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A. Sampling Program Results

1. Regular Test Stations

On the following pages in tabular form are the results of sampling data gathered throughout the course of the project at points selected for evaluation. Flows were measured at these stations by use of a 90^0 triangular V notch sharp crested weir inserted in a vitrified clay pipe or by use of Gurley current meter. Samples taken were sent to the Department of Environmental Resource's approved laboratory for testing.

Under the column entitled "Other" the results of special analysis have been shown to indicate the quantity of the following chemical substances:

Chemical Substance	Symbol
Ferrous Iron	Fe_2
Aluminum	Al
Calcium	Ca

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A. SAMPLING PROGRAM RESULTS

Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
1	Point on Little Toby Creek	6-1-73	5702	3.3	150	10269	5.0	342	446	31494		0	
		6-27-73	2110	3.4	150	3800	18.0	456	490	12415		0	
		7-12-73	3726	3.4	190	8502	14.0	626	570	25504		0	
		8-2-73	1526	3.1	220	4032	13.0	238	600	10997		0	
		9-7-73	1796	3.1	210	4528	17.0	366	620	13369		0	
		10-19-73	808	3.2	220	2135	23.2	225	424	41144		0	
		11-25-73	50288	3.5	44	26566	25.7	15517	250	150,948		0	
		12-14-73	10461	3.1	140	17585	11.2	1407	380	47732		0	
		12-28-73	16164	3.2	80	15526	10.9	2113	310	60164		0	
		1-26-74	7363	3.4	94	8310	9.5	835	330	29176		0	
		2-16-74	4579	3.0	140	7698	13.6	747	475	26119		0	
		3-23-74	10461	3.7	88	11054	7.1	892	550	43964		0	
		Average	9582	3.2	144	10000	14.1	1981	454	41085			
11	Cartwright Mine to Little Toby Creek	7-12-73	2	3.8	68	1	3.0	0.1	360	8.0		0	
		8-2-73	1	3.3	110	1	24.0	3.0	390	4.0		0	
		9-7-73	.5	3.7	150	1	18	0.1	570	3.1		0	
		11-25-73	.6	2.9	120	1	1.8	0.1	200	1.6		0	
		12-14-73	.6	3.0	160	1	8.4	0.1	425	3.4		0	
		12-28-73	2	3.0	100	3	12.5	0.3	345	9.3		0	
		1-26-74	11.2	3.4	100	13	3.4	.5	325	43.8		0	
		2-16-74	1.3	3.0	80	1	54.5	.9	200	3.2		0	
		3-23-74	6.7	3.7	42	3	17.6	1.4	350	28.3		0	
		Average	2.2	3.3	103	3	15.9	0.7	352	11.6			

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A. SAMPLING PROGRAM RESULTS

Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
24	Unnamed Stream to Sawmill Run	5-31-73	663	4.2	150	1221	0.4	3.0	1000	8140	0		
		6-26-73	166	4.1	120	239	1.55	3.0	720	1436	0		Al-14
		7-12-73	143	4.0	240	414	1.2	2.0	1300	2243	0		
		8-2-73	148	3.7	210	374	1.4	2.0	1300	3414	0		
		9-7-73	62	3.7	190	143	2.2	2.0	1300	981	0		
		10-19-73	71	4.1	204	175	0.89	0.8	1198	1033	0		
		11-25-73	1257	4.5	28	422	1.2	18.1	200	3019	0		
		12-14-73	538	4.0	138	893	0.74	4.8	1020	6599	0		
		12-28-73	251	3.9	100	301	0.29	0.9	745	2249	0		
		1-26-74	479	4.0	184	1057	.59	3.4	900	5172	0		
		2-16-74	139	3.8	204	340	.59	1.0	1025	1712	0		
		3-23-74	395	4.4	122	579	.44	2.1	850	4032	0		
		Average	359	4.0	157	615	2.0	3.5	964	3336			

Note: Al determined by AA method 129 std. meth., 13th edition.

25	Gavazzi Mine to Sawmill Run	7-12-73	4.0	2.9	720	35	110	5	1200	58	0		
		8-2-73	3.6	2.5	930	40	150	6	1500	65	0		
		9-7-73	1.3	2.6	980	16	200	3	1700	27	0		
		10-10-73	1.1	2.7	900	12	190	3	1799	24	0		
		11-25-73	4.0	2.4	940	45	83	4	723	35	0		
		12-14-73	2.2	2.7	1180	32	62	2	1100	30	0		
		12-28-73	10.8	2.6	700	91	137	17	1200	155	0		
		1-26-74	3.8	2.8	540	25	109	5	725	33	0		
		2-16-74	9.0	2.5	560	1	196	21	825	88	0		
		3-23-74	3.8	3.1	620	28	65	3	850	39	0		
		Average	4.3	2.6	807	32	167	7	1162	55			

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Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
27	Point on Sawmill Run	7-12-73	116	5.7	6	8	0.2	0.3	5	7		0	
		8-2-73	47	5.6	8	5	0.5	0.3	29	17		0	
		9-7-73	49	5.9	4	2	0.6	0.4	7	4		0	
		10-19-73	3.4	5.4	4	15	0.15	0.6	149	562	2	7	
		11-25-73	1674	4.6	8	161	1.05	21.0	250	5027	2	40	
		12-14-73	996	4.9	8	96	0.58	7.0	45	539	4	48	
		12-28-73	3143	4.1	60	2264	0	0	12	452.8		0	
		1-26-74	2101	4.2	6	151	.15	3.7	6	1514		0	
		2-16-74	553	4.8	8	53	.29	1.93	150	996.2		0	
		3-23-74	1149	5.3	4	55	0	0	40	552		0	
		Average	1014	5.0	12	281	0.3	3.5	69	831	2.2	31	
28	Dagus Mine Old Mine Opening to Sawmill Run	6-1-73	49	3.0	280	166	11	7	590	350		0	
		6-26-73	22	3.1	260	70	36	10	780	210		0	
		7-12-73	13	3.2	320	52	27	4	610	99		0	
		8-2-73	9	2.9	580	63	24	3	660	71		0	
		9-7-73	6	3.0	340	27	20	2	650	53		0	
		10-19-73	3				18	1	649	24		0	
		11-25-73	20	2.7	280	68	9.71	2	349	85		0	
		12-28-73	57	3.0	100	69	31.85	22	355	246		0	
		1-26-74	58	.13	104	73	9.44	6.6	310	217		0	
		2-16-74	90	2.8	280	301	13.6	19.6	575	619		0	
		3-23-74	54	3.6	142	92	9.78	6.3	350	226		0	
		Average	35	2.7	269	98	19.12	11	534	200			

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A. SAMPLING PROGRAM RESULTS

Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM	Other lb/day
43	Toby Mine Caved Mine Opening to Little Toby Creek	5-31-73	754	3.0	390	3532	16	145	1000	9057		0		
		6-26-73	197	3.1	300	711	33	78	1200	2846		0		
		7-13-73	157	3.3	380	717	24	45	1100	2076		0	Fe_2-0.5	1
		8-2-73	125	3.0	160	241	19	29	1000	1509		0	Fe_2-1.0	2
		9-7-73	76	3.0	410	376	23	21	1100	1008		0	Fe_2-0.5	1
		10-19-73	62	3.1	400	302	19	14	649	490		0		
		11-25-73	67	2.7	460	372	23	19	825	667		0		
		12-14-73	121	3.0	318	463	17	26	1050	1428		0		
		12-28-73	134	3.0	380	616	27	44	850	1375		0		
		1-26-74	358	3.0	440	1897	38	164	900	3882		0		
		2-16-74	134	2.6	300	485	25	40	825	1334		0		
		3-23-74	561	3.3	350	2359	29	197	650	4380		0		
		Average	228	3.0	357	1005	24	68	929	2504			Fe_2-0.7	1
54	Dagus Mine Caved Mine to Little Toby Creek	5-31-73	336	3.2	200	808	4.1	16	1100	4448		0		
		6-26-73	112	3.3	150	202	7.0	9	600	809		0	Al-15	
		7-13-73	31	3.4	210	79	5.1	2	1000	377		0		
		8-2-73	33	3.2	200	81	3.6	1	610	247		0		
		9-7-73	21	3.5	150	38	3.9	1	550	139		0		
		10-19-73	12	3.5	142	21	3.0	0.4	473	69		0		
		11-25-73	121	5.9	16	23	9.45	13	226	329	12	17		
		12-13-73	22	3.2	220	59	3.2	0.8	495	133		0		
		12-28-73	103	2.9	340	442	35.88	45	700	868		0		
		1-26-74	121	3.2	204	297	9.71	14	425	619		0		
		2-16-74	56	2.8	140	97	11.5	8	325	226		0		
		3-23-74	498	3.5	160	957	9.8	59	450	2693		0		
		Average	122	3.5	178	257	8.85	14	580	913				

Note Al determined by AA method 129 standard method 13th edition

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Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
67	Point on Little Toby Creek	5-31-73	637	4.0	40	306	1.8	14	600	4593		0	
		6-26-73	179	3.5	98	211	4.8	10	430	927		0	
		7-13-73	76	3.6	130	119	6.3	6	370	339		0	
		8-2-73	85	3.2	140	143	5.2	5	450	461		0	
		9-7-73	58	3.3	150	105	60.0	4	410	287		0	
		10-19-73	107	3.3	122	158	4.7	6	424	584		0	
		11-25-73	471	3.2	64	362	7.3	42	175	991		0	
		12-13-73	431	3.7	94	486	4.9	25	295	1527		0	
		12-28-73	1676	3.9	46	926	3.0	61	210	4226		0	
		1-26-74	934	3.6	64	718	4.5	50	200	2243		0	
		2-16-74	370	3.1	60	266	6.2	27.6	275	1223		0	
		3-23-74	660	4.2	48	380	3.1	24.6	175	1837		0	
		Average	473	3.6	88	348	9.3	23	334	1603			
68	Unnamed Stream to Little Toby Creek	5-31-73	1014	3.7	64	780	0.4	5	280	3411		0	
		6-26-73	237	3.9	54	154	1.6	5	250	714		0	
		7-13-73	58	3.9	58	41	1.7	1	370	259		0	
		8-2-73	76	3.6	76	70	2.1	2	400	367		0	
		9-7-73	103	3.6	100	124	2.9	4	410	508		0	
		10-19-73	125	3.7	84	109	2.5	4	397	599		0	
		11-25-73	336	3.5	48	194	4.9	20	226	914		0	
		12-13-73	179	3.6	80	172	2.0	4	320	690		0	
		12-28-73	516	3.7	32	198	1.8	11	220	1364		0	
		1-26-74	727	4.9	12	105	.15	1	240	2096		0	
		2-16-74	377	3.5	34	151	1.0	4	225	1000		0	
		3-23-74	862	5	14	145	.67	7	305	3157		0	
		Average	384	3.8	55	186	1.81	6	304	1257			

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Test Point No.	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
73 Sawmill Run to Little Toby Creek	6-4-73	4736	4.8	15	853	0.2	11	120	6825	0		
	6-27-73	1436	4.6	24	414	0.2	4	86	1483	0		
	7-13-73	471	4.7	22	124	1.0	6	160	906	0		
	8-2-73	237	4.5	52	149	0.4	1	290	829	0		
	9-7-73	471	4.6	40	226	.2	1	200	1132	0		
	10-19-73	709	4.7	20	170	.2	2	198	1687	2	17	
	11-25-73	13470	4.2	8	1293	1.8	291	150	24259	0		
	12-28-73	5388	4.5	8	518	0	0	60	3882	2	129	
	1-26-74	5148	4.6	24	1484	1.4	84	120	7418	0		
	2-16-74	2182	4.1	14	366	.2	4	200	5240	0		
	3-23-74	5698	5.0	14	958	0	0	95	6499	0		
	Average	3631	4.6	21	595	0.5	37	153	5469	2	73	
74 Unnamed Stream to Little Toby Creek	5-31-73	547	3.9	110	723	1.0	7	1670	4406	0		
	6-26-73	579	3.8	98	681	1.9	13	830	5772	0		Al-8.0
	7-12-73	345	3.8	130	540	2.1	9	890	3694	0		
	8-2-73	139	3.7	110	184	1.1	2	940	1571	0		
	9-7-73	130	3.7	110	171	1.2	2	970	1516	0		
	10-19-73	148	4.3	92	163	1.1	2	799	1421	0		
	11-25-73	4067	4.4	34	1660	10.1	488	224	10941	0		
	12-14-73	700	4.2	90	757	2.1	17	650	5466	0		
	12-28-73	754	3.8	62	562	2.6	24	530	4800	0		
	1-26-74	1101	3.5	126	1666	8.9	118	525	6943	0		
	2-16-74	943	3.4	60	679	5.8	65	550	6226	0		
	3-28-74	503	4.0	90	568	4.9	31	425	2681	0		
	Average	830	3.9	93	696	3.5	64	750	4620			

Note Al determined by AA method 129 standard method 13th edition

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Test Point No.	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
75 Kyler Run to Little Toby Creek	5-31-73	4189	3.2	180	9053	6.8	342	420	21125	0		
	6-27-73	1167	3.3	170	2382	19.0	266	430	6027	0		
	7-12-73	2105	3.3	200	5057	14.0	354	480	12136	0		
	8-2-73	695	3.0	210	1754	14.0	117	550	4595	0		
	9-7-73	1126	3.1	220	2976	17.0	230	580	7848	0		
	10-19-73	1329	3.1	28	447	21.8	348	776	12383	0		
	11-25-73	9217	3.3	72	7969	10.9	1206	150	16602	0		
	12-14-73	2155	3.2	150	3881	13.6	351	410	10609	0		
	12-28-73	6824	3.2	160	13111	24.7	2027	395	32368	0		
	1-26-74	4777	3.3	144	8260	11.2	642	275	15774	0		
	2-16-74	1194	3.1	180	2037	19.4	219	300	3396	0		
	3-23-74	6497	3.6	128	9985	11.1	867	300	23402	0		
	Average	3439	3.2	153	5576	15.3	580	422	13855			
76 Limestone Run to Little Toby Creek	5-31-73	1517	4.4	78	1421	0.9	16	370	6742	0		
	6-26-73	148	4.0	100	178	2.2	4	480	854	0		Al-10.0 Ca-119
	7-12-73	188	4.2	150	340	2.2	5	460	1042	0		
	8-2-73	143	3.7	130	210	0.3	1	450	776	0		
	9-7-73	215	3.8	130	336	2.3	6	570	1474	0		
	10-19-73	1468	3.9	114	2009	2.3	41	602	10612	0		
	11-25-73	1796	3.7	88	1897	31.1	670	225	4852	0		
	12-13-73	345	4.2	114	473	3.7	15	345	1432	0		
	12-28-73	1185	4.4	5.0	712	1.8	26	245	3487	0		
	1-26-74	1329	4.6	50	798	2.0	32	280	4468	0		
	2-16-74	5029	4.1	88	5313	4.9	295	225	3585	0		
	3-23-74	700	4.8	48	404	2.2	18	225	1892	0		
	Average	1171	4.1	91	1174	4.6	94	373	3434			

