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ORGANIC GEOCHEMICAL ANALYSES,
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
Sec. 28 & 29, T30S, R15W, HIDALGO COUNTY,
NEW MEXICO

By G.S. Bayliss and R.R. Schwarzer

October 1987

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES
FOR

OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS
SEC.28&29, T30S, R15W, HIDALGO CO., NEW MEXICO

GEOCHEM JOB NO. 3576

Prepared

for

PROGRAM PARTICIPANTS

by

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CONFIDENTIAL
OCTOBER 1987
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NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES

WELL NAME: OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
AREA: SOUTHWEST
LOCATION: HIDALGO COUNTY, NEW MEXICO SEC.28&29, T30S, R15W
GEOCHEM JOB NO.: 3576
TOTAL DEPTH:
INTERVAL SAMPLED:
TOTAL NUMBER OF SAMPLES: 63

GEOCHEM SAMPLE NUMBER	SAMPLE DEPTH	STRATIGRAPHIC INTERVAL	ANALYSES				
			TOC	LITHO	ROCK-EVAL	KEROGEN	OTHER
3576-001	MES-47-1	Horquilla Form.(Penn.)	X	X		X	
3576-002	-46-190	Paradise Form.(Miss.)	X	X		X	
3576-003	-46-95	Paradise Form.(Miss.)	X	X		X	
3576-004	-46-92	Paradise Form.(Miss.)	X	X		X	
3576-005	-46-67	Paradise Form.(Miss.)	X	X		X	
3576-006	-46-0	Paradise Form.(Miss.)	X	X		X	
3576-007	-45-0	Paradise Form.(Miss.)	X	X		X	
3576-008	-44-131	Paradise Form.(Miss.)	X	X		X	
3576-009	-44-72	Paradise Form.(Miss.)	X	X		X	
3576-010	-44-15	Paradise Form.(Miss.)	X	X		X	
3576-011	-44-2	Paradise Form.(Miss.)	X	X		X	
3576-012	-43-370	Escabrosa Group (Miss.)	X	X		X	
3576-013	-43-298	Escabrosa Group (Miss.)	X	X		X	
3576-014	-43-258	Escabrosa Group (Miss.)	X	X		X	
3576-015	-43-218	Escabrosa Group (Miss.)	X	X		X	
3576-016	-43-126	Escabrosa Group (Miss.)	X	X		X	
3576-017	-43-1	Escabrosa Group (Miss.)	X	X		X	
3576-018	-42-317	Escabrosa Group (Miss.)	X	X		X	
3576-019	-42-289	Escabrosa Group (Miss.)	X	X		X	
3576-020	-42-251	Escabrosa Group (Miss.)	X	X		X	
3576-021	-42-187	Escabrosa Group (Miss.)	X	X		X	
3576-022	-42-70	Escabrosa Group (Miss.)	X	X		X	
3576-023	-42-13	Escabrosa Group (Miss.)	X	X		X	
3576-024	-41-0	Escabrosa Group (Miss.)	X	X		X	
3576-025	-40-34	Escabrosa Group (Miss.)	X	X		X	
3576-026	-40-2	Escabrosa Group (Miss.)	X	X		X	
3576-027	-39-137	Escabrosa Group (Miss.)	X	X		X	
3576-028	-39-71	Escabrosa Group (Miss.)	X	X		X	
3576-029	-38-1	Escabrosa Group (Miss.)	X	X		X	

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES

(continued)

WELL NAME: OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
 AREA: Mescal Canyon Section, Big Hatchet Mountains,
 LOCATION: Southwest
 GEOCHEM JOB NO.: HIDALGO COUNTY, NEW MEXICO SEC.28&29, T30S, R15W
 3576
 TOTAL DEPTH:
 INTERVAL SAMPLED:
 TOTAL NUMBER OF SAMPLES: 63

GEOCHEM SAMPLE NUMBER	SAMPLE DEPTH	STRATIGRAPHIC INTERVAL	ANALYSES				
			TOC	LITHO	ROCK-EVAL	KEROGEN	OTHER
3576-030	MES-37-35	Percha Form.(Devon.)	X	X		X	
3576-031	-37-1	Percha Form.(Devon.)	X	X		X	
3576-032	-34-8	Percha Form.(Devon.)	X	X		X	
3576-033	-34-4	Percha Form.(Devon.)	X	X		X	
3576-034	-33-206	Percha Form.(Devon.)	X	X		X	
3576-035	-31-5	Montoya Form.(Ordov.)	X	X		X	
3576-036	-30-19	Montoya Form.(Ordov.)	X	X		X	
3576-037	-29-79	Montoya Form.(Ordov.)	X	X		X	
3576-038	-29-4	Montoya Form.(Ordov.)	X	X		X	
3576-039	-28-4	Montoya Form.(Ordov.)	X	X		X	
3576-040	-27-14	Montoya Form.(Ordov.)	X	X		X	
3576-041	-25-166	El Paso Form.(Ordov.)	X	X		X	
3576-042	-25-97	El Paso Form.(Ordov.)	X	X		X	
3576-043	-25-29	El Paso Form.(Ordov.)	X	X		X	
3576-044	-24-74	El Paso Form.(Ordov.)	X	X		X	
3576-045	-24-71	El Paso Form.(Ordov.)	X	X		X	
3576-046	-24-4A	El Paso Form.(Ordov.)	X	X		X	
3576-047	-23-21	El Paso Form.(Ordov.)	X	X		X	
3576-048	-23-8	El Paso Form.(Ordov.)	X	X		X	
3576-049	-22-2	El Paso Form.(Ordov.)	X	X		X	
3576-050	-21-50	El Paso Form.(Ordov.)	X	X		X	
3576-051	-21-7	El Paso Form.(Ordov.)	X	X		X	
3576-052	-20-1	El Paso Form.(Ordov.)	X	X		X	
3576-053	-19-1	El Paso Form.(Ordov.)	X	X		X	
3576-054	-17-7	El Paso Form.(Ordov.)	X	X		X	
3576-055	-17-1	El Paso Form.(Ordov.)	X	X		X	
3576-056	-16-0	El Paso Form.(Ordov.)	X	X		X	
3576-057	-12-2	El Paso Form.(Ordov.)	X	X		X	
3576-058	-11-13	El Paso Form.(Ordov.)	X	X		X	

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES
(continued)

WELL NAME: OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
AREA: SOUTHWEST
LOCATION: HIDALGO COUNTY, NEW MEXICO SEC.28&29, T30S, R15W
GEOCHEM JOB NO.: 3576
TOTAL DEPTH:
INTERVAL SAMPLED:
TOTAL NUMBER OF SAMPLES: 63

GEOCHEM SAMPLE NUMBER	SAMPLE DEPTH	STRATIGRAPHIC INTERVAL	ANALYSES				
			TOC	LITHOS	ROCK-EVAL	KEROGEN	OTHER
3576-059	MES-10-12	El Paso Form.(Ordov.)	X	X		X	
3576-060	-9-59	El Paso Form.(Ordov.)	X	X		X	
3576-061	-9-1	El Paso Form.(Ordov.)	X	X		X	
3576-062	-7-1	Bliss Form.(Cam.-Ordov.)	X	X		X	
3576-063	-6-1	Bliss Form.(Cam.-Ordov.)					

