BASIC CRUDE OIL CHARACTERISTICS AND BIOMARKER ANALYSIS FROM THE KINGS MEADOW RANCHES NO. 17-1 WELL, COVENANT FIELD, SEVIER COUNTY, UTAH

by

Baseline DGSI
The Woodlands, Texas

OPEN-FILE REPORT 467 **December 2005**

Utah Geological Survey
a division of
UTAH DEPARTMENT OF NATURAL RESOURCES

TABLE OF CONTENTS

INTRODUCTION

Covenant field was discovered in 2004 by Michigan-based Wolverine Oil & Gas Company, with the completion in the Jurassic Navajo Sandstone of the No. 17-1 Kings Meadow Ranches well (SE1/4NW1/4 section 17, T. 23 S., R. 1 W., Salt Lake Baseline and Meridian), Sevier County, Utah. The Covenant trap is an elongate, symmetric, northeast-trending anticline. The Navajo in the 17-1 well is repeated due to a detachment within the structure. Only the upper Navajo is productive containing a 487-foot oil column (Douglas Strickland, Wolverine Oil & Gas Company, verbal communication, 2005).

In the 17-1 Kings Meadow Ranches well, the initial flowing potential was 708 bbls of oil and 20 bbls of water per day; there was essentially no gas production. Cumulative production as of August 1, 2005, was 334,391 bbls of oil and 30,201 bbls of water (Utah Division of Oil, Gas and Mining, 2005).

A sample of crude oil, produced from the 17-1 Kings Meadow Ranches well, was collected by the Utah Geological Survey and analyzed by Baseline DGSI. This report contains the basic oil characteristics (API gravity, viscosity, pour point, and sulfur and nitrogen content) of the analyzed oil. The report also includes raw, uninterpreted, isotopic and biomarker (whole oil and saturate gas chromatograph) data derived from the oil sample.

GENERAL SAMPLE INFORMATION

Field: Covenant

Well Name and Number: Kings Meadow Ranches No. 17-1 (field discovery well)

API Number: 43-041-30030

Operator: Wolverine Oil and Gas Company of Utah, LLC

Well Location: 2040’ FNL & 2000’ FWL, SE1/4NW1/4 section 17, T. 23 S., R. 1 W., Salt Lake Base Line and Meridian, Sevier County, Utah

Well Completion Date: May 3, 2004

Reservoir: Jurassic Navajo Sandstone

Perforated Interval: 6215 to 6225 feet

Sample Source: Well site storage tanks

Collection Date: August 31, 2004

Sample Repository: Utah Core Research Center, Utah Geological Survey, Salt Lake City, Utah

BASELINE DGSI
ANALYTICAL LABORATORIES

API GRAVITY

Company: UTAH GEOLOGICAL SU **Project #: 05-253-A**

Client ID	Lab ID	API Gravity	Comments
17-1 KINGS MEADOW	SU000009	40.5	

Baseline/DGSI - USA
8701 New Trails Drive, The Woodlands, TX 77381-4241
Telephone: 281-681-2200
Facsimile: 281-681-0326
E-mail: info@baselinedgsi.com
Web Site: http://www.baselinedgsi.com

Baseline DGSI - Brazil
Rua Benjamin Batista 55 / 301 Jardim Botânico,
22461-120 Rio de Janeiro (RJ) – Brazil
Tel/Fax: + 55.21 / 537 7893
E-mail: ssp@solintec.com.br

BASELINE DGSI
ANALYTICAL LABORATORIES

VISCOSITY

Company: UTAH GEOLOGICAL SURVEY **Project #: 05-253-A**

Client ID	Lab ID	Viscosity	Temperature	Units
17-1 KINGS MEADOW	SU000009	4.0	25 C	Cst

Baseline/DGSI - USA
8701 New Trails Drive, The Woodlands, TX 77381-4241
Telephone: 281-681-2200
Facsimile: 281-681-0326
E-mail: info@baselinedgsi.com
Web Site: http://www.baselinedgsi.com

Baseline DGSI - Brazil
Rua Benjamin Batista 55 / 301 Jardim Botânico,
22461-120 Rio de Janeiro (RJ) – Brazil
Tel/Fax: + 55.21 / 537 7893
E-mail: ssp@solintec.com.br

BASELINE DGSI
ANALYTICAL LABORATORIES

POUR POINT

Company: UTAH GEOLOGICAL SU **Project #: 05-253-A**

Client ID	Lab ID	Pour Point	Comments
17-1 KINGS MEADOW	SU000009	2.2 F	ASTM D 97

Baseline/DGSI - USA
8701 New Trails Drive, The Woodlands, TX 77381-4241
Telephone: 281-681-2200
Facsimile: 281-681-0326
E-mail: info@baselinedgsi.com
Web Site: http://www.baselinedgsi.com

