

## OIL-SHALE ASSAYS BY MODIFIED FISCHER RETORT METHOD

Samples from Diamond Shamrock Corporation's Rainbow-Federal Well 1-6 drilled in the SE1/4NW1/4  
(1,980 feet S/N, 1,980 feet E/W) of sec 6, T 22 N, R 111 W, Lincoln County, Wyoming

Kelly bushing elevation 6,274 feet

Sample number		Run No.	Yield of product				Specific gravity of oil at 60°/60° F	Properties of spent shale Tendency to coke		Remarks
			Weight percent		Gas + loss	Gal per ton				
Laramie	Their		Oil	Water		Spent shale		Oil <sup>1/</sup>	Water	
SBR74-13967	0- 60						No oil			
SBR74-13968-73	90-270						No oil			
SBR74-13974-5	270-330						Trace			
SBR74-13976-7	330-390						No oil			
SBR74-13978	390-420						b			
SBR74-13979	420-450						Trace			
SBR74-13980	450-480	96396	1.1	1.0	96.2	1.7	2.8a	2.4		None
SBR74-13981	480-510	96397	1.7	2.2	95.0	1.1	4.5a	5.3		None
SBR74-13982	510-540	96398	1.8	2.0	94.7	1.5	4.7a	4.8		None
SBR74-13983	540-570	96399	1.7	2.5	94.5	1.3	4.5a	6.0		None
SBR74-13984	570-600	96400	.1	1.9	96.8	1.2	.3a	4.5		None
SBR74-13985-6	600-660						c			
SBR74-13987-8	660-720						Trace			
SBR74-13989	720-730						No oil			
SBR74-13990	730-740						Trace			
SBR74-13991	740-750						No oil			
SBR74-13992	750-760						b			
SBR74-13993	760-770						Trace			
SBR74-13994-5	770-790						b			
SBR74-13996-8	790-820						Trace			
SBR74-13999	820-830						c			
SBR74-14000-1	830-850						b			
SBR74-14002-3	850-870						c			
SBR74-14004-5	870-890						b			
SBR74-14006	890-900						c			
SBR74-14007	900-910						b			
SBR74-14008	910-920						c			
SBR74-14009	920-930	96401	.5	5.2	93.1	1.2	1.3a	12.6		None
SBR74-14010	930-940	96402	5.6	3.1	87.9	3.4	14.7	7.4	0.916	None
SBR74-14011	940-950	96403	5.6	3.3	87.9	3.2	14.8	7.8	.911	None

See footnote at end of table.

Drill cutting samples received July 31, 1974; assays made on air-dried samples

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Kelly bushing elevation 6,274 feet

Sample number		Run No.	Yield of product				Specific gravity of oil at 60°/60° F	Properties of spent shale		Remarks
			Weight percent		Spent shale	Gas + loss		Gal per ton		
Laramie	Their		Oil	Water					Oil <sup>1/</sup>	Water
SBR74-14012	950- 960	96404	6.0	3.9	87.8	2.3	16.0	9.4	0.903	None
SBR74-14013	960- 970	96405	6.2	3.7	87.8	2.3	16.4	8.9	.902	None
SBR74-14014	970- 980	96406	6.4	3.9	87.1	2.6	17.0	9.4	.905	None
SBR74-14015	980- 990	96407	5.9	3.5	88.0	2.6	15.7	8.5	.900	None
SBR74-14016	990-1000	96408	5.9	3.1	88.2	2.8	15.6	7.5	.903	None
SBR74-14017	1000-1010	96409	6.2	3.8	87.9	2.1	16.5	9.2	.900	None
SBR74-14018	1010-1020	96410	6.3	3.7	87.7	2.3	16.8	8.8	.902	None
SBR74-14019	1020-1030	96411	6.4	3.7	87.8	2.1	17.1	8.9	.902	None
SBR74-14020	1030-1040	96412	6.2	3.6	88.0	2.2	16.6	8.6	.901	None
SBR74-14021	1040-1050	96413	6.2	3.6	88.3	1.9	16.5	8.6	.902	None
SBR74-14022	1050-1060	96414	6.2	3.5	88.4	1.9	16.4	8.4	.903	None
SBR74-14023	1060-1070	96415	6.1	3.6	88.2	2.1	16.3	8.5	.903	None
SBR74-14024	1070-1080	96416	5.9	3.9	88.1	2.1	15.6	9.3	.904	None
SBR74-14025	1080-1090	96422	6.0	3.7	88.5	1.8	16.1	8.9	.901	None
SBR74-14026	1090-1100	96423	6.2	3.6	88.2	2.0	16.5	8.7	.904	None
SBR74-14027	1100-1110						No oil			
SBR74-14028	1120-1130	96424	1.0	7.3	90.8	.9	2.7a	17.5		None
SBR74-14029	1130-1140	96425	3.0	5.0	90.7	1.3	7.9	12.0	.899	None
SBR74-14030	1140-1150	96426	.0	9.0	90.2	.8	Trace	21.5		None
SBR74-14031	1150-1160						No oil			
SBR74-14032	1160-1170	96427	1.4	6.5	91.2	.9	3.7a	15.6		None
SBR74-14033	1170-1180	96428	.0	6.9	90.8	2.3	Trace	16.5		None
SBR74-14034	1180-1190	96429	2.8	5.3	90.8	1.1	7.3a	12.8		None
SBR74-14035	1190-1200	96430	.6	8.5	90.0	.9	1.5a	20.4		None
SBR74-14036	1200-1210	96431	.9	2.9	91.1	5.1	2.5a	7.0		None
SBR74-14037	1210-1220	96432	3.0	4.0	91.6	1.4	8.1	9.6	.900	None
SBR74-14038	1220-1230	96433	3.5	4.3	90.5	1.7	9.3	10.3	.902	None
SBR74-14039	1230-1240	96434	3.2	3.9	91.0	1.9	8.4a	9.3		None
SBR74-14040	1240-1250	96435	1.6	4.5	91.3	2.6	4.1a	10.8		None
SBR74-14041	1250-1260	96436	.3	7.5	91.4	.8	.8a	18.0		None