TABLE 1

RESULTS OF TOTAL ORGANIC CARBON

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
 OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
 MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
 SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	CLIENT IDENTIFICATION NUMBER	TOTAL ORGANIC CARBON (% of Rock)
3576-001	MES-47-1	0.13
3576-002	46-190	0.06
3576-003	46-95	0.10
3576-004	46-92	0.28/0.30
3576-005	46-67	0.17
3576-006	46-0	0.02
3576-007	45-0	0.10
3576-008	44-131	0.09
3576-009	44-72	0.09
3576-010	44-15	0.15
3576-011	44-2	0.05
3576-012	43-370	0.30/0.31
3576-013	43-298	0.29
3576-014	43-258	0.09
3576-015	43-218	0.17
3576-016	43-126	0.09
3576-017	43-1	0.15
3576-018	42-317	0.22
3576-019	42-289	0.15
3576-020	42-251	0.08/0.06
3576-021	42-187	0.09
3576-022	42-70	0.08
3576-023	42-13	0.07
3576-024	41-0	0.09
3576-025	40-34	0.11
3576-026	40-2	0.08
3576-027	39-137	0.03
3576-028	39-71	0.09/0.08
3576-029	38-1	0.09
3576-030	37-35	0.09
3576-031	37-1	0.06
3576-032	34-8	0.13
3576-033	34-4	0.13
3576-034	33-206	0.10
3576-035	31-5	0.07
3576-036	30-19	0.04/0.03
3576-037	29-79	0.07
3576-038	29-4	0.07
3576-039	28-4	0.15
3576-040	27-14	0.15

TABLE I (continued)

RESULTS OF TOTAL ORGANIC CARBON

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
 OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
 MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
 SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	CLIENT IDENTIFICATION NUMBER	TOTAL ORGANIC CARBON (% of Rock)
3576-041	MES-25-166	0.03
3576-042	25-97	0.08
3576-043	25-29	0.02
3576-044	24-74	0.04/0.03
3576-045	24-71	0.04
3576-046	24-4A	0.09
3576-047	23-21	0.07
3576-048	23-8	0.09
3576-049	22-2	0.15
3576-050	21-50	0.07
3576-051	21-7	0.07
3576-052	20-1	0.08/0.07
3576-053	19-1	0.11
3576-054	17-7	0.11
3576-055	17-1	0.14
3576-056	16-0	0.29
3576-057	12-2	0.21
3576-058	11-13	0.30
3576-059	10-12	0.14
3576-060	9-59	0.07/0.08
3576-061	9-1	0.10
3576-062	7-1	0.06
3576-063	6-1	0.14

TABLE II

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-001 -A	HORQUILLA FORMATION	100% Limestone, very fine crystalline, medium dark gray.	N4	0.13
3576-002 -A	PARADISE FORMATION	100% Limestone, medium crystalline, medium dark gray to brownish gray.	N4 to 2YR-4/1	0.06
3576-003 -A	PARADISE FORMATION	100% Limestone, fine crystalline, dark gray.	N3	0.10
3576-004 -A	PARADISE FORMATION	100% Limestone, very fine crystalline, medium dark gray.	N4	0.28/0.30
3576-005 -A	PARADISE FORMATION	100% Limestone, medium crystalline, medium dark gray to brownish gray.	N4 to 2YR-4/1	0.17
3576-006 -A	PARADISE FORMATION	100% Limestone, fine crystalline, brownish gray.	2YR-4/1	0.02
3576-007 -A	PARADISE FORMATION	100% Limestone, fine crystalline, fossiliferous, brownish gray.	2YR-4/1	0.10
3576-008 -A	PARADISE FORMATION	100% Limestone, medium to fine crystalline, medium dark gray to brownish gray.	N4 to 2YR-4/1	0.09

TABLE II (continued)

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-009 -A	PARADISE FORMATION	100% Limestone, medium crystalline, brownish gray.	2YR-4/1	0.09
3576-010 -A	PARADISE FORMATION	100% Limestone, medium crystalline, brownish gray.	2YR-4/1	0.15
3576-011 -A	PARADISE FORMATION	100% Limestone, fine crystalline, fossiliferous, brownish gray.	2YR-4/1	0.05
3576-012 -A	ESCABROSA GROUP	100% Limestone, medium to fine crystalline, medium dark gray to brownish gray.	N4 to 2YR-4/1	0.31/0.31
3576-013 -A	ESCABROSA GROUP	100% Limestone, medium to fine crystalline, medium dark gray to brownish gray.	N4 to 2YR-4/1	0.29
3576-014 -A	ESCABROSA GROUP	100% Limestone, medium to fine crystalline, medium dark gray to brownish gray.	N4 to 2YR-4/1	0.09
3576-015 -A	ESCABROSA GROUP	100% Limestone, medium to coarse crystalline, fossiliferous, medium dark gray.	N4	0.17
3576-016 -A	ESCABROSA GROUP	100% Limestone, fine crystalline, brownish gray.	2YR-4/1	0.09

TABLE II (continued)

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-017 -A	ESCABROSA GROUP	100% Limestone, medium to fine crystalline, medium dark gray to brownish gray.	N4 to 2YR-4/1	0.15
3576-018 -A	ESCABROSA GROUP	100% Limestone, fine crystalline, medium dark gray.	N4	0.22
3576-019 -A	ESCABROSA GROUP	100% Limestone, medium crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.15
3576-020 -A	ESCABROSA GROUP	100% Limestone, fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.08/0.06
3576-021 -A	ESCABROSA GROUP	100% Limestone, fine crystalline, medium dark gray.	N4	0.09
3576-022 -A	ESCABROSA GROUP	100% Limestone, fine crystalline, medium dark gray.	N4	0.08
3576-023 -A	ESCABROSA GROUP	100% Limestone, fine crystalline, medium dark gray.	N4	0.07
3576-024 -A	ESCABROSA GROUP	100% Limestone, fine crystalline, fossiliferous, medium dark gray.	N4	0.09

TABLE II (continued)

