UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Rock-Eval pyrolysis data for petroleum-potential evaluation based on well cuttings and core samples from Eastern Nevada collected during 1990

by

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Open-File Report 90-698

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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1990

CONTENTS

Page
Contents..... 2
Introduction..... 3
Rock-Eval Pyrolysis..... 3
Acknowledgments..... 3
Well location and sample number key..... 4
Abbreviations.....4
Rock-Eval Data..... 6
References..... 6
Rock-Eval Results..... 7

INTRODUCTION

This report makes available recent Rock-Eval analyses measured as part of a thermal maturity study of eastern Nevada. Recent general discussions of the interpretation of Rock-Eval data are: Katz, 1983; Peters, 1986; Langford and Blanc-Valleron, 1990.

The well samples were collected from the Nevada Bureau of Mines and Geology (NBMG) core library at the University of Nevada, Reno. The well list includes a "NV permit no." column to cross reference our data to the more complete well information in Garside et al. (1988) and in the files of the NBMG.

ROCK-EVAL PYROLYSIS

Rock-Eval pyrolysis and measurement of total organic carbon (TOC) qualitatively evaluate organic matter geochemistry and thermal maturity but must be used with qualification of results from low-organic matter rocks and with caution if organic contamination is present (Peters, 1986). Even with these limitations, the trends shown by Rock-Eval results, if checked by quantitative chemical analysis and organic petrography, can be useful indicators of thermal maturation and petroleum generation potential in a system. In clay-rich rocks containing less than 0.5 weight percent TOC humic organic matter, the hydrogen index (HI) is likely to be too low and Tmax too high (See Rock Eval data section below or see Peters (1986) for a further discussion of terminology). We usually ignore results from samples with less than 0.5 weight percent TOC to avoid these problems.

Organic drilling mud additives can increase HI. Samples contaminated by particulate mud additives were detected by examination under a binocular microscope and removed by sieving, picking with tweezers, or blowing on the sample to float off the lighter organic materials.

Rock-Eval pyrolysis also is influenced by migrated oil or bitumen. Such migration produces an S1 peak greater than 2 mg hydrocarbon (HC)/g rock, an anomalously high transformation ratio and low Tmax as compared to adjacent samples, and a bimodal S2 peak. The low Tmax may also be related to weak S2 peaks resulting from low TOC values and not from organic contamination. Generally no oil staining or bitumen was observed in these samples, so migrated hydrocarbon is not a common factor in these samples at least at the low power magnification level of observation.

ACKNOWLEDGMENTS

We thank Becky Weimer and Ron Hess of the NBMG for expediting and enabling our sampling program. Dr. Jon Price, Director, NBMG, allowed us access to the core library, which has the best integration of well information and sample availability data that we have found.

WELL LOCATION AND SAMPLE KEY

ABBREVIATIONS

The following abbreviations are used in this table and report: sec. = section; Twp. = township; NV Permit no. refers to the Nevada State well permit number; Gov't = Government; N/A = not available; Sample no. = USGS internal control number; Sample wt. = Sample weight in milligrams.

Operator + Well name Sample no.	Sec., Twp., Range	NV permit no.
Clark County		
Brown Wilson (Gov't.) 1 Sample no. 90066-032 to 042	24, 21 S., 61 E.	33
Chevron Colorock Quarry 1 Sample no. 90066-043 to 053	22, 18 S., 65 E.	319
Jayhawk Federal Indian Springs 1 Sample no. 90067-024 to 029	6, 17 S., 57 E.	344
Mobil Virgin River 1A Sample no. 90066-054 to 070	9, 15 S., 68 E.	272
Sun 1 Blue Diamond Federal Sample no. 90066-018 to 024	25, 21 S., 59 E.	462
Elko County		
Amoco Huntington Creek 1 Sample no. 90059-001 to 004	30, 31 N., 56 E.	266
Diamond Shamrock Magneson 22-21 Sample no. 90067-050 to 057	21, 35 N., 55 E.	428
Richfield Scott Ogilive 1 Sample no. 90066-001 to 009	22, 43 N., 52 E.	32
US Geological Survey EOS 3 Sample no. 90098-001 to 035	36, 34 N. ,55 E.	N/A
Wexpro Cord 24-1 Sample no. 90067-001 to 013	24, 29 N., 55 E.	246
Wexpro Jiggs Unit 2 Sample no. 90067-030 to 033	19, 28 N., 64 E.	297
Wexpro Jiggs 10-1 Sample no. 90092-021 to 029	10, 29 N., 55 E.	263
Eureka County		
Amoco East Henderson Creek 1 Sample no. 90092-033 to 043	16, 25 N., 51 E.	425
Depco Silver State Federal 33-18 Sample no. 90092-003 to 005	18, 20 N., 50 E.	322
Shell Diamond Valley Unit 1 Sample no. 90092-050 to 054	30, 23 N., 54 E.	29

