

Laboratory data presented in Appendix C "Gypsum Testing and Physical Properties" were from the report titled "*Use of Coal Combustion By-products As Engineered Fills*" prepared by Law Engineering, Inc. dated November 10, 1995.

TVA - Fly Ash, Bottom Ash and Scrubber Sludge Study
 Classification (Index Property) Summary
 Low Engineering Project No. 5810860107

Source	Code	Material	Bucket Code	Date Collected	Moisture Content, %	Grain Size - ASTM D112		Alterable Limits ASTM D4318		Specific Gravity	USCS Classification	AASHTO Classification
						% Pass No. 4	% Pass No. 200	LL	PL			
Allen	ALF	Boiler Slag - Fine Recd Rejects	A-B	5/11/95	0.08	18.2	0.8	N/A	N/A	2.75	SM	A-2(10.0)
			C-D		0.0	14.6	0.8	N/A	N/A	2.79	SM	A-2(10.0)
			E-F		0.0	16.0	0.8	N/A	N/A	2.81	SM	A-2(10.0)
Bull Run	BRF	Dry Fly Ash	A-B	4/4/95	0.02	91.2	16.6	N/A	N/A	2.16	ML	A-4(0.0)
			C-D		0.0	91.2	19.2	N/A	N/A	2.28	ML	A-4(0.0)
			E-F		0.0	90.7	17.3	N/A	N/A	2.37	ML	A-4(0.0)
			A-B		6.92	21.0	4.0	N/A	N/A	2.31	SW	A-1-b
			C-D		6.07	21.3	6.9	N/A	N/A	2.29	SW-SM	A-1-b
			E-F		6.74	17.9	5.9	N/A	N/A	2.35	SW-SM	A-1-b
Colbert	COF	Dry Fly Ash - Units 1&2 - Units 3&4 - Units 1&2 - Units 3&4 - Units 1&2 - Units 3&4 Bottom Ash - From Pond	A	5/25/95	0.01	81.6	14.9	N/A	N/A	2.02	ML	A-4(0.0)
			B		0.0	69.9	11.5	N/A	N/A	2.00	ML	A-4(0.0)
			C		0.01	83.6	3.9	N/A	N/A	1.95	ML	A-4(0.0)
			D		8.02	7.2	13.6	N/A	N/A	2.15	SM	A-1-b
			E		6.86	15.9	10.8	N/A	N/A	2.08	SP-SM	A-1-b
			F		7.92	12.8	10.5	N/A	N/A	2.10	SP-SM	A-1-b
			A-B		0.31	0.0	95.1	N/A	N/A	2.57	ML	A-4(0.0)
			C-D		0.0	94.0	20.7	N/A	N/A	2.84	ML	A-4(0.0)
			E-F		0.01	93.2	29.8	N/A	N/A	2.55	ML	A-4(0.0)
			A-B		14.32	30.9	1.1	N/A	N/A	2.59	SW	A-1-b
			C-D		13.66	46.2	2.2	N/A	N/A	2.66	SW	A-1-b
			E-F		5.08	32.2	2.1	N/A	N/A	2.63	SW	A-1-b
Cumberland	CUP	Dry Fly Ash - Units 1&2 - Units 1&2 - Units 1&2 Bottom Ash - From Pond Scrubber Gypsum	A-B	4/17/95	0.01	95.1	30.0	N/A	N/A	2.57	ML	A-4(0.0)
			C-D		0.0	94.0	20.7	N/A	N/A	2.84	ML	A-4(0.0)
			E-F		0.01	93.2	29.8	N/A	N/A	2.55	ML	A-4(0.0)
			A-B		14.32	30.9	1.1	N/A	N/A	2.59	SW	A-1-b
			C-D		13.66	46.2	2.2	N/A	N/A	2.66	SW	A-1-b
			E-F		5.08	32.2	2.1	N/A	N/A	2.63	SW	A-1-b
Gallatin	GAF	Dry Fly Ash - Unit 3 Hoppers Bottom Ash - From Pond	A-B	6/9/95	0.03	94.2	12.0	N/A	N/A	2.17	NIL	A-4(0.0)
			C-D		0.01	95.2	13.8	N/A	N/A	2.40	NIL	A-4(0.0)
			E-F		0.01	93.5	14.8	N/A	N/A	2.19	NIL	A-4(0.0)
			A-B		19.11	18.2	5.9	N/A	N/A	2.16	SP-SM	A-1-b
			C-D		7.32	27.0	4.0	N/A	N/A	2.17	SW	A-1-b
			E-F		10.20	18.8	5.6	N/A	N/A	2.32	SW-SM	A-1-b
John Sevier	JSF	Dry Fly Ash - Unit 4, Hoppers 11&12 - Unit 3, Hoppers 11&12 - Unit 4, Hoppers 9, 10&13 - Unit 3, Hoppers 9&10 - Unit 4, Hopper 15, - Unit 3, Hopper 16 - Unit 4, Hopper 15 Bottom Ash - From Pond	A	5/25/95	0.06	94.2	17.4	N/A	N/A	2.17	NIL	A-4(0.0)
			B		0.0	86.1	22.1	N/A	N/A	2.15	NIL	A-4(0.0)
			C		0.01	94.1	28.0	N/A	N/A	2.43	NIL	A-4(0.0)
			D		26.68	22.8	4.3	N/A	N/A	2.13	SP	A-1-b
			E		27.72	24.2	3.3	N/A	N/A	2.14	SW	A-1-b
			F		30.70	27.8	3.7	N/A	N/A	2.12	SW	A-1-b