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
 OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
 MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
 SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-025 -A	ESCOBROSA GROUP	100% Limestone, fine crystalline, fossiliferous, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.11
3576-026 -A	ESCOBROSA GROUP	100% Limestone, fine crystalline, fossiliferous, medium dark gray.	N4 to 5YR-4/1	0.08
3576-027 -A	ESCOBROSA GROUP	100% Limestone, coarse crystalline, medium light gray to light brownish gray.	N6 to 5YR-6/1	0.03
3576-028 -A	ESCOBROSA GROUP	100% Limestone, medium to coarse crystalline, light gray.	N7	0.09/0.08
3576-029 -A	ESCOBROSA GROUP	100% Limestone, coarse crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.09
3576-030 -A	PERCHA FORMATION	100% Limestone, fine crystalline, brownish gray.	5YR-4/1	0.09
3576-031 -A	PERCHA FORMATION	100% Limestone, coarse crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.06
3576-032 -A	PERCHA FORMATION	100% Lime Mudstone, medium olive gray.	5Y-5/1	0.13

TABLE II (continued)

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-033 -A	PERCHA FORMATION	100% Lime Mudstone, pale yellowish brown.	10YR-6/2	0.13
3576-034 -A	PERCHA FORMATION	100% Lime Mudstone, pale yellowish brown.	10YR-6/2	0.10
3576-035 -A	MONTOYA FORMATION	100% Dolostone, fine crystalline, dark brownish gray.	5YR-3/1	0.07
3576-036 -A	MONTOYA FORMATION	100% Dolostone, fine crystalline, brownish gray.	5YR-4/1	0.04/0.03
3576-037 -A	MONTOYA FORMATION	100% Dolostone, fine crystalline, brownish gray.	5YR-4/1	0.07
3576-038 -A	MONTOYA FORMATION	100% Dolostone, fine crystalline, dark brownish gray.	5YR-3/1	0.07
3576-039 -A	MONTOYA FORMATION	100% Dolostone, fine crystalline, dark brownish gray.	5YR-3/1	0.15
3576-040 -A	MONTOYA FORMATION	100% Dolostone, very fine crystalline, light brownish gray.	5YR-6/1	0.15
3576-041 -A	EL PASO FORMATION	100% Dolostone, fine crystalline, brownish gray.	5YR-4/1	0.03

TABLE II (continued)

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-042 -A	EL PASO FORMATION	100% Dolostone, fine crystalline, brownish gray.	5YR-4/1	0.08
3576-043 -A	EL PASO FORMATION	100% Dolostone, fine crystalline, light brownish gray.	5YR-6/1	0.02
3576-044 -A	EL PASO FORMATION	100% Limestone, coarse crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.04/0.03
3576-045 -A	EL PASO FORMATION	100% Limestone, very fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.04
3576-046 -A	EL PASO FORMATION	100% Limestone, very fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.09
3576-047 -A	EL PASO FORMATION	100% Limestone, very fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.07
3576-048 -A	EL PASO FORMATION	100% Limestone, very fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.09
3576-049 -A	EL PASO FORMATION	100% Limestone, very fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.15

TABLE II (continued)

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-050 -A	EL PASO FORMATION	100% Limestone, very fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.07
3576-051 -A	EL PASO FORMATION	100% Limestone, fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.07
3576-052 -A	EL PASO FORMATION	100% Limestone, fine crystalline, dark gray.	N3	0.08/0.07
3576-053 -A	EL PASO FORMATION	100% Limestone, fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.11
3576-054 -A	EL PASO FORMATION	100% Limestone, fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.11
3576-055 -A	EL PASO FORMATION	100% Limestone, fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.14
3576-056 -A	EL PASO FORMATION	100% Limestone, fine crystalline, medium dark gray to brownish gray.	N4 to 5YR-4/1	0.29
3576-057 -A	EL PASO FORMATION	100% Dolostone, medium crystalline, medium gray.	N5	0.21

TABLE II (continued)

LITHOLOGICAL DESCRIPTIONS AND ORGANIC CARBON ANALYSES

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	LITHO DESCRIPTION	GSA NO.	ORGANIC CARBON (wt.%)
3576-058 -A	EL PASO FORMATION	100% Dolostone, fine crystalline, dark gray.	N3	0.30
3576-059 -A	EL PASO FORMATION	100% Dolostone, fine crystalline, pale brown.	5YR-5/2	0.14
3576-060 -A	EL PASO FORMATION	100% Dolostone, fine crystalline, dark gray.	N3	0.07/0.08
3576-061 -A	EL PASO FORMATION	100% Dolostone, medium crystalline, medium gray.	N5	0.10
3576-062 -A	BLISS FORMATION	100% Dolostone, medium crystalline, medium gray.	N5	0.06
3576-063 -A	BLISS FORMATION	100% Dolostone, medium crystalline, medium gray.	N5	0.14

TABLE III

SUMMARY OF ORGANIC CARBON AND VISUAL KEROGEN DATA

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES
 OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS
 MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
 SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	TOTAL ORGANIC CARBON	ORGANIC MATTER TYPE	VISUAL ABUNDANCE NORMALIZED PERCENT					ALTERATION STAGE	THERMAL ALTERATION INDEX
				Al	Am	H	W	I		
3576-001	MES-47-1	0.13	Am**~H*; I;W	0	36	36	9	19	3	3.4
3576-002	46-190	0.06	Am**;H*;-	0	67	33	0	0	3	3.4
3576-003	46-95	0.10	H*;Am**;-	0	29	71	0	0	3	3.4
3576-004	46-92	0.28/0.30	H-I;W;Am**	0	9	33	25	33	3 to 3+	3.6
3576-005	46-67	0.17	Am**~H*;-;W-I	0	40	40	10	10	3	3.4
3576-006	46-0	0.02	H*;Am**;-	0	44	56	0	0	3	3.4
3576-007	45-0	0.10	Am**~H*;-;I	0	44	44	0	12	3	3.4
3576-008	44-131	0.09	H;Am**;I	0	22	67	0	11	3	3.4
3576-009	44-72	0.09	H*;Am**;-	0	37	63	0	0	3	3.4
3576-010	44-15	0.15	H;Am**;W-I	0	33	45	11	11	3- to 3	3.3
3576-011	44-2	0.05	Am**;H*;-	0	57	43	0	0	3- to 3	3.2
3576-012	43-370	0.30/0.31	Am**;H*;-	0	57	43	0	0	3- to 3	3.2
3576-013	43-298	0.29	H*;Am**;-	0	37	63	0	0	3 to 3+	3.5
3576-014	43-258	0.09	Am**~H*;-;-	0	50	50	0	0	3 to 3+	3.5
3576-015	43-218	0.17	H*;Am**;-	0	29	71	0	0	3 to 3+	3.5
3576-016	43-126	0.09	H*;Am**;-	0	37	63	0	0	3	3.4
3576-017	43-1	0.15	Am**~H*;-;-	0	50	50	0	0	3- to 3	3.2
3576-018	42-317	0.22	Am**~H*;-;-	0	50	50	0	0	3	3.4
3576-019	42-289	0.15	H*;Am**;W	0	25	63	12	0	3- to 3	3.2
3576-020	42-251	0.08/0.06	H*;Am**;-	0	37	63	0	0	3	3.4
3576-021	42-187	0.09	Am**~H*;-;-	0	50	50	0	0	3- to 3	3.2
3576-022	42-70	0.08	Am**~H*;-;I	0	44	44	0	12	3- to 3	3.2