Operator + Well name Sample no.	Sec., Twp., Range	NV permit no.
Lincoln County		
Amoco Dutch John Unit 1 Sample no. 90067-034 to 044	21, 7 N., 66 E.	421
Amoco Garden Valley 1 Sample no. 90092-030 to 032	27, 2 N., 57 E.	470
Texaco Federal 1 Sample no. 90067-045 to 049	18, 12 S., 65 E.	155
Nye County		
BTA Stone Cabin 1 Sample no. 90092-044 to 049	6, 5 N., 48 E.	456
Celsius Duckwater Federal 1-9 Sample no. 900059-022 to 024	9, 12 N., 57 E.	419
Meridian Spencer Federal 32-29 Sample no. 90059-016 to 021	29, 9 N., 57 E.	446
Northwest Blue Eagle 1 Sample no. 90092-001 to 002	13, 9 N., 57 E.	183
Northwest Trap Spring 20-X Sample no. 90092-009	22, 9 N., 56 E.	233
Northwest Warm Spring Unit 1 Sample no. 90067-020 to 023	32, 8 N., 56 E.	231
Northwest White River 1 Sample no. 90067-014 to 019	2, 7 N., 61 E.	179
Shell Eagle Springs Unit 4 Sample no. 90092-055 to 056	22, 8 N., 57 E.	25
Supron Lease F-27-6-55 no. 1 Sample no. 90066-025 to 031	27, 6 N., 55 E.	276
Supron Lease F-30-4-55 no. 1 Sample no. 90059-005 to 015	30, 4 N., 55 E.	280
White Pine County		
Amoco Stage Line Unit 1A Sample no. 90092-010 to 020	22, 23 N., 56 E.	427
Standard-Conoco Meridian Unit 1 Sample no. 90058-001 to 030	31, 16 N., 56 E.	WP5

ROCK EVAL DATA

Analyses performed on a Delsi Rock-Eval II system. Abbreviations, units, and terminology used at the column headers mostly discussed by Espitalie et al. (1977) and Peters (1986). Recent general discussions of the interpretation of Rock-Eval data are: Katz, 1983; Peters, 1986; Langford and Blanc-Valleron, 1990. Specific definitions for Rock Eval data reports are as follows: S1 and S2 are the first and second peaks of hydrocarbon yield occurring during pyrolysis of the sample; S3 is the amount of CO_2 generated during pyrolysis; TOC is total organic carbon; Tmax is the temperature at which the S2 peak occurs during pyrolysis of kerogen; Hydrogen index (HI) = (S2/TOC)x100; Oxygen index (OI) = (S3/TOC)x100; PI = Transformation ratio = S1/(S1+S2); PC = pyrolysable carbon in the sample.

A zero reported value in the Tmax column indicates Tmax values considered by the analyst to be unreliable due to low concentration of S2. Zeros in other columns indicate the sample did not produce a complete pyrogram, and this parameter could not be computed.

REFERENCES

Espitalie, J., Laporte, J.L., Madec, M., Marquis, F., Leplat, P., Paulet, J., Boutefeu, A., 1977, Rapid method of characterizing source rocks and their petroleum potential and degree of maturity: Revue de l'Institut Francais du Petrole, v. 32, p. 23-42.

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Katz, B.J., 1983, Limitations of 'Rock-Eval' pyrolysis for typing organic matter: Organic Geochemistry, v. 4, p. 195-199.

Langford, F.F. and Blanc-Valleron, M.-M., 1990, Interpreting Rock-Eval pyrolysis data using graphs of pyrolizable hydrocarbons vs. total organic carbon: American Association of Petroleum Geologists Bulletin, v. 70, no. 6, p. 799-804.

Peters, K.E., 1986, Guidelines for evaluating petroleum source rock using programmed pyrolysis: American Association of Petroleum Geologists Bulletin, v. 70, no. 3, p. 318-329.

