

Table 2. Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index, ash-fusion temperature determinations, Hardgrove grindability indexes, and equilibrium moistures for 19 lignite samples from the San Sebastian Formation (Oligocene) in northwestern Puerto Rico (PAGE 1 OF 7 PAGES).

[All analyses, in percent, except those of heat contents, free-swelling indexes, ash-fusion temperatures and Hardgrove grindability indexes. For each sample number, the analyses are reported three ways: first, as received; second, moisture free; and third, moisture and ash free. All analyses by a commercial testing laboratory following ASTM standards. G for ash-fusion temperatures means "greater than". Sample number is USGS identification number. The USGS makes no claims as to the accuracy of rank calculated from these parameters. 1. as-received; 2. dry basis; 3. dry and ash-free basis; 4. as-received to equilibrium moisture basis].

Sample Number	PROXIMATE ANALYSIS				ULTIMATE ANALYSIS					HEAT CONTENT			Lab Number
	Equilibrium Moisture	Moisture	Volatile Matter	Fixed Carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	KCal/KG	Btu/lb	
MOCA-1	23.06	24.98	8.46	1.56	65.00	3.57	4.46	0.07	26.25	0.65	290	530	W253180
	---	---	11.28	2.08	86.64	1.04	5.94	.09	5.42	.87	390	700	
	---	---	84.43	15.57	---	7.78	44.46	.67	40.58	6.51	2,900	5,260	
	---	23.06	8.68	1.60	66.66	3.37	4.57	.07	24.65	.67	300	540	
L1A	30.49	28.76	17.69	11.41	42.14	4.60	15.42	.19	35.86	1.79	1,289	2,300	W253196
	---	---	24.84	16.01	59.15	1.94	21.64	.27	14.49	2.51	1,800	3,230	
	---	---	60.81	39.19	---	4.75	52.98	.66	35.47	6.14	4,400	7,910	
	---	30.49	17.26	11.13	41.12	4.76	15.05	.19	37.15	1.75	945	1,700	
L1B	29.38	30.13	15.85	8.12	45.90	4.50	11.62	.19	35.66	2.13	930	1,680	W253197
	---	---	22.69	11.62	65.69	1.61	16.63	.27	12.75	3.05	1,330	2,400	
	---	---	66.13	33.87	---	4.69	48.47	.79	37.16	8.89	3,890	7,000	
	---	29.38	16.02	8.21	46.39	4.43	11.74	.19	35.09	2.15	2,920	5,260	
L1C	24.30	30.34	12.78	2.67	54.21	4.36	7.04	.14	33.82	.43	480	870	-----
	---	---	18.35	3.83	77.82	1.39	10.10	.19	9.89	.61	695	1,250	
	---	---	82.74	17.26	---	6.27	45.54	.86	44.58	2.75	3,130	5,630	
	---	24.30	13.89	2.90	58.91	3.77	7.65	.15	29.05	.47	1,740	940	
L2A	32.12	32.07	21.35	16.83	29.75	5.35	23.24	.43	37.77	3.46	2,100	3,780	W253192
	---	---	31.43	24.77	43.80	2.60	34.21	.64	13.66	5.09	3,100	5,570	
	---	---	55.92	44.08	---	4.63	60.87	1.14	24.30	9.06	5,500	9,900	
	---	32.12	21.33	16.82	29.73	5.35	23.22	.43	37.81	3.46	2,100	3,780	
L2B	20.09	24.40	7.70	0.10	67.80	3.44	1.41	.04	27.01	.30	30	50	W253193
	---	---	10.19	.13	89.68	.94	1.87	.06	7.05	.40	40	70	
	---	---	98.74	1.26	---	9.11	18.12	.58	68.31	3.88	360	640	
	---	20.09	8.14	.11	71.67	3.00	1.49	.04	23.49	.32	30	50	
L2C1+L2C2	30.12	32.01	23.92	19.30	24.77	5.17	23.56	.38	37.97	8.15	2,130	3,830	W253194
	---	---	35.18	28.39	36.43	2.33	34.65	.55	14.05	11.99	3,130	5,630	
	---	---	55.34	44.66	---	3.67	54.51	.87	22.09	18.86	4,920	8,850	
	---	30.12	24.58	19.84	25.46	5.00	24.21	.39	36.56	8.38	2,190	3,930	
L2D	29.89	25.02	9.07	.04	65.87	3.45	2.34	.00	27.29	1.05	60	110	W253195
	---	---	12.10	.05	87.85	.87	3.13	.00	6.75	1.40	80	150	
	---	---	99.62	.38	---	7.16	25.77	.00	55.54	11.53	670	1,210	
	---	29.89	8.48	.04	61.59	3.95	2.19	.00	31.29	.98	60	100	