LEGEND:

KEROGEN KEY

Predominant; Secondary; Trace
 60-100% 20-40% 0-20%

Al = Algal
 Am = Amorphous-Sapropel
 Am** = Relic Amorphous-Sapropel
 H = Herbaceous-Spore/Pollen
 H* = Degraded Herbaceous
 W = Woody-Structured
 U = Unidentified Material
 I = Inertinite
 C = Coaly

TABLE III (continued)

SUMMARY OF ORGANIC CARBON AND VISUAL KEROGEN DATA

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES
 OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS
 MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
 SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	TOTAL ORGANIC CARBON	ORGANIC MATTER TYPE	VISUAL ABUNDANCE NORMALIZED PERCENT					ALTERATION STAGE	THERMAL ALTERATION INDEX
				Al	Am	H	W	I		
3576-023	MES-42-13	0.07	Am**; H*; -	0	57	43	0	0	3- to 3	3.3
3576-024	41-0	0.09	Am**; H*; -; -	0	50	50	0	0	3- to 3	3.2
3576-025	40-34	0.11	Am**; H*; -	0	57	43	0	0	3- to 3	3.2
3576-026	40-2	0.08	H*; Am**; -	0	37	63	0	0	3	3.4
3576-027	39-137	0.03	H*; Am**; -	0	33	67	0	0	3 to 3+	3.5
3576-028	39-71	0.09/0.08	Am**; H*; -	0	67	33	0	0	3 to 3+	3.5
3576-029	38-1	0.09	H*; Am**; -	0	29	71	0	0	3	3.4
3576-030	37-35	0.09	Am**; H*; -	0	67	33	0	0	3 to 3+	3.5
3576-031	37-1	0.06	H*; Am**; -	0	43	57	0	0	3 to 3+	3.5
3576-032	34-8	0.13	Am**; H-I; -	0	50	25	0	25	3 to 3+	3.6
3576-033	34-4	0.13	Am**; -; H-I	0	66	17	0	17	3 to 3+	3.6
3576-034	33-206	0.10	Am**; H*; -	0	57	43	0	0	3	3.4
3576-035	31-5	0.07	Am**; H*; -; -	0	50	50	0	0	3	3.4
3576-036	30-19	0.04/0.03	H*; Am**; -	0	37	63	0	0	3 to 3+	3.5
3576-037	29-79	0.07	H*; Am**; -	0	37	63	0	0	3 to 3+	3.5
3576-038	29-4	0.07	H*; Am**; -	0	37	63	0	0	3	3.4
3576-039	28-4	0.15	H*; Am**; -	0	29	71	0	0	3- to 3	3.3
3576-040	27-14	0.15	Am**; H*; -; -	0	50	50	0	0	3 to 3+	3.5
3576-041	25-166	0.03	Am**; H*; W-I	0	50	24	13	13	3 to 3+	3.6
3576-042	25-97	0.08	Am**; H*; -	0	57	43	0	0	3	3.4
3576-043	25-29	0.02	Am**; H*; -	0	57	43	0	0	3- to 3	3.2
3576-044	24-74	0.04/0.03	Am**; H*; -; -	0	50	50	0	0	3	3.4

LEGEND:

KEROGEN KEY

Predominant;	Secondary;	Trace
60-100%	20-40%	0-20%

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TABLE III (continued)

SUMMARY OF ORGANIC CARBON AND VISUAL KEROGEN DATA

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES
 OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS
 MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
 SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	DEPTH INTERVAL (feet)	TOTAL ORGANIC CARBON	ORGANIC MATTER TYPE	VISUAL ABUNDANCE NORMALIZED PERCENT					ALTERATION STAGE	THERMAL ALTERATION INDEX
				Al	Am	H	W	I		
3576-045	MES-24-71	0.04	Am**~H*;-;-	0	50	50	0	0	3	3.4
3576-046	24-4A	0.09	Am**~H*;-;-	0	50	50	0	0	3	3.4
3576-047	23-21	0.07	Am**~H*;-;-	0	50	50	0	0	3	3.4
3576-048	23-8	0.09	H*~Am**;-	0	37	63	0	0	3- to 3	3.2
3576-049	22-2	0.15	H*~Am**;-	0	37	63	0	0	3	3.4
3576-050	21-50	0.07	Am**~H*;-	0	67	33	0	0	3 to 3+	3.5
3576-051	21-7	0.07	H*~Am**;-	0	43	57	0	0	3	3.4
3576-052	20-1	0.08/0.07	H*~Am**;-	0	37	63	0	0	3	3.4
3576-053	19-1	0.11	H*~Am**;-	0	37	63	0	0	3	3.4
3576-054	17-7	0.11	Am**~H*;-	0	57	43	0	0	3- to 3	3.2
3576-055	17-1	0.14	H*~Am**;-	0	37	63	0	0	3 to 3+	3.5
3576-056	16-0	0.29	Am**~H*;-	0	57	43	0	0	3- to 3	3.2
3576-057	12-2	0.21	Am**~H*;-	0	67	33	0	0	3 to 3+	3.5
3576-058	11-13	0.30	Am**~H*;-; I	0	44	44	0	12	3 to 3+	3.5
3576-059	10-12	0.14	Am**~H*~I	0	57	29	0	14	3	3.4
3576-060	9-59	0.07/0.08	H*~Am**;-	0	44	56	0	0	3 to 3+	3.6
3576-061	9-1	0.10	H*~Am**;-	0	37	63	0	0	3 to 3+	3.6
3576-062	7-1	0.06	H*~Am**;-	0	37	63	0	0	3 to 3+	3.5
3576-063	6-1	0.14	H*~Am**;-	0	37	63	0	0	3 to 3+	3.6

LEGEND:

KEROGEN KEY

Predominant; Secondary; Trace
 60-100% 20-40% 0-20%

Al = Algal
 Am = Amorphous-Sapropel
 Am** = Relic Amorphous-Sapropel
 H = Herbaceous-Spore/Pollen
 H* = Degraded Herbaceous
 W = Woody-Structured
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RESULTS OF ROCK-EVAL PYROLYSIS ANALYSIS

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR
OUTCROP SAMPLES, CAMBRIAN-MISSISSIPPIAN ROCKS,
MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS,
SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO

GEOCHEM SAMPLE NUMBER	CLIENT IDENTIFICATION NUMBER	TMAX (c)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	PI	PC*	T.O.C. (wt.%)	HYDROGEN INDEX	OXYGEN INDEX
3576-002	MES-46-190	436	0.04	0.01	0.43	1.00	0.00	0.06	16	716
3576-005	46-67	377	0.05	0.03	0.75	0.62	0.00	0.17	17	441
3576-010	44-15	251	0.06	0.02	0.60	0.75	0.00	0.15	13	400
3576-012	43-370	223	0.02	0.01	0.51	1.00	0.00	0.31	3	164
3576-013	43-298	239	0.04	0.03	0.63	0.67	0.00	0.29	10	217
3576-015	43-218	216	0.03	0.00	0.48	1.00	0.00	0.17	0	282
3576-017	43-1	216	0.04	0.00	0.55	1.00	0.00	0.15	0	366
3576-018	42-317	234	0.04	0.00	0.46	1.00	0.00	0.22	0	209
3576-019	42-289	289	0.05	0.02	0.69	0.83	0.00	0.15	13	460
3576-025	40-34	268	0.06	0.04	0.50	0.60	0.00	0.11	36	454
3576-032	34-8	229	0.03	0.00	0.80	1.00	0.00	0.13	0	615
3576-033	34-4	275	0.04	0.05	0.83	0.50	0.00	0.13	38	638
3576-039	28-4	275	0.04	0.02	0.63	0.67	0.00	0.15	13	420
3576-040	27-14	249	0.03	0.02	0.53	0.75	0.00	0.15	13	353
3576-049	22-2	232	0.03	0.02	0.61	0.75	0.00	0.15	13	406
3576-052	20-1	197	0.04	0.00	0.45	1.00	0.00	0.08	0	562
3576-054	17-7	192	0.04	0.00	0.53	1.00	0.00	0.11	0	481
3576-055	17-1	201	0.04	0.01	0.55	1.00	0.00	0.14	7	392
3576-056	16-0	233	0.04	0.03	0.53	0.67	0.00	0.29	10	182
3576-058	11-13	301	0.03	0.08	0.65	0.30	0.00	0.30	26	216
3576-063	6-1	275	0.02	0.03	0.63	0.50	0.00	0.14	21	450

T.O.C. = Total organic carbon, wt. %
S1 = Free hydrocarbons, mg HC/g of rock
S2 = Residual hydrocarbon potential
(mg HC/g of rock)

S3 = CO2 produced from kerogen pyrolysis
(mg CO2/g of rock)
PC* = 0.083 (S1 + S2)
Hydrogen
Index = mg HC/g organic carbon

Oxygen
Index = mg CO2/g organic carbon
PI = S1/S1 + S2
TMAX = Temperature Index, degrees C.

TABLE V
VISUAL KEROGEN ASSESSMENT WORKSHEET

[illegible]

TABLE V

VISUAL KEROGEN ASSESSMENT WORKSHEET

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR:				INDIGENOUS POPULATION (INTERPRETED)				GENERAL CHARACTERISTICS						CAVED AND/OR REWORKED POPULATION(S)				SUMMARY ORGANIC MATTER TYPE
				TYPE OF ORGANIC MATTER		MATURATION INDEX		COLOR OF ORGANIC MATTER		STATE OF ORGANIC MATTER		%	TYPE OF ORGANIC MATTER		MATURATION INDEX			
GEOCHEM No.	DEPTH																	REMARKS
3576-021	MES-42-187																	
3576-022	42-70																	
3576-023	42-13																	
3576-024	41-0																	
3576-025	40-34																	
3576-026	40-2																	
3576-027	39-137																	
3576-028	39-71																	
3576-029	38-1																	
3576-030	37-35																	
3576-031	37-1																	
3576-032	34-8																	
3576-033	34-4																	
3576-034	33-206																	
3576-035	31-5																	
3576-036	30-19																	
3576-037	29-79																	
3576-038	29-4																	
3576-039	28-4																	
3576-040	27-14																	

VISUAL KEROGEN ASSESSMENT WORKSHEET

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR: OUTCROP SAMPLES, CAMB.-MISS. ROCKS MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS, SEC.28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO			INDIGENOUS POPULATION (INTERPRETED)			GENERAL CHARACTERISTICS			CAVED AND/OR REWORKED POPULATION(S)			SUMMARY ORGANIC MATTER TYPE	
		TYPE OF ORGANIC MATTER	MATURATION INDEX			COLOR OF ORGANIC MATTER	STATE OF ORGANIC MATTER	%	TYPE OF ORGANIC MATTER	MATURATION INDEX			
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
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		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	
		ALIPHATIC	AROMATIC	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	CONDENSED	COND			