TVA - Fly Ash, Bottom Ash and Scrubber Sludge Study
 Classification (Index Property) Summary
 Law Engineering Project No. 5810860101

Source	Code	Material	Buret Code	Date Collected	Moisture Content, %	Grain Size - ASTM D422		Atterberg Limits - ASTM D4318		Specific Gravity	USCS Classification	AASHTO Classification			
						% Ret. on No. 4	% Pass No. 200	LL	PL						
Johnstonville	JDF	Ponded Fly Ash (New Dredge Cell)	A-B	6/7/95	28.82	3.2	47.1	NL	NP	N/A	1.36	SM	A-4(0.0)		
			C-D		29.10	0.0	54.4	NL	NP	N/A	1.56	ML	A-4(0.0)		
			E-F		31.07	1.8	59.2	NL	NP	N/A	2.31	NL	A-4(0.0)		
		Ponded Fly Ash (Old Dredge Cell)	A-B	13.61	3.6	31.6	NL	NP	N/A	N/A	2.41	SM	A-2-4(0.0)		
			C-D	10.98	8.7	42.2	NL	NP	N/A	N/A	2.43	SM	A-2-4(0.0)		
			E-F	15.11	2.2	41.4	NL	NP	N/A	N/A	2.23	SM	A-2-4(0.0)		
		Ponded Fly Ash (Active Ash Pond)	A-B	23.07	0.0	95.0	NL	NP	N/A	N/A	2.48	NL	A-4(0.0)		
			C-D	31.07	0.0	94.8	NL	NP	N/A	N/A	2.50	NL	A-4(0.0)		
			E-F	32.70	0.0	93.9	NL	NP	N/A	N/A	2.29	SM	A-4(0.0)		
		Bottom Ash - From Pond	A-B	13.28	15.6	26.2	NL	NP	N/A	N/A	2.39	SM	A-1-b		
			C-D	11.92	23.0	16.8	NL	NP	N/A	N/A	2.39	SM	A-1-b		
			E-F	11.51	29.3	18.1	NL	NP	N/A	N/A	2.39	SM	A-1-b		
Kingston	KIF	Ponded Fly Ash (Cell I)	A-B	5/1/95	28.28	0.0	86.4	NL	NP	N/A	2.28	ML	A-4(0.0)		
			C-D		23.95	0.0	97.1	NL	NP	N/A	2.31	ML	A-4(0.0)		
			E-F		30.85	0.0	94.0	NL	NP	N/A	2.30	ML	A-4(0.0)		
		Ponded Fly Ash (Cell III)	A-B	36.00	0.0	96.5	NL	NP	N/A	N/A	2.31	ML	A-4(0.0)		
			C-D	36.12	0.0	98.3	NL	NP	N/A	N/A	2.29	ML	A-4(0.0)		
			E-F	36.92	0.0	96.1	NL	NP	N/A	N/A	2.34	ML	A-4(0.0)		
		Bottom Ash - From Pond	A-B	10.91	21.9	9.7	NL	NP	N/A	N/A	2.37	SP-SM	A-1-b		
			C-D	9.82	19.3	10.7	NL	NP	N/A	N/A	2.34	SP-SM	A-1-b		