Sample Number	Air-dried Loss	FORMS OF SULFUR				ASH-FUSION TEMPERATURE, °C			Hardgrove Grindability index	Lab Number
		Sulfate	Pyritic	Organic	Free-swelling index	Initial deformation	Softening	Fluid		
HOCA-1	21.31	0.11	0.54	0.00	0.0	1,210	1,310	1,400	125	W253180
	---	.15	.72	.00						
	---	1.12	5.39	.00						
	---	.11	.55	.00						
L1A	23.91	.87	.15	.77	0.0	1,480	1,520	1,540G	71	W253196
	---	1.23	.21	1.07						
	---	3.01	.51	2.62						
	---	.85	.15	.75						
L1B	24.47	.95	.18	1.00	0.0	1,480	1,500	1,540G	95	W253197
	---	1.35	.26	1.44						
	---	3.93	.76	4.20						
	---	.96	.18	1.01						
L1C	25.81	.13	.13	.17	0.0	1,480	1,540G	1,540G	175	W253198
	---	.18	.18	.25						
	---	.81	.81	1.13						
	---	.14	.14	.18						
L2A	26.83	.20	1.19	2.07	0.0	1,230	1,390	1,480	47	W253192
	---	.29	1.75	3.05						
	---	.52	3.11	5.43						
	---	.20	1.19	2.07						
L2B	20.74	.19	.09	.02	0.0	1,530	1,540G	1,540G	175	W253193
	---	.25	.12	.03						
	---	2.42	1.16	.30						
	---	.20	.10	.20						
L2C1+L2C2	21.59	2.12	3.33	2.70	0.0	1,080	1,100	1,240	67	W253194
	---	3.12	4.90	3.97						
	---	4.91	7.71	6.24						
	---	2.18	3.42	2.78						
L2D	21.16	.80	.21	.04	0.0	1,230	1,470	1,540G	64	W253195
	---	1.07	.28	.05						
	---	8.81	2.31	.41						
	---	.75	.20	.04						