Note: Al determined by AA method 129 standard method 13th edition
Ca determined by AA EPA method 203A standard method 13th edition

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Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
77	Unnamed Stream to Little Toby Creek	5-31-73	130	4.7	12	19	0.2	0.3	170	266		0	
		6-26-73	35	4.5	14	6	0.3	0.2	370	160		0	
		7-13-73	22	4.7	20	5	0.5	0.1	240	65		0	
		8-2-73	26	4.5	20	6	0.7	0.2	250	81		0	
		9-7-73	29	4.6	7	2	1.3	0.5	250	87		0	
		10-19-73	49	4.9	12	7	7.6	5.0	271	161	4	2	
		11-25-73	251	4.6	8	24	1.8	5.4	175	528	2	6	
		12-13-73	116	4.8	32	44	6.2	8.7	205	287	4	5	
		12-28-73	341	4.7	12	49	0	0	160	656	6	25	
		1-26-74	172	4.8	16	33	.3	.6	140	289		0	
		2-16-74	170	4.6	10	20	.7	1.5	225	460		0	
		3-23-74	3071	5.2	6	22	0	0	115	4241		0	
		Average	367	4.7	14	19	1.6	1.8	214	593	4	9	
78	Dagus Mine Air Seal to Little Toby Creek	5-31-73	246	5.5	8	24	4.4	13	270	801		0	
		6-26-73	242	5.5	26	76	18.0	52	270	786		0	
		7-13-73	125	5.6	30	45	13.0	20	270	408		0	
		8-2-73	80	5.3	44	43	16.0	16	340	330		0	
		9-7-73	139	4.9	26	43	24.0	40	300	501		0	
		10-19-73	89	5.3	44	47	30.6	33	314	339	6	6	
		11-25-73	41	4.6	88	44	23.0	11	226	112	4	2	
		12-13-73	139	3.5	74	123	24.7	41	275	460		0	
		12-28-73	134	4.1	44	71	18.3	30	215	348		0	
		1-26-74	263	5.3	10	32	5.0	16	235	742		0	
		2-16-74	305	4.2	4	14	10.3	37	225	825		0	
		3-23-74	269	5.1	74	239	4.9	16	200	647		0	
		Average	172	4.9	39	66	16.0	27	261	524	5	4	

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Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
81	Dagus Mine Air Seal to Little Toby Creek	7-13-73	9	3.3	220	24	39	4.2	560	60	0		Ca-110
		8-2-73	9	3.0	220	26	33	3.9	550	65	0		
		9-7-73	7	3.1	190	17	28	3.0	490	45	0		
		10-19-73	5	3.1	180	12	17.8	1.0	323	21	0		
		11-25-73	4	3.0	232	13	4.2	0.2	276	15	0		
		12-13-73	9	3.2	210	33	19.4	2.1	285	30	0		
		12-28-73	9	3.2	80	9	2.3	0.2	200	23	0		
		1-26-74	21	3.3	166	41	5.4	1.0	325	81	0		
		2-16-74	10	3.0	140	16	17.3	2.0	350	41.5	0		
		3-23-74	16	3.5	254	48	12.0	2.0	350	66	0		
		Average	10	3.2	189	24	17.8	2.0	371	45			
		Note: Ca determined by AA EPA method 203A standard method 13th edition											
85	Kyler Mine Caved Mine Heading to Little Toby Creek	8-24-73	2	3.2	130	3.5	5.2	0.1	600	16	0		
		9-7-73	4	3.3	140	7.5	5.4	0.3	600	32	0		
		10-9-73	3	3.4	124	5.4	26.1	1.1	451	19	0		
		12-13-73	1	3.3	122	1.9	2.8	.01	455	7	0		
		12-28-73	16	3.5	44	8.5	1.2	0.2	255	49	0		
		1-26-74	34	3.7	54	8.7	3.4	.5	225	36	0		
		2-16-74	22	3.4	80	21.4	2.2	.6	340	29	0		
		Average	23	3.5	96	8.0	5.9	0.4	404	33			

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A. SAMPLING PROGRAM RESULTS

Test Point No.	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM	Other lb/day
93 Kyler Mine Heading to Kyler Run	6-1-73	1526	3.0	240	4399	14.0	257	520	9531	0			
	6-26-73	915	3.1	180	1980	37.0	407	450	4949	0		Al-19 Ca-99	
	7-13-73	754	3.2	230	2083	29.0	263	500	4528	0	Fe_2-	0.5	5
	8-2-73	449	2.9	250	1347	29.0	156	560	3018	0	Fe_2-	19.0	102
	9-7-73	718	3.6	280	2415	33.0	285	600	5175	0	Fe_2-	17.0	147
	10-19-73	574	3.1	26	179	26.1	180	451	3112	0		---	
	11-25-73	651	2.9	200	1563	26.4	206	375	2931	0	Fe_2-	6.7	52
	12-13-73	790	3.0	350	3321	24.5	232	600	5693	0		---	
	12-28-73	1796	3.0	240	5175	35.2	759	450	9704	0	Fe_2-	14.6	315
	1-26-74	1347	3.1	212	3429	22.7	376	275	4448	0	Fe_2-	5.6	91
	2-16-74	1391	3.0	240	4010	31.0	518	275	4596	0	Fe_2-	15.7	261
	3-23-74	1751	3.3	240	5046	27.5	578	325	6833	0	Fe_2-	15.7	330
	Average	1054	3.1	224	2912	28.0	351	448	5376		Fe_2-	11.8	163
94 Unnamed Stream from Stripping to Kyler Run	6-1-73	31	3.5	580	219	1.5	0.6	1200	453	0			
	6-26-73	13	3.5	600	97	2.2	0.4	1300	210	0		Al-95	
	7-13-73	7	3.6	230	20	2.6	0.2	1500	129	0		Al-130	
	8-2-73	10	3.3	730	86	2.5	0.3	1000	190	0			
	9-7-73	11	3.3	710	96	2.5	0.3	1700	229	0			
	10-19-73	10	3.6	760	82	0.9	0.1	1398	151	0			
	11-25-73	62	3.3	32	24	0.7	0.5	976	736	0			
	12-9-73	59	3.5	920	654	1.36	0.9	1050	747	0			
	12-28-73	179	3.4	542	1169	2.01	4.3	1065	2297	0			
	1-26-74	153	3.4	542	993	12.6	9.5	600	453	0			
	2-16-74	53	3.6	526	337	1.0	.7	900	577	0			
	3-23-74	63	3.9	340	257	12.6	9.5	600	453	0			
	Average	54	3.5	542	336	3.3	2.2	1105	552				

Note: Al determined by AA method 129 standard method 13th edition
Ca determined by AA EPA method 203A standard method 13th edition

A. SAMPLING PROGRAM RESULTS

Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM	Other lb/day
97	Eureka #2 Mine to Unnamed Stream to Kyler Run	6-1-73	498	6.4			0.8	5	34	203	20	120	---	
		6-27-73	170	6.7			1.6	3	53	109	30	61	---	
		7-13-73	188	6.4			1.8	4	57	129	30	68	Fe_2-0.5	1
		8-2-73	27	6.6			1.4	0.5	38	12	34	11		
		9-7-73	22	6.7			1.6	0.4	36	9.7	52	14		
		10-19-73	18	6.4	2.0	0.4	4.3	0.9	34	7.3	62	13		
		11-25-73	45	6.7	8	4.3	1.0	0.5	225	121	44	24		
		12-9-73	266	6.5	10	32	6.2	19	95	304	80	256		
		12-28-73	404	4.8	12	58	4.9	24	120	582	6	29		
		1-26-74	524	4.9	32	201	4.2	26	100	629	72	5		
		2-16-74	5	6.2	6	0.4	1.5	0.1	125	8.1		0		
		3-23-74	524	6.2	12	76	6.4	40	80	505		0		
		Average	224	6.2	11	60.0	3.0	10.0	83	218	43	60	Fe_2-0.5	1
99	Unnamed Stream to Kyler Run	6-1-73	1373	3.4	120	647	5.4	89	380	6268		0	---	
		6-26-73	473	3.5	98	581	8.9	53	590	3499		0	---	
		7-13-73	372	3.6	120	536	8.5	38	420	1879		0	Fe_2-0.5	2
		8-2-73	89	3.4	110	119	6.0	6	460	496		0	Fe_2-2.7	3
		9-7-73	103	3.6	76	94	4.6	6	410	508		0	Fe_2-1.0	1
		10-19-73	89	3.5	84	91	4.3	5	349	376		0	---	
		11-25-73	466	3.9	34	191	2.0	11	226	1267		0	---	
		12-9-73	418	3.7	82	412	14.7	74	225	1132		0	---	
		12-28-73	1915	2.9	80	1840	9.1	211	325	7474		0	---	
		1-26-74	2335	3.2	100	2803	13.0	364	150	4205		0	Fe_2-4.5	23
		2-16-74	867	3.2	10	104	13.0	135	175	1820		0	Fe_2-5.6	11
		3-23-74	2205	3.5	84	2223	10.0	265	200	5294		0	Fe_2-5.6	28
		Average	893	3.4	83	803	8.3	104	325	2851			Fe_2-3.3	11

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A. SAMPLING PROGRAM RESULTS

Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
101	Point on Little Toby Creek @ Kyler's Corner	5-31-73	5567	3.3	120	8022	3.2	214	420	28076		0	
		6-26-73	902	3.4	130	1408	8.7	94	590	6393		0	
		7-13-73	2033	3.4	170	4151	9.5	232	420	10257		0	
		8-2-73	502	3.1	180	1087	8.0	48	440	2657		0	
		9-7-73	1257	3.2	210	3170	10.0	151	530	8000		0	
		10-19-73	835	3.3	180	1805	9.4	94	426	4272		0	
		11-25-73		3.5			36.7		150			0	
		12-14-73	6824	3.3	120	9833	8.1	663	445	36464		0	
		12-28-73	12931	3.4	164	25462	11.8	1838	355	55118		0	
		1-26-74	8591	3.4	124	12790	9.0	928	225	23208		0	
		2-16-74	6286	3.2	12	905	12.9		275	20755		0	
		3-23-74	5029	3.6	102	6159	7.6	456	150	9057		0	
		Average	4614	3.4	130	6799	11.2	471	368	18568			
103	Kyler Mine Stripping Outflow to Kyler Run	6-4-73		4.1	24		0.4		190			0	
		6-27-73	13	4.1	54	9	1.1	0.2	220	36		0	
		6-13-73	9	4.0	46	5	1.0	0.1	230	25		0	
		8-2-73	3	3.6	72	3	0.9		290	11		0	
		9-7-73	3	3.6	96	4	0.8	.03	320	14		0	
		10-19-73	2	3.7	72	2	2.9	.07	248	6		0	
		11-25-73	2	3.4	50	2	.15	.01	151	5		0	
		12-9-73	26	3.8	44	14	.44	.14	165	53		0	
		12-28-73	80	5.6	4	4	.438	.43	85	82		0	
		1-26-74	157	6.6	8	15	.146	.28	85	160		0	
		2-16-74	101	4.5	20	24	.741	.90	175	213		0	
		3-23-74	305	4.8	18	66	.444	2.0	170	623		0	
		Average	64	4.3	42	13	0.78	.39	194	112			

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A. SAMPLING PROGRAM RESULTS

Test Point No.	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM	Other lb/day
104 Dagus Mine to Little Toby Creek	6-4-73		3.5	100		4.2		470		0		---	
	6-27-71	395	3.4	110	97	36.0	171	480	2277	0		---	
	7-12-73	224	3.4	110	297	38.0	102	480	1294	0		Fe_2-18.0	48
	8-2-73	121	3.1	120	175	32.0	47	500	728	0		Fe_2-27.0	39
	9-7-73	125	3.4	160	241	42.0	63	520	785	0		Fe_2-28.0	42
	10-19-73	121	3.2	140	204	30.0	44	348	507	0		Fe_2- 6.7	10
	11-25-73	130	3.4	46	72	29.4	46	200	313	0		Fe_2- 9.0	14
	12-13-73	396	3.1	134	639	25.3	120	390	1858	0		Fe_2-19.0	90
	12-28-73	170	3.4	76	156	26.1	54	225	461	0		Fe_2-10.0	20
	1-26-74	180	3.6	62	134	9.7	21	390	841	0		Fe_2- 5.6	12
	2-16-74	651	3.4	68	531	14.3	111	325	2540	0		Fe_2- 5.6	44
	3-23-74	166	4.7	32	64	7.1	14	325	648	0		Fe_2- 1.1	2
	Average	243	3.5	97	237	24.5	72	388	1114			Fe_2-13.0	32
107 Kyler Mine to Hays Run	6-23-73	3138	3.2	220	8290	88	3316	840	31654	0		---	
	7-13-73	2294	3.3	230	6336	76	2093	840	23140	0		Fe_2- 1.0	28
	8-2-73	1055	2.9	320	4054	110	1393	970	12289	0		Fe_2- 91.0	1153
	9-7-73	1364	3.2	380	6227	130	2131	1000	16389	0		Fe_2-100.0	1638
	10-19-73	1508	2.9	420	7607	99	1793	597	10814	0		Fe_2- 70.6	1279
	11-25-73	1575	3.0	54	1022	78.5	1485	850	16084	0		Fe_2- 19.5	369
	12-14-73	1243	2.9	400	5973	48.3	721	1020	15231	0		Fe_2- 44.8	669
	12-28-73	1293	3.0	200	3105	85.1	1323	925	14362	0		Fe_2- 66.0	1025
	1-26-74	2492	6.3	8	239	.3	9	45	1346	0		---	
	2-16-74	1563	3.2	178	3339	40.5	759	400	7504	0		Fe_2- 30.2	567
	3-23-84	2012	4.0	206	4975	27.3	659	450	10868	0		Fe_2- 26.9	650
	Average	1776	3.5	238	4652	71.2	1426	722	14517			Fe_2- 50.0	820

