Table 27.--Semiquantitative spectrographic, chemical, and radiometric analyses of ashed surface samples of lignite and carbonaceous shale from Tongue River Member of Fort Union Formation, North Cave Hills, Harding County, South Dakota--Continued

Sample No.	Location in T. 22 N. R. 5 E.	Bed thickness (feet)	Source of sample	Ash (percent)	Chemical: Uranium in ash (percent)	Chemical: Uranium in sample (percent)	Radiometric Equivalent Uranium	Si	Al	Fe	Ca	Na	Mg	K	As	Mo	Ba	Ti	P	Sr	B	Zr	Mn	Ni	V	Y	Cu	La	Co	Pb	Li	Ge	Cr	Ga	Sc	Yb	Sn	Be	Nb	Ag	Other elements
Western part of South Riley Pass area--Continued																																										
145779	SWSW 26	0.7		54	0.722	0.39	0.20	1	1	2+	2	2-	3+	3+	3-	3-	3-	3	0	4+	4-	4	5	4-	4-	5+	4-	5	5+	5+	0	5+	5+	5+	5-	6+	5	6+	0	0	
787	do	1.0		53	.169	.090	.045	1	1	2+	2	2-	3+	3+	4+	4+	3-	3	0	4+	4-	4+	5-	4-	4-	5+	5+	5	5+	5	0	5-	5+	5+	5-	6+	0	6	0	0	
778	do	1.2		39	.46	.18	.072	1	1	2+	2-	2-	3	3+	4+	3-	4+	3	0	4+	4-	4+	5	4-	4-	5+	4-	5	5+	5	0	5-	5+	5+	5-	6+	5-	6+	0	0	
786	do	.9		38	.168	.064	.028	1	1	2+	2	2-	3+	3+	4+	4	3-	3-	0	4+	4-	4	5+	4	4-	5+	4	5	5+	5	0	5	5	5+	5	6+	0	5-	0	0	
992	SESW 26	.4		85	.007	.005	.014	1	2+	2	2-	2-	3+	2-	4+	4+	3-	3-	0	4-	5	4	4+	5+	4-	5	5+	0	5-	5+	0	0	4-	6+	5-	6	0	6	0	0	
793	do	.4		70	.068	.048	.048	1	1	2+	2-	2-	3+	2-	4+	4-	3-	3-	0	4+	4	5+	4-	4-	4-	5+	4-	5	5	5+	0	5-	5	5+	5-	6+	5-	6-	0	0	
792	do	.5		65	.138	.090	.008	1	1	2+	2	2-	3+	3+	3-	4	3-	3-	0	4+	4	4-	5+	4	4	5+	4-	5	5+	4-	0	5	5	5+	5-	6+	5-	6	0	0	
146032	do	.6		69	.024	.016	.024	1	2+	2+	2	2	2-	2-	4+	4+	3-	3	0	4+	5	4	4+	4-	4-	5+	4-	0	5+	5+	0	5	4-	5-	5	6+	0	6	0	7+	
145791	do	.5		77	.005	.004	.006	1	1	2+	2-	2-	3+	2-	0	5+	3-	3	0	4+	4-	5+	4	4-	4-	0	5+	5	5+	5	0	5-	5+	5	5-	6+	5-	6	0	0	
Central part of South Riley Pass area																																										
237053	SESW 26	1.4	Upper 0.6 ft	43	2.7	1.17	0.99	1	2	1	2	n.d.	3+	0	*3+	*3	3	3	0	3	Tr	3	5	5+	5+	5+	4-	Tr	5-	4-	0	5	5	Tr	5+	5-	4-	6+	0	0	Cd, <0.05.
052	do	1.4	Basal 0.8 ft	45	.95	.43	.77	1	2+	1	2+	n.d.	3+	2-	*3-	*2-	3	3	0	3-	Tr	3-	4+	4-	4+	4-	4	4-	5-	4	0	4-	5+	5	5+	5	0	5-	0	0	Ce, 4; Nd, 4.