Baseline DGSI - Brazil
Rua Benjamin Batista 55 / 301 Jardim Botânico,
22461-120 Rio de Janeiro (RJ) – Brazil
Tel/Fax: + 55.21 / 537 7893
E-mail: ssp@solintec.com.br

BASELINE DGSI
ANALYTICAL LABORATORIES

SULFUR

Company: UTAH GEOLOGICAL SU **Project #: 05-253-A**

Client ID	Lab ID	% Sulfur	Comments
17-1 KINGS MEADOW	SU000009	0.48	ASTM 4629

Baseline/DGSI - USA
8701 New Trails Drive, The Woodlands, TX 77381-4241
Telephone: 281-681-2200
Facsimile: 281-681-0326
E-mail: info@baselinedgsi.com
Web Site: http://www.baselinedgsi.com

Baseline DGSI - Brazil
Rua Benjamin Batista 55 / 301 Jardim Botânico,
22461-120 Rio de Janeiro (RJ) – Brazil
Tel/Fax: + 55.21 / 537 7893
E-mail: ssp@solintec.com.br

BASELINE DGSI
ANALYTICAL LABORATORIES

TOTAL NITROGEN

Company: UTAH GEOLOGICAL SU **Project #:** 05-253-A

Client ID	Lab ID	Nitrogen ppm	Comments
17-1 KINGS MEADOW	SU000009	474	ASTM 4629

Baseline/DGSI - USA
8701 New Trails Drive, The Woodlands, TX 77381-4241
Telephone: 281-681-2200
Facsimile: 281-681-0326
E-mail: info@baselinedgsi.com
Web Site: http://www.baselinedgsi.com

Baseline DGSI - Brazil
Rua Benjamin Batista 55 / 301 Jardim Botânico,
22461-120 Rio de Janeiro (RJ) – Brazil
Tel/Fax: + 55.21 / 537 7893
E-mail: ssp@solintec.com.br

Company: UTAH GEOLOGICAL SURVEY **Project #: 05-253-A**

Client ID	Lab ID	$\delta^{13}C$ Saturate	$\delta^{13}C$ Aromatic	$\delta^{13}C$ Resin	$\delta^{13}C$ Asph	$\delta^{13}C$ Whole
17-1 KINGS MEADOW	SU000009	-29.4	-29.0			

Baseline/DGSI - USA
8701 New Trails Drive, The Woodlands, TX 77381-4241
Telephone: 281-681-2200
Facsimile: 281-681-0326
E-mail: info@baselinedgsi.com
Web Site: http://www.baselinedgsi.com

Baseline DGSI - Brazil
Rua Benjamin Batista 55 / 301 Jardim Botânico,
22461-120 Rio de Janeiro (RJ) – Brazil
Tel/Fax: + 55.21 / 537 7893
E-mail: ssp@solintec.com.br