			E-F	17.15	18.4	11.3	NL	NP	N/A	N/A	2.33	SP-SM	A-1-b		
		Paradise	PAF	Ponded Fly Ash (East Cell)	A-B	5/1/95	0.0	0.0	99.4	NL	NP	N/A	2.82	NL	A-4(0.0)
					C-D		0.0	0.0	99.1	NL	NP	N/A	2.77	NL	A-4(0.0)
					E-F		0.0	0.0	98.5	NL	NP	N/A	2.93	NL	A-4(0.0)
Boiler Slag (Reed Rejects)	A-B			5.8	0.0	5.8	NL	NP	N/A	N/A	2.78	SP-SM	A-1-b		
	C-D			23.64	20.0	11.2	NL	NP	N/A	N/A	2.84	SM	A-2-4(0.0)		
	E			0.0	1.0	10.2	NL	NP	N/A	N/A	2.73	SP-SM	A-1-b		
Scrubber Gypsum	A-B			0.0	0.0	0.0	NL	NP	N/A	N/A	3.00	SM	A-1-b		
	C-D			0.0	0.0	0.0	NL	NP	N/A	N/A	3.00	SM	A-1-b		
	E			0.0	0.0	0.0	NL	NP	N/A	N/A	3.00	SM	A-1-b		
Shawnee	SHF			Dry Fly Ash	A-B	4/8/95	0.14	0.0	91.6	NL	NP	N/A	2.14	NL	A-4(0.0)
					C-D		0.13	0.0	91.2	NL	NP	N/A	2.09	NL	A-4(0.0)
					E-F		0.16	0.0	90.1	NL	NP	N/A	2.11	NL	A-4(0.0)
		Bottom Ash - From Pond	A-B	23.64	20.0	11.2	NL	NP	N/A	N/A	2.14	SP-SM	A-1-b		
			C-D	23.83	14.7	9.1	NL	NP	N/A	N/A	2.09	SP-SM	A-1-b		
			E-F	21.11	18.3	9.3	NL	NP	N/A	N/A	2.93	SP-SM	A-1-b		
		Clair	A-B	0.00	0.00	0.00	NL	NP	N/A	N/A	2.86	SM	A-1-b		
			C-D	0.00	0.00	0.00	NL	NP	N/A	N/A	2.82	SM	A-1-b		
			E-F	0.00	0.00	0.00	NL	NP	N/A	N/A	3.00	SM	A-1-b		
		Wilders Creek	WCF	Ponded Fly Ash (Ash Pond)	A-B	4/28/95	42.10	0.0	84.5	NL	NP	N/A	2.38	NL	A-4(0.0)
					C-D		75.19	1.5	84.6	NL	NP	N/A	2.40	NL	A-4(0.0)
					E-F		63.46	0.0	97.9	NL	NP	N/A	2.22	NL	A-4(0.0)
Scrubber Gypsum	A-B			0.00	0.00	0.00	NL	NP	N/A	N/A	3.01	SM	A-1-b		
	C-D			0.00	0.00	0.00	NL	NP	N/A	N/A	3.01	SM	A-1-b		
	E-F			0.00	0.00	0.00	NL	NP	N/A	N/A	3.01	SM	A-1-b		
Bottom Ash - From Pond	A-B			4.25	33.7	4.8	NL	NP	N/A	N/A	2.74	SW	A-1-b		
	C-D			3.26	29.9	4.1	NL	NP	N/A	N/A	2.80	SW	A-1-b		
	E-F			4.03	40.9	4.5	NL	NP	N/A	N/A	2.67	SW	A-1-b		

