Source rock potential and geochemical characterization (total organic carbon, rock-eval, and gas chromatogram mass spectrography of extracted organic matter) of the Tenneco Oil Company OCS Y-0943-1 (Aurora No. 1) well as determined from unwashed cuttings (6,960' - 14,190').

Received 18 March 1993

Total of 29 pages in report

Alaska Geologic Materials Center Data Report No. 209

TENNECO AURORA #1 (API #551410000400) GEOCHEMICAL ANALYSIS

- performed by by DGSi, Houston, July 1992

Sample Code	DGSi Sample #	Sample Type	Sample Depth	Approx. Age	TOC	S1	S2	S3	TMAX	HI	OI	S2/S3	FI	Source Potential	Thermal Maturity
TA 1	92/2284-1	cuttings	6960-7560	Mid Eocene	0.96	0.02	0.31	1.04	439	32	108	0.3	0.06	poor, gas	mature
TA 2	92/2284-2	cuttings	13620-13710	Early Eocene	1.29	0.35	0.93	2.05	437	72	159	0.45	0.27	poor, gas	mature
TA 3	92/2284-3	cuttings	14010-14190	Paleocene	1.33	0.18	0.79	0.67	448	59	50	1.18	0.19	poor, gas	mature

MISCELLANEOUS SAMPLES

DGSI/92/2284

LIQUID CHROMATOGRAPHY

Sample Identification	DGSI No.	Saturates (%)	Aromatics (%)	NSO (%)	Asphalt (%)
TA1	1	38.9	22.2	22.2	16.7
TA2	2	43.9	23.0	23.0	10.2
TA3	3	45.9	24.5	21.8	7.7

STABLE CARBON ISOTOPE

Sample Identification	DGSI No.	Saturates o/oo	Aromatics o/oo
TA1	1	-28.3	-27.9
TA2	2	-27.4	-26.6
TA3	3	-28.1	-26.5

MISCELLANEOUS SAMPLES

DGSI/92/2284

EXTRACT CALCULATIONS

Sample Identification	No.	PPM	<u>EXTRACT</u> TOC	Pr/Ph	Pr/C17	Ph/C18	CPI
TA1	1	290	0.030	1.5	1.00	1.32	2.11
TA2	2	840	0.065	2.8	0.85	0.31	1.38
TA3	3	566	0.043	3.5	0.89	0.26	1.44

EXTRACT DATA

No.	SAMPLE wt.	EXTRACT wt.	TOC	C17	Pr	C18	Ph	C28	C29	C30
1	12.070	0.004	0.96	182039	181334	90934	120364	35205	75064	36045
2	38.078	0.032	1.29	1354220	1154617	1318615	408915	427352	457374	235943
3	47.017	0.027	1.33	2179298	1946152	2083261	548860	844601	988100	527700

NORMALIZED ISOPRENOID DATA

No.	IC13	IC14	IC15	IC16	IC18	IC19	IC20
1	3.6	17.6	2.8	10.6	13.3	31.3	20.8
2	4.6	22.3	6.5	15.4	14.9	26.8	9.5
3	5.2	21.6	9.0	16.4	13.6	26.6	7.5

AREA DATA

No.	IC13	IC14	IC15	IC16	IC18	IC19	IC20
1	20865	101810	16190	61174	76892	181334	120364
2	196337	960687	280872	664805	640241	1154617	408915
3	381405	1579360	655765	1201401	991756	1946152	548860

84-1 Extract

284-2 Extract

284-3 Extract

GC/MS ANALYSIS TERPANES (m/z 191)