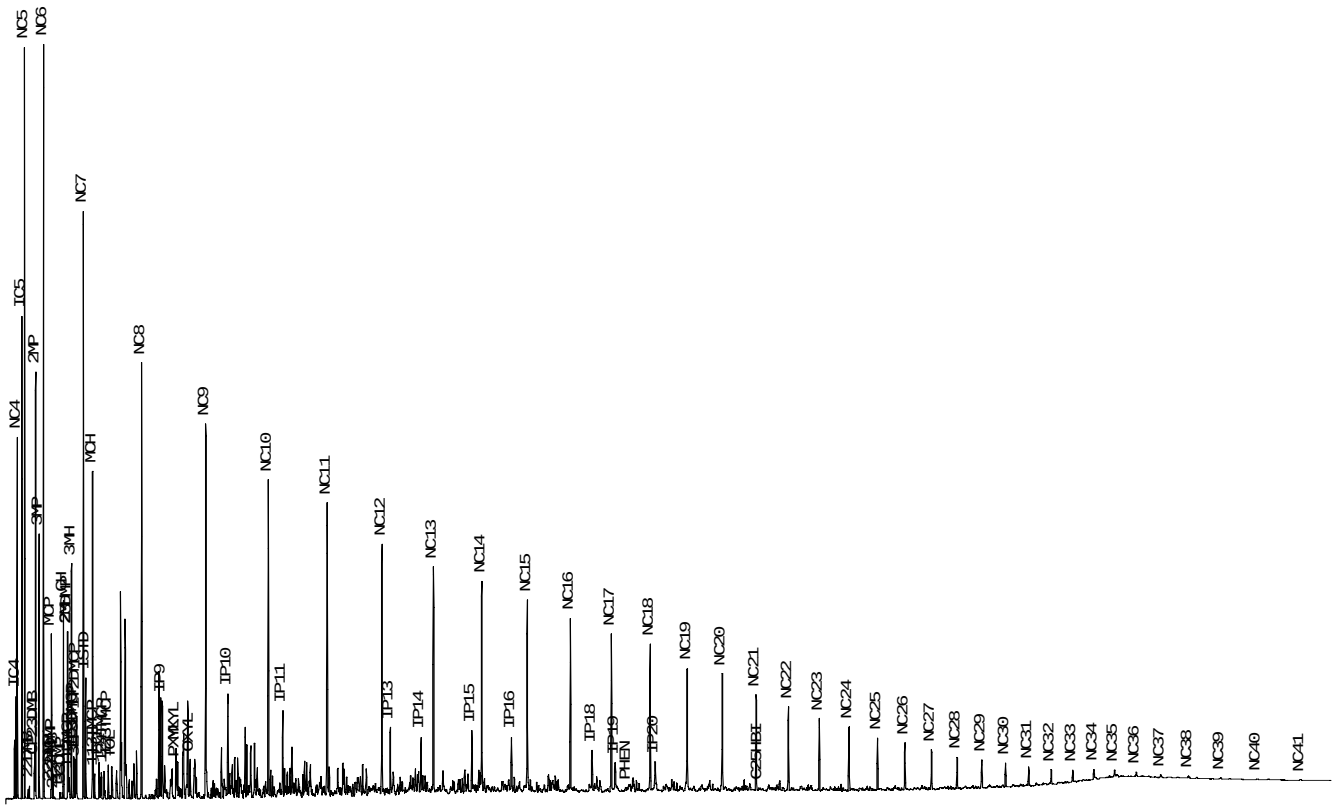
BASELINE DGSI
ANALYTICAL LABORATORIES

WHOLE OIL GC

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Country:	**UNITED STATES**	**Project #:**	**05-253-A**
Basin:		**Lab ID:**	**SU000009**
Lease:		**Sample Type:**	**OIL**
Block:		**Sampling Point:**	
Field:		**Formation:**	**NAVAJO SANDSTONE**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Geologic Age:**	**JURASSIC**
Latitude:		**Top Depth:**	
Longitude:		**Bottom Depth:**	

Whole Oil GC Trace

G1050495.D



WGC parameters	
Pristane/Phytane	0.96
Pristane/*n* C_{17}	0.30
Phytane/*n* C_{18}	0.34
n C_{18}/*n* C_{19}	1.13
n C_{17}/*n* C_{29}	4.80
CPI Marzi[4]	1.00
Normal Paraffins	34.3
Isoprenoids	4.9
Cycloparaffins	4.7
Branched (iso-) Paraffins	6.2
BTX aromatics	0.6
Resolved unknowns	49.0

Thompson[1]		
A.	BZ/*n* C_6	0.01
B.	TOL/*n* C_7	0.07
C.	(*n* C_6+*n* C_7)/(CH+MCH)	2.15
I.	Isoheptane Value	2.32
F.	*n* C_7/MCH	1.67
U.	CH/MCP	1.33
R.	*n* C_7/2MH	3.87
S.	*n* C_6/22DMB	72.27
H.	Heptane Value	33.86
	MCH/*n* C_7	0.60
	mpXYL/*n* C_8	0.15

Mango[2]	
P_1	34.75
P_2	21.86
P_3	7.10
$5N_1$	7.11
N_2	5.82
$6N_1$	23.36
K_1	0.92
K_2	0.79
$5N_1/6N_1$	0.30
P_3/N_2	1.22
ln(24DMP/23DMP)	-1.23

Halpern[3]	
Tr_1	2.07
Tr_2	28.79
Tr_3	10.67
Tr_4	7.44
Tr_5	18.11
Tr_7	1.85
Tr_8	3.12
C_1	0.06
C_2	0.57
C_3	0.17
C_4	0.05
C_5	0.15

[1]Thompson, K.F.M.,1983.GCA:V.47, p.303.[2]Mango, F.D.,1994.GCA: V.58, p.895.[3]Halpern,H.I.,1995,AAPG Bull.: V.79, p.801.[4]Marzi,1993,OrgG;20,1301.

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Project #:**	**05-253-A**
Depth:	**-**	**Lab ID:**	**SU000009**
Sampling Point:		**File Name:**	**G1050495.D**