1.0 - Ash - From Ash Pond

TVA - Fly Ash, Bottom Ash and Scrubber Sludge Study
Volumetric Testing Summary
Law Engineering Project No. 5810860101

Source	Code	Material	Standard Proctor		Modified Proctor		Relative Density, Dry Method (pcf)	
			Max. Dry Dens. (pcf)	Opt. Moisture (%)	Max. Dry Dens. (pcf)	Opt. Moisture (%)	Minimum	Maximum
Allen	ALF	Boiler Slag (Fine Reed Rejects)	95.3	21.5	102.6	23.2	****	****
Bull Run	BRF	Dry Fly Ash	91.6	17.4	95.7	15.1	****	****
		Bottom Ash - From Pond	91.9	22.6	98.7	18.5	73.9	92.1
Colbert	COF	Dry Fly Ash (Units 1-4)	56.7	45.4	62.9	40.3	****	****
		Bottom Ash - From Pond	64.2	27.4	73.2	17.2	55.7	71.2
Cumberland	CUF	Dry Fly Ash (Units 1-2)	111.4	13.2	116.3	11.5	****	****
		Bottom Ash - From Pond	90.1	15.4	103.3	15.7	67.0	87.1
		Scrubber Gypsum	77.6	40.6	85.9	29.7	****	****
Gallatin	GAF	Dry Fly Ash (Unit 2 Hoppers)	86.6	21.4	88.9	18.8	****	****
		Bottom Ash - From Pond	92.0	25.5	102.5	20.9	71.3	90.7
John Sevier	JSF	Dry Fly Ash (Units 3-4)	83.7	18.6	86.7	17.8	****	****
		Bottom Ash - From Pond	78.9	30.3	96.2	21.9	55.7	73.9
Johnsonville	JOF	Ponded Fly Ash (New Dredge Cell)	75.8	31.4	92.5	20.6	****	****
		Ponded Fly Ash (Old Dredge Cell)	89.5	20.5	96.0	16.1	****	****
		Ponded Fly Ash (Active Ash Pond)	86.6	22.8	91.7	18.0	****	****
		Bottom Ash - From Pond	99.2	18.0	104.1	12.0	80.2	99.2
Kingston	KIF	Ponded Fly Ash (Cell I)	81.0	25.2	84.7	24.1	****	****
		Ponded Fly Ash (Cell III)	81.0	23.5	84.4	23.7	****	****
		Bottom Ash - From Pond	89.0	24.1	97.6	21.0	71.0	88.4
Paradise	PAF	Ponded Fly Ash (East Cell)	110.0	16.5	114.4	13.7	****	****
		Boiler Slag (Reed Rejects)	112.5	18.2	116.0	18.7	****	****
		Scrubber Gypsum	85.7	31.7	87.4	30.8	****	****
Shawnee	SHF	Dry Fly Ash	72.4	28.3	77.2	24.4	****	****
		Bottom Ash - From Pond	71.7	30.5	81.4	26.1	57.4	74.0
		Spent Bed Material (SBM)	****	****	****	****	****	****
Widows Creek	WCF	Char	****	****	****	****	****	****
		Ponded Fly Ash (Ash Pond)	67.0	30.8	73.5	27.8	****	****
		Scrubber Gypsum	92.0	23.1	99.9	19.4	****	****
		Bottom Ash - From Pond	106.2	17.6	120.8	15.8	83.0	103.3

bb:all:va:pjgm.xls (Proctor)

TVA - Fly Ash, Bottom Ash and Scrubber Sludge Study
Consolidation/Hydraulic Conductivity/Chemical Testing Summary
Law Engineering Project No. 5810860101