146823	do	.8		53	.57	.30	.27	1	1	2	2	2	2-	2-	3	3+	3-	3-	0	3-	5	3-	4	5+	5+	4-	5	0	5	5+	0	0	4-	5	5+	5-	0	6+	0	0	
822	do	.4		86	.044	.038	.036	1	1	2	2-	2	2-	2-	0	3+	3	3-	0	4	5+	4	4+	5	5+	5	5	0	5-	5	0	0	4-	6+	5	6	0	6-	0	0	
821	do	.9		71	.70	.50	.45	1	1	2	2-	2	2-	2-	3	3+	3-	3-	0	4+	5	3-	4+	5	5+	5+	5	0	5-	5+	0	0	4-	5	5+	6+	0	6	0	0	
237048	do	1.2	Upper 0.3 ft	52	5.30	2.76	1.80	1	2	2+	2-	n.d.	3	0	*2-	3+	3-	3+	2-	3-	Tr	3-	4-	5+	4-	4-	4-	4-	5-	4-	0	5	5+	5	5+	5	5+	6+	0	0	Cd, <0.05; Ce, 4; Nd, 4-.
049	do	1.2	Next 0.3 ft	35	1.90	.67	.54	1	2	2+	2-	n.d.	3	0	*3	3+	3+	3	0	4+	Tr	3	5	4	4	4-	4-	4-	5-	4-	0	5	5	5	5+	5	5	5-	0	0	Ce, 4; Nd, 4-.
050	do	1.2	do	32	.69	.22	.12	1	1	1	2-	n.d.	3	0	*4	*3-	3-	3-	0	3-	Tr	3-	5+	4+	4+	4	5+	4-	5+	4	0	5+	5	5	4-	5	0	5	0	0	Ce, 4; Nd, 4-.
051	do	1.2	Basal 0.3 ft	37	.12	.046	.036	1	2+	1	2-	n.d.	3+	0	*4+	*4-	3	3	0	3-	Tr	4+	4+	4	4+	4+	4	4	5+	4+	0	5+	5	5	4-	5+	0	5	Tr	0	Ce, 4; Nd, 4.
Eastern part of South Riley Pass area																																										
237176	NENE 35	0.8		31	0.040	0.012	0.010	1	1	2+	2+	2+	2	2-	0	4	3	3	0	4+	4	4+	4+	5-	4-	5	5	0	5-	5+	0	5+	5	4-	5-	6+	0	5-	0	0	
178	NWNE 35	1.5	Upper 0.5 ft	44	3.4	1.5	1.3	1	2+	2	3+	2+	3	3+	2+	2-	3-	3+	0	4+	4-	3-	4	5+	4-	5+	5+	0	5	4-	0	0	5+	5+	5+	6+	5	6+	0	0	
180	do	1.5	Basal 0.5 ft	36	.36	.13	.10	2+	2+	1	2	2+	3+	3+	3-	2-	3-	3-	0	3	4-	4+	4+	4	4	4-	4+	4-	5+	4	0	4-	5-	5	5+	5	0	5-	0	0	Nd, 4-.