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A. SAMPLING PROGRAM RESULTS

Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM	Other lb/day
112	Dagus Mine Caved Heading to Limestone Run	6-26-73	76	3.0	340	311	50	49	610	559	0		Al-24 Ca-108	
		7-13-73	9	3.1	380	41	44	5	680	73	0		Fe_2-0.5	1
		8-2-73	6	2.7	400	32	50	4	750	61	0		Fe_2-8.4	1
		9-7-73	3	2.8	420	18.	60	3	830	36	0		Fe_2-0.8	
		10-19-73	1	2.8	560	9	46	1	798	13	0		---	
		11-25-73	12	2.8	340	49	36.7	5	650	95	0		Fe_2-6.7	1
		12-13-73	282	2.8	600	2037	30.7	104	700	2377	0		---	
		12-28-73	143	2.9	300	518	44.7	77	425	733	0		Fe_2-6.7	12
		1-26-74	144	3.0	326	562	33.4	58	450	776	0		Fe_2-4.5	8
		2-16-74	30	2.9	340	123	38	14	400	145	0		Fe_2-4.5	2
		3-23-74	139	3.3	282	471	28	47	400	668	0		Fe_2-2.2	4
		Average	77	2.9	390	379	42.0	33	609	503			Fe_2-4.3	4
		Note: Al determined by AA method 129 standard method 13th edition Ca determined by AA EPA method 203A standard method 13th edition												
113	Dagus Mine Caved Heading to to Limestone Run	7-12-73	9	3.7	76	12	8.0	0.8	310	33	0			
		8-2-73	11	3.3	80	11	9.0	1.2	380	53	0			
		9-7-73	4	3.4	82	4	26.0	1.4	320	17	0			
		10-19-73	9	3.2	100	100	11	1.2	326	35	0			
		11-25-73	39	5.7	44	20	3.2	1.5	176	83	24	11		
		12-13-73	10	5.4	50	6.4	4.3	.6	215	27	18	2.3		
		12-28-73	24	3.4	40	11.6	3.77	1.1	275	80	0			
		1-26-74	72	5.5	32	28	.44	.4	195	168	0			
		2-16-74	27	3.7	94	30	3.9	1.2	225	72	0			
		3-23-74	211	5.1	24	61	3.3	8.3	305	773	0			
		Average	42	4.2	62	20	7.3	1.9	273	134	21	6.6		

V. APPENDIX

A. SAMPLING PROGRAM RESULTS

Test Point No.		Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron lb/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other PPM
121	Unnamed Stream From Smith& Rogos Stripping	7-12-73	9	3.6	100	11	3.7	0.4	380	41		0	
		8-2-73	2	3.2	110	3	4.1	0.1	120	3		0	
		9-7-73	1	3.4	120	1	5.7	0.1	380	4		0	
		10-19-73	5	3.5	102	6	3.4	0.2	274	16		0	
		11-25-73	987	3.8	56	664	2.5	29.6	225	2669		0	
		12-13-73	32	3.8	60	23	1.4	0.5	260	100.9		0	
		12-28-73	155	4.1	22	41	.7	1.4	205	383		0	
		1-26-74	215	4.6	22	57	.6	2.0	285	737		0	
		2-16-74	505	3.7	70	424	1.5		225	1364		0	
		3-23-74	525	4.1	114	719	.9	6.0	450	2838		0	
		Average	244	3.8	78	195	2.5	4.0	280	816			
130	Point on Little Toby Creek Below Hays Run Outflow	9-7-73	1885	3.1	240	5434	23.0	521	600	13585		0	
		10-19-73	1194	3.1	220	3155	38.0	545	349	5005		0	
		11-25-73										0	
		12-14-73	5118	3.1	140	8604	15.6	958	410	25197		0	
		12-28-73	18332	3.4	122	26853	13.2	2906	310	68236		0	
		1-26-74	9770	3.2	122	14312	10.6	1243	200	23462		0	
		2-16-74	6941	3.2	138	11501	12.8	1066	250	20836		0	
		3-23-74	5370	3.7	96	6190	8.7	558	275	17731		0	
		Average	6944	3.3	154	10864	17.4	1114	342	24864			

2. Special Test Stations

In addition to the regular test stations, investigations were made at numerous other points to more accurately pinpoint problem areas and to clarify questions that had arisen from past results. A summary of these results are enumerated hereunder:

(a) From this form of testing it was learned that the flows on the western side of the Cartwright Mine were acidic in some locations and alkaline in others.

(b) Sample results from points *#62,* an outlet to a surface mine pond, and #131 a point up stream from discharge of pond, indicated that after the

Test Point	Date	Flow GPM	pH	Acidity PPM	Acidity #/Day	Total Iron PPM	Total Iron #/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/Day	Other
3	8-22-73	1	2.7	220	1.2	28	0.2	310	1.7	---	---	
14	8-22-73	1	7.0	---	---	6	0.1	160	1.7	110	1.2	
15	8-22-73	1	2.5	7.30	7.8	110	1.2	830	8.9	---	---	
16	8-22-73	2	2.8	220	4.7	73	1.5	520	11.2	---	---	
17	8-22-73	11	6.8	---	---	4	0.6	470	63.3	170	22.9	
143	8-22-73	27	7.7	---	---	5	1.4	540	174.7	150	48.5	

ponding and liming, the water quality was poorer than the stream coming directly through the stripping spoil. These points are on the head waters of Little Toby Creek due east of Coal Hollow.

Test Point	Date	Flow GPM	pH	Acidity PPM	Acidity #/Day	Total Iron PPM	Total Iron #/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Othe
62	8-22-73	31	3.7	79	29.8	9	3.4	430	162.3	---	---	
131	8-21-73	34	3.5	51	20.6	2	0.6	130	52.6	---	---	

(c) Water being emitted from air seals along the old road from Toby to Coal Hollow varied considerably in quality in that two points, (79, 80) were found to be alkaline and have tolerable sulfate quantities while the other seals were emitting acid water with wide ranges of sulfates. Iron contents were fairly constant.

Test Point	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron #/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other
65	3-23-74	135	4.9	46	74	59	97.0	225	364	---	---	
79	8-24-73	---	6.5	--	--	2.8		290		10		
80	8-24-73	6	7.5	--	--	5.1	0.4	24	1.7	73	5.1	
80	9-7-73	1	7.8	--	--	0.1	---	29	0.3	84	0.9	
84	8-24-73	1	2.9	270	2.9	7.1	0.1	520	5.6	---	---	
84	9-7-73	---	3.0	240	--	7.2	---	500	---	---	---	
84	10-19-73	1	3.0	264	0.1	8.6	0.0	524	0.1	---	---	

(d) Water from the Ticossi Mine in the Middle Kittanning Coal is alkaline, the same as water from the Eureka #2 Mine (#97). The sulfate and iron content however is higher at Ticossi.

Test Point	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron #/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other
122	8-22-73	4	7.6	---	---	3.1	0.2	150	8.1	120	6.5	

(e) The dilution of the mine water surfacing at point #113 in the Limestone Run area by an alkaline spring with acceptable iron and sulfate quantities located downstream is effective in improving water quality.

Test Point	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron #/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other
132	8-21-73	11	6.6	--	--	0.6	0.1	2.0	7.9	2.2	3.0	
133	8-21-73	13	6.0	15	2.4	0.9	0.1	170	275	---	---	
113	8-2-73	11	3.3	80	11	9.0	1.2	380	53	---	---	
113	9-7-73	4	3.4	82	4	26.0	1.4	320	17	---	---	

(f) Water delivered to a home from the Dagus Mine Water Supply, located near reference point 90 was analyzed and found to have a pH of 6.1 and acid content of 4 ppm. A water sample taken from a gas station receiving water from the Kyler Run Reservoir was also analyzed and found to be a higher quality water as alkalinity was tested at 2 ppm, iron at 0.5 ppm and sulfates at 5 ppm. The pH was 6.7. Sample numbers were 134 and 135.

(g) Sampling of Hays Run at reference point 139 above the Kyler Mine water course at point #107 indicates that the mine is the source of pollution on this stream.

Test Point	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron #/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Other
139	8-22-73	6.4		---	---	1.9	0.9	62	30.1	---	---	

(h) The effect of seepage through old mine refuse located on the western bank of Little Toby Creek was determined by analyzing water from pools located above and below a refuse pile located on Little Toby Creek. The water in the lower pool coming from seepage through the refuse. In this case the pH went from 3.4 to 2.6 while the acidity went from 92 to 360 ppm. Iron content rose from 4 to 72 while sulfate went from 380 to 590. See analysis results for points 141 and 142 on page 35 .

(i) Results of water analysis from other points are tabulated hereunder.

Test Point	Date	Flow GPM	pH	Acidity PPM	Acidity lb/day	Total Iron PPM	Total Iron #/day	Sulfates PPM	Sulfates lb/day	Alkalinity PPM	Alkalinity lb/day	Location
90	8-22-73	22	3.0	160	43.1	17	4.6	490	132.1	---	---	Air Seal-Dagus Mine
106	8-22-73	1	2.4	640	6.9	110	1.2	660	7.1	---	---	Air Seal-Kyler Mine
111	8-24-73	---	6.7	---	---	1.5	---	19	---	10	---	Spring Disgs.
125	8-22-73	---	6.7	---	---	0.8	---	14	---	9	---	Pond discharge Daguscahonda Run
136	8-24-73	6	2.8	310	21.7	36	2.5	820	57.5	---	---	Caved Drift-Toby Mine
138	8-24-73	---	5.9	6	---	1.5	---	31	---	---	---	Spring Disgs.
140	8-24-73	---	3.0	150	---	8.0	---	400	---	---	---	Pond
144	8-24-73	22	3.4	78	302.7	3.9	15.1	360	1397.3	---	---	Little Toby Cr.
149	2-16-74	---	5.7	82	1708	10.3	214	225	4686	---	---	Kyler Run
150	2-16-74	1795	3.6	64	1380	4.2	89	275	5930	---	---	Little Toby Cr.
151	2-16-74	13	6.0	10	2	0.9	0.1	300	48	---	---	Swamp Disgs.
98	10-19-73	---	3.0	200	---	26.1	---	524	---	---	---	Unnamed Stream to Kyler Run
98	2-16-74	---	3.0	140		27.2		425		---	---	Pond along Unnamed Stream
49	9-7-73	---	6.8	10	0.5	1.1	0.05	680	33	---	---	Spring Disgs.
117	9-7-73	4	3.0	1100	47	20	0.9	2100	91	---	---	Discharge from Surface Mine

B. Subsurface Exploration Program

1. SL 132-5 Project Area

In order to properly evaluate proposed reclamation measures and ascertain the validity of the mine map information u tilized for the preparation of this plan a subsurface exploration program was under taken. The results of this program are included herein. The tabulation on pages 62 through 73 briefly describes the findings at each hole and summarizes the results of the drilling and pressure testing within the project area. The drill lugs have been plotted and are also presented herein. There locations are found on Plate 19.

An investigation and determination of property owners was made during the subsurface exploration program. Information obtained was presented to DER in reproducible form at that time.

2. SL 132-1 Project Area

In order to obtain more data to assist in the evaluation of information provided to DER in the Toby Creek SL 132 -1 Report five test holes here drilled in the Brandy Camp Creek to Hays Run Area. Of these five, three were cored and two drilled with an air rotary rig.

From the information; provided by drilling these five holes, we have concluded that the Lower Kittanning seam has been mined out as shown, but there are major variances in the contours. There was no evidence of mining in the Middle Kittanning seam except in drill hole KK which means holes II, JJ and LL all hit pillars of coal remaining in the mined *out* area or mining in this seam was n ot as extensive as shown. The elevations of this seam found by drilling conformed with those shown on Drawing A4. Drill hole EE hit a barrier as anticipated. The Freeport Limestone depicted on Drawing A5 does exist throughout this area as shown. A brief analysis of these holes is found on page 74.

The drill hole locations are found on Plate 6, while logs are found on Plates 16 and 17.

The following tabulation and drill hole logs summarizes the results of the drilling and pressure testing conducted within the project area.

Drill Hole No.	Type	Comments
A	Core Boring	Lower Kittanning coal barrier was found in tact. Minimal amounts of grout would be required above and below the coal seam; however, the seam itself was found to be quite permeable.
B	Core Boring	Mine void was encountered in Lower Kittanning coal seam. This was considered to be the heading shown on the mine map. Apparently the outflow of water was restricted since the 24 hour reading indicated that the water level was above the roof of the mine. Grout requirements 28 feet above the void are minimal.
C	Core Boring	Lower Kittanning coal barrier was found intact. Heavy grouting required below, in and above coal seam.
D	Core Boring	Lower Kittanning Coal barrier was encountered. Grouting considered unnecessary. 24 hour water level was above coal seam.
E	Core Boring	Lower Kittanning coal seam was found intact Heavy grouting could be required below, in and 8 feet above coal seam.
E-1	Core Boring	Mine void found in Lower Kittanning seam assumed to be mine opening shows on mine map. Mine roof was found to be very solid thereby eliminating the need for grouting.
F	Core Boring	Lower Kittanning coal barrier was found intact Heavy grouting could be required above and below the coal seam. The coal seam itself and the strata immediately above it was found to be impervious.
G	Rotary	The Lower Kittanning coal seam was found signifying that a stump in the mine had been encountered. A monitor well was installed.