PROJECT #90-058

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90058001	486	103.7	437	1.58	43.2	1.04	0.04	41.53	3.73	7.33	589	14
90058002	1028	195.4	435	0.2	1.78	0.28	0.1	6.35	0.16	0.83	214	33
90058003	1582	172.1	440	0.15	2.27	0.36	0.06	6.3	0.2	1.05	216	34
90058004	1811	211.3	435	0.16	1.89	0.42	0.08	4.5	0.17	0.83	227	50
90058005	2267	245.2	426	0.05	0.09	0.25	0.36	0.36	0.01	0.13	69	192
90058006	2286	221.2	433	0.26	0.76	0.45	0.25	1.68	0.08	0.53	143	84
90058007	2338	200.8	436	0.19	0.84	0.24	0.19	3.5	0.08	0.48	175	50
90058008	2472	167.6	438	0.21	2.84	0.36	0.07	7.88	0.25	1.27	223	28
90058009	2777	200.6	440	0.41	3.42	0.81	0.11	4.22	0.31	1.88	181	43
90058010	4028	235.2	446	0.04	0.17	0.14	0.2	1.21	0.01	0.19	89	73
90058011	4885	234.9	438	0.05	0.08	0.12	0.42	0.66	0.01	0.15	53	80
90058012	5682	248.3	0	0.02	0.04	0.13	0.33	0.3	0	0.25	16	52
90058013	6100	244.7	405	0.04	0.05	0.09	0.5	0.55	0	0.09	55	100
90058014	6413	236	427	0.08	0.1	0.13	0.44	0.76	0.01	0.1	100	130
90058015	6688	245.5	0	0.03	0.03	0.08	0.5	0.37	0	0.12	25	66
90058016	6947	236.7	0	0.02	0.02	0.16	0.5	0.12	0	0.17	11	94
90058017	7225	239.7	0	0.02	0.01	0.18	1	0.05	0	0.16	6	112
90058018	7725	239	0	0.01	0.04	0.14	0.25	0.28	0	0.11	36	127
90058019	7729	216	438	0.11	0.13	0.14	0.46	0.92	0.02	0.5	26	28
90058020	7943	249.7	0	0.01	0.01	0.1	0.5	0.1	0	0.15	6	66
90058021	8120	225.7	0	0.04	0.03	0.15	0.67	0.2	0	0.12	25	125
90058022	8324	242.6	0	0	0	0.11	0	0	0	0.08	0	137
90058023	8586	241.5	0	0	0	0.12	0	0	0	0.12	0	100
90058024	8834	246.5	419	0.05	0.04	0.15	0.62	0.26	0	0.1	40	150
90058025	9034	211.4	0	0.01	0.01	0.11	0.5	0.09	0	0.18	5	61
90058026	9173	238.9	0	0	0.02	0.17	0	0.11	0	0.14	14	121
90058027	9400	248.1	0	0	0	0.1	0	0	0	0.15	0	66
90058028	9600	236.5	0	0.04	0.05	0.16	0.5	0.31	0	0.17	29	94
90058029	10073	242	0	0.01	0.02	0.09	0.5	0.22	0	0.05	40	180
90058030	10305	241.1	0	0.01	0.03	0.12	0.25	0.25	0	0.08	37	150

PROJECT #90-059

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90059001	4120	216.6	430	0.07	0.45	0.27	0.13	1.66	0.04	0.28	160	96
90059002	6280	234.1	441	0.64	22.41	0.58	0.03	38.63	1.92	3.45	649	16
90059003	6730	223.7	433	0.18	1.38	0.48	0.12	2.87	0.13	1.22	113	39
90059004	7194	243.4	440	0.15	0.24	0.44	0.39	0.54	0.03	0.51	47	86
90059005	260	193.5	0	0.16	0.23	0.8	0.42	0.28	0.03	0.26	88	307
90059006	810	218	0	0.01	0.04	0.38	0.25	0.1	0	0.02	200	1900
90059007	1890	236.6	0	0	0.03	0.2	0	0.15	0	0	0	0
90059008	2700	243.7	0	0.01	0	0.17	0	0	0	0.01	0	1700
90059009	3640	230.8	0	0.04	0.03	0.11	0.67	0.27	0	0.02	150	550
90059010	4950	244.2	0	0.01	0.03	0.23	0.25	0.13	0	0.02	150	1150
90059011	5990	221.1	0	0.02	0.01	0.09	1	0.11	0	0.02	50	450
90059012	6420	222.6	0	0.04	0.04	0.12	0.5	0.33	0	0.03	133	400
90059013	7050	230.9	0	0.03	0.04	0.1	0.5	0.4	0	0.02	200	500
90059014	7770	240.7	0	0.02	0	0.1	1	0	0	0.02	0	500
90059015	8120	245	0	0.03	0.08	0.14	0.3	0.57	0	0.02	400	700
90059016	5120	206.7	0	0.18	0.19	0.35	0.5	0.54	0.03	0.23	82	152
90059017	7000	205	0	0.17	0.2	0.56	0.47	0.35	0.03	0.29	68	193
90059018	9160	192.3	0	0.07	0.09	0.26	0.44	0.34	0.01	0.25	36	104
90059019	11800	161.1	432	0.1	1.3	0.62	0.07	2.09	0.11	1.33	97	46
90059020	12480	238.1	439	0.05	0.39	2.04	0.11	0.19	0.03	1.04	37	196
90059021	14480	206	435	0.34	2.05	0.74	0.14	2.77	0.19	1.28	160	57
90059022	6190	243.5	425	0.12	0.56	0.53	0.18	1.05	0.05	0.25	224	212
90059023	6680	221.6	423	0.17	0.53	0.71	0.24	0.74	0.05	0.78	67	91
90059024	7080	246.4	441	0.13	1.35	1.1	0.09	1.22	0.12	1.68	80	65