Peak Label	Compound Name	Ret. Time	Area	Height	ppt (Area)	ppt (Hght)
IC4	Iso-alkane C4	3.926	13644	12916	1.41	3.01
NC4	Normal Alkane C4	4.038	50683	46276	5.23	10.78
IC5	Iso-alkane C5	4.456	70631	60776	7.28	14.16
NC5	Normal Alkane C5	4.688	116754	94998	12.04	22.14
22DMB	2,2-Dimethylbutane	5.123	2094	1552	0.22	0.36
CP	Cyclopentane	5.578	6187	4496	0.64	1.05
23DMB	2,3-Dimethylbutane	5.610	9930	6621	1.02	1.54
2MP	2-Methylpentane	5.690	77719	53738	8.01	12.52
3MP	3-Methylpentane	5.980	50839	33366	5.24	7.78
NC6	Normal Alkane C6	6.384	151327	94980	15.60	22.13
22DMP	2,2-Dimethylpentane	7.040	1940	1179	0.20	0.28
MCP	Methylcyclopentane	7.096	36469	20739	3.76	4.83
24DMP	2,4-Dimethylpentane	7.230	5437	3000	0.56	0.70
223TMB	2,2,3-Trimethylbutane	7.383	411	207	0.04	0.05
BZ	Benzene	7.861	1986	772	0.21	0.18
33DMP	3,3-Dimethylpentane	8.053	1604	809	0.17	0.19
CH	Cyclohexane	8.166	48631	24990	5.01	5.82
2MH	2-Methylhexane	8.551	41622	21121	4.29	4.92
23DMP	2,3-Dimethylpentane	8.599	18626	9661	1.92	2.25
11DMCP	1,1-Dimethylcyclopentane	8.685	5596	2671	0.58	0.62
3MH	3-Methylhexane	8.890	59720	29639	6.16	6.91
1C3DMCP	1-cis-3-Dimethylcyclopentane	9.118	11043	5334	1.14	1.24
1T3DMCP	1-trans-3-Dimethylcyclopentane	9.231	10357	4983	1.07	1.16
3EP	3-Ethylpentane	9.313	4882	3135	0.50	0.73
1T2DMCP	1-trans-2-Dimethylcyclopentane	9.344	22334	10375	2.30	2.42
NC7	Normal Alkane C7	9.950	161099	73958	16.61	17.23
ISTD	Internal Standard	10.163	34331	15191	3.54	3.54
MCH	Methylcyclohexane	10.785	96724	41480	9.97	9.67
113TMCP	1,1,3,-Trimethylcyclopentane	10.952	7723	3124	0.80	0.73
ECP	Ethylcyclopentane	11.360	10633	4587	1.10	1.07
124TMCP	1,2,4-Trimethylcyclopentane	11.808	8187	3504	0.84	0.82
123TMCP	1,2,3-Trimethylcyclopentane	12.177	10065	4247	1.04	0.99
TOL	Toluene	12.505	11580	4017	1.19	0.94
NC8	Normal Alkane C8	15.167	153749	54954	15.85	12.81
IP9	Isoprenoid C9	17.017	33128	12290	3.42	2.86
MXYL	m-Xylene	18.233	17308	6366	1.79	1.48
PXYL	p-Xylene	18.299	5800	2064	0.60	0.48
OXYL	o-Xylene	19.492	15559	4992	1.60	1.16
NC9	Normal Alkane C9	20.912	139232	47322	14.36	11.03
IP10	Isoprenoid C10	22.878	38171	13165	3.94	3.07
NC10	Normal Alkane C10	26.502	120899	40162	12.47	9.36
IP11	Isoprenoid C11	27.787	32603	10982	3.36	2.56
NC11	Normal Alkane C11	31.752	117288	37101	12.09	8.65
NC12	Normal Alkane C12	36.666	98032	31752	10.11	7.40
IP13	Isoprenoid C13	37.395	29179	8550	3.01	1.99
IP14	Isoprenoid C14	40.147	22178	7211	2.29	1.68
NC13	Normal Alkane C13	41.266	91494	28681	9.43	6.68
IP15	Isoprenoid C15	44.694	26859	7899	2.77	1.84
NC14	Normal Alkane C14	45.590	86806	26732	8.95	6.23
IP16	Isoprenoid C16	48.240	29743	7052	3.07	1.64
NC15	Normal Alkane C15	49.666	83045	24373	8.56	5.68

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Project #:**	**05-253-A**
Depth:	**-**	**Lab ID:**	**SU000009**
Sampling Point:		**File Name:**	**G1050495.D**