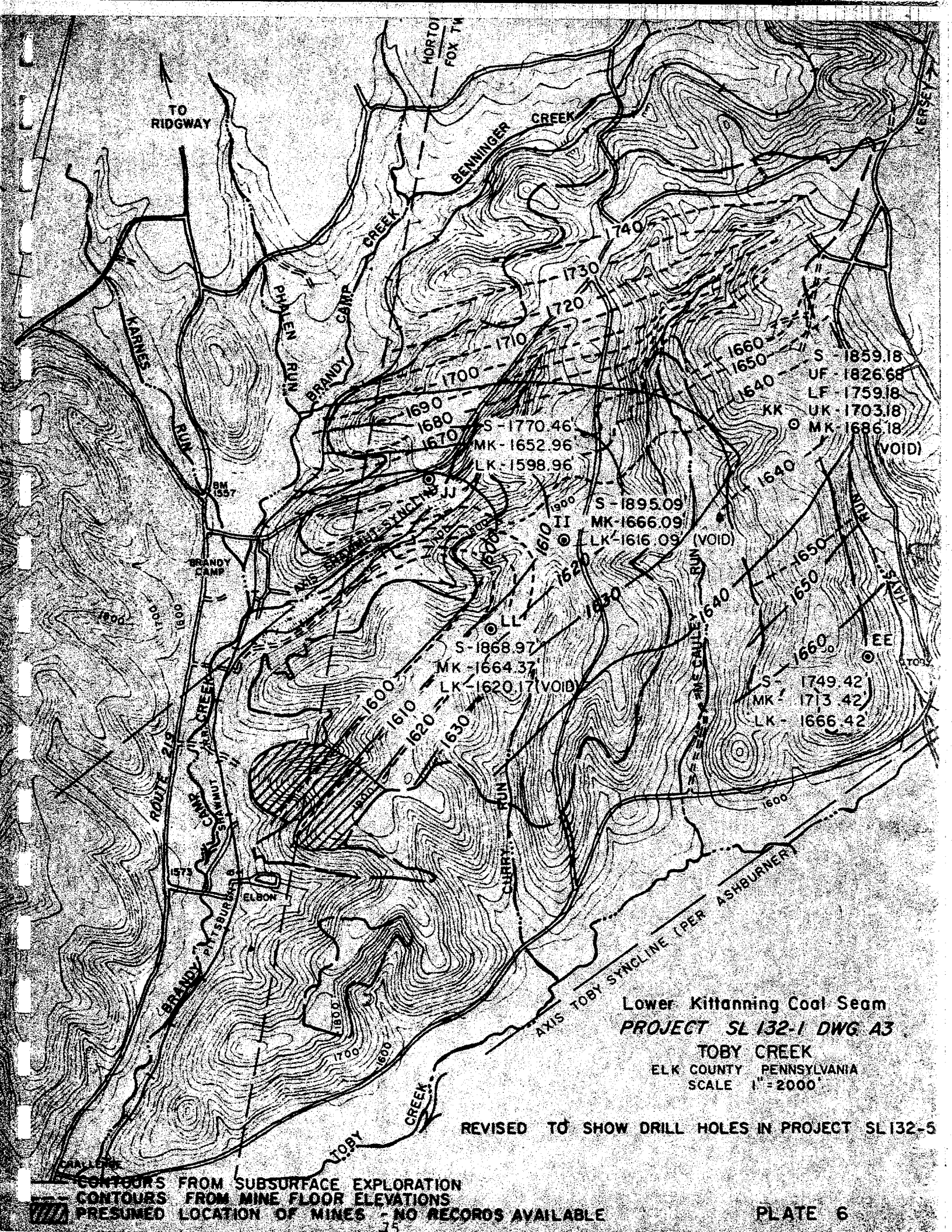
Drill Hole No.	Type	Comments
H	Rotary	The Lower Kittanning coal seam was encountered and found in tact. This site would be suitable for discharge.
I	Rotary	A mine void in the Lower Kittanning coal seam was found. This site would be more suitable for a discharge point than the location "H" since the coal seam is 3 feet lower and has been removed.
J	Core Boring	The Middle Kittanning coal was found intact The mine in the Lower Kittanning coal seam was caved with some subsidence occurring above the mine. Medium amounts of grout would be required for sealing. Seven feet of limestone(considered Vanport) was found 45 feet below the mine floor.
K	Core Boring	Mine void found in Lower Kittanning seam. - The mine roof was found to be solid. A mine water stand pipe was installed.
L	Core Boring	The Lower Kittanning coal seam was found to be intact and solid. Weathered shale immediately above the coal would accept minor amounts of grout.
M	Core Boring	A mine void was found in the Lower Kittanning coal seam. The roof was solid and would be suitable for sealing. Medium amounts of grout would be required after the first five feet of roof
N	Core Boring	The Lower Kittanning Coal Seam was found to be intact but quite pervious. Immediately above and below the seam the strata was impervious.
N-1	Core Boring	A mine void was found in the Lower Kittanning coal seam, indicating that the mine entrance shown on the map had been drilled through. The roof was found to be solid and impervious making it suitable for sealing.
N-2	Core Boring	The Lower Kittanning coal seam was found intact but very pervious thereby requiring large amounts of grout if seepage is to be curtailed. The strata above is solid.

Drill Hole No.	Type	Comments
N-3	Core Boring	The Lower Kittanning coal seam was encountered. Medium amounts of grout would be required to seal the seam but the roof was found to be impervious for approximately six feet above the coal seam.
N-4	Core Boring	The Lower Kittanning coal seam was encountered. No pressure testing was performed.
N-5	Core Boring.	A mine void was found at this location indicating that the mine opening shown on the map had been located. The roof was solid and impervious making it suitable for sealing. Medium amounts of grout would be required to seal strata laying five feet above the mine roof.
0	Core Boring	The Lower Kittanning coal seam was encountered and found to be impervious. The strata above the mine was also found to be relatively impermeable during pressure testing.
0-1	Core Boring	22 feet of Lower Kittanning coal was found in this drill hole. The strata below, in and above the coal was found to be quite pervious which accounts for the numerous seeps along the coal outcrop line. Limestone was found to be 52 feet thick 54feet under the coal.
P	Rotary	A void was encountered as expected in the mine opening at the Lower Kittanning coal seam horizon. This point would be suitable for a discharge structure.
Q	Core Boring	A barrier was hit in the Lower Kittanning coal seam. No pressure testing was conducted.
R	Core Boring	The Lower Kittanning coal seam was encountered and found to be porous enough to require medium amounts of grout for complete sealing.
R-1	Core Boring	The Lower Kittanning Coal seam located in this hole was quite impervious. Three feet of Limestone was found 50 feet below the coal.
R-2	Core Boring	The Lower Kittanning coal seam encountered was porous indicating medium amounts of grout would be required.

Drill Hole No.	Type	Comments
R-3	Core Boring	A mine void was hit at the Lower Kittanning coal seam. Pressure testing indicated that a heavy grout with additives would be needed to form an impervious roof if sealed at this point.
T	Rotary	The Middle Kittanning coal seam was found in tact and a void was hit as anticipated at the Lower Kittanning coal seam elevations. The roof was intact. A monitor well was installed.
V	Rotary	Only 14 feet of spoil was encountered after which undisturbed overburden was found which meant that the Lower Kittanning coal seam was not removed by surface mining at this location.
W	Rotary	Undisturbed overburden was found under 16 feet of spoil at this point. Forty nine feet lower a mine void was found in Lower Kittanning coal horizon. Surface mining would have been in the Middle Kittanning at this location.
X	Rotary	Forty feet of overburden was found above a three foot seam of fire clay commonly found under the Lower Kittanning coal. It was therefore concluded that the Lower Kittanning coal seam had been removed by surface mining.
Y	Rotary	Only nine feet of spoil was found here before undisturbed shale was encountered. Fifty eight feet above the clay found in Hole X. This indicated that the Middle Kittanning seam had been removed by surface mining operations.
Z	Rotary	Eighteen feet of spoil was found before undisturbed earth was encountered. This indicates that the Lower Kittanning coal had been removed in its entirety along the crop line.
AA	Rotary	Only thirteen feet of spoil was found before undisturbed overburden was encountered. The elevation indicates that the mine map was correct in showing the rise of the Lower Kittanning coal seam.

Drill Hole No.	Type	Comments
FF	Rotary	A mine void was encountered at an elevation of 1718. This would place the mining activities in the Middle Kittanning seam or the Enos Hays Mine. A monitor well was installed.
FF-1	Rotary	This hole was drilled over two hundred feet west of FF in an effort to miss the Enos Hayes Mine. However the Middle Kittanning seam had been removed at this location indicating that the mine map utilized in planning did not depict the extent of this mining operation. Due to the consistency found in the elevation difference between the Lower Kittanning and the Middle Kittanning seam the drilling was not continued into the Lower Kittanning seam.
MM	Core Boring	A mine void was hit at the Lower Kittanning Coal seam elevation. The roof was found to be solid and impervious which would be satisfactory for sealing.
NN	Core Boring	The Lower Kittanning coal seam was encountered and found to be impervious as was the strata directly above. The underlying strata was less dense and would require grout for sealing.
NN-1	Core Boring	The Lower Kittanning coal seam was found in tact. Pressure tests indicated that the strata was very dense and would not require grout if sealed and flooded.
PP	Core Boring	The bottom of a void in the Cartwright Mine was found at an elevation of 1711.58 approximately 52 feet below a 22 foot seam of un-mined Middle Kittanning coal. These elevations verified previous field work and mapping.
QQ	Core Boring	A mine void was encountered in the Lower Kittanning coal seam verifying the mine map data in this area.

Drill Hole No.	Type	Comments
EE	Core Boring	The first coal seam encountered at an elevation of 1713.42 was considered as the Middle Kittanning seam which placed the Lower Kittanning at 1666.42. Both seams were intact which placed the hole outside the periphery of this mine. The Lower Kittanning coal elevation compare favorably with mine map contours.
II	Core Boring	A mine void was encountered in the Lower Kittanning coal seam with a bottom elevation of 1616 which places it approximately 20 feet lower than mine map contours. The Middle Kittanning seam was intact at an elevation of 1666 which is approximately ten feet lower than the mine map contours at this location. A 7.1 foot seam of Freeport Limestone was found at 1737.
JJ	Rotary	The Lower Kittanning coal seam was encountered at an elevation of 1599 which placed the Middle Kittanning at 1653. The Middle Kittanning is in agreement with the report map but the Lower Kittanning varies by 60 feet. Although recorded differently in the field we believe the strata from 1720 to 1727 is Freeport Limestone.
KK	Rotary	A mine void was encountered in the Middle Kittanning coal seam at an elevation of 1686. This indicates that the Middle Kittanning drawing in the report is fairly accurate. We interpret the 12 foot seam found from 1747 to 1759 as including Freeport Limestone.
LL		The mine void encountered at this location was in the Lower Kittanning seam. The Middle Kittanning seam was intact. The Lower Kittanning lies at 1620.17 which agrees Fully with the mine map contours. The Middle Kittanning was found to be 10 feet lower than shown on the drawing.



Lower Kittanning Coal Seam

PROJECT SL 132-1 DWG A3

TOBY CREEK

ELK COUNTY PENNSYLVANIA

SCALE 1" = 2000'

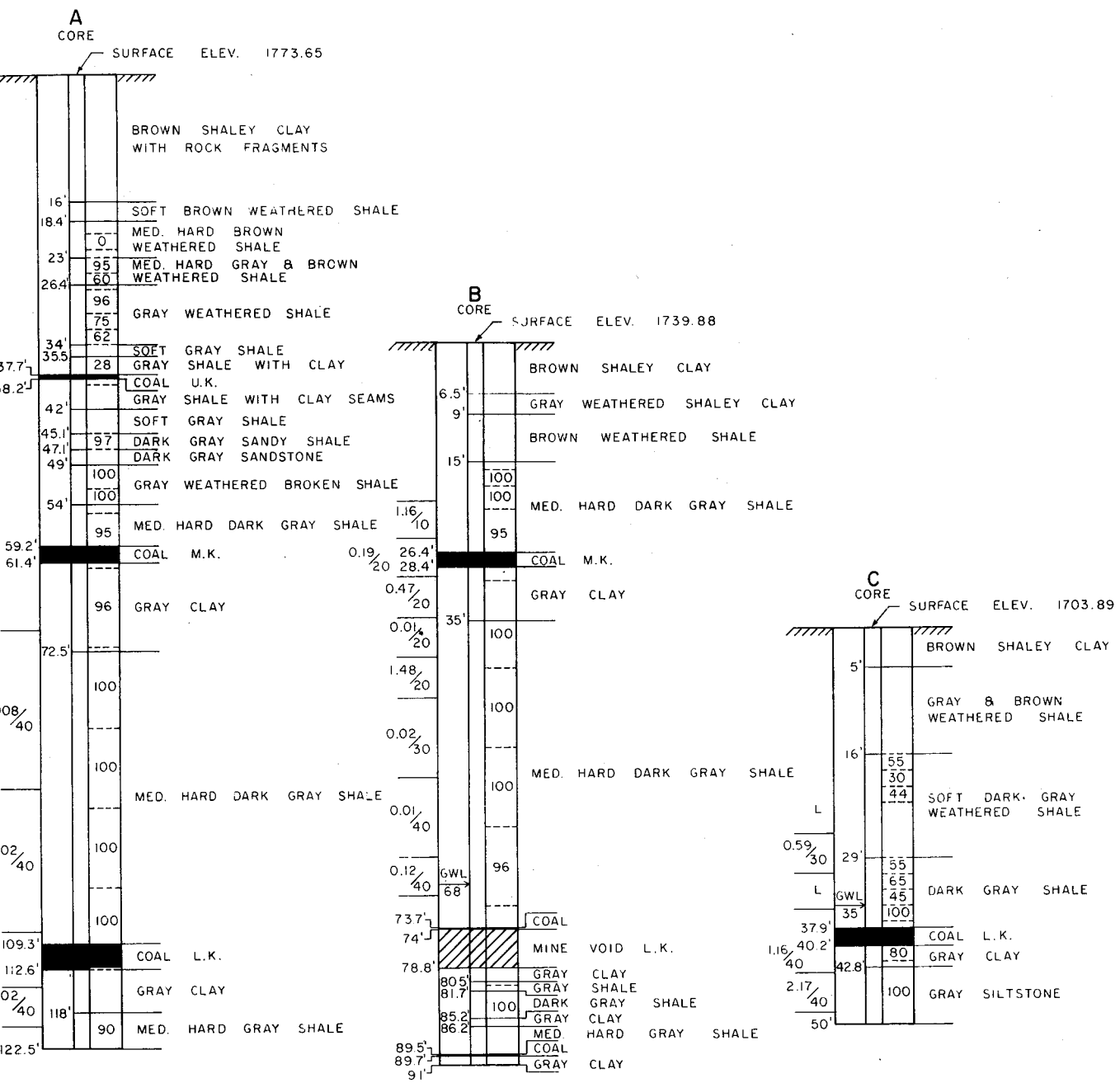
REVISED TO SHOW DRILL HOLES IN PROJECT SL 132-5

CONTOURS FROM SUBSURFACE EXPLORATION

CONTOURS FROM MINE FLOOR ELEVATIONS

PRESUMED LOCATION OF MINES - NO RECORDS AVAILABLE

PLATE 6



DEPARTMENT OF ENVIRONMENTAL RESOURCES

PROJECT SL 132-5-101.5

LITTLE TOBY CREEK
ELK COUNTY

SUBSURFACE EXPLORATION

BORE HOLES A, B, C, D, E, E-1

VERTICAL SCALE
10 5 0 10

UPPER SECTION ELEVATIONS FOR SPLIT HOLES

1930 20 10 1900 90 80 70 60 50 40 30 20 10 1800 90 80 70 60 1750

1750 40 30 20 10 1700 90 80 70 60 50 40 30 20 1610

F
CORE

SURFACE ELEV. 1710.74

- 0 – 5' BROWN SHALEY CLAY
- 5' – 11.5' GRAY SHALEY CLAY
- 11.5' – 26.5' SOFT DARK GRAY SHALE
- 26.5' – 29.5' MED HARD DARK GRAY SHALE
- 29.5' – 31.3' COAL L.K.
- 31.3' – 33.5' GRAY CLAY
- 33.5' – 39' GRAY SILTSTONE