5

PROJECT #90-066

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90066001	550	209.6	440	0.04	1.03	0.63	0.04	1.63	0.08	0.84	122	75
90066002	1080	27.4	446	0.32	9.56	1.2	0.03	7.96	0.82	4.19	228	28
90066003	1123	120.7	445	0.26	5	0.87	0.05	5.74	0.43	2.26	221	38
90066004	1649	166.8	446	0.16	1.31	0.52	0.11	2.51	0.12	0.89	147	58
90066005	1730	168.5	452	0.18	1.81	0.52	0.09	3.48	0.16	1.31	138	39
90066006	1990	81.4	452	0.25	5.3	0.63	0.05	8.41	0.46	2.14	247	29
90066007	2600	233.3	440	0.05	0.13	0.37	0.28	0.35	0.01	0.22	59	168
90066008	3180	237.5	428	0.07	0.13	0.37	0.35	0.35	0.01	0.31	41	119
90066009	3386	240.1	0	0.18	0.13	0.41	0.6	0.31	0.02	0.26	50	157
90066018	1000	247.4	0	0.06	0.09	0.21	0.43	0.42	0.01	0.12	75	175
90066019	1310	249	0	0.11	0.14	0.09	0.46	1.55	0.02	0.06	233	150
90066020	2680	204.1	0	0.11	0.13	0.25	0.46	0.52	0.02	0.1	130	250
90066021	3670	245.1	0	0.06	0.08	0.13	0.43	0.61	0.01	0.07	114	185
90066022	4900	235	0	0.05	0.07	0.23	0.42	0.3	0.01	0.17	41	135
90066023	5160	236.7	0	0.02	0.05	0.15	0.33	0.33	0	0.2	25	75
90066024	5890	235.9	0	0.08	0.37	0.61	0.18	0.6	0.03	0.32	115	190
90066025	1350	172.1	0	0.07	0.22	0.85	0.25	0.25	0.02	0.34	64	250
90066026	2880	195.3	0	0.01	0.02	0.44	0.5	0.04	0	0.08	25	550
90066027	3330	205.5	0	0.02	0.02	0.21	0.5	0.09	0	0.07	28	300
90066028	4020	205.2	0	0.02	0.02	0.26	0.5	0.07	0	0.08	25	325
90066029	4430	248.2	0	0	0	0.22	0	0	0	0.08	0	275
90066030	5020	210.6	0	0.01	0.01	0.22	0.5	0.04	0	0.03	33	733
90066031	6090	244	429	0.02	0.15	0.16	0.12	0.93	0.01	0.19	78	84
90066032	2630	221.6	0	0.18	0.24	0.33	0.43	0.72	0.03	0.11	218	300
90066033	3880	242.2	0	0.19	0.32	0.22	0.38	1.45	0.04	0.11	290	200
90066034	4450	245	0	0.04	0.03	0.17	0.67	0.17	0	0.07	42	242
90066035	4485	249.8	0	0.04	0.06	0.22	0.4	0.27	0	0.11	54	200
90066036	4655	244.8	0	0.06	0.06	0.25	0.5	0.24	0.01	0.11	54	227
90066037	5182	237.6	0	0.08	0.16	0.37	0.33	0.43	0.02	0.09	177	411
90066038	5958	240	0	0.27	0.16	0.48	0.64	0.33	0.03	0.1	160	480
90066039	6251	233	411	0.09	0.12	0.21	0.45	0.57	0.01	0.13	92	161
90066040	6171	239.8	0	0.07	0.08	0.28	0.5	0.28	0.01	0.27	29	103
90066041	6183	229.7	420	0.28	0.3	0.4	0.48	0.75	0.04	0.22	136	181
90066042	6223	246.3	438	0.34	0.85	0.42	0.29	2.02	0.09	0.6	141	70
90066043	1140	249.5	0	0.19	0.17	0.3	0.53	0.56	0.03	0.11	154	272
90066044	1830	187.2	0	0.05	0.09	0.27	0.36	0.33	0.01	0.1	90	270
90066045	2920	248.1	0	0.13	0.31	0.38	0.3	0.81	0.03	0.11	281	345
90066046	3980	232.2	0	0.04	0.12	0.32	0.25	0.37	0.01	0.2	60	160
90066047	4910	201.1	415	0.09	0.18	2.1	0.35	0.08	0.02	0.86	20	244
90066048	5150	233.1	426	0.06	0.14	0.42	0.3	0.33	0.01	0.26	53	161
90066049	5980	216.2	0	0.08	0.09	0.43	0.5	0.2	0.01	0.15	60	286
90066050	7790	241.8	0	0.03	0.06	0.16	0.37	0.37	0	0.12	50	133
90066051	9010	228.7	0	0.03	0.06	0.22	0.37	0.27	0	0.17	35	129
90066052	9410	210.1	421	0.06	0.09	0.25	0.43	0.36	0.01	0.21	42	119