TABLE V
VISUAL KEROGEN ASSESSMENT WORKSHEET

NEW MEXICO ORGANIC GEOCHEMICAL ANALYSES FOR: OUTCROP SAMPLES, CAMB.-MISS. ROCKS MESCAL CANYON SECTION, BIG HATCHET MOUNTAINS, SEC. 28&29, T30S, R15W, HIDALGO COUNTY, NEW MEXICO		INDIGENOUS POPULATION (INTERPRETED)		GENERAL CHARACTERISTICS			CAVED AND/OR REWORKED POPULATION(S)		SUMMARY ORGANIC MATTER TYPE
GEOCHEM No.	DEPTH	TYPE OF ORGANIC MATTER	MATURATION INDEX	COLOR OF ORGANIC MATTER	STATE OF ORGANIC MATTER	%	TYPE OF ORGANIC MATTER	MATURATION INDEX	
3576-061	MES-9-1	1. 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 5.0 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 6.0 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7.0 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 8.0 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9.0 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 10.0 10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 11.0 11.1 11.2 11.3 11.4 11.5 11.6 11.7 11.8 11.9 12.0 12.1 12.2 12.3 12.4 12.5 12.6 12.7 12.8 12.9 13.0 13.1 13.2 13.3 13.4 13.5 13.6 13.7 13.8 13.9 14.0 14.1 14.2 14.3 14.4 14.5 14.6 14.7 14.8 14.9 15.0 15.1 15.2 15.3 15.4 15.5 15.6 15.7 15.8 15.9 16.0 16.1 16.2 16.3 16.4 16.5 16.6 16.7 16.8 16.9 17.0 17.1 17.2 17.3 17.4 17.5 17.6 17.7 17.8 17.9 18.0 18.1 18.2 18.3 18.4 18.5 18.6 18.7 18.8 18.9 19.0 19.1 19.2 19.3 19.4 19.5 19.6 19.7 19.8 19.9 20.0 20.1 20.2 20.3 20.4 20.5 20.6 20.7 20.8 20.9 21.0 21.1 21.2 21.3 21.4 21.5 21.6 21.7 21.8 21.9 22.0 22.1 22.2 22.3 22.4 22.5 22.6 22.7 22.8 22.9 23.0 23.1 23.2 23.3 23.4 23.5 23.6 23.7 23.8 23.9 24.0 24.1 24.2 24.3 24.4 24.5 24.6 24.7 24.8 24.9 25.0 25.1 25.2 25.3 25.4 25.5 25.6 25.7 25.8 25.9 26.0 26.1 26.2 26.3 26.4 26.5 26.6 26.7 26.8 26.9 27.0 27.1 27.2 27.3 27.4 27.5 27.6 27.7 27.8 27.9 28.0 28.1 28.2 28.3 28.4 28.5 28.6 28.7 28.8 28.9 29.0 29.1 29.2 29.3 29.4 29.5 29.6 29.7 29.8 29.9 30.0 30.1 30.2 30.3 30.4 30.5 30.6 30.7 30.8 30.9 31.0 31.1 31.2 31.3 31.4 31.5 31.6 31.7 31.8 31.9 32.0 32.1 32.2 32.3 32.4 32.5 32.6 32.7 32.8 32.9 33.0 33.1 33.2 33.3 33.4 33.5 33.6 33.7 33.8 33.9 34.0 34.1 34.2 34.3 34.4 34.5 34.6 34.7 34.8 34.9 35.0 35.1 35.2 35.3 35.4 35.5 35.6 35.7 35.8 35.9 36.0 36.1 36.2 36.3 36.4 36.5 36.6 36.7 36.8 36.9 37.0 37.1 37.2 37.3 37.4 37.5 37.6 37.7 37.8 37.9 38.0 38.1 38.2 38.3 38.4 38.5 38.6 38.7 38.8 38.9 39.0 39.1 39.2 39.3 39.4 39.5 39.6 39.7 39.8 39.9 40.0 40.1 40.2 40.3 40.4 40.5 40.6 40.7 40.8 40.9 41.0 41.1 41.2 41.3 41.4 41.5 41.6 41.7 41.8 41.9 42.0 42.1 42.2 42.3 42.4 42.5 42.6 42.7 42.8 42.9 43.0 43.1 43.2 43.3 43.4 43.5 43.6 43.7 43.8 43.9 44.0 44.1 44.2 44.3 44.4 44.5 44.6 44.7 44.8 44.9 45.0 45.1 45.2 45.3 45.4 45.5 45.6 45.7 45.8 45.9 46.0 46.1 46.2 46.3 46.4 46.5 46.6 46.7 46.8 46.9 47.0 47.1 47.2 47.3 47.4 47.5 47.6 47.7 47.8 47.9 48.0 48.1 48.2 48.3 48.4 48.5 48.6 48.7 48.8 48.9 49.0 49.1 49.2 49.3 49.4 49.5 49.6 49.7 49.8 49.9 50.0 50.1 50.2 50.3 50.4 50.5 50.6 50.7 50.8 50.9 51.0 51.1 51.2 51.3 51.4 51.5 51.6 51.7 51.8 51.9 52.0 52.1 52.2 52.3 52.4 52.5 52.6 52.7 52.8 52.9 53.0 53.1 53.2 53.3 53.4 53.5 53.6 53.7 53.8 53.9 54.0 54.1 54.2 54.3 54.4 54.5 54.6 54.7 54.8 54.9 55.0 55.1 55.2 55.3 55.4 55.5 55.6 55.7 55.8 55.9 56.0 56.1 56.2 56.3 56.4 56.5 56.6 56.7 56.8 56.9 57.0 57.1 57.2 57.3 57.4 57.5 57.6 57.7 57.8 57.9 58.0 58.1 58.2 58.3 58.4 58.5 58.6 58.7 58.8 58.9 59.0 59.1 59.2 59.3 59.4 59.5 59.6 59.7 59.8 59.9 60.0 60.1 60.2 60.3 60.4 60.5 60.6 60.7 60.8 60.9 61.0 61.1 61.2 61.3 61.4 61.5 61.6 61.7 61.8 61.9 62.0 62.1 62.2 62.3 62.4 62.5 62.6 62.7 62.8 62.9 63.0 63.1 63.2 63.3 63.4 63.5 63.6 63.7 63.8 63.9 64.0 64.1 64.2 64.3 64.4 64.5 64.6 64.7 64.8 64.9 65.0 65.1 65.2 65.3 65.4 65.5 65.6 65.7 65.8 65.9 66.0 66.1 66.2 66.3 66.4 66.5 66.6 66.7 66.8 66.9 67.0 67.1 67.2 67.3 67.4 67.5 67.6 67.7 67.8 67.9 68.0 68.1 68.2 68.3 68.4 68.5 68.6 68.7 68.8 68.9 69.0 69.1 69.2 69.3 69.4 69.5 69.6 69.7 69.8 69.9 70.0 70.1 70.2 70.3 70.4 70.5 70.6 70.7 70.8 70.9 71.0 71.1 71.2 71.3 71.4 71.5 71.6 71.7 71.8 71.9 72.0 72.1 72.2 72.3 72.4 72.5 72.6 72.7 72.8 72.9 73.0 73.1 73.2 73.3 73.4 73.5 73.6 73.7 73.8 73.9 74.0 74.1 74.2 74.3 74.4 74.5 74.6 74.7 74.8 74.9 75.0 75.1 75.2 75.3 75.4 75.5 75.6 75.7 75.8 75.9 76.0 76.1 76.2 76.3 76.4 76.5 76.6 76.7 76.8 76.9 77.0 77.1 77.2 77.3 77.4 77.5 77.6 77.7 77.8 77.9 78.0 78.1 78.2 78.3 78.4 78.5 78.6 78.7 78.8 78.9 79.0 79.1 79.2 79.3 79.4 79.5 79.6 79.7 79.8 79.9 80.0 80.1 80.2 80.3 80.4 80.5 80.6 80.7 80.8 80.9 81.0 81.1 81.2 81.3 81.4 81.5 81.6 81.7 81.8 81.9 82.0 82.1 82.2 82.3 82.4 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118.7 118.8 118.9 119.0 119.1 119.2 119.3 119.4 119.5 119.6 119.7 119.8 119.9 120.0 120.1 120.2 120.3 120.4 120.5 120.6 120.7 120.8 120.9 121.0 121.1 121.2 121.3 121.4 121.5 121.6 121.7 121.8 121.9 122.0 122.1 122.2 122.3 122.4 122.5 122.6 122.7 122.8 122.9 123.0 123.1 123.2 123.3 123.4 123.5 123.6 123.7 123.8 123.9 124.0 124.1 124.2 124.3 124.4 124.5 124.6 124.7 124.8 124.9 125.0 125.1 125.2 125.3 125.4 125.5 125.6 125.7 125.8 125.9 126.0 126.1 126.2 126.3 126.4 126.5 126.6 126.7 126.8 126.9 127.0 127.1 127.2 127.3 127.4 127.5 127.6 127.7 127.8 127.9 128.0 128.1 128.2 128.3 128.4 128.5 128.6 128.7 128.8 128.9 129.0 129.1 129.2 129.3 129.4 129.5 129.6 129.7 129.8 129.9 130.0 130.1 130.2 130.3 130.4 130.5 130.6 130.7 130.8 130.9 131.0 131.1 131.2 131.3 131.4 131.5 131.6 131.7 131.8 131.9 132.0 132.1 132.2 132.3 132.4 132.5 132.6 132.7 132.8 132.9 133.0 133.1 133.2 133.3 133.4 133.5 133.6 133.7 133.8 133.9 134.0 134.1 134.2 134.3 134.4 134.5 134.6 134.7 134.8 134.9 135.0 135.1 135.2 135.3 135.4 135.5 135.6 135.7 135.8 135.9 136.0 136.1 136.2 136.3 136.4 136.5 136.6 136.7 136.8 136.9 137.0 137.1 137.2 137.3 137.4 137.5 137.6 137.7 137.8 137.9 138.0 138.1 138.2 138.3 138.4 138.5 138.6 138.7 138.8 138.9 139.0 139.1 139.2 139.3 139.4 139.5 139.6 139.7 139.8 139.9 140.0 140.1 140.2 140.3 140.4 140.5 140.6 140.7 140.8 140.9 141.0 141.1 141.2 141.3 141.4 141.5 141.6 141.7 141.8 141.9 142.0 142.1 142.2 142.3 142.4 142.5 142.6 142.7 142.8 142.9 143.0 143.1 143.2 143.3 143.4 143.5 143.6 143.7 143.8 143.9 144.0 144.1 144.2 144.3 144.4 144.5 144.6 144.7 144.8 144.9 145.0 145.1 145.2 145.3 145.4 145.5 145.6 145.7 145.8 145.9 146.0 146.1 146.2 146.3 146.4 146.5 146.6 146.7 146.8 146.9 147.0 147.1 147.2 147.3 147.4 147.5 147.6 147.7 147.8 147.9 148.0 148.1 148.2 148.3 148.4 148.5 148.6 148.7 148.8 148.9 149.0 149.1 149.2 149.3 149.4 149.5 149.6 149.7 149.8 149.9 150.0 150.1 150.2 150.3 150.4 150.5 150.6 150.7 150.8 150.9 151.0 151.1 151.2 151.3 151.4 151.5 151.6 151.7 151.8 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APPENDIX A