1.22/40 · 0.0 GWL · 40 31.3' · 0.37/40 · 50 · 40 · 60 · 30 · 42 · 100

G (1931.10-1750)
ROTARY

SURFACE ELEV. 1931.10

- 0 – 6' OVERBURDEN
- 6' – 10' SOFT BROWN SANDSTONE
- 10' – 40' HARD BROWN SANDY SHALE
- 40' – 50' MED. HARD DARK GRAY SHALE
- 50' – 57' HARD GRAY SANDSTONE
- 57' – 64' MED. HARD BROWN SANDSTONE
- 64' – 67' HARD GRAY SANDSTONE
- 67' – 71' SOFT TO MED. HARD BROWN SANDSTONE
- 71' – 75' SOFT TO MED. HARD GRAY SANDSTONE
- 75' – 83' VERY HARD GRAY SANDSTONE
- 83' – 100' MED. HARD GRAY & BROWN SHALE
- 100' – 125' MED. HARD DARK GRAY SHALE
- 125' – 126.8' COAL U.F.
- 126.8' – 145' MED. HARD DARK GRAY SHALE
- 145' – 145.7' COAL L.F.
- 145.7' – 150' MED. HARD DARK GRAY SHALE
- 150' – 151' COAL L.F.
- 151' – 152' MED. HARD DARK GRAY SHALE
- 152' – 155' HARD GRAY SANDSTONE
- 155' – 160' HARD GRAY SANDY SHALE
- 160' – 168' HARD DARK GRAY SHALE
- 168' – 186.5' MED. HARD DARK GRAY SHALE

G (1750-1619.10)
ROTARY

- 186.5' – 188' MED. HARD DARK SHALE CONT.
- 188' – 190' COAL U.K.
- 190' – 195' SOFT GRAY CLAYEY SHALE
- 195' – 204' HARD GRAY SANDSTONE
- 204' – 207' MED. HARD GRAY SANDY SHALE
- 207' – 211' COAL M.K.
- 211' – 220' FIRE CLAY
- 220' – 253' SOFT LIGHT GRAY SHALE
- 253' – 256' MED. HARD DARK GRAY SHALE
- 256' – 312' COAL L.K.
- 312' – MED. HARD LIGHT GRAY SHALE

H
ROTARY

SURFACE ELEV. 1699.84

- 0 – 12' OVERBURDEN
- 12' – 22.5' SOFT DARK GRAY SHALE
- 22.5' – 26' COAL L.K.
- 26' – 28' SOFT TO MED HARD CLAYEY SHALE

I
ROTARY

SURFACE ELEV. 1709.72

- 0 – 17' OVERBURDEN
- 17' – 36' MED. HARD DARK GRAY SHALE
- 36' – 39' MINE VOID L.K.
- 39' – 49' NO RETURN

UPPER SECTION ELEVATION FOR SPLIT HOLES

1930 20 10 1900 90 80 70 60 50 40 30 20 10 1800 90 80 70 60 50 40 30 20 1640

1750 90 80 70 60 50 40 30 20 1700 90 80 70 60 50 40 30 20 10 1880

DEPARTMENT OF ENVIRONMENTAL RESOURCES

PROJECT SL 132-5-101.5

LITTLE TOBY CREEK
ELK COUNTY

SUBSURFACE EXPLORATION

BORE HOLES
F, G, H, I

VERTICAL SCALE
10 5 0 10

K
CORE
SURFACE ELEV. 1865.95
SOFT BROWN WEATHERED SHALE
10'
50
50
80 GRAY SANDY SHALE
95 COAL
93 GRAY SANDY SHALE
28'
97 FINE GRAIN GRAY SANDSTONE
30.5'
84 BROWN TO GRAY SOFT SHALEY CLAY
41'
100 MED. HARD GRAY WEATHERED SHALE
48'
100 BROWN SHALE CLAY
52.4'
96 MED. HARD DARK GRAY SHALE
57'
GRAY SANDSTONE & SHALE
60'
100 MED. HARD DARK GRAY WEATHERED SHALE
83
78'
BLACK SHALE
82'
100 MED. HARD GRAY SHALE
100
97'
100' COAL M.K.
GRAY CLAY
102'
GRAY SILTSTONE
100
108'
100
100 DARK GRAY SHALE
100
GWL
151' 150
153'
GRAY CLAY
100 HARD GRAY SHALE
160'

L
CORE
SURFACE ELEV. 1759.66
BROWN SHALEY CLAY
10.5'
LIGHT GRAY WEATHERED SHALE
14.5'
16.3'
DARK GRAY WEATHERED SHALE
30
0.65/40
95
BROKEN GRAY SHALE
100
0.14/40
25'
88 SOFT TO HARD GRAY SHALE
31'
0.53/40
100 DARK GRAY SLIGHTLY WEATHERED SHALE
0.64/40
41'
0.91/40
62 MED. HARD LIGHT GRAY WEATHERED SHALE
52.4'
63
0.06
55.2'
COAL L.K.
40
56.5'
GRAY CLAY
0.002/40
98 MED. HARD GRAY SHALE
63'
65'
GRAY & BROWN WEATHERED BROKEN SHALE

M
CORE
SURFACE ELEV. 1799.57
SHALEY CLAY
17.5'
SOFT GRAY SHALE
23'
24.6'
COAL U.K.
SOFT GRAY SHALE
26.5'
95
MED. HARD GRAY SHALE
31'
100 SOFT GRAY SHALE
36'
MED. HARD GRAY SHALE
38'
40.3'
COAL M.K.
43'
100 GRAY CLAY
100
87
0.53/40
97 MED. HARD DARK GRAY SHALE
100
0.60/40
85
0.23/40
89
GWL
92.5'
91
MINE VOID L.K.
96'
GRAY CLAY
100 GRAY SHALE
101

N-1
CORE
SURFACE ELEV 1755.66
BROWN SHALEY CLAY
10'
DARK GRAY WEATHERED SHALE
14.1'
1.04/40
100
100 MED. HARD DARK GRAY WEATHERED SHALE
0.43/40
21'
0.02/40
50
MED. HARD DARK GRAY SHALE
0.0/40
GWL
37.5'
37
MINE VOID L.K.
40'
100 GRAY CLAY
44.3'
46'
GRAY SHALE

N-3
CORE
SURFACE ELEV. 1754.47
BROWN SHALEY CLAY
14.5'
DARK GRAY WEATHERED SHALE
L
22.5'
25
85
90 MED. HARD DARK GRAY WEATHERED SHALE
2.20/40
28.5'
100
GWL
0.02/40
29
100 MED. HARD DARK GRAY SHALE
35.7'
0.37/40
38.2'
COAL L.K.
86 GRAY CLAY
0.002/40
42.5'