Source	Code	Material	Consolidation Compression Index, C _c	Hydraulic Conductivity (cm/sec)	Resistivity (Ohm-cm)	pH	Water Soluble Sulfate (mg/kg)	Water Soluble Chloride (mg/kg)
Allen	ALE	Boiler Slag (Fine Reed Rejects)	0.04	9.0E-4	30000	7.5	43	<10
	BRF	Dry Fly Ash	0.04	4.0E-5	690	8.4	4630	<10
Colbert	COF	Bottom Ash - From Pond	****	1.8E-2	7300	7.2	370	<10
	CUF	Dry Fly Ash (Units 1-4)	0.08	2.8E-4	850	9.4	1660	<10
Cumberland	CUF	Bottom Ash - From Pond	****	1.6E-2	4500	5.4	215	<10
	CUF	Dry Fly Ash (Units 1-2)	0.01	2.2E-5	2600	11.6	5020	<10
Gallatin	GAF	Bottom Ash - From Pond	****	6.8E-2	1200	2.7	4790	<10
	GAF	Scrubber Gypsum	0.12	1.2E-3	1100	7.8	4830	<10
John Sevier	JSF	Dry Fly Ash (Unit 2 Hoppers)	0.05	7.7E-5	420	10.6	5800	<10
	JSF	Bottom Ash - From Pond	****	2.9E-2	1600	2.8	1660	<10
Johnsonville	JOF	Dry Fly Ash (Units 3-4)	0.05	5.5E-5	440	4.1	4910	<10
	JOF	Bottom Ash - From Pond	****	2.6E-2	5200	6.8	285	<10
Kingston	KIF	Ponded Fly Ash (New Dredge Cell)	0.06	5.0E-4	2800	8.1	83	<10
	KIF	Ponded Fly Ash (Old Dredge Cell)	0.10	5.8E-4	2600	6.8	1520	20
Paradise	PAF	Ponded Fly Ash (Active Ash Pond)	0.11	3.5E-5	690	8.4	2960	60
	PAF	Bottom Ash - From Pond	****	4.7E-3	740	6.0	2200	<10
Shavnee	SIF	Ponded Fly Ash (Cell I)	0.05	8.3E-5	7700	7.6	200	<10
	SIF	Ponded Fly Ash (Cell III)	0.05	3.4E-5	6400	6.8	140	<10
Widows Creek	WCF	Bottom Ash - From Pond	****	9.1E-3	1900	4.0	490	<10
	WCF	Ponded Fly Ash (East Cell)	0.04	1.0E-5	2600	8.1	340	<10
Shavnee	SIF	Boiler Slag (Reed Rejects)	****	1.3E-3	9700	4.3	220	<10
	SIF	Scrubber Gypsum	0.13	1.5E-4	1100	7.7	4630	10
Widows Creek	WCF	Dry Fly Ash	0.04	9.2E-5	1000	11.5	2270	<10
	WCF	Bottom Ash - From Pond	****	8.9E-3	3000	8.1	4200	10
Widows Creek	WCF	Spent Bed Material (SBM)	****	****	****	12.0	4190	150
	WCF	Char	****	****	190	12.0	4130	980
Widows Creek	WCF	Ponded Fly Ash (Ash Pond)	0.12	1.8E-4	1400	9.2	1060	<10
	WCF	Scrubber Gypsum	0.07	3.9E-4	1200	6.7	3050	<10
Widows Creek	WCF	Bottom Ash - From Pond	****	3.4E-2	3100	8.0	4070	130

Note: Consolidation and Hydraulic Conductivity test specimen were remolded to approximately 95 percent of the Standard Proctor maximum dry density