Composition and selected ratios

TOTAL % COMPOSITION	TA1	TA2	TA3
<u>Tricyclic Terpanes</u>			
C19-C29	11.53	20.55	18.50
C30-C36	1.06	2.82	1.24
<u>Pentacyclic Terpanes</u>			
Hopanes	79.97	69.37	70.63
Non-Hopanes	6.38	5.23	7.75
<hr/>			
RATIO			
Tricyclic Index	57.30	110.50	97.18
C19 Tricyclic / C23 Tricyclic	0.36	0.79	0.60
C23 Tricyclic / C24 Tetracyclic	2.05	1.55	1.62
Tm / Ts	1.81	0.55	0.58
C28 Hopane / C29 Hopane	1.23	0.23	0.28
C28 Hopane / C30 Hopane	0.63	0.10	0.11
C28 Hopane / (C28 + C30 Hopanes)	0.39	0.09	0.10
C29 Hopane / C30 Hopane	0.51	0.43	0.40
C30 Moretane / C30 Hopane	0.18	0.14	0.13
C30 Oleanane / C30 Hopane	0.26	0.24	0.41
Gammacerane Index	5.56	4.58	0.00
22S / (22S + 22R) C31 Hopane (%)	41.67	43.61	43.98
22S / (22S + 22R) C32 Hopane (%)	50.64	59.66	60.97
C35 / C34 Extended Hopanes	1.42	0.64	0.61
Tricyclic / 17aH - Hopane Ratio	0.05	0.06	0.07
C35-Homohopane Index (%)	10.36	5.35	5.09

GC/MS ANALYSIS STERANES (m/z 217)

Composition and selected ratios

TOTAL % COMPOSITION	TA1	TA2	TA3
<u>Regular steranes</u>			
C27	20.00	22.69	26.26
C28	21.45	12.68	8.58
C29	32.71	26.29	18.88
Total	74.16	61.66	53.72
<u>Rearranged (diasteranes)</u>			
C27	11.76	11.59	14.25
C28	6.10	8.31	12.22
C29	7.98	18.44	19.80
Total	25.84	38.34	46.28
<u>NORMALIZED PERCENTAGE</u>			
C27 aaa (20R)	21.93	16.78	21.11
C28 aaa (20R)	33.01	36.13	28.25
C29 aaa (20R)	45.06	47.09	50.64
<u>NORMALIZED PERCENTAGE</u>			
C27 aaa (20R + 20S)	25.88	16.65	21.34
C28 aaa (20R + 20S)	29.98	27.22	22.71
C29 aaa (20R + 20S)	44.15	56.13	55.95
<u>RATIO</u>			
Diasterane Index	43.47	203.47	266.49
Diasteranes / regular steranes	0.35	0.62	0.86
C27 aaa (20R) / C29 aaa (20R)	0.49	0.36	0.42
C29 aaa (20S) / C29 aaa (20R)	0.15	1.06	1.53
C29 abb (20R) / C29 aaa (20R)	0.17	1.00	1.36
20S / (20S + 20R) C29 aaa sterane (%)	13.16	51.38	60.54
abb / (aaa + abb) C29 sterane (%)	31.29	49.17	51.22
abb / (aaa + abb) C27 sterane (%)	34.12	82.54	86.63
Hopanes / Steranes (TT / ST)	1.14	2.36	3.02
(Steranes + Diasteranes) / C27-C30 hopanes	1.45	0.77	0.60