1870
60
50
40
30
20
10
1800
90
80
70
60
50
40
30
20
10
1700
1690

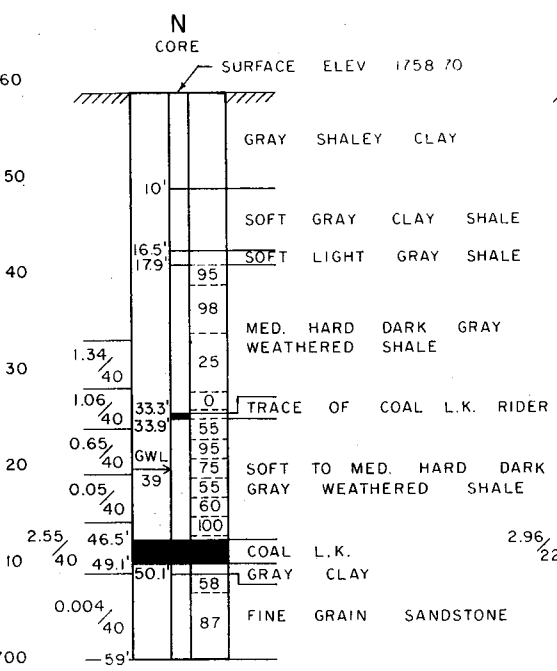
DEPARTMENT OF ENVIRONMENTAL RESOURCES

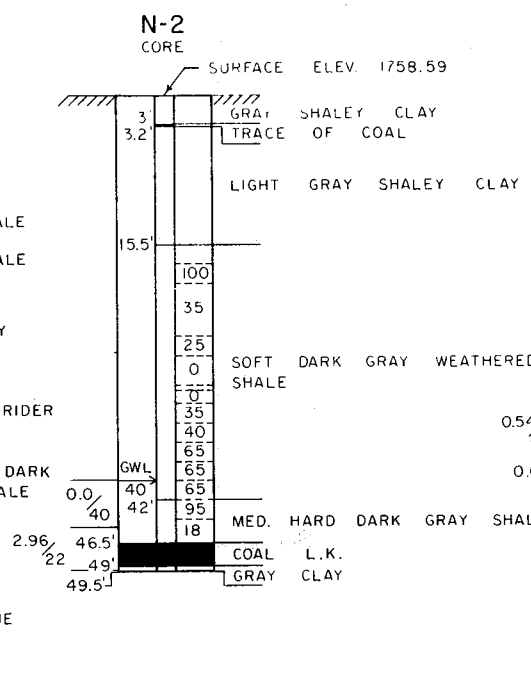
PROJECT SL 132-5-101.5

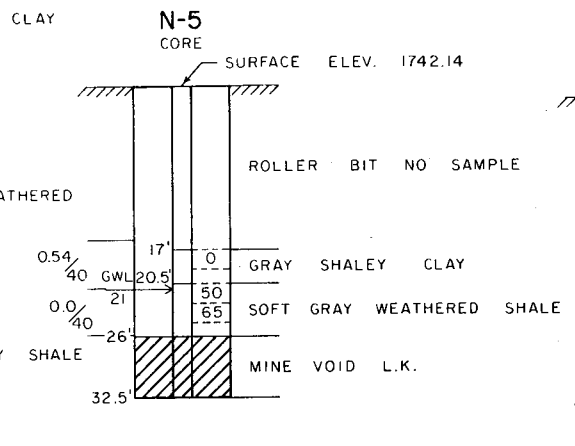
LITTLE TOBY CREEK
ELK COUNTY

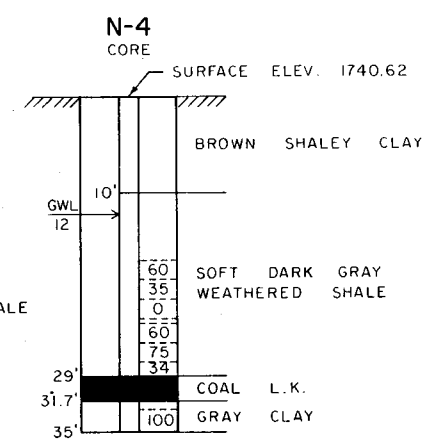
SUBSURFACE EXPLORATION
BORE HOLES
K, L, M, N-1, N-3

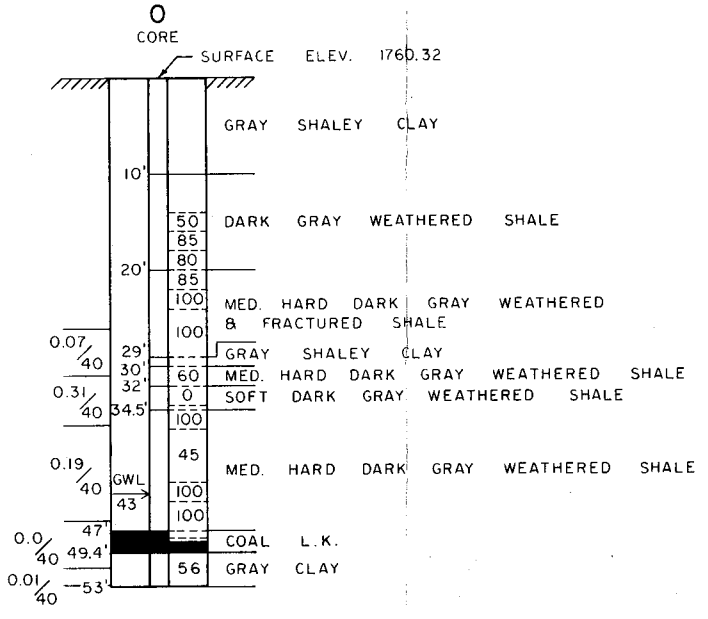
VERTICAL SCALE
10 5 0 10











DEPARTMENT OF ENVIRONMENTAL RESOURCES

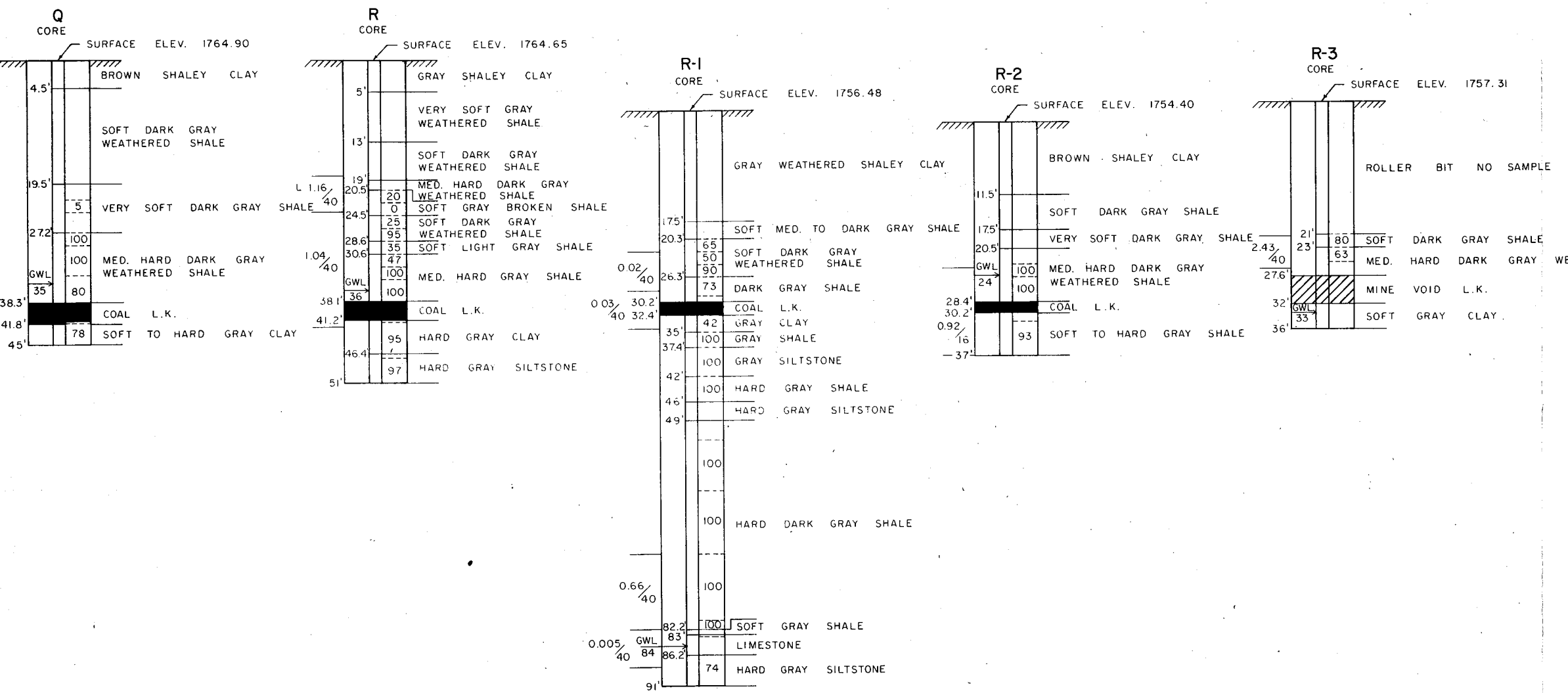
PROJECT SL 132-5-101.5

LITTLE TOBY CREEK
ELK COUNTY

SUBSURFACE EXPLORATION

BORE HOLES
N, N-2, N-5, N-4, O

VERTICAL SCALE
10 5 0 10



DEPARTMENT OF ENVIRONMENTAL RESOURCES

PROJECT SL 132-5-101.5

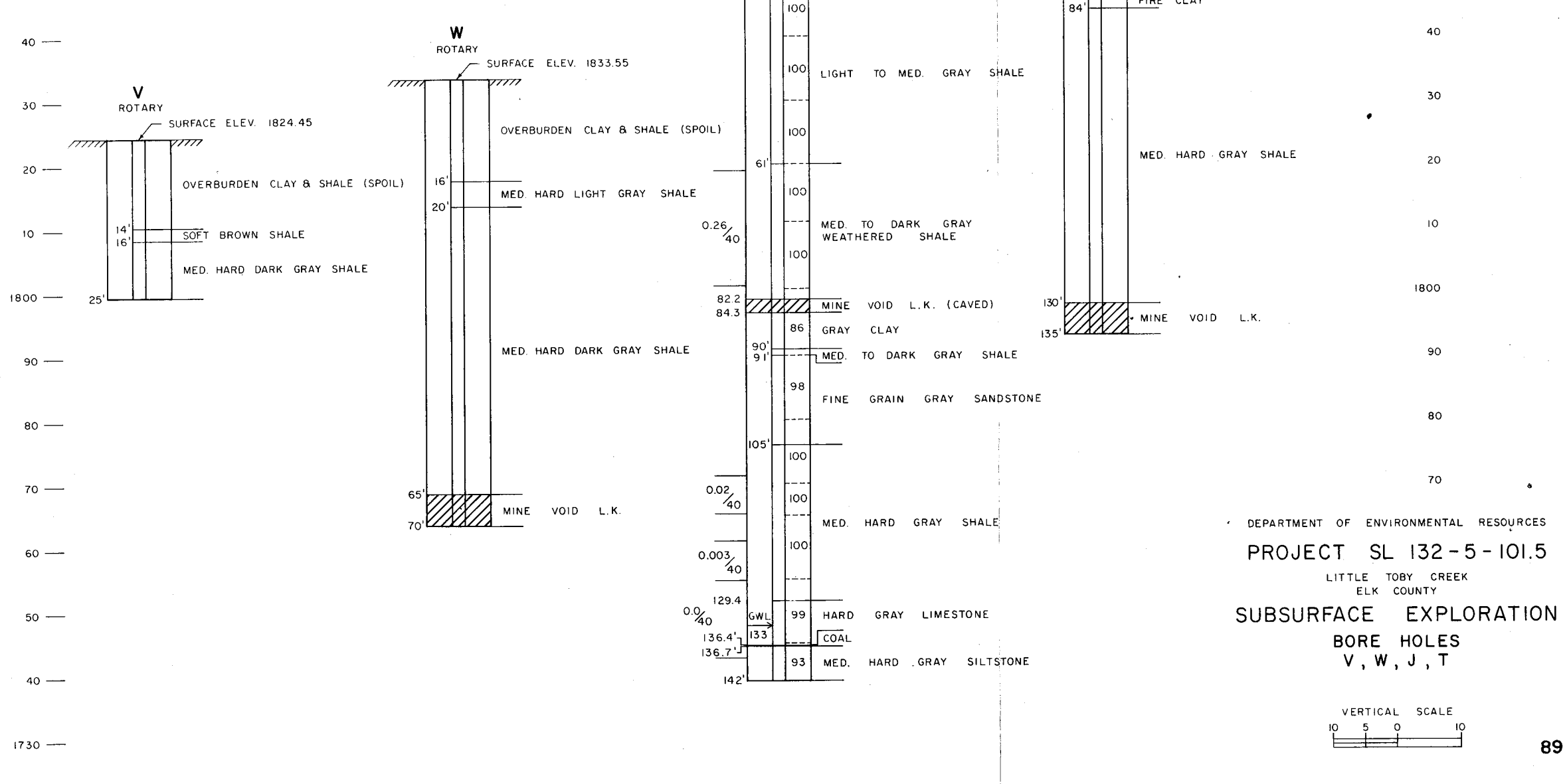
LITTLE TOBY CREEK
ELK COUNTY

SUBSURFACE EXPLORATION

BORE' HOLES
Q, R, R-1, R-2, R-3

VERTICAL SCALE
10 5 0 10

PLATE 13



DEPARTMENT OF ENVIRONMENTAL RESOURCES

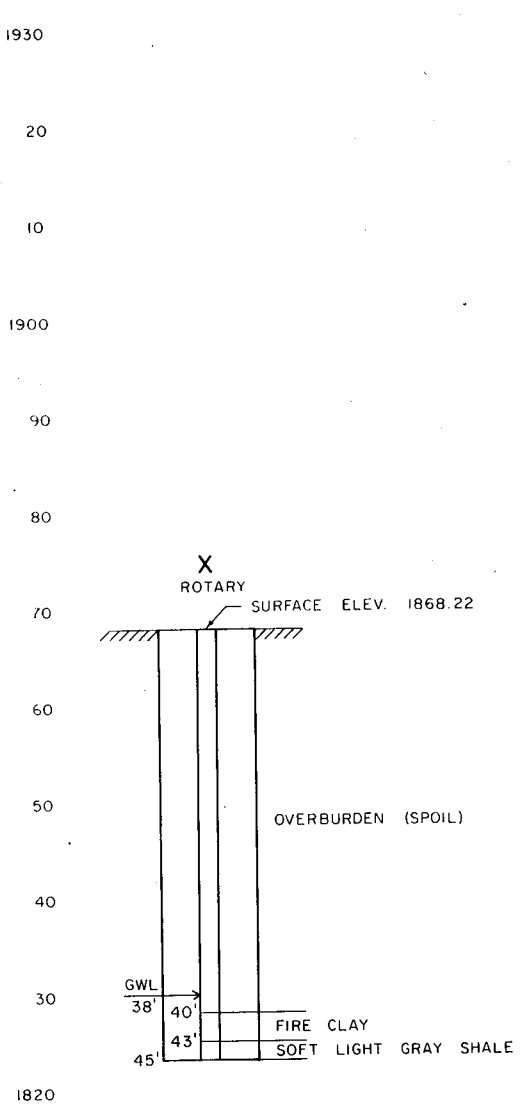
PROJECT SL 132-5-101.5

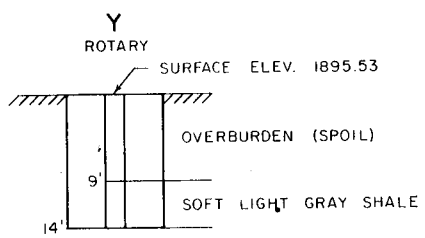
LITTLE TOBY CREEK
ELK COUNTY

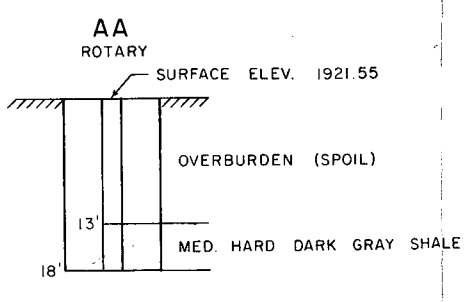
SUBSURFACE EXPLORATION

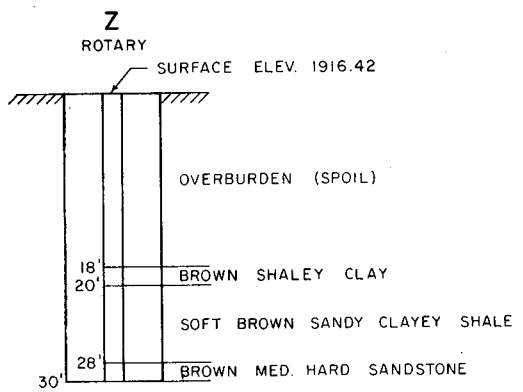
BORE HOLES
V, W, J, T

VERTICAL SCALE
10 5 0 10









DEPARTMENT OF ENVIRONMENTAL RESOURCES

PROJECT SL 132-5-101.5

LITTLE TOBY CREEK
ELK COUNTY

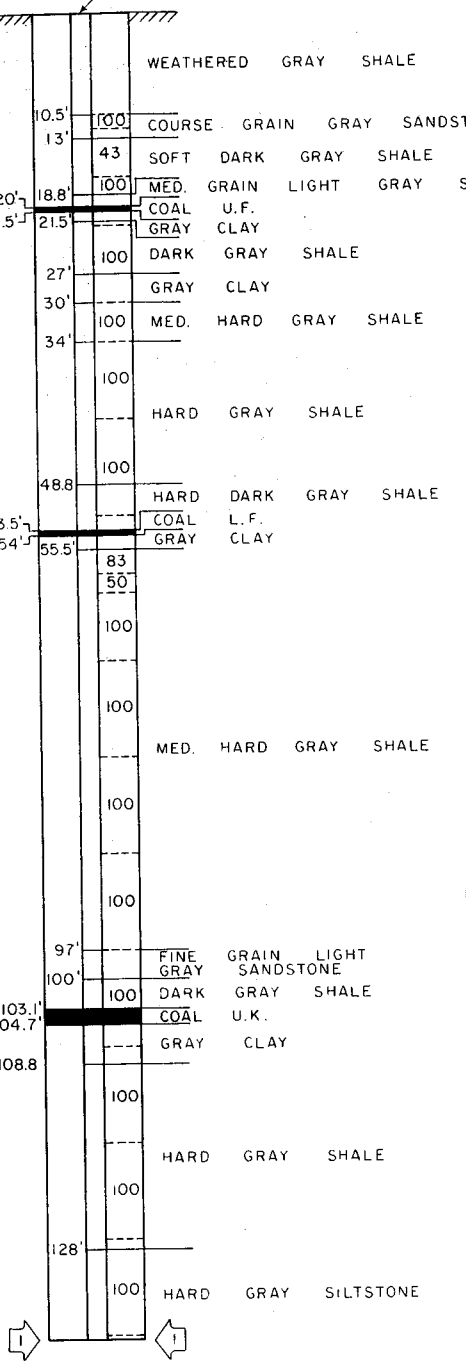
SUBSURFACE EXPLORATION

BORE HOLES
X, Y, AA, Z

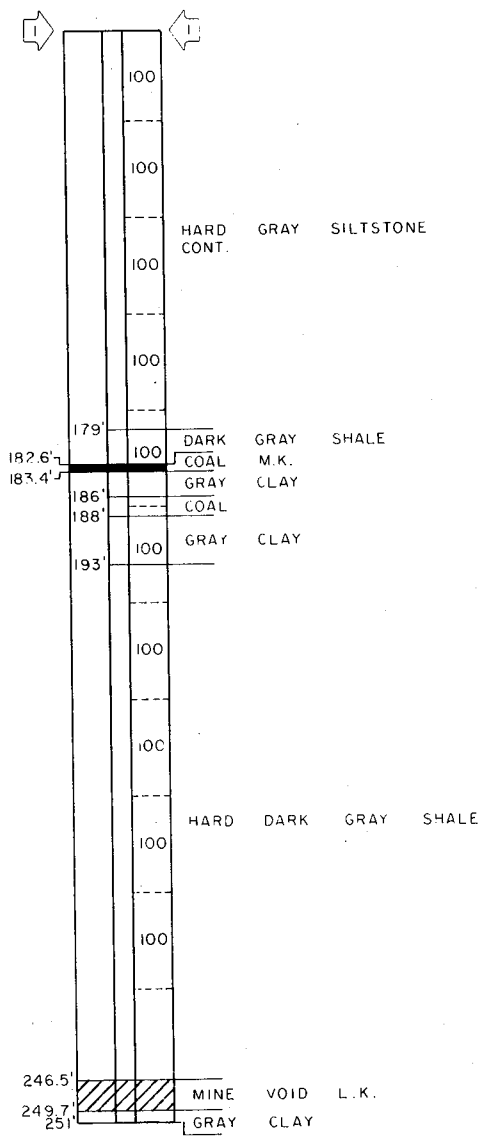
VERTICAL SCALE
10 5 0 10

QQ (1947.57 - 1810)

CORE

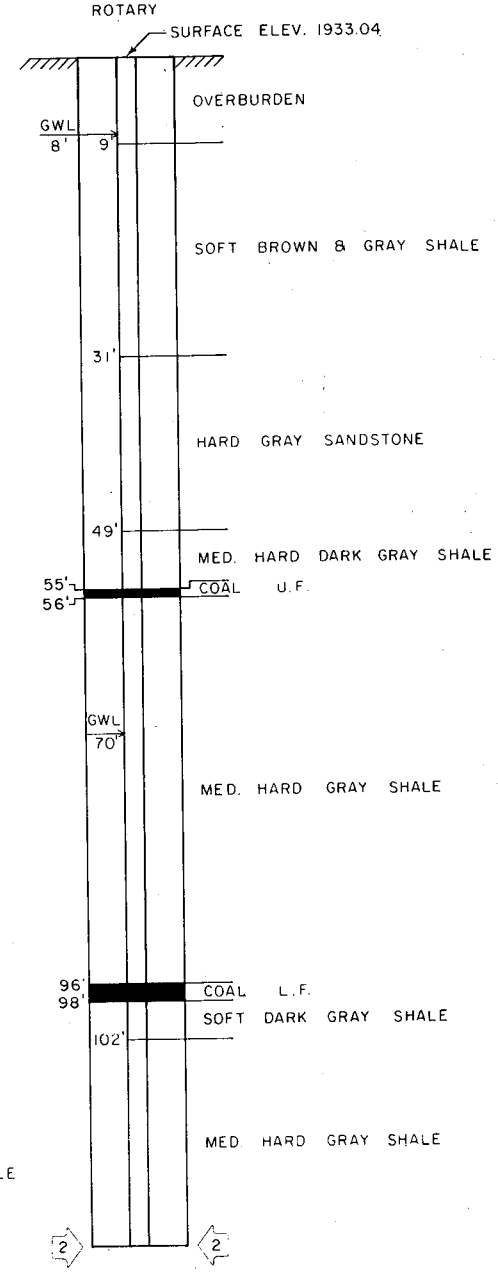


QQ (1810 - 1696.57)