Brief Description of Organic Geochemical analyses Carried Out by GeoChem

C₁-C₇ Hydrocarbon

The C₁-C₇ hydrocarbon content and composition of sediments reflects source type, source quality and thermal maturity.

The C₁-C₇ hydrocarbon content of well cuttings is determined by analyzing both a sample of the cuttings and the air space at the top of the can. The results of the two analyses are summed to give an inventory of the C₁-C₇ hydrocarbon content of the well cuttings prior to any losses from the cuttings during the lapsed time period between collection at the wellsite and laboratory analysis.

The air space C₁-C₇ hydrocarbon analysis involves taking a measured volume of the air space gas out of the can with a syringe and injecting same into a gas chromatograph. GeoChem uses a Varian Aerograph Model 1400 instrument equipped with a Porapak Q column. The gas sample is taken through the column by a carrier gas and before reaching the detector is separated into its various C₁ (methane), C₂ (ethane), C₃ (propane), iC₄ (isobutane), nC₄ (normal butane), and C₅, C₆, C₇ hydrocarbon components.

This particular analysis gives a complete separation of the C₁-C₄ gas-range hydrocarbons and a partial separation of the C₅-C₇ gasoline-range hydrocarbons. (A detailed C₄-C₇ analysis, to be discussed later, involving a capillary column, effects a complete separation of this molecular range into its several individual molecular species.)

The electrical response of the various hydrocarbons as they reach the detector is recorded on a paper strip chart as a peak. This response is simultaneously fed to an integrator which computes the area of each peak. The concentration of C₁-C₇ hydrocarbons in the air space, expressed as volumes of gas per million volumes of cuttings, is determined by a calculation involving the volume of cuttings, volume of air space in the can, volume of sample injected, volume of standard gas sample used in the calibration, calibration factor for C₁, C₂, C₃, etc. determined by gc analysis of a standard gas sample, and the gc peak response.

The C₁-C₇ hydrocarbon content of the cuttings is determined by degasification of a measured volume of cuttings (in a medium of a measured volume of water) in a closed blender, sampling of the air space at the top of the blender, and injection of a measured volume of gas into the gas chromatograph.

The C₁-C₇ hydrocarbon data from the air space and cuttings gas analyses are summed to give a "restored" C₁-C₇ hydrocarbon content of the cuttings.

Sample Washing and Hand-Picking of Uncaved Lithology Samples

The cuttings samples are washed to remove all drilling mud from the cuttings. Care is taken in the washing procedure not to remove any soft clays, claystones, etc. and any loose fine sand and silt. The washed cuttings are usually kept under water cover until picked, to prevent loss of any gasoline-range hydrocarbons. Using the C₁-C₇ hydrocarbon data profile and the electrical well log supplied to us and our visual examination of the cuttings material under the binocular microscope, we carefully hand-pick and describe a suite of uncaved lithologies representative of the various stratigraphic zones penetrated by the well. The lithological data is used to compile a gross litho percentage log which is shown on all Figures. The 2-4 gram picked lithology samples are stored under water in small glass vials in those instances where we wish to run detailed C₄-C₇ hydrocarbon analyses. This sample set is used not only for the C₄-C₇ hydrocarbon analysis, but also for the visual kerogen and total organic carbon analyses. All remaining cuttings material is dried and packaged in labelled plastic bags for possible C₁₅₊ soxhlet extraction and/or eventual return to the client. Sample material from this study will be retained at GeoChem until advised of disposition.