See footnote at end of table.

Drill cutting samples received July 31, 1974; assays made on air-dried samples

## OIL-SHALE ASSAYS BY MODIFIED FISCHER RETORT METHOD

Samples from Diamond Shamrock Corporation's Rainbow-Federal Well 1-6 (con.)

Kelly bushing elevation 6,274 feet

Sample number		Run No.	Yield of product				Specific gravity of oil at 60°/60° F	Properties of spent shale		Remarks
			Weight percent			Gal per ton		Tendency to		
Laramie	Their		Oil	Water	Spent shale	Gas + loss	Oil <sup>1/</sup>	Water	coke	
SBR74-14042	1260-1270	96437	1.1	6.0	91.4	1.5	2.9a	14.4	None	
SBR74-14043	1270-1280	96438	3.6	4.9	89.9	1.6	9.7	11.7	0.899	None
SBR74-14044-6	1280-1310						Trace			
SBR74-14047	1310-1320						b			
SBR74-14048-9	1320-1340						c			
SBR74-14050	1340-1350	96439	.2	4.0	94.9	.9	.6a	9.6	None	
SBR74-14051	1350-1360	96440	2.4	5.4	90.6	1.6	6.3	12.8	.900	None
SBR74-14052	1360-1370	96441	1.9	4.8	92.0	1.3	4.8a	11.5	None	
SBR74-14053	1370-1380	96446	.3	5.2	93.5	1.0	.7a	12.5	None	
SBR74-14054-60	1380-1450						c			
SBR74-14061-4	1460-1500						b			
SBR74-14065	1500-1510	96447	.4	4.0	94.6	1.0	1.0a	9.7	None	
SBR74-14066-8	1520-1550						c			
SBR74-14069-71	1550-1580						b			
SBR74-14072	1580-1590	96448	.9	5.3	92.9	.9	2.4a	12.6	None	
SBR74-14073	1590-1600	96449	.5	5.3	93.4	.8	1.3a	12.6	None	
SBR74-14074	1600-1610	96450	1.5	5.1	92.4	1.0	3.8a	12.2	None	
SBR74-14075	1610-1620	96451	1.7	4.2	92.9	1.2	4.5a	9.9	None	
SBR74-14076	1620-1630	96452	3.6	3.3	91.2	1.9	9.5	8.1	.897	None
SBR74-14077	1630-1640	96453	2.6	4.3	91.2	1.9	6.9a	10.2	None	
SBR74-14078	1640-1650	96454	1.5	5.5	90.8	2.2	4.1a	13.1	None	
SBR74-14079	1650-1660	96455	3.7	5.0	89.1	2.2	9.7	12.0	None	
SBR74-14080	1660-1670	96456	.6	4.3	92.4	2.7	1.6a	10.3	None	
SBR74-14081	1670-1680						Trace			
SBR74-14082	1680-1690						b			
SBR74-14083	1690-1700						Trace			
SBR74-14084	1700-1710	96457	1.0	6.1	91.1	1.8	2.7a	14.6	None	
SBR74-14085	1710-1720	96458	2.3	5.1	91.8	.8	6.1a	12.3	None	
SBR74-14086	1720-1730	96459	2.5	5.0	91.1	1.4	6.5a	12.0	None	
SBR74-14087	1730-1740	96460	1.5	4.9	92.4	1.2	4.0a	11.7	None	