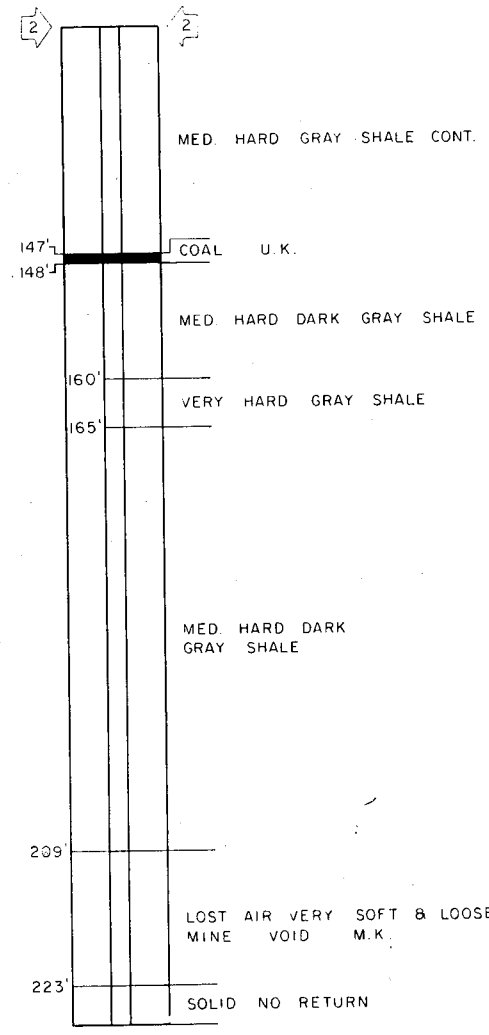


FF-1 (1933.04 - 1810)

ROTARY

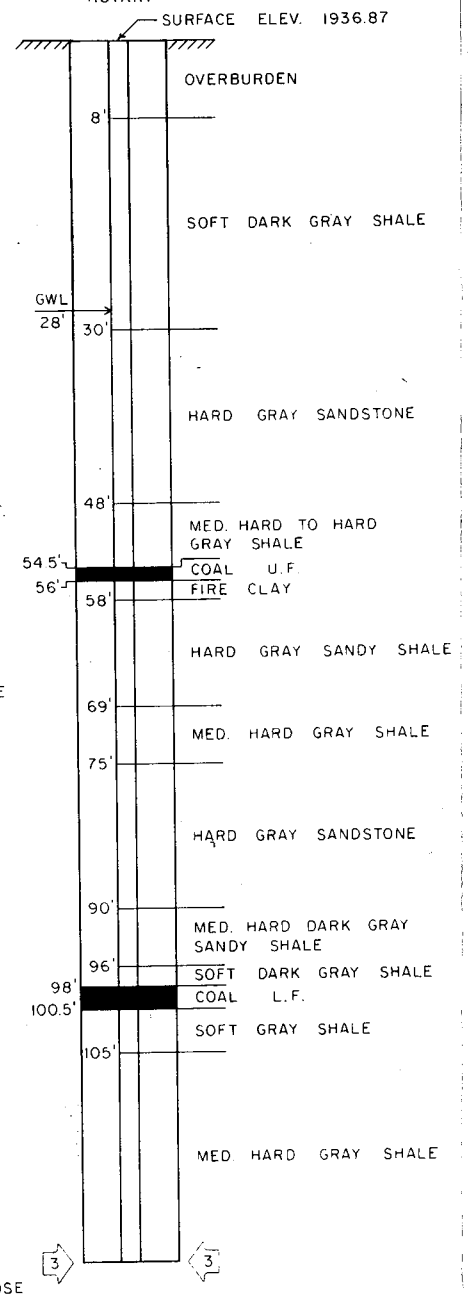


FF-1 (1810 - 1706.04)

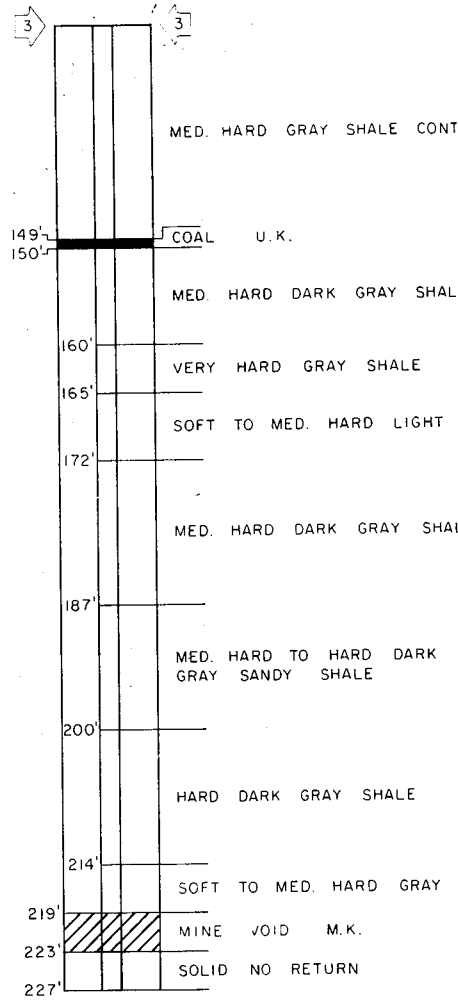


FF (1936.87 - 1810)

ROTARY



FF (1810 - 1709.87)



UPPER SECTION ELEVATIONS	FOR SPLIT HOLES
1950	
40	
30	
20	
10	
1900	
1800	90
90	80
80	70
70	60
60	50
50	40
40	30
30	20
20	1810
1710	

DEPARTMENT OF ENVIRONMENTAL RESOURCES

PROJECT SL 132-5-101.5

LITTLE TOBY CREEK
ELK COUNTY

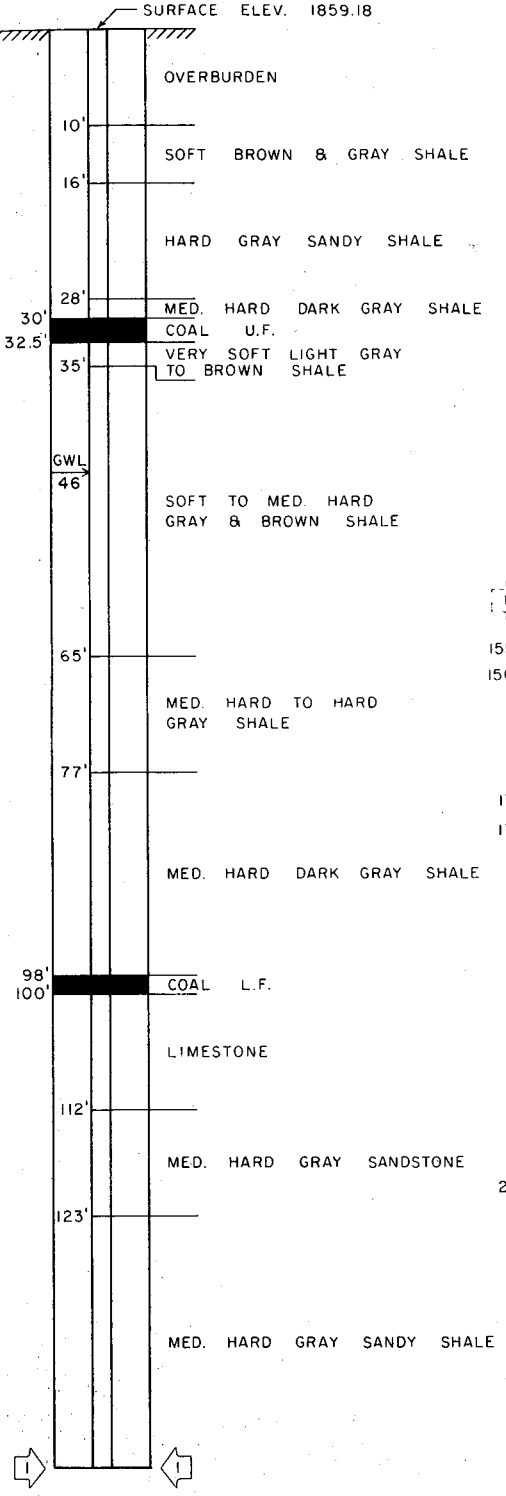
SUBSURFACE EXPLORATION

BORE HOLES
QQ, FF-1, FF

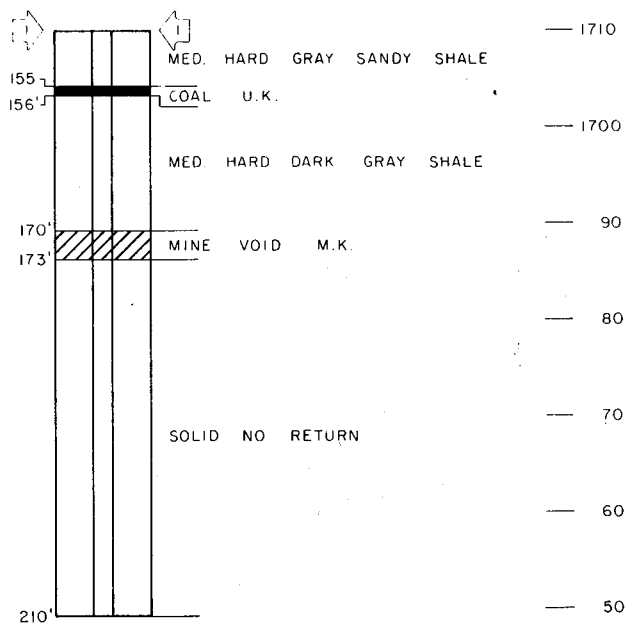
VERTICAL SCALE
10 5 0 10

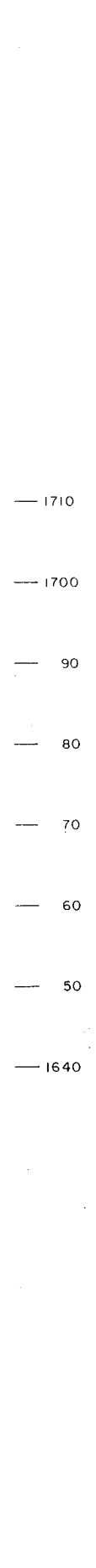
KK (1859.18 - 1710)

ROTARY



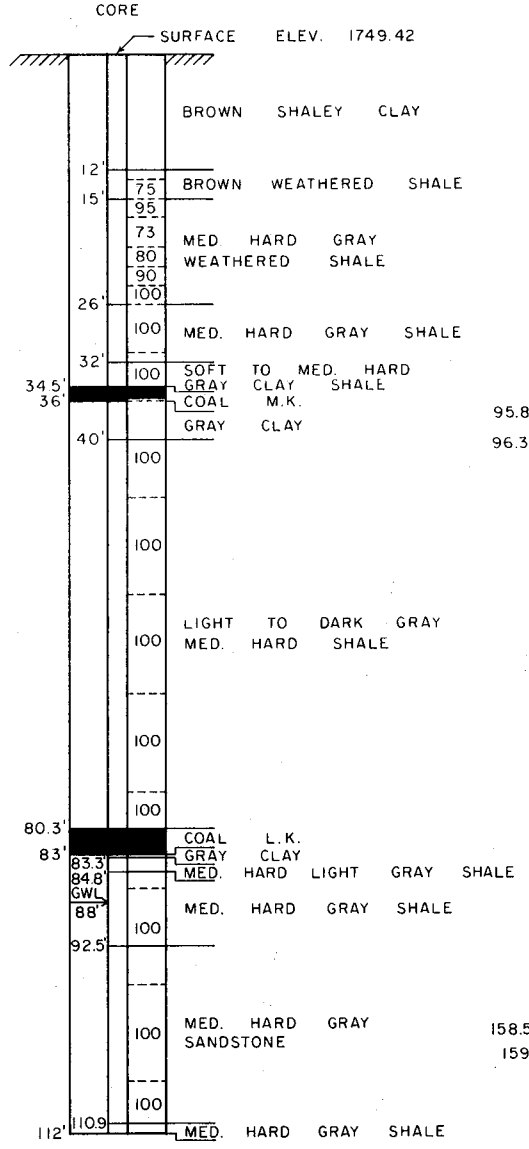
KK (1710 - 1649.18)