PROJECT #90-066

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90066053	9760	247.4	421	0.08	0.1	0.24	0.44	0.41	0.01	0.16	62	150
90066054	100	225.1	0	0.03	0.03	0.08	0.5	0.37	0	0.03	100	266
90066055	1140	227	0	0.05	0.07	0.32	0.42	0.21	0.01	0.11	63	290
90066056	5050	243	0	0.09	0.07	0.14	0.56	0.5	0.01	0.06	116	223
90066057	7720	234	0	0.07	0.08	0.3	0.5	0.26	0.01	0.09	88	333
90066058	9100	231.4	0	0.02	0.09	0.51	0.2	0.17	0	0.1	90	510
90066059	10070	248	0	0.06	0.12	0.37	0.33	0.32	0.01	0.15	80	246
90066060	11030	242.9	0	0.02	0.06	0.29	0.25	0.2	0	0.12	50	241
90066061	11040	207.5	0	0.08	0.19	0.27	0.31	0.7	0.02	0.21	90	128
90066062	11240	248.8	0	0.04	0.07	0.27	0.4	0.25	0	0.1	70	270
90066063	12000	235.9	0	0.04	0.04	0.31	0.5	0.12	0	0.07	57	442
90066064	15070	248.4	0	0.36	0.12	0.18	0.75	0.66	0.04	0.13	92	138
90066065	15490	249.2	0	0.57	0.79	0.83	0.42	0.92	0.11	0.72	109	115
90066066	16250	250	0	0.15	0.1	0.35	0.62	0.28	0.02	0.12	83	291
90066067	17550	15.6	0	11.15	32.05	31.28	0.26	1.02	3.6	16.32	196	191
90066068	17820	246.2	0	0.17	0.39	1.02	0.3	0.38	0.04	0.38	102	268
90066069	18100	248.3	0	0.13	0.03	0.44	0.81	0.06	0.01	0.19	15	231
90066070	18480	245.6	0	0.14	0.07	0.49	0.7	0.14	0.01	0.2	35	245