TA1

Peak ID.	Compound Name	Carbon#	Ret Time	Area	Area%
1 A	C19-Tricyclic Terpene	19	25.382	157581	0.79
2 B	C20-Tricyclic Terpene	20	29.869	210043	1.05
3 C	C21-Tricyclic Terpene	21	34.568	205796	1.03
4 D	C22-Tricyclic Terpene	22	39.138	73528	0.37
5 E	C23-Tricyclic Terpene	23	44.577	434088	2.17
6 F	C24-Tricyclic Terpene	24	47.653	261568	1.31
7 G	C25-Tricyclic Terpene #1	25	53.763	119509	0.60
8 G	C25-Tricyclic Terpene #2	25	53.943	128891	0.64
9 H	C24-Tetracyclic Terpene	24	57.746	212159	1.06
10 I	C26-Tricyclic Terpene #1	26	58.276	105360	0.53
11 I	C26-Tricyclic Terpene #2	26	58.692	86414	0.43
12 J	C28-Tricyclic Terpene #1	28	68.42	138295	0.69
13 J	C28-Tricyclic Terpene #2	28	69.143	119594	0.60
14 K	C29-Tricyclic Terpene #1	29	71.35	115237	0.58
15 K	C29-Tricyclic Terpene #2	29	72.203	152464	0.76
16 L	18aH-Trisnorhopane (Ts)	27	74.261	361740	1.81
17 M	17aH-Trisnorhopane (Tm)	27	76.092	654502	3.27
18 N	C30-Tricyclic Terpene #1	30		0	0.00
19 N	C30-Tricyclic Terpene #2	30		0	0.00
20 O	17aH,18aH,21bH-Bisnorhopane	28	80.353	2526810	12.62
21 P	C31-Tricyclic Terpene #1	31		0	0.00
22 P	C31-Tricyclic Terpene #2	31		0	0.00
23 Q	17aH,21bH-Norhopane	29	82.528	2059840	10.29
24 R	17bH,21aH-Normoretane	29	84.634	1072183	5.36
25 S	18aH-Oleanane	30	85.982	1052829	5.26
26 T	17aH,21bH-Hopane	30	86.416	4028500	20.13
27 U	17bH,21aH-Moretane	30	88.136	738874	3.69
28 V	C33-Tricyclic Terpene #1	33		0	0.00
29 V	C33-Tricyclic Terpene #2	33		0	0.00
30 W	17aH,21bH-Homohopane (22S)	31	91.285	897572	4.48
31 X	17aH,21bH-Homohopane (22R)	31	91.91	1256471	6.28
32 Y	Gammacerane	30	92.489	224042	1.12
33 Z	C34-Tricyclic Terpene #1	34		0	0.00
34 Z	C34-Tricyclic Terpene #2	34		0	0.00
35 a	17aH,21bH-Bishomohopane (22S)	32	95.66	502984	2.51
36 b	17aH,21bH-Bishomohopane (22R)	32	96.664	490253	2.45
37 c	C35-Tricyclic Terpene #1	35	98.811	118957	0.59
38 c	C35-Tricyclic Terpene #2	35	100.517	93487	0.47
39 d	17aH,21bH-Trishomohopane (22S)	33	101.529	285627	1.43
40 e	17aH,21bH-Trishomohopane (22R)	33	103.161	326564	1.63
41 f	C36-Tricyclic Terpene #1	36		0	0.00
42 f	C36-Tricyclic Terpene #2	36		0	0.00
43 g	17aH,21bH-Tetrahomohopane (22S)	34	108.747	165246	0.83
44 h	17aH,21bH-Tetrahomohopane (22R)	34	111.128	166664	0.83
45 i	17aH,21bH-Pentahomohopane (22S)	35	117.267	194734	0.97
46 j	17aH,21bH-Pentahomohopane (22R)	35	120.756	278209	1.39

Date Acquired: 10 Jun 92 2:37 pm
Sample Name: 2284-1
Misc Info: TA1

Date Acquired: 10 Jun 92 2:37 pm
 Sample Name: 2284-1
 Misc Info: TA1

STERANES (m/z = 217)

TA1

Peak ID.	Sterane Name	Ret Time	Area	Area%
1 A	C27 ba diasterane (20S)	63.215	583986	3.09
2 B	C27 ba diasterane (20R)	65.049	497936	2.64
3 C	C27 ab diasterane (20S)	66.429	282349	1.49
4 D	C27 ab diasterane (20R)	67.474	857630	4.54
5 E	C28 ba diasterane (20S)	67.874	876491	4.64
6 F	C28 ba diasterane (20R)	69.81	275607	1.46
7 G	C27 aaa (20S) + C28 ab dia-(20S)	71.245	694214	3.67
8 H	C27 abb (20R) + C29 ba dia-(20S)	71.559	981532	5.20
9 I	C27 abb (20S) + C28 ab dia-(20R)	71.962	307653	1.63
10 J	C27 aaa sterane (20R)	73.171	1794783	9.50
11 K	C29 ba diasterane (20R)	73.689	1042164	5.52
12 L	C29 ab diasterane (20S)	74.613	465416	2.46
13 M	C28 aaa sterane (20S)	75.827	182525	0.97
14 N	C28 abb sterane (20R)	76.475	712321	3.77
15 O	C28 abb sterane (20S)	76.849	457035	2.42
16 P	C28 aaa sterane (20R)	78.308	2701078	14.30
17 Q	C29 aaa sterane (20S)	79.69	558700	2.96
18 R	C29 abb sterane (20R)	80.433	622527	3.29
19 S	C29 abb sterane (20S)	80.654	1311520	6.94
20 T	C29 aaa sterane (20R)	82.497	3687630	19.52