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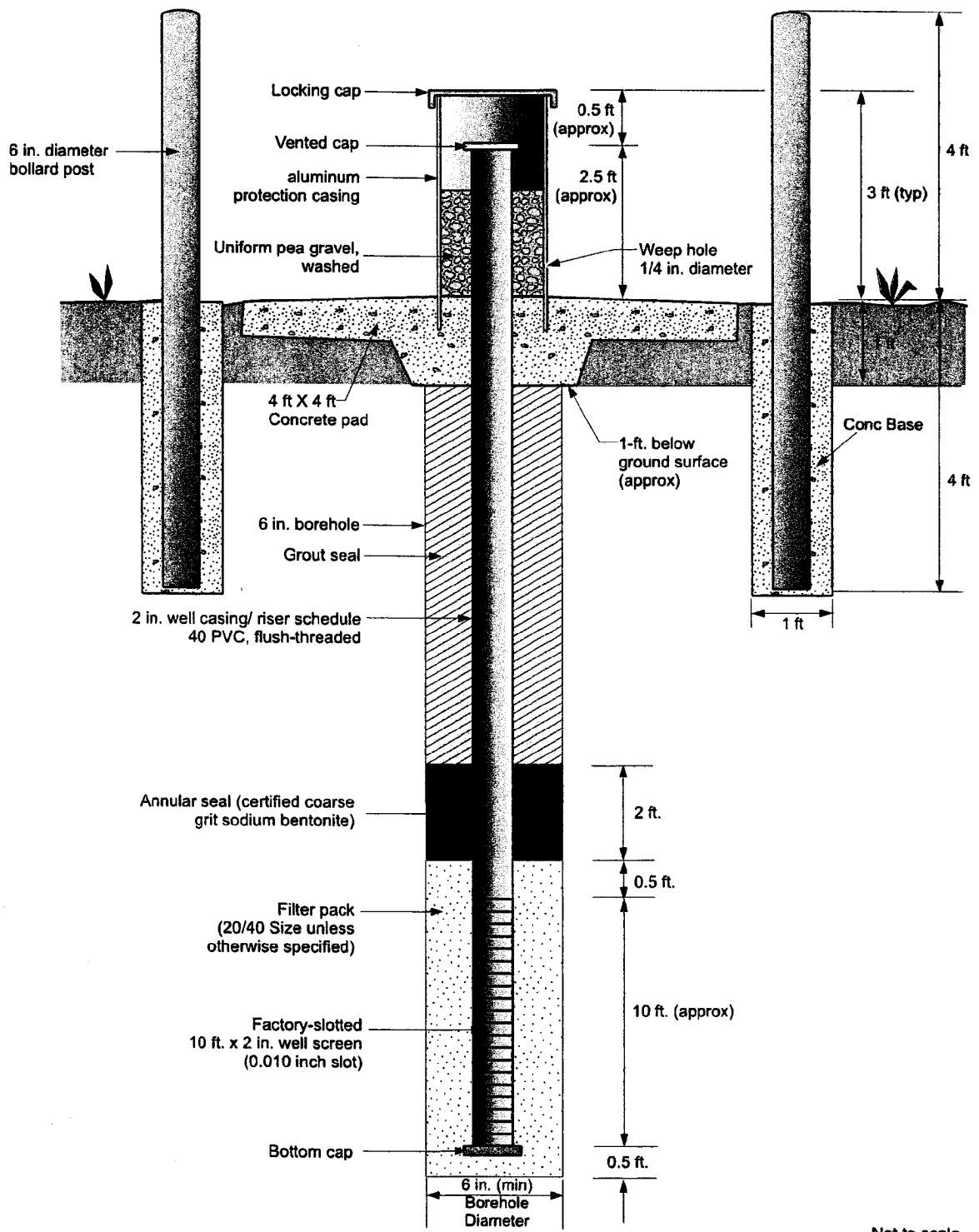
TVA - Fly Ash, Bottom Ash and Scrubber Sludge Study
Strength Testing Summary
Low Engineering Project No. 5810860101