PROJECT #90-067

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90067001	1380	171.7	423	0.17	0.78	0.79	0.18	0.98	0.07	0.43	181	183
90067002	2460	244.6	426	0.18	2.2	0.58	0.08	3.79	0.19	0.95	231	61
90067003	4650	202.5	435	0.17	2.15	0.76	0.07	2.82	0.19	0.77	279	98
90067004	5810	215.6	0	0.06	0.08	0.51	0.43	0.15	0.01	0.37	21	137
90067005	6860	232.2	432	0.09	0.31	0.52	0.22	0.59	0.03	0.4	77	130
90067006	7330	194.6	0	0.06	0.06	0.5	0.5	0.12	0.01	0.36	16	138
90067007	8260	232.1	423	0.21	0.28	0.63	0.44	0.44	0.04	0.55	50	114
90067008	9150	54.4	0	0.51	0.53	0.51	0.49	1.03	0.08	1.91	27	26
90067009	9410	48.9	0	0.34	0.77	2.53	0.31	0.3	0.09	2.22	34	113
90067010	11130	47.6	0	0.27	0.16	0.31	0.64	0.51	0.03	1.12	14	27
90067011	11220	29	0	0.2	0.13	0.31	0.62	0.41	0.02	0.88	14	35
90067012	11630	24.8	0	0.28	0.24	0.32	0.54	0.75	0.04	0.66	36	48
90067013	11880	38.5	0	0.46	0.36	0.33	0.56	1.09	0.06	0.94	38	35
90067014	5300	17.6	425	0.56	20.68	5.9	0.03	3.5	1.77	3.63	569	162
90067015	7780	237	429	0.16	1.18	0.75	0.12	1.57	0.11	0.49	240	153
90067016	8150	234.4	432	0.08	0.41	1.8	0.17	0.22	0.04	0.78	52	230
90067017	9200	170.7	435	0.11	0.67	1.61	0.14	0.41	0.06	1.16	57	138
90067018	9600	59.6	452	0.26	3.99	1.02	0.06	3.91	0.35	2.82	141	36
90067019	10400	237.9	434	0.1	0.55	0.5	0.16	1.1	0.05	0.38	144	131
90067020	450	176	0	0.49	2.09	2.9	0.19	0.72	0.21	0.94	222	308
90067021	1060	167.7	0	0.06	0.34	0.95	0.15	0.35	0.03	0.21	161	452
90067022	3390	225.8	0	0.04	0.05	0.25	0.5	0.2	0	0.07	71	357
90067023	4430	241.9	434	0.05	0.08	0.23	0.42	0.34	0.01	0.12	66	191
90067024	598	211.1	439	0.02	0.01	0.2	1	0.05	0	0.08	12	250
90067025	1470	240.2	0	0.01	0	0.13	0	0	0	0.12	0	108
90067026	2460	239.1	0	0.07	0.07	0.15	0.5	0.46	0.01	0.13	53	115
90067027	2670	190.7	0	0.15	0.23	0.28	0.39	0.82	0.03	0.19	121	147
90067028	2750	245.9	0	0.02	0.03	0.12	0.5	0.25	0	0.06	50	200
90067029	3690	226.5	0	0.16	0.26	0.23	0.38	1.13	0.03	0.08	325	287
90067030	6490	46.9	448	0.19	4.69	1.53	0.04	3.06	0.4	0.91	515	168
90067031	7060	205.2	440	0.05	1.71	1.07	0.03	1.59	0.14	0.77	222	138
90067032	8020	169.2	427	0.49	5.01	3.4	0.09	1.47	0.45	3.44	145	98
90067033	8460	246.5	0	1.21	4.8	3.05	0.2	1.57	0.5	2.25	213	135
90067034	450	202.9	0	0.2	0.21	0.28	0.5	0.75	0.03	0.12	175	233
90067035	2800	211.8	0	0.47	0.85	0.66	0.36	1.28	0.11	0.31	274	212
90067036	4970	231.7	0	0.12	0.12	0.24	0.5	0.5	0.02	0.13	92	184
90067037	5840	231.8	440	0.13	0.75	0.5	0.15	1.5	0.07	0.96	78	52
90067038	7000	220.6	455	0.15	0.85	1.32	0.15	0.64	0.08	1.18	72	111
90067039	8000	112.6	476	0.74	3.07	1.13	0.19	2.71	0.31	4.7	65	24
90067040	8120	240.6	425	0.1	0.23	0.56	0.31	0.41	0.02	0.24	95	233
90067041	8640	248.8	0	0.18	0.3	0.42	0.37	0.71	0.04	0.42	71	100
90067042	10000	248.2	0	0.07	0.09	0.2	0.44	0.45	0.01	0.17	52	117
90067043	11000	243.1	0	0.1	0.13	0.2	0.45	0.65	0.01	0.23	56	86
90067044	12700	248.9	0	0.06	0.07	0.16	0.5	0.43	0.01	0.15	46	106
90067045	1410	247.9	431	0.06	0.71	0.75	0.08	0.94	0.06	0.27	262	277
90067046	2460	233.8	465	0.03	0.12	0.36	0.21	0.33	0.01	0.82	14	43
90067047	4050	243.2	418	0.02	0.07	0.25	0.25	0.28	0	0.26	26	96
90067048	5360	215.2	422	0.28	4.01	1.02	0.07	3.93	0.35	1.73	231	58
90067049	6920	242	426	0.02	0.02	0.19	0.5	0.1	0	0.09	22	211
90067050	1500	155	435	0.2	0.34	0.56	0.37	0.6	0.04	0.25	136	224
90067051	2000	151.2	431	0.21	1.17	0.46	0.15	2.54	0.11	0.73	160	63
90067052	3710	170.5	433	0.23	2.81	0.66	0.08	4.25	0.25	1	281	66
90067053	5300	162.6	433	0.27	0.57	0.47	0.32	1.21	0.07	1.1	51	42

PROJECT #90-067

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90067054	6000	209.8	0	0.19	0.14	0.3	0.59	0.46	0.02	0.59	23	50
	6500	197.4	0	0.11	0.08	0.26	0.61	0.3	0.01	0.46	17	56
90067055	7000	223.6	0	0.25	0.12	0.28	0.69	0.42	0.03	0.14	85	200
90067056	8820	55.5	0	1.08	0.5	0.41	0.68	1.21	0.13	0.9	55	45
90067057	8840	82	0	1.03	0.56	0.47	0.65	1.19	0.13	0.87	64	54