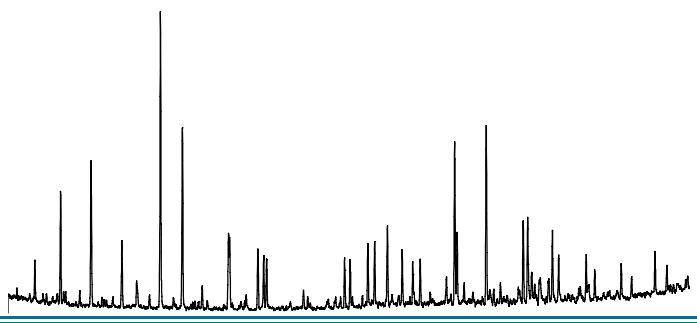
Peak Label	Compound Name	Ret. Time	Area	Height	ppt (Area)	ppt (Hght)
NC16	Normal Alkane C16	53.522	72933	22102	7.52	5.15
IP18	Isoprenoid C18	55.444	25032	5351	2.58	1.25
NC17	Normal Alkane C17	57.177	68344	19998	7.05	4.66
IP19	Isoprenoid C19 (Pristane)	57.521	20218	3757	2.09	0.88
PHEN	Phenanthrene	58.616	2850	608	0.29	0.14
NC18	Normal Alkane C18	60.648	61764	18653	6.37	4.35
IP20	Isoprenoid C20 (Phytane)	61.101	21077	3791	2.17	0.88
NC19	Normal Alkane C19	63.955	54514	15584	5.62	3.63
NC20	Normal Alkane C20	67.112	53430	14811	5.51	3.45
NC21	Normal Alkane C21	70.121	43169	12224	4.45	2.85
C25HBI	Highly Branch Isoprenoid C25	70.370	2205	466	0.23	0.11
NC22	Normal Alkane C22	73.010	38699	10655	3.99	2.48
NC23	Normal Alkane C23	75.775	32847	9229	3.39	2.15
NC24	Normal Alkane C24	78.433	28557	8136	2.95	1.90
NC25	Normal Alkane C25	80.984	25176	6663	2.60	1.55
NC26	Normal Alkane C26	83.441	22541	6062	2.32	1.41
NC27	Normal Alkane C27	85.810	18638	5107	1.92	1.19
NC28	Normal Alkane C28	88.102	15980	4094	1.65	0.95
NC29	Normal Alkane C29	90.307	14247	3666	1.47	0.85
NC30	Normal Alkane C30	92.444	12144	3076	1.25	0.72
NC31	Normal Alkane C31	94.511	9481	2413	0.98	0.56
NC32	Normal Alkane C32	96.516	7576	1875	0.78	0.44
NC33	Normal Alkane C33	98.460	6917	1572	0.71	0.37
NC34	Normal Alkane C34	100.340	5675	1327	0.59	0.31
NC35	Normal Alkane C35	102.181	4154	893	0.43	0.21
NC36	Normal Alkane C36	104.137	3237	611	0.33	0.14
NC37	Normal Alkane C37	106.321	2350	404	0.24	0.09
NC38	Normal Alkane C38	108.803	1897	281	0.20	0.07
NC39	Normal Alkane C39	111.668	1235	166	0.13	0.04
NC40	Normal Alkane C40	114.960	870	110	0.09	0.03
NC41	Normal Alkane C41	118.818	755	65	0.08	0.02

BASELINE DGSI
ANALYTICAL LABORATORIES

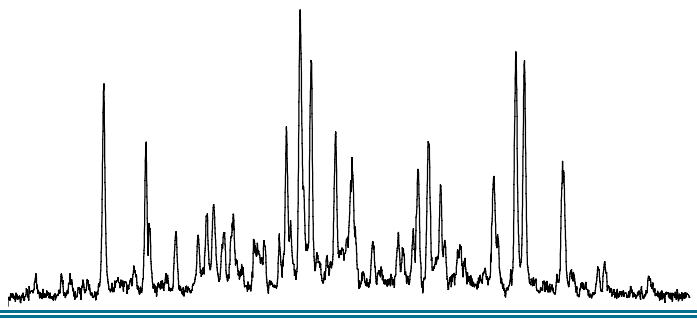
SATURATE GCMS

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Country:	**UNITED STATES**	**Project #:**	**05-253-A**
Basin:		**Lab ID:**	**SU000009**
Lease:		**Sample Type:**	**OIL**
Block:		**Sampling Point:**	
Field:		**Formation:**	**NAVAJO SANDSTONE**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Geologic Age:**	**JURASSIC**
Latitude:		**Top Depth:**	
Longitude:		**Bottom Depth:**	

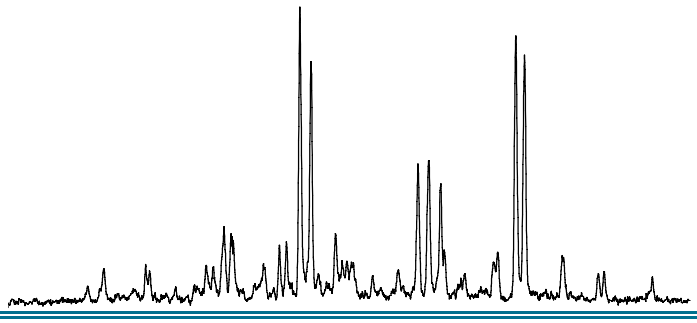
***m/z* 191: Tri- and Pentacyclics** M2050408.D