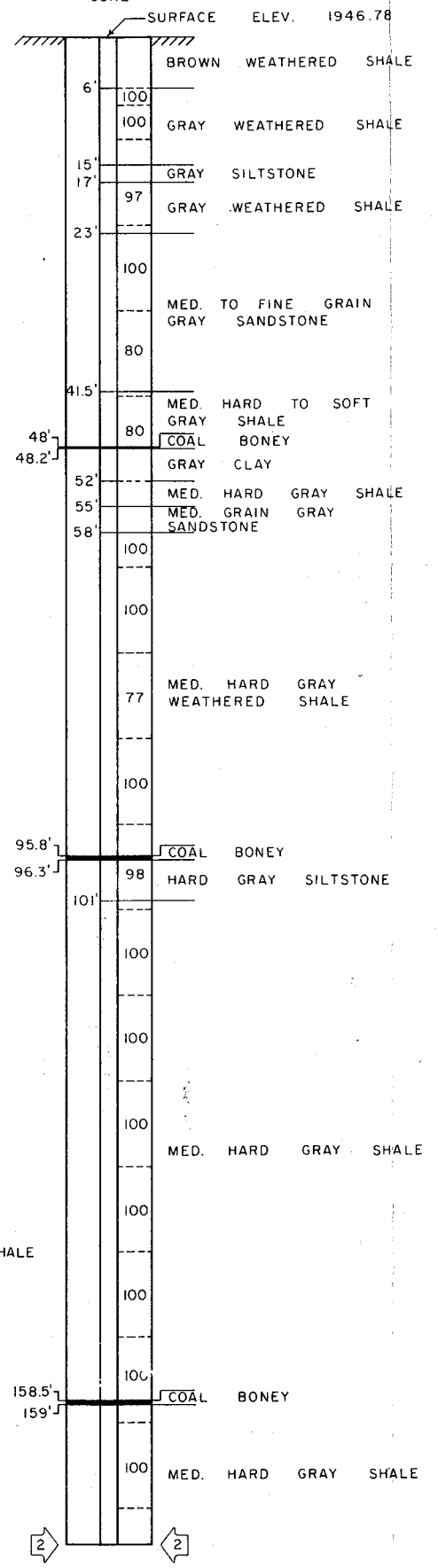
EE

CORE

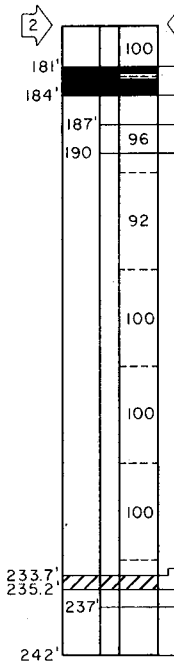


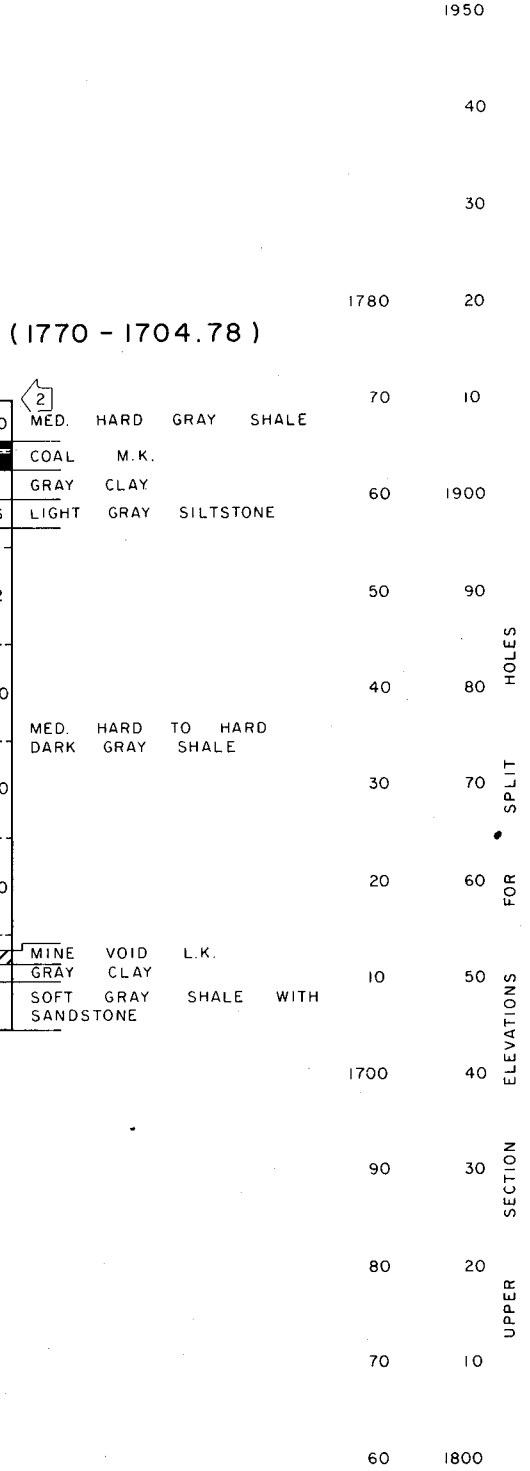
PP (1946.78 - 1770)

CORE



PP (1770 - 1704.78)





DEPARTMENT OF ENVIRONMENTAL RESOURCES

PROJECT SL 132-5-101.5

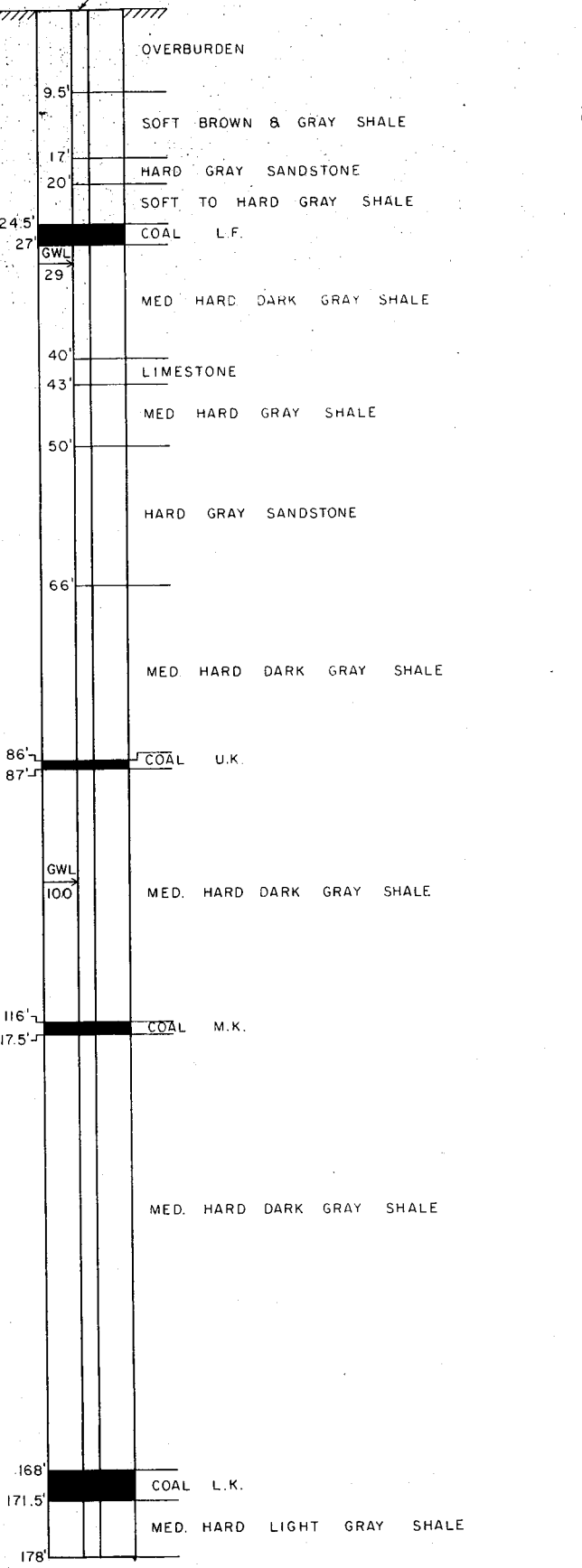
LITTLE TOBY CREEK
ELK COUNTY

SUBSURFACE EXPLORATION

BORE HOLES
KK, EE, PP

VERTICAL SCALE
10 5 0 10

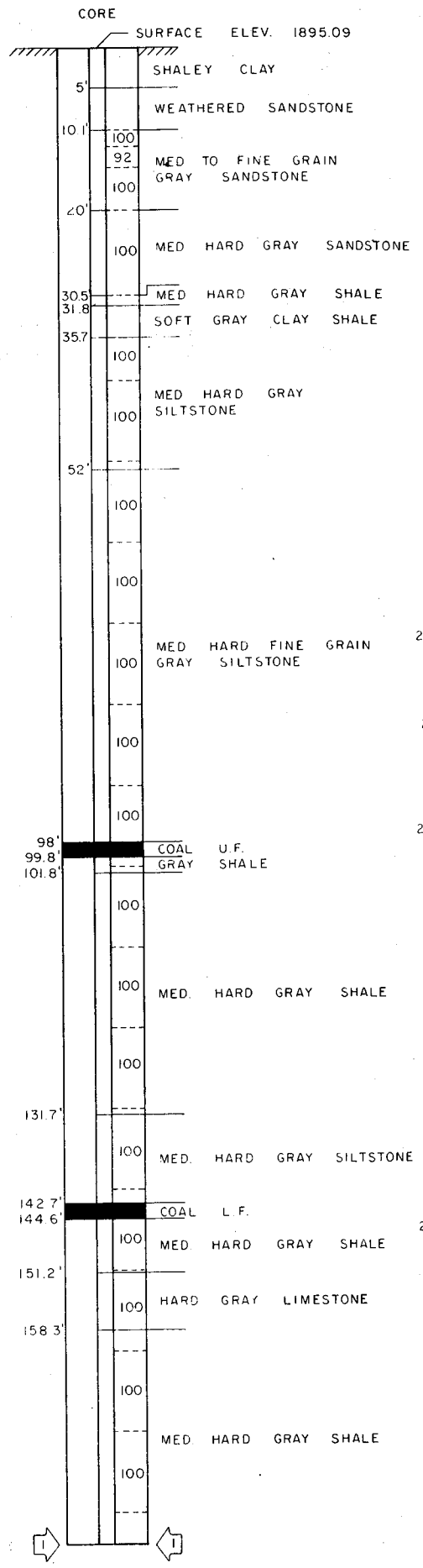
JJ
ROTARY



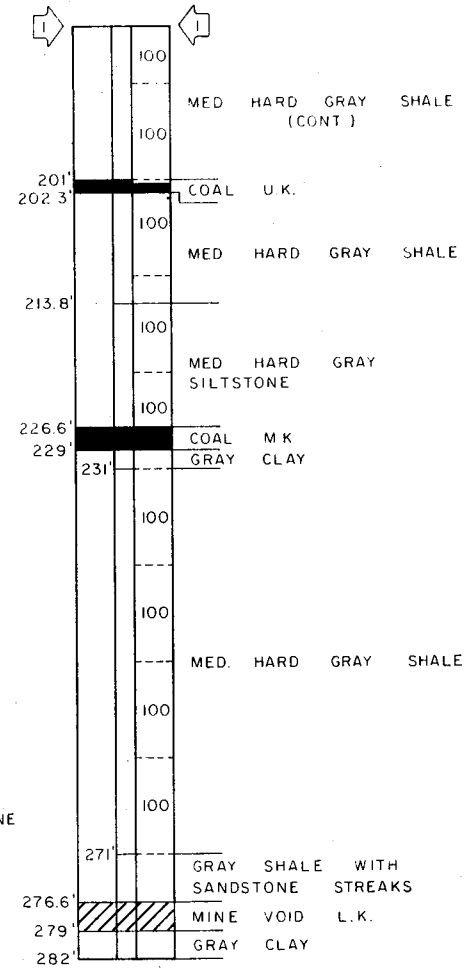
UPPER SECTION ELEVATIONS FOR SPLIT HOLES

1900			
90			
80			
70			
60			
50			
40	1710		
30	1700		
20	90		
10	80		
1800	70		
90	60		
80	50		
70	40		
60	30		
50	20		
40	1610		
30			
20			
1710			

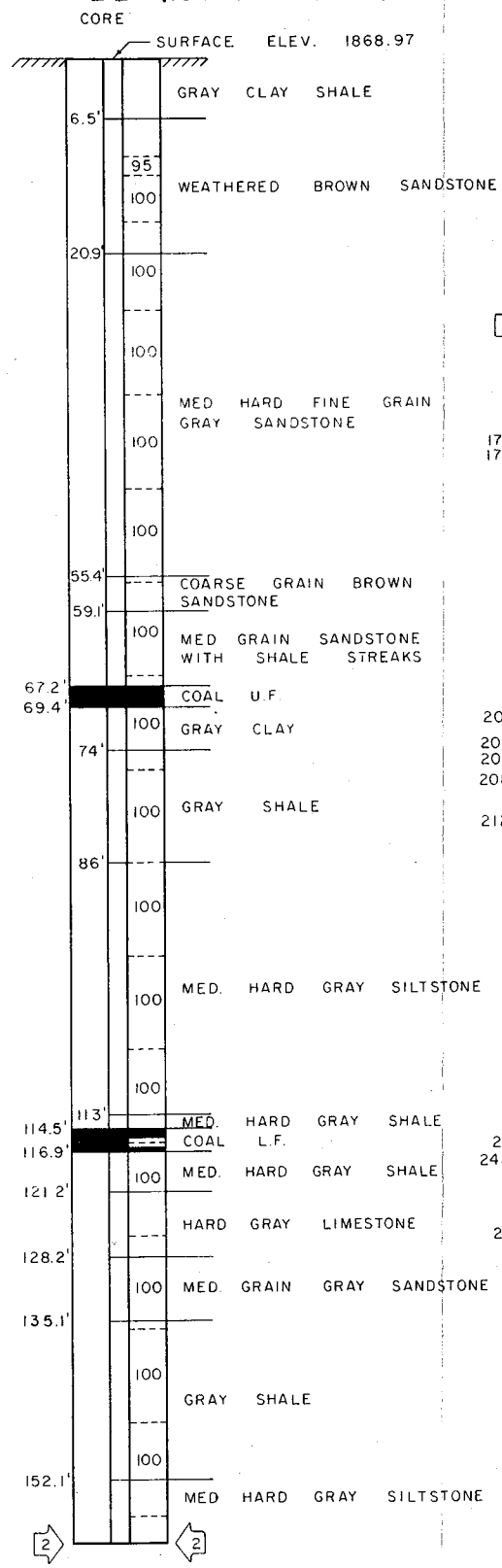
II (1895.09 - 1710)
CORE



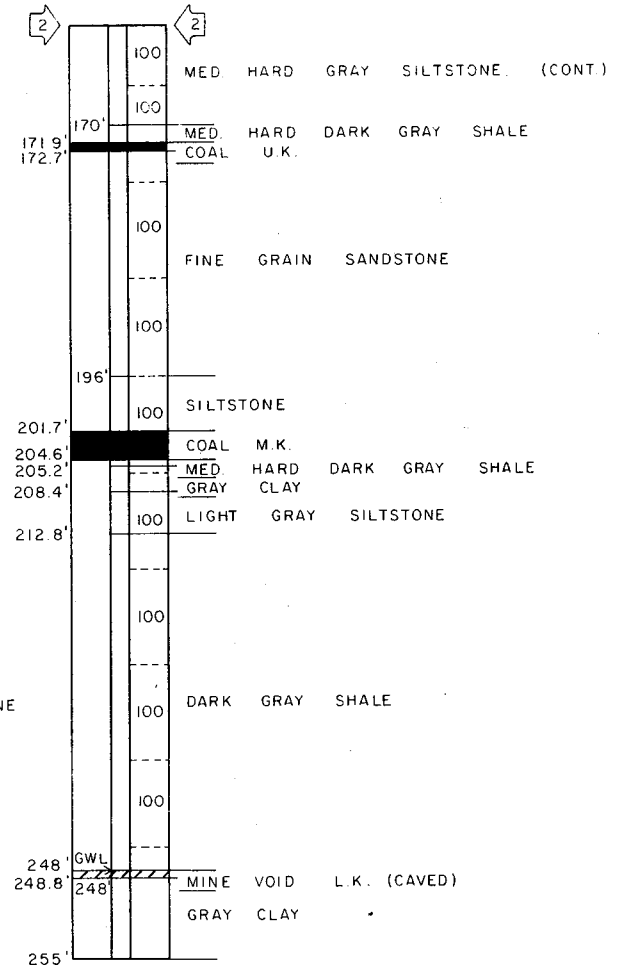
II (1710 - 1613.09)



LL (1868.97 - 1710)
CORE



LL (1710 - 1613.97)



UPPER SECTION ELEVATIONS FOR SPLIT HOLES

1710	40
1700	30
90	20
80	10
70	1800
60	90
50	80
40	70
30	60
20	50
1610	1740

DEPARTMENT OF ENVIRONMENTAL RESOURCES

PROJECT SL 132-5-101.5

LITTLE TOBY CREEK
ELK COUNTY

SUBSURFACE EXPLORATION

BORE HOLES
JJ , II , LL

VERTICAL SCALE
10 5 0 10