187	do	1.4		42	2.7	1.13	.94	1	2+	1	2	2-	3+	3+	2+	2	3-	3-	0	3-	5	3-	4-	5+	4-	5+	4-	5+	0	4-	0	5+	5	5	5+	5-	0	5-	0	0	
188	NENE 35	1.4		38	2.4	.91	.76	1	2+	1	2	2	3+	3+	2	2	3	3-	0	3	5	3-	4-	5+	4-	5+	5+	5+	0	4-	0	5	5	5	5+	5-	0	5-	0	0	
190	NWNE 35	.6		63	.12	.075	.086	1	2+	1	2+	2	2	2-	3	3	3	3	0	3-	6	4+	4+	5+	4-	5+	5+	5+	5	4-	0	5+	5	5	5+	5-	0	5-	0	0	
191	do	1.3		58	1.6	.93	.73	1	2+	1	2	2	2-	2-	2	2	3	3+	0	3-	5	3-	4	5+	4-	5+	5+	5+	0	4-	0	5+	5+	5	5+	5-	0	6+	0	0	
193	NENE 35	.4		54	.033	.017	.021	1	1	2+	2	2+	2+	2-	3	4+	4+	3+	0	3-	4-	4+	4	4-	4-	4-	4-	0	5+	5+	0	5+	5	5-	5+	5-	0	5-	0	0	
194	do	.6		59	.13	.076	.094	1	2+	1	2+	2+	2	2-	3	4+	4+	3	0	3	5+	4	4+	5+	4-	4-	5+	5+	5+	4-	0	5+	5	5	5+	5	0	5-	0	0	
196	do	1.1		47	.18	.084	.087	1	2+	1	2	2+	2-	3+	3-	3	4	3	0	3-	5	3-	4	5+	4-	5+	5+	5+	5	4-	0	5+	5	5	5+	5	0	5-	0	0	
202	do	1.3	Upper 0.4 ft	58	2.8	1.6	1.8	1	2+	2	2-	2+	3	--	1	2	3	3+	0	3-	4-	4+	4-	5	4-	5+	5+	0	0	4-	0	5	5+	5	5+	n.d.	0	6+	0	0	
204	do	1.3	Basal 0.5 ft	42	.13	.054	.056	1	2+	1	2	2+	2-	3+	2-	4+	4-	3	0	3	5	4	4+	4-	4	4-	4-	4	4-	4	0	4-	5	5	4-	5	0	5	0	0	Nd, 4.
205	do	1.0		59	.088	.052	.055	1	2+	1	2+	2+	2-	2-	4+	3-	4+	3	0	3-	5	4+	4+	5+	4	4-	5+	5+	5+	4-	0	5+	5	5	5+	5-	0	5-	0	0	
208	do	1.0		50	3.0	1.5	1.2	1	2+	1	2+	2+	2	2-	2+	2-	3	3	0	3	5	3-	4+	5+	4	4-	5+	4-	5+	4-	0	5+	5	5	5+	5	0	5-	0	0	
210	do	1.2		51	2.0	1.0	.78	1	2+	2+	2	2	3	3+	2+	2-	3	3	0	3-	5	4+	4	5+	4-	4-	5+	5+	--	4-	0	5	5	5	5+	5-	0	6+	0	0	
212	do	1.4		29	4.6	1.3	1.2	1	1	2	2	2	3-	0	2+	2-	3-	3	0	3-	5+	3-	4-	4-	4-	4-	5+	0	5+	4-	0	0	5	5	5+	5	5	5-	0	0	
211	do	1.4	Upper 0.3 ft	42	2.4	1.0	.95	1	2+	2+	2	2	3	--	2+	2	3	3-	2-	3	5	3-	4-	--	4-	4-	5+	0	--	4-	0	0	5+	5	5+	n.d.	0	6+	0	0	
145710	NENW 35	1.2		42	1.9	.80	.97	1	2+	2	2	2	3+	3+	2-	3+	3	3-	0	4+	4	4	5	4	4-	5+	4-	5+	4-	4	0	5	5	5+	5-	5-	0	6+	0	6-	
148821	NWNW 36	.9		37	.076	.028	.033	1	2+	2+	2	2	3+	3+	4+	3+	3-	3	0	3-	4-	3-	4-	5+	4-	5+	5+	0	5	5+	0	0	5+	5	5	6+	0	6+	0	0	
Riley Pass area																																										
221127	SWSE 15	0.8		76	0.033	0.025	0.019	1	1	2	3+	3+	3+	2-	0	4+	4+	3	0	4	5+	4	4-	5+	4-	5	5+	5+	5-	5	0	0	5+	5	5-	6+	0	6	0	0	Ce, 4-; Nd, 5+.