Date Acquired: 10 Jun 92 2:37 pm
 Sample Name: 2284-1
 Misc Info: TA1

Date Acquired: 10 Jun 92 2:37 pm
 Sample Name: 2284-1
 Misc Info: TA1

Date Acquired: 10 Jun 92 2:37 pm
Sample Name: 2284-1
Misc Info: TA1

TA2

Peak ID.	Compound Name	Carbon#	Ret Time	Area	Area%
1 A	C19-Tricyclic Terpane	19	25.713	450416	2.47
2 B	C20-Tricyclic Terpane	20	30.141	690018	3.79
3 C	C21-Tricyclic Terpane	21	34.809	482421	2.65
4 D	C22-Tricyclic Terpane	22	39.35	109221	0.60
5 E	C23-Tricyclic Terpane	23	44.776	573636	3.15
6 F	C24-Tricyclic Terpane	24	47.854	364893	2.00
7 G	C25-Tricyclic Terpane #1	25	53.948	109975	0.60
8 G	C25-Tricyclic Terpane #2	25	54.137	139649	0.77
9 H	C24-Tetracyclic Terpane	24	57.95	368914	2.02
10 I	C26-Tricyclic Terpane #1	26	58.475	130723	0.72
11 I	C26-Tricyclic Terpane #2	26	58.893	104386	0.57
12 J	C28-Tricyclic Terpane #1	28	68.628	196576	1.08
13 J	C28-Tricyclic Terpane #2	28	69.348	136419	0.75
14 K	C29-Tricyclic Terpane #1	29	71.581	178691	0.98
15 K	C29-Tricyclic Terpane #2	29	72.431	78486	0.43
16 L	18aH-Trisnorhopane (Ts)	27	74.477	1160619	6.37
17 M	17aH-Trisnorhopane (Tm)	27	76.3	633989	3.48
18 N	C30-Tricyclic Terpane #1	30		0	0.00
19 N	C30-Tricyclic Terpane #2	30		0	0.00
20 O	17aH,18aH,21bH-Bisnorhopane	28	80.523	334362	1.83
21 P	C31-Tricyclic Terpane #1	31		0	0.00
22 P	C31-Tricyclic Terpane #2	31		0	0.00
23 Q	17aH,21bH-Norhopane	29	82.718	1456583	7.99
24 R	17bH,21aH-Normoretane	29	84.809	278502	1.53
25 S	18aH-Oleanane	30	86.04	798199	4.38
26 T	17aH,21bH-Hopane	30	86.605	3389670	18.60
27 U	17bH,21aH-Moretane	30	88.345	471018	2.58
28 V	C33-Tricyclic Terpane #1	33		0	0.00
29 V	C33-Tricyclic Terpane #2	33		0	0.00
30 W	17aH,21bH-Homohopane (22S)	31	91.532	1002656	5.50
31 X	17aH,21bH-Homohopane (22R)	31	92.156	1296255	7.11
32 Y	Gammacerane	30	92.736	155115	0.85
33 Z	C34-Tricyclic Terpane #1	34		0	0.00
34 Z	C34-Tricyclic Terpane #2	34		0	0.00
35 a	17aH,21bH-Bishomohopane (22S)	32	95.936	688802	3.78
36 b	17aH,21bH-Bishomohopane (22R)	32	96.931	465743	2.56
37 c	C35-Tricyclic Terpane #1	35	99.113	141711	0.78
38 c	C35-Tricyclic Terpane #2	35	100.806	83133	0.46
39 d	17aH,21bH-Trishomohopane (22S)	33	101.827	461524	2.53
40 e	17aH,21bH-Trishomohopane (22R)	33	103.462	330739	1.81
41 f	C36-Tricyclic Terpane #1	36	105.268	120885	0.66
42 f	C36-Tricyclic Terpane #2	36	107.379	168161	0.92
43 g	17aH,21bH-Tetrahomohopane (22S)	34	109.07	237974	1.31
44 h	17aH,21bH-Tetrahomohopane (22R)	34	111.464	172100	0.94
45 i	17aH,21bH-Pentahomohopane (22S)	35	117.644	155752	0.85
46 j	17aH,21bH-Pentahomohopane (22R)	35	121.145	107536	0.59