***m/z* 217: Steranes** M2050408.D



***m/z* 218: ββ Steranes** M2050408.D



RATIOS (on Areas)[1]		Appl[2]	TEV[3]
Steranes (*m/z* 217; 218)			
%C_{27} αββS (218)	35.7	D	
%C_{28} αββS (218)	24.8	D	
%C_{29} αββS (218)	39.4	D	
%C_{27} αααR (217)	39.6	D	
%C_{28} αααR (217)	17.8	D	
%C_{29} αααR (217)	42.6	D	
S/(S+R) (C_{29} ααα) (217)	0.46	M	0.55 (0.8%)
ββS/(ββS+ααR) (C29) (217)	0.57	M	0.70 (0.9%)
(C_{21}+C_{22})/(C_{27}+C_{28}+C_{29}) (217)	0.15		
C_{27}/C_{29} (αββS) (218)	0.91	D	
C_{28}/C_{29} (αββS) (218)	0.63	D	
Diaster/ααα Ster (C_{27}) (217)	1.07	M/D	1.00 (1.4%)
C30 αββS Sterane Index (218)	4.2	D	
C30 S+R Sterane Index (218)	4.2	D	
Terpanes (*m/z* 191)			
Oleanane/Hopane		D/A	
Gammacerane/Hopane	0.22	D	
Norhopane/Hopane	0.88	D	
Bisnorhopane/Hopane			
Diahopane/Hopane	0.11	M/D	
Moretane/Hopane	0.12	M	0.05 (0.7%)
25-*nor* -hopane/hopane		B	
Ts/(Ts+Tm) trisnorhopanes	0.60	M/D	1.00 (1.4%)
C29Ts/C29 Hopane	0.49	M	
H32 S/(R+S) Homohopanes	0.61	M	0.60 (0.6%)
H35/H34 Homohopanes	1.23	D	
C24 Tetracyclic/Hopane	0.35	D	
C24 Tetracyclic/C26 Tricyclics	0.58	D	
C23/C24 Tricyclic terpanes	1.57	D	
C19/C23 Tricyclic terpanes	0.12	D	
C26/C25 Tricyclic terpanes	0.77	D	
(C28+C29 Tricyclics)/Ts	2.68	A	
Various (*m/z* 191; 217)			
Steranes/Hopanes	0.60	D	
Tricyclic terpanes/Hopanes	1.27	M	1.00 (1.4%)
Tricyclic terpanes/Steranes	2.10	M/D	1.00 (1.4%)

[1]Definition and utility of the ratios can be found on our website www.BaselineDGSI.com

[2]A=Source Age; D=Depositional environment; M= Maturity; B=Possible Biodegradation

[3]Thermal equilibrium value of the biomarker ratio and in brackets the approximate VR value at which this value is reached

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Project #:**	**05-253-A**
Depth:	**-**	**Lab ID:**	**SU000009**
Sampling Point:		**File Name:**	**M2050408.D**

Ion	Peak Label	Compound Name	Ret. Time	Area	Height	ppm (Area)	ppm (Hght)
217	CHOL	*5β cholane (internal standard)*	42.334	15165	2131	100.0	100.0
123	LABD	labdane					
123	RIMU	rimuane					
123	PIM	pimarane					
123	ENTBEY	ent-beyerane					
123	ISOPIM	isopimarane					
123	B_PHYLLO	β-phyllocladane					
123	B_KAUR	β-kaurane					
123	A_PHYLLO	α-phyllocladane					
125	BCAROT	β-carotane					
187	4MDIAM	4-methyldiamantane	9.349	3202	1163	21.1	54.6
187	1MDIAM	1-methyldiamantane	9.941	2369	729	15.6	34.2
187	3MDIAM	3-methyldiamantane	10.325	1936	596	12.8	28.0
188	DIAM	diamantane	9.192	3263	1198	21.5	56.2
191	TR19	C19 tricyclic terpane	18.986	4169	724	27.5	34.0
191	TR20	C20 tricyclic terpane	21.809	11690	1965	77.1	92.2
191	TR21	C21 tricyclic terpane	25.155	17870	2528	117.8	118.6
191	TR22	C22 tricyclic terpane	28.553	8465	1176	55.8	55.2
191	TR23	C23 tricyclic terpane	32.797	34305	5144	226.2	241.4
191	TR24	C24 tricyclic terpane	35.203	21881	3133	144.3	147.0
191	DESAOL	des-A-oleanane					
191	DESALU	des-A-lupane					
191	TR25A	C25 tricyclic terpane (a)	40.276	9746	1329	64.3	62.4
191	TR25B	C25 tricyclic terpane (b)	40.416	7663	1261	50.5	59.2
191	DESEHOP	des-E-hopane	43.519	7715	1064	50.9	49.9
191	TR26A	C26 tricyclic terpane (a)	44.164	6648	936	43.8	43.9
191	TR26B	C26 tricyclic terpane (b)	44.461	6678	880	44.0	41.3
191	TR28A	C28 tricyclic terpane (a)	53.056	5797	892	38.2	41.9
191	TR28B	C28 tricyclic terpane (b)	53.666	5943	859	39.2	40.3
191	TR29A	C29 tricyclic terpane (a)	55.619	7702	1104	50.8	51.8
191	TR29B	C29 tricyclic terpane (b)	56.369	7100	1126	46.8	52.8
191	TR30A	C30 tricyclic terpane (a)	60.553	5039	761	33.2	35.7
191	TR30B	C30 tricyclic terpane (b)	61.373	5306	822	35.0	38.6
191	TS	Ts 18α(H)-trisnorhopane	57.764	9906	1410	65.3	66.2
191	TM	Tm 17α(H)-trisnorhopane	59.385	6619	993	43.6	46.6
191	H28	C28 17α18α21β(H)-bisnorhopane					
191	NOR25H	C29 Nor-25-hopane					
191	H29	C29 Tm 17α(H)21β(H)-norhopane	65.173	19550	2853	128.9	133.9
191	C29TS	C29 Ts 18α(H)-norneohopane	65.435	9482	1276	62.5	59.9
191	DH30	C30 17α(H)-diahopane	66.220	2450	395	16.2	18.5
191	M29	C29 normoretane	67.178	1728	232	11.4	10.9
191	OL	oleanane					
191	H30	C30 17α(H)-hopane	68.643	22192	3124	146.3	146.6
191	M30	C30 moretane	70.212	2733	390	18.0	18.3