129	SENE 22	2.0		21	.32	.066	.033	2+	1	2+	2	3+	3	3+	2-	3+	3	3-	0	3	5	3-	5	4-	4-	4-	5+	4-	5+	5	0	0	5+	5+	5	5-	0	5-	0	0	Ce, 4-; Nd, 5+.
128	SWNE 22	.4		94	.43	.40	.64	1	1	2	3	2-	3+	3+	0	4+	3+	3	0	4+	4	4	4	5+	4+	4-	5+	4-	5	5+	0	0	4-	5-	5	5-	0	6	0	0	Ce, 4 ; Nd, 4-.
145	do	1.1		51	.021	.011	.009	1	2+	2+	2	3+	2-	3	0	4	3	3-	0	3-	Tr	4+	5+	5+	5+	4-	5	5+	5	5+	0	5	5	5	5-	5-	0	6+	0	0	Ce, 4-; Nd, Tr.
136	NESE 22	.5		27	.30	.080	.058	1	1	2+	2	2+	3+	0	3-	3-	3	3-	0	3	5+	4+	4-	4	4-	4-	5	4-	4-	5+	0	5-	5	5	5	5-	0	5-	0	0	Ce, 4-; Nd, 4-.
135	do	.5		32	.18	.058	.038	1	1	1	2	2+	3+	0	4+	3-	3	3	0	3	5	4+	5+	4	4-	4-	5+	4-	4-	5+	0	5-	5+	5	5	5-	0	5-	0	0	Nd, 4-.
134	do	.5		28	.13	.036	.031	2+	1	1	2	2+	3+	3+	3-	3-	3	3	0	3	5+	3-	4-	4	4+	4	5+	4	4-	4	0	5	5+	5+	5+	5	0	5-	0	0	Ce, 4 ; Nd, 4 .
147	do	.8		35	.88	.31	.21	1	1	2+	2	2-	2-	3+	3	3	3-	3	0	3-	4	4+	4	4-	4-	4-	5+	5+	5+	5	0	5	5+	5+	5	5-	0	6+	0	0	Nd, 5+.
144	SESE 22	.6		47	.094	.044	.022	2+	1	2+	2+	3+	3+	3+	2-	3-	3+	3	0	3-	Tr	3-	5	4-	4	4	5+	4	5+	4-	0	5+	5+	5+	5	5	0	5-	0	0	Ce, 4 ; Nd, 4 .
139	do	1.2		47	1.18	.55	.27	1	2+	2+	2	2-	2-	3+	2-	4+	3-	3-	0	3-	5-	4+	4-	5+	4-	4-	5+	5+	5+	4-	0	5+	5	5	5	5-	0	6+	0	0	Nd, Tr.
146	do	1.0		51	.042	.021	.014	1	1	2+	2	2-	2	2-	4+	4+	3	3	0	3-	5	3-	4-	4-	4	4-	5	4-	5+	5+	0	5-	5+	5+	5	5-	0	5-	0	0	Ce, 4-; Nd, 4-.
131	NWSE 22	.5		42	.013	.005	.006	1	1	2+	2	2+	3	0	0	4	4+	3	0	3-	5	4+	5	4-	4-	4-	5+	4-	5+	5	0	0	5+	5+	5	6-	0	6+	0	0	Ce, 4-; Nd, 4-.
132	do	1.0		27	15.96	4.37	2.50	2+	1	1	2	2	3	0	2	2-	3+	3-	0	3-	5	3	4-	4	5+	4-	5+	4	--	4-	0	0	5	5	4-	0	0	5-	0	0	
133	do	.5		18	.28	.051	.051	2+	1	2+	2	2+	3+	0	3-	3-	2-	3-	0	3	4-	3-	4	4+	4-	4	5	4	4	4-	0	5-	5	5	5+	5	0	5	0	0	Ce, 4; Nd, 4-; Zn, 4-.