Date Acquired: 8 Jun 92 3:11 pm
 Sample Name: 2284-2
 Misc Info: TA2

Date Acquired: 8 Jun 92 3:11 pm
 Sample Name: 2284-2
 Misc Info: TA2

TA2

Peak ID.		Sterane Name	Ret Time	Area	Area%
1	A	C27 ba diasterane (20S)	63.414	468159	5.38
2	B	C27 ba diasterane (20R)	65.252	233304	2.68
3	C	C27 ab diasterane (20S)	66.631	176497	2.03
4	D	C27 ab diasterane (20R)	67.596	129828	1.49
5	E	C28 ba diasterane (20S)	68.086	520247	5.98
6	F	C28 ba diasterane (20R)	70.017	202938	2.33
7	G	C27 aaa (20S) + C28 ab dia-(20S)	71.394	143298	1.65
8	H	C27 abb (20R) + C29 ba dia-(20S)	71.774	1472923	16.93
9	I	C27 abb (20S) + C28 ab dia-(20R)	72.173	156359	1.80
10	J	C27 aaa sterane (20R)	73.37	201449	2.32
11	K	C29 ba diasterane (20R)	73.9	1206718	13.87
12	L	C29 ab diasterane (20S)	74.815	397494	4.57
13	M	C28 aaa sterane (20S)	76.043	130076	1.50
14	N	C28 abb sterane (20R)	76.691	229871	2.64
15	O	C28 abb sterane (20S)	77.061	309126	3.55
16	P	C28 aaa sterane (20R)	78.483	433656	4.99
17	Q	C29 aaa sterane (20S)	79.854	597229	6.87
18	R	C29 abb sterane (20R)	80.652	562567	6.47
19	S	C29 abb sterane (20S)	80.883	561844	6.46
20	T	C29 aaa sterane (20R)	82.648	565204	6.50