PROJECT #90-092

SAMPLE #	'DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90092001	8565	223.2	0	0.21	0.39	1.11	0.35	0.35	0.05	0.29	134	382
90092002	9040	246.3	417	0.12	0.18	0.7	0.4	0.25	0.02	0.13	138	538
90092003	6810	229.6	411	0.04	0.12	0.47	0.25	0.25	0.01	0.16	75	293
90092004	8350	226	0	0.05	0.06	0.9	0.5	0.06	0	0.14	42	642
90092005	8800	233.3	0	0.05	0.05	0.57	0.5	0.08	0	0.15	33	380
90092006	9860	242.6	0	0.04	0.05	0.37	0.5	0.13	0	0.09	55	411
90092007	10500	247.1	0	0.05	0.06	0.42	0.5	0.14	0	0.15	40	280
90092008	11020	216.8	0	0.04	0.04	0.33	0.5	0.12	0	0.17	23	194
90092009	4980	162.3	0	0.12	0.16	0.46	0.43	0.34	0.02	0.15	106	306
90092010	890	135.2	0	0.93	5.85	4.26	0.14	1.37	0.56	2.08	281	204
90092011	1520	73.4	437	0.27	6.26	2.31	0.04	2.7	0.54	3.27	191	70
90092012	2100	136.6	437	0.3	7.2	0.93	0.04	7.74	0.62	2.63	273	35
90092013	3050	150.1	426	0.07	0.84	4.63	0.08	0.18	0.07	0.22	381	2104
90092014	3130	209.2	441	0.01	0.09	0.29	0.1	0.31	0	0.11	81	263
90092015	3130	241	429	0.03	0.06	0.12	0.37	0.5	0	0.09	66	133
90092016	4480	232.7	0	0.03	0.08	0.57	0.3	0.14	0	0.14	57	407
90092017	5501	182.4	0	0.01	0.02	0.2	0.5	0.1	0	0.08	25	250
90092018	6690	209.8	0	0.04	0.05	0.45	0.5	0.11	0	0.25	20	180
90092019	7490	241.3	0	0.04	0.08	0.23	0.33	0.34	0.01	0.2	40	115
90092020	8490	222.4	0	0.09	0.03	0.31	0.75	0.09	0.01	0.09	33	344
90092021	1530	201.6	426	0.52	1.25	3.88	0.3	0.32	0.14	0.6	208	646
90092022	2200	190.8	435	0.17	1.87	0.93	0.08	2.01	0.17	0.66	283	140
90092023	3000	182.2	434	0.17	2.34	0.97	0.07	2.41	0.2	0.68	344	142
90092024	4000	224.6	437	0.18	5.44	1.22	0.03	4.45	0.46	1.24	438	98
90092025	5000	215.7	437	0.18	3.67	1.01	0.05	3.63	0.32	0.88	417	114
90092026	6000	241.5	444	0.03	0.38	0.36	0.07	1.05	0.03	0.2	190	180
90092027	9600	238.7	439	0.18	0.56	0.6	0.24	0.93	0.06	0.55	101	109
90092028	10000	197.7	430	0.16	0.7	1.09	0.19	0.64	0.07	1.01	69	107
90092029	10900	236.4	0	0.03	0.03	0.61	0.5	0.04	0	0.15	20	406
90092030	5770	182.9	0	0.09	0.15	0.25	0.37	0.6	0.02	0.06	250	416
90092031	6000	199.6	0	0.07	0.11	0.29	0.39	0.37	0.01	0.14	78	207
90092032	6370	234.1	0	0.04	0.14	0.87	0.22	0.16	0.01	0.29	48	300
90092033	4630	185.1	445	0.08	0.91	0.31	0.08	2.93	0.08	1.06	85	29
90092034	4980	238	444	0.26	1.27	0.49	0.17	2.59	0.12	1.8	70	27
90092035	5500	207.9	439	0.13	0.62	0.56	0.18	1.1	0.06	1.46	42	38
90092036	6000	155.4	462	0.21	1.01	0.42	0.17	2.4	0.1	1.65	61	25
90092037	6500	175.9	469	0.17	0.56	0.36	0.24	1.55	0.06	1.63	34	22
90092038	7000	137.9	473	0.25	0.56	0.29	0.31	1.93	0.06	1.45	38	20
90092039	7500	172.1	542	0.12	0.31	0.49	0.29	0.63	0.03	1.6	19	30
90092040	8000	145.9	551	0.12	0.28	0.23	0.3	1.21	0.03	1.59	17	14
90092041	9260	244.1	0	0.1	0.14	0.26	0.42	0.53	0.02	0.24	58	108
90092042	10570	190.7	0	0.08	0.11	0.43	0.44	0.25	0.01	0.33	33	130
90092043	10970	248.2	0	0.29	0.65	0.67	0.31	0.97	0.07	0.41	158	163
90092044	6400	125.7	0	0.09	0.07	0.31	0.56	0.22	0.01	0.4	17	77
90092045	7230	209	0	0.09	0.06	0.21	0.64	0.28	0.01	0.64	9	32
90092046	7450	191.3	0	0.08	0.09	0.21	0.5	0.42	0.01	0.45	20	46
90092047	8500	202.6	0	0.03	0.06	0.19	0.37	0.31	0	0.12	50	158
90092048	9300	197.4	0	0.09	0.11	0.33	0.45	0.33	0.01	0.4	27	82
90092049	9610	233.2	0	0.07	0.16	0.42	0.32	0.38	0.01	0.19	84	221
90092050	4815	196.5	0	0.07	0.14	0.43	0.35	0.32	0.01	0.29	48	148
90092051	5027	85.2	0	0.12	0.1	0.31	0.55	0.32	0.01	1.19	8	26
90092052	7567	248.8	0	0.04	0.04	0.18	0.5	0.22	0	0.06	66	300