Sample Number	Equilibrium Moisture	PROXIMATE ANALYSIS				ULTIMATE ANALYSIS					HEAT CONTENT			Lab Number
		Moisture	Volatile Matter	Fixed Carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	KCal/KG	Btu/lb		
L3A	23.88	31.84	13.65	4.84	49.67	4.65	8.35	0.18	34.67	2.48	680	1,230	W253189	
	---	---	20.02	7.11	72.87	1.60	12.26	.27	9.37	3.63	1,010	1,810		
	---	---	73.79	26.21	---	5.90	45.19	1.00	34.53	13.38	3,700	6,660		
	---	23.88	15.26	5.39	55.47	3.89	9.33	.20	28.35	2.77	760	1,370		
L3B	31.29	33.69	22.74	17.91	25.66	5.44	22.33	.43	37.22	8.92	2,060	3,710	W253190	
	---	---	34.30	27.00	38.70	2.51	33.68	.65	11.01	13.45	3,110	5,600		
	---	---	55.95	44.05	---	4.09	54.94	1.06	17.97	21.94	5,070	9,140		
	---	31.29	23.56	18.56	26.59	5.23	23.14	.45	35.35	9.24	2,140	3,850		
L3C	25.69	25.16	18.88	8.77	47.19	3.97	13.19	.19	31.45	4.01	1,130	2,030	W253191	
	---	---	25.22	11.73	63.05	1.55	17.63	.26	12.16	5.35	1,510	2,710		
	---	---	68.26	31.74	---	4.20	47.72	.70	32.90	14.48	4,080	7,340		
	---	25.69	18.75	8.71	46.86	4.02	13.10	.19	31.86	3.98	1,120	2,020		
L4A	33.58	32.57	24.09	17.42	25.92	5.26	23.62	.33	41.31	3.56	2,010	3,610	W253181	
	---	---	35.73	25.83	38.44	2.40	35.03	.50	18.35	5.28	2,980	5,360		
	---	---	58.04	41.96	---	3.90	56.90	.81	29.81	8.58	4,840	8,710		
	---	33.58	23.73	17.16	25.53	5.35	23.27	.33	42.02	3.51	1,980	3,560		
L4B	23.45	27.64	25.87	16.35	30.14	4.38	18.98	.29	32.48	13.73	1,760	3,160	W253182	
	---	---	35.76	22.58	41.66	1.77	26.23	.40	10.97	18.97	2,430	4,370		
	---	---	61.29	38.71	---	3.03	44.96	.69	18.81	32.51	4,160	7,480		
	---	23.45	27.37	17.30	31.89	3.99	20.08	.31	29.22	14.53	1,860	3,340		
L4A+L4B	31.63	27.63	15.81	4.56	52.00	3.98	7.86	.11	30.84	5.21	620	1,120	W253183	
	---	---	21.84	6.31	71.85	1.23	10.86	.15	8.72	7.19	860	1,550		
	---	---	77.59	22.41	---	4.37	38.58	.53	30.98	25.54	3,060	5,510		
	---	31.63	14.94	4.31	49.13	4.38	7.43	.10	34.04	4.92	590	1,060		
L4C	27.42	29.63	18.66	7.68	44.03	4.76	14.75	.34	34.35	1.77	1,280	2,300	W253184	
	---	---	26.51	10.92	62.57	2.06	20.96	.48	11.42	2.51	1,820	3,270		
	---	---	70.82	29.18	---	5.50	55.99	1.28	30.52	6.71	4,850	8,730		
	---	27.42	19.25	7.92	45.41	4.56	15.21	.35	32.64	1.83	1,320	2,370		
L4D	33.45	37.04	27.25	21.87	13.84	6.03	29.92	.56	44.30	5.35	2,640	4,740	W253185	
	---	---	43.28	34.73	21.99	2.99	47.52	.89	18.11	8.50	4,180	7,520		
	---	---	55.48	44.52	---	3.83	60.91	1.14	23.22	10.90	5,360	9,640		
	---	33.45	28.80	23.12	14.63	5.74	31.63	.59	41.76	5.66	2,780	5,000		

Sample Number	PROXIMATE ANALYSIS				ULTIMATE ANALYSIS					HEAT CONTENT			Lab Number
	Equilibrium Moisture	Moisture	Volatile Matter	Fixed Carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	KCal/KG	Btu/lb	
L3A	23.88	31.84	13.65	4.84	49.67	4.65	8.35	0.18	34.67	2.48	680	1,230	W253189
	---	---	20.02	7.11	72.87	1.60	12.26	.27	9.37	3.63	1,010	1,810	
	---	---	73.79	26.21	---	5.90	45.19	1.00	34.53	13.38	3,700	6,660	
	---	23.88	15.26	5.39	55.47	3.89	9.33	.20	28.35	2.77	760	1,370	
L3B	31.29	33.69	22.74	17.91	25.66	5.44	22.33	.43	37.22	8.92	2,060	3,710	W253190
	---	---	34.30	27.00	38.70	2.51	33.68	.65	11.01	13.45	3,110	5,600	
	---	---	55.95	44.05	---	4.09	54.94	1.06	17.97	21.94	5,070	9,140	
	---	31.29	23.56	18.56	26.59	5.23	23.14	.45	35.35	9.24	2,140	3,850	
L3C	25.69	25.16	18.88	8.77	47.19	3.97	13.19	.19	31.45	4.01	1,130	2,030	W253191
	---	---	25.22	11.73	63.05	1.55	17.63	.26	12.16	5.35	1,510	2,710	
	---	---	68.26	31.74	---	4.20	47.72	.70	32.90	14.48	4,080	7,340	
	---	25.69	18.75	8.71	46.86	4.02	13.10	.19	31.86	3.98	1,120	2,020	
L4A	33.58	32.57	24.09	17.42	25.92	5.26	23.62	.33	41.31	3.56	2,010	3,610	W253181
	---	---	35.73	25.83	38.44	2.40	35.03	.50	18.35	5.28	2,980	5,360	
	---	---	58.04	41.96	---	3.90	56.90	.81	29.81	8.58	4,840	8,710	
	---	33.58	23.73	17.16	25.53	5.35	23.27	.33	42.02	3.51	1,980	3,560	
L4B	23.45	27.64	25.87	16.35	30.14	4.38	18.98	.29	32.48	13.73	1,760	3,160	W253182
	---	---	35.76	22.58	41.66	1.77	26.23	.40	10.97	18.97	2,430	4,370	
	---	---	61.29	38.71	---	3.03	44.96	.69	18.81	32.51	4,160	7,480	
	---	23.45	27.37	17.30	31.89	3.99	20.08	.31	29.22	14.53	1,860	3,340	
L4A+L4B	31.63	27.63	15.81	4.56	52.00	3.98	7.86	.11	30.84	5.21	620	1,120	W253183
	---	---	21.84	6.31	71.85	1.23	10.86	.15	8.72	7.19	860	1,550	
	---	---	77.59	22.41	---	4.37	38.58	.53	30.98	25.54	3,060	5,510	
	---	31.63	14.94	4.31	49.13	4.38	7.43	.10	34.04	4.92	590	1,060	
L4C	27.42	29.63	18.66	7.68	44.03	4.76	14.75	.34	34.35	1.77	1,280	2,300	W253184
	---	---	26.51	10.92	62.57	2.06	20.96	.48	11.42	2.51	1,820	3,270	
	---	---	70.82	29.18	---	5.50	55.99	1.28	30.52	6.71	4,850	8,730	
	---	27.42	19.25	7.92	45.41	4.56	15.21	.35	32.64	1.83	1,320	2,370	
L4D	33.45	37.04	27.25	21.87	13.84	6.03	29.92	.56	44.30	5.35	2,640	4,740	W253185
	---	---	43.28	34.73	21.99	2.99	47.52	.89	18.11	8.50	4,180	7,520	
	---	---	55.48	44.52	---	3.83	60.91	1.14	23.22	10.90	5,360	9,640	
	---	33.45	28.80	23.12	14.63	5.74	31.63	.59	41.76	5.66	2,780	5,000	