Source	Code	Material	CBR %	Resilient Modulus (Standard Effort)			Resilient Modulus (Modified Effort)				
				K1	K2	K3	K1	K2	K3		
Allen	ALF	Boiler Slag (Fine Reed Rejects)	37	2,662	0.09516	0.53980	6,419	2,468	0.14322	0.51069	N ₁ at S _e =4psi, S _u =4psi
Bull Run	BRF	Dry Fly Ash	2	3,225	-0.17750	0.54531	5,370	3,283	-0.01625	0.38843	6,110
		Bottom Ash - From Pond	35	1,857	0.10936	0.78070	6,378	1,977	0.13522	0.76648	5,500
Colbert	COF	Dry Fly Ash (Units 1-4)	9	1,353	-0.00868	0.56321	2,918	1,639	0.01011	0.53301	6,901
		Bottom Ash - From Pond	24	2,368	0.11934	0.58242	6,264	2,455	0.09488	0.59309	3,480
Cumberland	CUF	Dry Fly Ash (Units 1-2)	24	7,531	-0.03317	0.34550	11,612	10,959	0.14896	0.24877	6,372
		Bottom Ash - From Pond	15	2,194	0.09530	0.67882	6,417	1,994	0.13866	0.76150	19,021
		Scrubber Gypsum	20	9,623	0.09590	0.25471	15,646	11,738	0.08396	0.20475	6,945
Gallatin	GAF	Dry Fly Ash (Unit 2 Hoppers)	2	2,713	-0.09930	0.47991	4,598	3,602	-0.12389	0.45133	17,515
		Bottom Ash - From Pond	30	1,972	0.20995	0.65540	6,545	2,427	0.20416	0.61364	5,671
John Sevier	JSF	Dry Fly Ash (Units 3-4)	1	2,965	-0.08694	0.43636	4,813	4,033	-0.09489	0.39276	7,541
		Bottom Ash - From Pond	40	2,156	0.08085	0.70340	6,949	2,108	0.09702	0.69867	6,095
Johnsonville	JOF	Ponded Fly Ash (New Dredge Cell)	12	1,487	0.03358	0.63725	3,769	2,541	-0.01211	0.48836	6,352
		Ponded Fly Ash (Old Dredge Cell)	28	1,495	0.03707	0.78260	4,657	2,255	0.09559	0.65332	4,917
		Ponded Fly Ash (Active Ash Pond)	1	2,146	-0.18159	0.60215	3,844	3,980	-0.14235	0.42844	6,368
		Bottom Ash - From Pond	50	2,373	0.16927	0.51994	6,169	2,389	0.13323	0.56010	5,917
Kingston	KIF	Ponded Fly Ash (Cell I)	2	1,803	0.07728	0.41203	3,553	2,374	-0.06388	0.47386	6,247
		Ponded Fly Ash (Cell III)	1	2,592	-0.10787	0.48134	4,350	3,254	-0.09252	0.43051	4,309
		Bottom Ash - From Pond	60	1,427	0.13665	0.75876	4,938	1,822	0.19126	0.64487	5,199
Paradise	PAF	Ponded Fly Ash (East Cell)	4	5,929	-0.09595	0.40269	9,071	5,551	-0.06155	0.44309	5,807
		Boiler Slag (Reed Rejects)	55	1,661	0.06737	0.79102	5,460	1,715	0.08023	0.76411	9,421
		Scrubber Gypsum	14	9,420	0.10296	0.23790	15,110	10,977	0.08137	0.20492	5,529
Shawnee	SHF	Dry Fly Ash	9	2,390	-0.04340	0.45385	4,222	2,774	-0.03472	0.41978	16,325
		Bottom Ash - From Pond	25	1,928	0.11134	0.73640	6,244	1,558	0.08323	0.76224	4,731
		Spent Bed Material (SBM)	***	***	***	***	***	***	***	***	5,030
		Char	***	***	***	***	***	***	***	***	***
Widows Creek	WCF	Ponded Fly Ash (Ash Pond)	3	1,026	-0.02608	0.63430	2,384	3,283	-0.01625	0.38843	***
		Scrubber Gypsum	15	7,937	0.08949	0.23891	12,513	8,454	0.05337	0.26140	5,500
		Bottom Ash - From Pond	30	2,258	0.19103	0.66319	7,379	2,260	0.28011	0.26147	13,079

Note: CBR and Resilient Modulus test specimens were remolded to approximately 95 percent of the Standard Proctor (and Modified Proctor for Res. Mod.) maximum dry density at or near optimum moisture content.