148	SENW 22	1.0		52	.020	.010	.008	1	1	2+	2	2-	2-	3+	3-	4-	3	3-	0	3-	5-	4+	5+	4-	4	4-	5+	5+	5+	4-	0	5	5	5	5-	5-	0	5-	0	0	Nd, 5+.
149	NWSE 23	2.0		22	.27	.059	.099	2+	1	1	2	2-	3+	0	4+	3+	3+	3-	0	3	Tr	4+	5	4-	4-	4-	5	4-	5	5	0	Tr	5	5	5+	5-	0	5-	0	0	Ce, 4; Nd, 4-.
130	NWNW 22	1.5		85	.017	.014	.030	1	1	2	3+	2	3+	2-	4+	3-	4+	3	0	4+	5	4+	5+	5	4-	5+	5+	4-	6+	5	0	0	5+	5	5-	6+	0	6	0	0	Ce, 4-; Nd, 5+.
150	NWSE 23	2.0		32	.26	.083	.063	1	1	2+	2-	2	3+	3+	0	3+	3	3	0	3	5-	4+	5	4-	4-	4-	5+	4-	5	5	0	Tr	5+	5+	5	5-	0	5-	0	0	Ce, 4; Nd, 4-.
141	SESW 26	1.1		51	.37	.19	.099	2+	2+	1	2	2-	3	0	3-	3	3-	3	0	3-	Tr	4	4	5+	4+	4-	5+	4-	5	4-	0	5+	5	5	5	5-	0	6+	0	0	Nd, 4-.
142	do	.9		56	.36	.20	.10	1	1	1	2-	2-	3+	3+	3-	4+	3-	3-	0	4+	Tr	4	4+	5+	4	5+	5	5+	5+	5+	0	5+	5	5	5	5-	0	5-	0	0	Ce, Tr; Nd, Tr.
140	do	1.0		39	1.18	.53	.31	1	2+	1	2-	2-	3	3+	2-	3+	3	3-	0	3-	Tr	4	4	5+	4-	4-	5+	4-	5	5+	0	5+	5	5	5	5-	0	6+	0	0	Nd, 5+.
143	SWSW 26	.9		72	.55	.39	.22	1	1	2+	2-	2-	3+	2-	3-	4+	3-	3-	0	4	Tr	4	4+	5	4-	5+	5+	5+	5	5+	0	5	5	5	5-	5-	0	6+	0	0	
151	SWNW 26	1.3		49	.44	.22	.14	1	1	1	2-	2-	3+	3+	3-	3	3	3	0	3-	5-	4+	4-	4-	4	4-	5+	4-	5+	4-	0	5+	5+	5	5	5-	0	5-	0	0	Ce, Tr; Nd, 4-.
153	NENE 27	1.2		31	.50	.15	.050	1	1	1	2	2+	3+	0	4+	4	3-	3-	0	3	Tr	3-	5+	4+	3-	4-	5	4-	4	4-	0	5	5	5+	5+	5	0	5-	0	0	Ce, 4-; Nd, 4; Zn, 4-.
152	do	1.3		38	1.81	.69	.27	2+	2+	1	2	2-	2-	3	2	3+	3	3-	0	3	5-	4+	5+	4-	4	4-	5+	4-	5+	4-	0	5	5	5	5+	5	0	6+	0	0	Ce, Tr; Nd, 4-.
154	NWSE 27	1.0		62	.21	.13	.13	1	2+	2	2	2-	3+	3+	4+	4-	3	3-	0	3-	5-	4	4+	4-	4	5+	5+	5+	5+	4-	0	5+	5	5-	5	6+	0	6+	0	0	Zn 4-.
155	NWNE 36	1.0		34	7.68	2.57	1.10	1	3+	2+	2+	2-	2	0	2-	2-	3+	3-	0	3-	5	3	5	4	5+	4	5+	4	--	4-	0	0	5	5+	4-	6+	0	5	0	0	

* Determinations by chemical analysis.