Sample Number	PROXIMATE ANALYSIS				ULTIMATE ANALYSIS					HEAT CONTENT			Lab Number
	Equilibrium Moisture	Moisture	Volatile Matter	Fixed Carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	KCal/KG	Btu/lb	
L4C+L4D	31.46	28.91	14.71	7.01	49.37	4.33	10.99	0.24	32.58	2.49	920	1,660	W253186
	---	---	20.69	9.87	69.44	1.55	15.46	.33	9.71	3.51	1,300	2,330	
	---	---	67.71	32.29	---	5.07	50.59	1.08	31.77	11.49	4,240	7,620	
	---	31.46	14.18	6.76	47.60	4.58	10.60	.23	34.60	2.40	890	1,600	
L4F	33.12	37.26	27.73	21.10	13.91	5.94	29.67	.57	45.79	4.12	2,620	4,710	W253187
	---	---	44.21	33.62	22.17	2.82	47.30	.91	20.24	6.56	4,180	7,510	
	---	---	56.80	43.20	---	3.62	60.77	1.17	26.01	8.43	5,370	9,650	
	---	33.12	29.56	22.49	14.83	5.59	31.63	.61	42.95	4.39	2,790	5,020	
L4G	28.48	32.06	12.68	1.49	53.77	4.52	5.10	.08	28.54	7.99	210	380	W253188
	---	---	18.67	2.19	79.14	1.37	7.50	.12	.11	11.76	310	550	
	---	---	89.49	10.51	---	6.57	35.95	.58	.53	56.37	1,470	2,650	
	---	28.48	13.35	1.57	56.60	4.17	5.37	.08	25.36	8.41	220	400	

Sample Number	FORMS OF SULFUR					ASH-FUSION TEMPERATURE, °C			Hardgrove Grindability index	Lab Number
	Air-dried Loss	Sulfate	Pyritic	Organic	Free-swelling index	Initial deformation	Softening	Fluid		
L4C+L4D	23.29	1.04	0.14	1.31	0.0	1,390	1,440	1,540G	81	W253186
	---	1.46	.20	1.85						
	---	4.78	.65	6.06						
	---	1.00	.13	1.26						
L4F	29.73	1.37	.09	2.66	0.0	1,160	1,190	1,220	76	W253187
	---	2.18	.14	4.24						
	---	2.80	.18	5.45						
	---	1.46	.10	2.84						
L4G	27.39	1.08	.21	6.70	0.0	1,490	1,520	1,540G	121	W253188
	---	1.58	.31	9.87						
	---	7.57	1.49	47.31						
	---	1.14	.22	7.05						