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Project #:**	**05-253-A**
Depth:	**-**	**Lab ID:**	**SU000009**
Sampling Point:		**File Name:**	**M2050408.D**

Ion	Peak Label	Compound Name	Ret. Time	Area	Height	ppm (Area)	ppm (Hght)
191	H31S	C31 22S 17α(H) hopane	72.723	10193	1448	67.2	67.9
191	H31R	C31 22R 17α(H) hopane	73.211	11440	1505	75.4	70.6
191	GAM	gammacerane	73.647	4790	544	31.6	25.5
191	H32S	C32 22S 17α(H) hopane	75.931	8504	1250	56.1	58.7
191	H32R	C32 22R 17α(H) hopane	76.611	5417	810	35.7	38.0
191	H33S	C33 22S 17α(H) hopane	79.644	5461	835	36.0	39.2
191	H33R	C33 22R 17α(H) hopane	80.569	3973	569	26.2	26.7
191	H34S	C34 22S 17α(H) hopane	83.498	4218	634	27.8	29.8
191	H34R	C34 22R 17α(H) hopane	84.648	2836	394	18.7	18.5
191	H35S	C35 22S 17α(H) hopane	87.194	5437	771	35.9	36.2
191	H35R	C35 22R 17α(H) hopane	88.519	3216	492	21.2	23.1
205	H31_2ME	C31- 2α-methylhopane	68.992	573	98	3.8	4.6
205	H31S_205	C31 22S 17α(H) hopane	72.705	3014	465	19.9	21.8
205	H31R_205	C31 22R 17α(H) hopane	73.194	2242	335	14.8	15.7
205	H31_3ME	C31 3β-methylhopane	73.978	525	80	3.5	3.8
217	S21	C21 sterane	29.128	8373	1026	55.2	48.1
217	S22	C22 sterane	33.860	3498	457	23.1	21.4
217	DIA27S	C27 βα 20S diasterane	48.523	5471	722	36.1	33.9
217	DIA27R	C27 βα 20R diasterane	50.075	3309	525	21.8	24.6
217	DIA28SA	C28 βα 20S diasterane a	52.324	2460	281	16.2	13.2
217	DIA28SB	C28 βα 20S diasterane b	52.550	3060	312	20.2	14.6
217	DIA28RA	C28 βα 20R diasterane a	54.015	1593	193	10.5	9.1
217	DIA28RB	C28 βα 20R diasterane b	54.154	1332	179	8.8	8.4
217	C27S	C27 αα 20S sterane	55.218	4027	569	26.6	26.7
217	BB_D29S	C27 ββ 20R + C29 dia20S	55.724	9614	961	63.4	45.1
217	C27BBS	C27 ββ 20S sterane	56.125	5986	790	39.5	37.1
217	C27R	C27 αα 20R sterane	57.031	4181	549	27.6	25.8
217	DIA29R	C29 βα 20R diasterane	57.624	5482	462	36.1	21.7
217	C28S	C28 αα 20S sterane	59.333	1565	208	10.3	9.8
217	C28BBR	C28 ββ 20R sterane(+5 βαα)	60.048	3458	419	22.8	19.7
217	C28BBS	C28 ββ 20S sterane	60.414	4631	511	30.5	24.0
217	C28R	C28 αα 20R sterane	61.582	1880	163	12.4	7.6
217	C29S	C29 αα 20S sterane	62.837	3771	391	24.9	18.3
217	C29BBR	C29 ββ 20R sterane(+5 βαα)	63.639	6622	808	43.7	37.9
217	C29BBS	C29 ββ 20S sterane	63.953	6075	778	40.1	36.5
217	C29R	C29 αα 20R sterane	65.348	4502	448	29.7	21.0
218	C27ABBR	C27 ββ 20R sterane	55.706	10613	1508	70.0	70.8
218	C27ABBS	C27 ββ 20S sterane	56.125	8693	1230	57.3	57.7
218	C28ABBR	C28 ββ 20R sterane	60.048	5430	708	35.8	33.2
218	C28ABBS	C28 ββ 20S sterane	60.449	6039	725	39.8	34.0
218	C29ABBR	C29 ββ 20R sterane	63.639	10535	1364	69.5	64.0
218	C29ABBS	C29 ββ 20S sterane	63.953	9596	1265	63.3	59.4
218	C30ABBR	C30 ββ 20R sterane	66.655	1163	149	7.7	7.0
218	C30ABBS	C30 ββ 20S sterane	66.865	1061	160	7.0	7.5