Tab. 20 (1) (a) (continued)

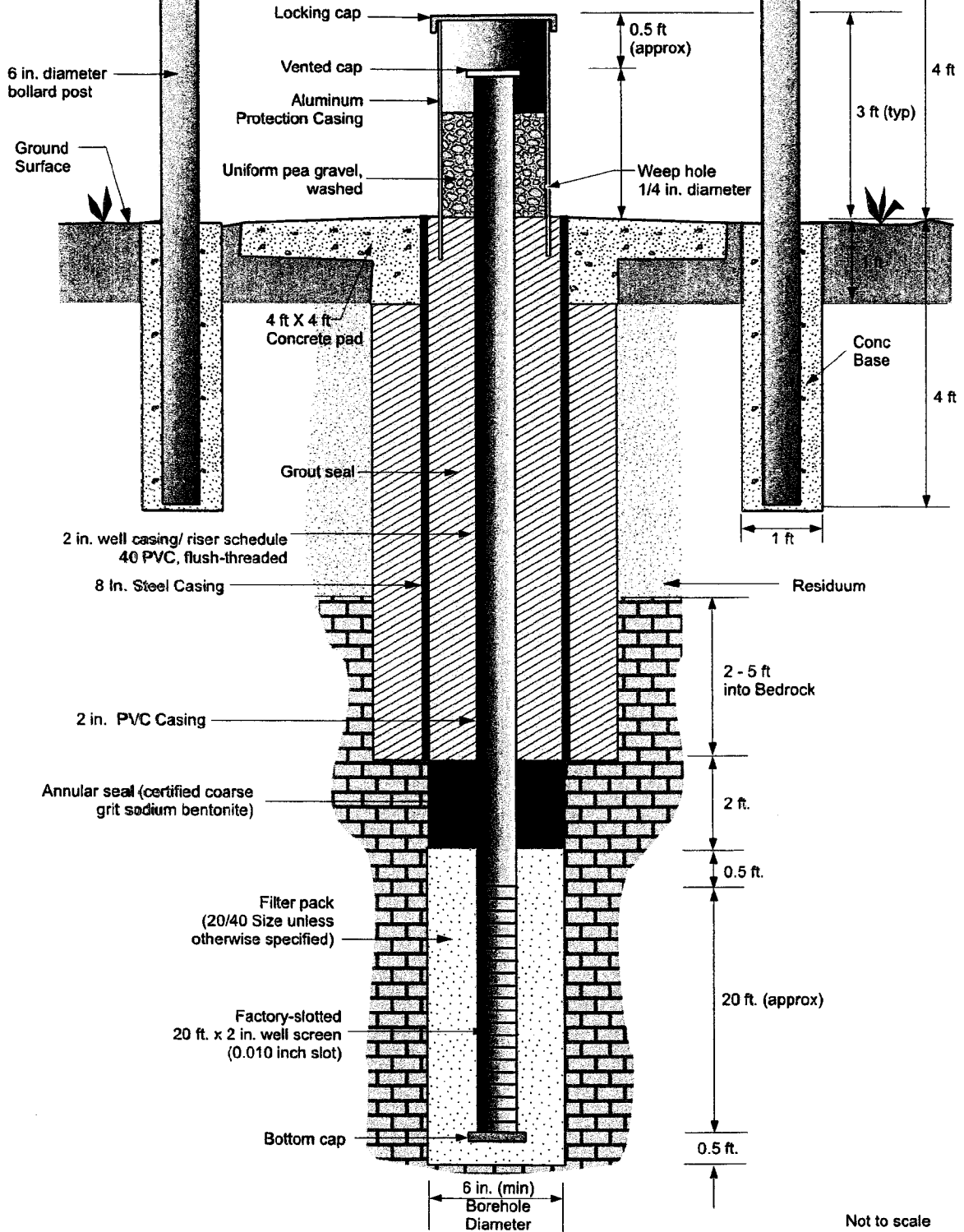
RESIDUUM MONITORING WELL SCHEMATIC



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FIGURE NO.	1-2
PROJECT NO.	GR3731-06
DOCUMENT NO.	GA060000
FILE NO.	M-WELLS.CDR

BEDROCK MONITORING WELL SCHEMATIC




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FIGURE NO.	1-3
PROJECT NO.	GR3731-06
DOCUMENT NO.	GA060000
FILE NO.	M-WELLS.CDR