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Kelly bushing elevation 6,274 feet

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			Weight percent		Spent shale	Gas + loss		Gal per ton		
Laramie	Their		Oil	Water					Oil <sup>1/</sup>	Water
SBR74-14088	1740-1750						c			
SBR74-14089	1760-1770	96461	2.1	4.4	91.9	1.6	5.4a	10.5	None	
SBR74-14090	1770-1780	96462	1.5	3.6	92.6	2.3	3.8a	8.7	None	
SBR74-14091	1780-1790						c			
SBR74-14092	1800-1810	96463	.9	2.7	95.3	1.1	2.3a	6.5	None	
SBR74-14093	1810-1820	96464	1.5	3.0	94.2	1.3	3.8a	7.1	None	
SBR74-14094	1820-1830	96465	.2	6.6	90.9	2.3	.5a	15.8	None	
SBR74-14095	1830-1840	96466	2.4	4.8	91.6	1.2	6.3a	11.5	None	
SBR74-14096	1840-1850	96467	.6	7.5	91.2	.7	1.6a	18.0	None	
SBR74-14097	1850-1860						c			
SBR74-14098	1860-1870						b			
SBR74-14099	1910-1920	96468	1.5	5.0	91.6	1.9	4.0a	12.0	None	
SBR74-14100	1920-1930	96469	1.5	6.0	91.1	1.4	3.9a	14.5	None	
SBR74-14101	1930-1940	96470	1.6	5.8	91.0	1.6	4.1a	13.9	None	
SBR74-14102	1940-1950	96477	1.5	6.0	91.2	1.3	4.0a	14.4	None	
SBR74-14103	1950-1960	96478	1.6	5.6	91.3	1.5	4.0a	13.5	None	
SBR74-14104	1960-1970	96479	.9	1.9	91.8	5.4	2.3a	4.5	None	
SBR74-14105	1970-1980	96480	1.3	5.6	91.5	1.6	3.3a	13.5	None	
SBR74-14106	1980-1990	96481	1.7	6.0	91.0	1.3	4.5a	14.3	None	
SBR74-14107	1990-2000	96482	.9	3.9	93.9	1.3	2.4a	9.4	None	
SBR74-14108	2000-2010	96483	.7	3.9	93.2	2.2	1.9a	9.3	None	
SBR74-14109	2010-2020	96484	.5	1.4	92.9	5.2	1.3a	3.5	None	
SBR74-14110	2020-2030	96485	.8	4.5	93.3	1.4	2.1a	10.8	None	
SBR74-14111	2030-2040	96486	1.1	3.5	92.7	2.7	2.8a	8.4	None	
SBR74-14112	2040-2050	96487	.9	4.9	92.5	1.7	2.4a	11.7	None	
SBR74-14113	2050-2060	96488	1.3	4.7	92.3	1.7	3.3a	11.3	None	
SBR74-14114	2060-2070	96489	1.2	4.7	92.3	1.8	3.2a	11.3	None	
SBR74-14115-7	2070-2100						c			
SBR74-14118	2100-2110	96490	1.0	5.4	92.2	1.4	2.7	12.9	None	
SBR74-14119	2110-2120	96491	.9	6.1	91.6	1.4	2.4	14.7	None	

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Kelly bushing elevation 6,274 feet

Sample number		Run No.	Yield of product				Specific gravity of oil at 60°/60° F	Properties of spent shale		Remarks
			Weight percent		Gal per ton			Tendency to		
Laramie	Their		Oil	Water	Spent shale	Gas + loss	Oil <sup>1/</sup>	Water	coke	
SBR74-14120	2120-2130	96492	0.9	2.8	92.3	4.0	2.4a	6.7	None	
SBR74-14121-6	2130-2190						c			
SBR74-14127	2190-2200	96493	1.2	6.6	90.9	1.3	3.0a	15.8	None	
SBR74-14128	2200-2210	96494	.9	7.0	91.1	1.0	2.3a	16.8	None	
SBR74-14129	2210-2220	96495	.3	7.5	91.6	.6	.8a	18.0	None	
SBR74-14130-3	2220-2260						c			
SBR74-14134	2260-2270						b			
SBR74-14135	2270-2280						c			
SBR74-14136-8	2280-2310						b			
SBR74-14139-40	2310-2330						c			
SBR74-14141	2330-2340						b			
SBR74-14142-3	2340-2360						c			
SBR74-14144-5	2360-2380						b			
SBR74-14146-7	2380-2400						c			
SBR74-14148-50	2400-2430						b			
SBR74-14151-3	2430-2460						c			
SBR74-14154	2460-2470						b			
SBR74-14155	2470-2480						c			
SBR74-14156	2480-2490						b			
SBR74-14157-61	2490-2540						c			
SBR74-14162-6	2540-2590						b			
SBR74-14167	2590-2600	96496	1.2	4.6	93.1	1.1	3.2a	11.0	None	
SBR74-14168	2600-2610	96497	1.1	4.4	93.7	.8	2.8a	10.5	None	
SBR74-14169	2610-2620	96498	.6	5.0	93.5	.9	1.5a	12.0	None	
SBR74-14170-1	2620-2640						c			
SBR74-14172	2640-2650	96499	1.5	4.2	93.5	.8	4.0a	9.9	None	
SBR74-14173	2650-2660	96500	1.1	4.2	93.1	1.6	2.8a	10.1	None	
SBR74-14174	2660-2670	96501	.9	4.6	93.4	1.1	2.3a	11.0	None	
SBR74-14175-7	2670-2700						c			
SBR74-14178	2700-2710						b			