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Project #:**	**05-253-A**
Depth:	**-**	**Lab ID:**	**SU000009**
Sampling Point:		**File Name:**	**M2050408.D**

Ion	Peak Label	Compound Name	Ret. Time	Area	Height	ppm (Area)	ppm (Hght)
259	D27S	C27 βα 20S diasterane	48.506	3053	428	20.1	20.1
259	D27R	C27 βα 20R diasterane	50.075	2131	312	14.1	14.6
259	D28SA	C28 βα 20S diasterane a	52.341	1083	113	7.1	5.3
259	D28SB	C28 βα 20S diasterane b	52.585	1157	137	7.6	6.4
259	D28RA	C28 βα 20R diasterane a	54.015	972	118	6.4	5.5
259	D28RB	C28 βα 20R diasterane b	54.207	548	87	3.6	4.1
259	D29S	C29 βα 20S diasterane	55.776	3553	277	23.4	13.0
259	D29R	C29 βα 20R diasterane	57.641	2050	166	13.5	7.8
259	C30TP1	C30 tetracyclic polyprenoid	67.144	944	131	6.2	6.1
259	C30TP2	C30 tetracyclic polyprenoid	67.300	888	122	5.9	5.7

Company:	**UTAH GEOLOGICAL SURVEY**	**Client ID:**	**17-1 KINGS MEADOW**
Well Name:	**17-1 KINGS MEADOW RANCHES**	**Project #:**	**05-253-A**
Depth:	**-**	**Lab ID:**	**SU000009**
Sampling Point:		**File Name:**	**M2050408.D**

Miscellaneous Ratios	By Areas	By Heights
Steroids		
%C27 αββS (218)	35.7	38.2
%C28 αββS (218)	24.8	22.5
%C29 αββS (218)	39.4	39.3
C30 αββS Sterane Index (218)	4.2	4.7
C30 S+R Sterane Index (218)	4.2	4.3
C_{27}/C_{29} (αββS) (218)	0.91	0.97
C_{28}/C_{29} (αββS) (218)	0.63	0.57
C_{29}/C_{27} (αββS) (218)	1.10	1.03
%C27 αααR (217)	39.6	47.3
%C28 αααR (217)	17.8	14.1
%C29 αααR (217)	42.6	38.6
S/R (C_{29} ααα) (217)	0.84	0.87
S/(S+R) (C_{29} ααα) (217)	0.46	0.47
ββ/(αα+ββ) (C_{29}) (217)	0.61	0.65
αββS/αααR (C_{29}) (217)	1.35	1.74
(C_{21}+C_{22})/(C_{27}+C_{28}+C_{29}) (217)	0.15	0.16
Diaster/ααα Ster (C_{27}) (217)	1.07	1.12
Terpenoids		
C19/C23 Tricyclic terpanes	0.12	0.14
C23/C24 Tricyclic terpanes	1.57	1.64
C26/C25 Tricyclic terpanes	0.77	0.70
C24 Tetracyclic/C26 Tricyclics	0.58	0.59
C24 Tetracyclic/Hopane	0.35	0.34
Ts/Tm trisnorhopanes	1.50	1.42
Ts/(Ts+Tm) trisnorhopanes	0.60	0.59
C29Ts/C29 Hopane	0.49	0.45
Bisnorhopane/Hopane		
Norhopane/Hopane	0.88	0.91
Diahopane/Hopane	0.11	0.13
Oleanane/Hopane		
Gammacerane/Hopane	0.22	0.17
Moretane/(Moretane+Hopane)	0.11	0.11
H32 S/(S+R) Homohopanes	0.61	0.61
H35/H34 Homohopanes	1.23	1.23
[Steranes]/[Hopanes]	0.60	0.49
[Tricyclic terpanes]/[Hopanes]	1.27	1.31
[Tricyclic terpanes]/[Steranes]	2.10	2.66