Detailed C₄-C₇ Hydrocarbon

The C₄-C₇ gasoline-range hydrocarbon content of sediments reflects source quality, thermal maturation and organic facies. Compositional data can be used in crude oil-parent rock correlation work.

The C₄-C₇ hydrocarbon content and detailed molecular composition of hydrocarbon, in hand-picked lithologies, is determined by a gc analysis of the light hydrocarbon extracted from 1-2 gram cuttings samples macerated in a microblender. A measured volume of sample is placed in a sealed microblender along with a measured volume of hot water. The rock sample is pulverized by the blades of the blender. A sample of the liberated light hydrocarbons which collect in the air space at the top of the blender is injected into our Varian Aerograph 1400 gc unit which is equipped with a capillary column. Data recording, computations, etc. are comparable to those used for the C₁-C₇ analysis discussed previously in this report. Hydrocarbon concentration is expressed as volume gas per million volumes of cuttings.

Organic Carbon

The total organic carbon content of a rock is a measure of its total organic richness. This data is used, in conjunction with visual kerogen and C₁-C₄, C₄-C₇ and C₁₅₊ hydrocarbon content of a rock, to indicate the hydrocarbon source quality of rocks.

The procedure for determining the total organic carbon content of a rock involves drying the sample, grinding to a powder, weighing out 0.2729 gram sample into a crucible, acidizing with hot and cold hydrochloric acid to remove calcium and magnesium carbonate, and carbon analysis by combustion in a Leco carbon analyzer.

We run several blank crucibles, standards (iron rings of known carbon content) and duplicate rock samples in this analysis at no additional charge to the client for purposes of data quality control.

C₁₅₊ Soxhlet Extraction, Deasphalting and Chromatographic Separation

The amount and composition of the organic matter which can be solvent-extracted from a rock reflects source quality and source type. C¹³/C¹² carbon isotopic, high mass spectrometric and gc analyses of the paraffin-naphthene and aromatic hydrocarbon fractions of the soluble extract gives data which is used in crude oil-parent rock correlations. This analysis involves grinding of a dry rock sample to a powder and removal of the soluble organic matter by soxhlet extraction using a co-distilled toluene-methanol azeotrope solvent. Where the amount of available sample material permits, we like to use at least 100 grams of rock for this analysis.

The extracted bitumen is separated into an asphaltene (ASPH) and a pentane soluble fraction by normal pentane precipitation. The pentane soluble components are separated into a C₁₅₊ paraffin-naphthene (P-N) hydrocarbon, C₁₅₊ aromatic hydrocarbon (AROM) and C₁₅₊ nitrogen-sulfur-oxygen containing fraction (NSO) by adsorption chromatography on a silica gel-alumina column using pentane, toluene and toluene-methanol azeotrope eluants.

GC Analysis of C₁₅₊ Paraffin-Naphthene (P-N) Hydrocarbons

The content and molecular composition of the heavy C₁₅₊ paraffin-naphthene (P-N) hydrocarbons of rocks, as determined by gc analysis, reflects source quality, source type and degree of thermal maturation.

In this analysis, we subject a very small fraction of the total amount of the P-N fraction extracted from a rock sample to gc analysis. The gas chromatograph is a Varian Aerograph Model 1400 equipped with a solid rod injection system and a eutectic column.

The calculated C.P.I. (carbon preference index) values for the normal paraffin data is defined as the mean of two ratios which are determined by dividing the sum of concentrations of odd-carbon numbered n-paraffins by the sum of even-carbon numbered n-paraffins. The C.P. Indices A and B were obtained by the formulas:

$$\text{C.P. Index A} = \frac{\frac{C_{21}+C_{23}+C_{25}+C_{27}}{C_{22}+C_{24}+C_{26}+C_{28}} + \frac{C_{21}+C_{23}+C_{25}+C_{27}}{C_{20}+C_{22}+C_{24}+C_{26}}}{2}$$

$$\text{C.P. Index B} = \frac{\frac{C_{25}+C_{27}+C_{29}+C_{31}}{C_{26}+C_{28}+C_{30}+C_{32}} + \frac{C_{25}+C_{27}+C_{29}+C_{31}}{C_{24}+C_{26}+C_{28}+C_{30}}}{2}$$

Visual Kerogen

A visual study of kerogen, the insoluble organic matter in rocks, can indicate the relative abundance, size, and state of preservation of the various recognizable kerogen types and thereby indicate the hydrocarbon source character of a rock. The color of the kerogen can be used to indicate the state of thermal maturity of the sediments (i.e., their time-temperature history). Thermal maturation plays an important role in the generation of hydrocarbons from organic matter, and also affects the composition of reservoired hydrocarbons.

Our procedure for visual kerogen slide preparation involves isolation of the organic matter of a rock by removal of the rock material with hydrochloric and hydrofluoric acid treatment and heavy liquid separation. This procedure is comparable to that used by the palynologist except it does not include an oxidation stage. (The oxidation treatment is deleted from our procedure because it removes a great deal of kerogen and bleaches any remaining kerogen to an extent whereby it is useless for our kerogen color observations.) The kerogen residue is mounted on a glass slide and is examined visually under a high power microscope.

Vitrinite Reflectance

Measurement of the reflectivity of vitrinite particles (R_o) present in the kerogen isolated from sedimentary rocks provides a method of determining the state of maturation, and the diagenetic (time-temperature) history of the organic matter present in the sediments.

The kerogen, obtained from a 25 gram aliquot of crushed rock by the acid procedure previously discussed, is dried and embedded in a Bioplastic plug. The surface of the plug is polished using 0.05 micron alumina and the reflectivity determined under oil using a Ziess high resolution microscope. A minimum of 40 values are required to adequately determine the Maturation Rank.

Fluorescence Spectrophotometric Analysis

Fluorescence spectrophotometry can be used to characterize and fingerprint crude oils, establish crude oil-source rock relationships, and to measure the hydrocarbon source potential of fine-grained sediments.

A one (1) microliter aliquot of either (i) a crude oil or (ii) the solvent extractable rock bitumen, is passed through an alumina silica gel micro column and the C₁₀₊ aromatic hydrocarbons isolated. The aromatic hydrocarbon is diluted and the emission and excitation spectra determined at 240 nm and 420 nm using a Perkin-Elmer Model 512 Double Beam Fluorescence Spectrophotometer.

GEO THERMAL DIAGENETIC CRITERIA

(GEOCHEM LABORATORIES, INC.)