PROJECT #90-092

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90092053	7782	177.3	437	0.09	0.14	0.51	0.41	0.27	0.01	0.31	45	164
90092054	7782	240.2	0	0.02	0	0.24	1	0	0	0.18	0	133
90092055	6734	211.1	440	0.19	1.29	2.19	0.13	0.58	0.12	1.64	78	133
90092056	7172	202.4	464	0.09	0.44	2.17	0.17	0.2	0.04	1.05	41	206

PROJECT #90-098

SAMPLE #	DEPTH	SAMPLE WT	T MAX	S1 MG/GM	S2 MG/GM	S3 MG/GM	PI	S2/S3	PC	TOC	HI	OI
90098001	62.2	4.4	439	0.68	144.54	23.18	0	6.23	12.1	26.8	539	86
90098002	68.8	8.5	442	0	32.47	4.7	0	6.9	2.7	3.84	845	122
90098003	70	25	437	0.28	47.04	2.84	0.01	16.56	3.94	5.4	871	52
90098004	104.8	3.9	429	1.02	36.15	15.12	0.03	2.39	3.09	19.1	189	79
90098005	109	3.9	442	0.25	205.12	21.53	0	9.52	17.11	26.5	774	81
90098006	172	10.9	442	0.18	8.44	2.84	0.02	2.97	0.71	2.42	348	117
90098007	182	15	434	0.33	8.66	1.86	0.04	4.65	0.74	2.71	319	68
90098008	209.6	13.1	434	0.45	59.84	6.25	0.01	9.57	5.02	11.38	525	54
90098009	214.4	11.3	445	0.08	12.56	2.65	0.01	4.73	1.05	3.18	394	83
90098010	234	10.4	441	0.38	19.23	4.42	0.02	4.35	1.63	3.57	538	123
90098011	235	15.8	436	0.56	10.37	2.15	0.05	4.82	0.91	2.64	392	81
90098012	253.8	12	446	0.16	35.66	2.91	0	12.25	2.98	4.71	757	61
90098013	272.3	10.5	446	0	9.14	2.28	0	4	0.76	2.11	433	108
90098014	286.6	18.5	444	0.32	41.08	3.4	0.01	12.08	3.45	5.69	721	59
90098015	297.3	16.6	448	0.18	17.59	2.1	0.01	8.37	1.48	2.76	637	76
90098016	307.2	138.6	417	0.13	0.56	0.37	0.19	1.51	0.05	1.03	54	35
90098017	313.3	14.1	447	0.14	9.29	1.34	0.01	6.93	0.78	2.37	391	56
90098018	325.4	16.2	443	0.74	40.98	3.95	0.02	10.37	3.47	5.62	729	70
90098019	333	23.8	446	0.33	22.35	2.98	0.01	7.5	1.89	3.63	615	82
90098020	344	23.1	444	0.38	30.99	2.07	0.01	14.97	2.61	4.64	667	44
90098021	353.9	13.5	446	0.22	22.22	3.7	0.01	6	1.87	3.52	631	105
90098022	374.4	23	440	0.34	33.04	3.3	0.01	10.01	2.78	4.57	722	72
90098023	363	19	443	0.31	36.42	3.84	0.01	9.48	3.06	5.11	712	75
90098024	377.5	30.3	438	0.49	12.27	2.17	0.04	5.65	1.06	3.32	369	65
90098025	390.5	23.1	438	0.69	68.57	4.84	0.01	14.16	5.77	8.56	801	56
90098026	398	5.6	445	0.35	25.17	6.78	0.01	3.71	2.12	3.93	640	172
90098027	411.6	16	442	0.25	16.62	3.18	0.01	5.22	1.4	2.79	595	113
90098028	418.3	20.2	441	0.49	36.43	4.55	0.01	8	3.07	5.58	652	81
90098029	430	11.1	443	1.53	76.39	7.47	0.02	10.22	6.49	8.55	893	87
90098030	431.7	8.3	444	0.6	31.32	6.5	0.02	4.81	2.66	4.48	699	145
90098031	448.3	10.8	443	1.2	66.66	7.12	0.02	9.36	5.65	7.4	900	96
90098032	456.3	24	445	0.33	42.33	3	0.01	14.11	3.55	4.61	918	65
90098033	466.4	25	442	0.64	41.6	3.24	0.02	12.83	3.52	5.33	780	60
90098034	475.9	14.2	440	0.42	13.52	3.59	0.03	3.76	1.16	2.31	585	155
90098035	478.2	6.7	442	0.14	12.98	4.47	0.01	2.9	1.09	2.19	592	204