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Kelly bushing elevation 6,274 feet

Sample number		Run No.	Yield of product				Specific gravity of oil at 60°/60° F	Properties of spent shale		Remarks
			Weight percent		Gal per ton			Tendency to		
Laramie	Their		Oil	Water	Spent shale	Gas + loss	Oil <sup>1</sup> / <sub>Water</sub>	coke		
SBR74-14179	2710-2720						Trace			
SBR74-14180-3	2720-2760						No oil			
SBR74-14184-7	2760-2800						Trace			
SBR74-14188-9	2820-2840						Trace			
SBR74-14190	2850-2860						Trace			
SBR74-14191-3	2870-2900						b			
SBR74-14194	2900-2910						Trace			
SBR74-14195-6	2910-2930						No oil			
SBR74-14197-8	2930-2950						Trace			
SBR74-14199	2950-2960						No oil			
SBR74-14200-4	2960-3010						Trace			
SBR74-14205	3010-3020						b			
SBR74-14206-7	3020-3040						Trace			
SBR74-14208-9	3040-3060						No oil			
SBR74-14210	3060-3070						Trace			
SBR74-14211	3070-3080						No oil			
SBR74-14212-3	3080-3100						Trace			
SBR74-14214	3100-3110						No oil			
SBR74-14215-7	3110-3140						Trace			
SBR74-14218	3140-3150						No oil			
SBR74-14219-25	3150-3260						Trace			
SBR74-14226-9	3260-3380						No oil			
SBR74-14230	3410-3440						Trace			
SBR74-14231-6	3440-3620						No oil			
SBR74-14237	3620-3630						Trace			
SBR74-14238	3630-3640	96502	1.1	3.0	94.9	1.0	2.8a	7.2	None	
SBR74-14239	3640-3650						Trace			
SBR74-14240	3650-3660						No oil			
SBR74-14241-3	3660-3690						c			
SBR74-14244	3690-3700	96503	1.4	3.5	93.8	1.3	3.6a	8.4	None	

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			Weight percent		Spent shale	Gas + loss		Gal per ton		
Laramie	Their		Oil	Water					Oil <sup>1/</sup>	Water
SBR74-14245	3700-3710	96504	2.2	2.9	93.0	1.9	6.0	7.0	0.896	None
SBR74-14246	3710-3720	96505	2.4	3.6	92.7	1.3	6.5	8.6	.893	None
SBR74-14247	3720-3730						b			
SBR74-14248	3740-3770	96506	.6	3.6	94.1	1.7	1.5a	8.7		None
SBR74-14249	3770-3800	96507	.5	4.3	93.7	1.5	1.2a	10.3		None
SBR74-14250	3800-3830						b			
SBR74-14251-2	3830-3890						Trace			
SBR74-14253	3890-3920						b			
SBR74-14254-9	3920-4100						No oil			
SBR74-14260	4100-4130						Trace			
SBR74-14261	4160-4190						No oil			
SBR74-14262	4190-4220						b			
SBR74-14263	4230-4260						c			
SBR74-14264	4260-4290	96508	1.2	5.8	91.6	1.4	3.2a	13.9		None
SBR74-14265	4290-4320	96509	.8	5.6	92.5	1.1	2.1a	13.4		None
SBR74-14266	4320-4350	96510	.9	5.4	92.8	.9	2.4a	12.9		None
SBR74-14267	4350-4380						c			
SBR74-14268	4380-4410						Trace			

<sup>1/</sup> "a"--indicates specific gravity estimated as 0.92. Oil yields were estimated by a rapid test-tube method: "No oil," "Trace," "b"--less than 1 gal oil/ton, "c"--1 to 3 gal oil/ton.

Drill cutting samples received July 31, 1974; assays made on air-dried samples