Date Acquired: 8 Jun 92 3:11 pm
 Sample Name: 2284-2
 Misc Info: TA2

Date Acquired: 8 Jun 92 3:11 pm
Sample Name: 2284-2
Misc Info: TA2

Date Acquired: 8 Jun 92 3:11 pm
Sample Name: 2284-2
Misc Info: TA2

TA3

Peak ID.	Compound Name	Carbon#	Ret Time	Area	Area%
1 A	C19-Tricyclic Terpane	19	25.747	408369	1.84
2 B	C20-Tricyclic Terpane	20	29.862	580074	2.62
3 C	C21-Tricyclic Terpane	21	34.828	478422	2.16
4 D	C22-Tricyclic Terpane	22	39.382	138367	0.62
5 E	C23-Tricyclic Terpane	23	44.819	675175	3.04
6 F	C24-Tricyclic Terpane	24	47.908	471357	2.13
7 G	C25-Tricyclic Terpane #1	25	53.995	142353	0.64
8 G	C25-Tricyclic Terpane #2	25	54.183	134842	0.61
9 H	C24-Tetracyclic Terpane	24	57.998	417799	1.88
10 I	C26-Tricyclic Terpane #1	26	58.522	163917	0.74
11 I	C26-Tricyclic Terpane #2	26	58.933	131290	0.59
12 J	C28-Tricyclic Terpane #1	28	68.683	224335	1.01
13 J	C28-Tricyclic Terpane #2	28	69.382	141701	0.64
14 K	C29-Tricyclic Terpane #1	29	71.635	249415	1.12
15 K	C29-Tricyclic Terpane #2	29	72.471	163284	0.74
16 L	18aH-Trisnorhopane (Ts)	27	74.525	1463862	6.60
17 M	17aH-Trisnorhopane (Tm)	27	76.159	848087	3.82
18 N	C30-Tricyclic Terpane #1	30		0	0.00
19 N	C30-Tricyclic Terpane #2	30		0	0.00
20 O	17aH,18aH,21bH-Bisnorhopane	28	80.558	475293	2.14
21 P	C31-Tricyclic Terpane #1	31		0	0.00
22 P	C31-Tricyclic Terpane #2	31		0	0.00
23 Q	17aH,21bH-Norhopane	29	82.74	1686306	7.60
24 R	17bH,21aH-Normoretane	29	84.833	329620	1.49
25 S	18aH-Oleanane	30	86.064	1718646	7.75
26 T	17aH,21bH-Hopane	30	86.627	4222131	19.04
27 U	17bH,21aH-Moretane	30	88.36	534144	2.41
28 V	C33-Tricyclic Terpane #1	33		0	0.00
29 V	C33-Tricyclic Terpane #2	33		0	0.00
30 W	17aH,21bH-Homohopane (22S)	31	91.546	1260832	5.69
31 X	17aH,21bH-Homohopane (22R)	31	92.17	1606177	7.24
32 Y	Gammacerane	30		0	0.00
33 Z	C34-Tricyclic Terpane #1	34		0	0.00
34 Z	C34-Tricyclic Terpane #2	34		0	0.00
35 a	17aH,21bH-Bishomohopane (22S)	32	95.944	877189	3.96
36 b	17aH,21bH-Bishomohopane (22R)	32	96.937	561444	2.53
37 c	C35-Tricyclic Terpane #1	35	99.118	166264	0.75
38 c	C35-Tricyclic Terpane #2	35	100.812	108336	0.49
39 d	17aH,21bH-Trishomohopane (22S)	33	101.83	587809	2.65
40 e	17aH,21bH-Trishomohopane (22R)	33	103.469	391965	1.77
41 f	C36-Tricyclic Terpane #1	36		0	0.00
42 f	C36-Tricyclic Terpane #2	36		0	0.00
43 g	17aH,21bH-Tetrahomohopane (22S)	34	109.07	314574	1.42
44 h	17aH,21bH-Tetrahomohopane (22R)	34	111.45	191364	0.86
45 i	17aH,21bH-Pentahomohopane (22S)	35	117.608	186022	0.84
46 j	17aH,21bH-Pentahomohopane (22R)	35	121.11	124469	0.56

Date Acquired: 9 Jun 92 11:07 am
Sample Name: 2284-3
Misc Info: TA3

Date Acquired: 9 Jun 92 11:07 am
 Sample Name: 2284-3
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Peak ID.		Sterane Name	Ret Time	Area	Area%
1	A	C27 ba diasterane (20S)	63.463	554245	5.74
2	B	C27 ba diasterane (20R)	65.301	349024	3.62
3	C	C27 ab diasterane (20S)	66.686	254904	2.64
4	D	C27 ab diasterane (20R)	67.636	217157	2.25
5	E	C28 ba diasterane (20S)	68.13	932107	9.66
6	F	C28 ba diasterane (20R)	70.054	247728	2.57
7	G	C27 aaa (20S) + C28 ab dia-(20S)	71.437	192717	2.00
8	H	C27 abb (20R) + C29 ba dia-(20S)	71.826	1826287	18.92
9	I	C27 abb (20S) + C28 ab dia-(20R)	72.209	369222	3.83
10	J	C27 aaa sterane (20R)	73.409	146239	1.52
11	K	C29 ba diasterane (20R)	73.943	1332036	13.80
12	L	C29 ab diasterane (20S)	74.861	579387	6.00
13	M	C28 aaa sterane (20S)	76.093	165180	1.71
14	N	C28 abb sterane (20R)	76.734	176720	1.83
15	O	C28 abb sterane (20S)	77.098	290761	3.01
16	P	C28 aaa sterane (20R)	78.542	195661	2.03
17	Q	C29 aaa sterane (20S)	79.885	538162	5.58
18	R	C29 abb sterane (20R)	80.673	478387	4.96
19	S	C29 abb sterane (20S)	80.924	454797	4.71
20	T	C29 aaa sterane (20R)	82.664	350724	3.63

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