GEOTECHNICAL SUBSURFACE INVESTIGATION DATA REPORT (REVISION NO. 1)

CGG Combined Operating License Application (COLA) Project
Calvert Cliffs Nuclear Power Plant (CCNPP)
Calvert County, Maryland

April 13, 2007

Prepared By:

SCHNABEL ENGINEERING NORTH, LLC
Gaithersburg, Maryland
(Schnabel Project No. 06120048)

Submitted To:

BECHTEL POWER CORPORATION
Frederick, Maryland
(Bechtel Subcontract No. 25237-103-HC4-CY00-00001)

Binder No. 3 of 3

Including:

Appendix I: Soil Laboratory Testing

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Appendix I
Soil Laboratory Testing

APPENDIX I
SOIL LABORATORY TESTING

- Summary of Soil Laboratory Test Results
- Summary of Chemical Laboratory Test Results – Soil and Water
- Gradation Curves
- Moisture Density Relationships
- California Bearing Ratio Results
- Consolidation Results
- Unconfined Compression Results
- UU Triaxial Compression Results
- CIU-bar Triaxial Compression Results
- Direct Shear Results
- Chemical Test Results – Soil
- Chemical Test Results – Water
- Organic Content

SUMMARY OF SOIL LABORATORY TEST RESULTS

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Project Name: Constellation Generation Group CCNPP Project
Calvert Cliffs Nuclear Power Plant (CCNPP)
Calvert County, Maryland

Project Number: 06120048.00

SUMMARY OF SOIL LABORATORY TEST RESULTS[1]

Boring / Test Pit No.	Sample Top Depth (ft.)	Sample Type[2]	USCS Sample Class. (D 2487)[3]	Sieve Results (D 422)		Atterberg Limits[4] (D 4318)				Organic Content (%)	Natural Moisture (%) (D 2216)	Moist Unit Weight (PCF)	Specific Gravity (D 854)	Moisture-Density Relationship (D 1557)		Bearing Ratio (D 1883)		Specimen		Shear Strength						Consolidation (D 2435)			
																					Total		Effective						
				Percent Passing No. 200	Percent Retained No. 4	LL	PL	PI	Oven Dried LL					Dry Unit Wt. (PCF)	Optium Moisture (%)	Dry	Soaked	Intact	Compacted	Test Type[5]	f deg.	C psi	f deg.	C' psi	Failure Criterion[6]	Cer	Cec	eo	Pp' tsf
B-301	2.5	SPT	SP-SM	8.1	0.7						6.6																		
B-301	10.5	SPT	SP-SM	6.2	0.1						14.3																		
B-301	18.5	SPT	SP-SM	10.9	0.8						19.0																		
B-301	28.5	SPT	CL	58.5	0.0	48	17	31			28.9																		
B-301	33.5	UD	Not yet available (Fugro)																										
B-301	48.5	SPT	CL								29.6																		
B-301	63.5	SPT	SP	2.1	0.0						20.4																		
B-301	83.5	SPT	SM	21.0	2.4						26.5																		
B-301	93.5	SPT	SM								25.8																		
B-301	103.5	SPT	CL								17.8																		
B-301	108.5	SPT	SM	34.7	1.5						23.2																		
B-301	118.5	SPT	SM	19.6	0.3						33.1																		
B-301	128.5	SPT	SC	32.3	0.0						42.3																		
B-301	143.5	SPT	CL	55.5	0.0						45.0																		
B-301	148.5	SPT	MH			114	55	59			62.2																		
B-301	153.5	SPT	SM	45.4	0.0						34.0																		
B-301	158.5	UD	CH	99.5	0.0	76	30	46			38.7	112.2	2.68					X	-	UU	NA	61.2	NA	NA	Dev	0.005	0.243	1.01	20
B-301	168.5	UD	CH	66.2	0.0	112	39	73			65.4	97.3	2.62													0.012	0.453	1.82	16
B-301	178.5	SPT	MH	60.0	0.0	111	47	64			60.4																		
B-301	193.5	SPT	MH			98	45	53			53.2																		
B-301	198.5	SPT	MH	79.0	0.0	157	71	86			82.6																		
B-301	203.5	SPT	SC								27.5																		
B-301	208.5	SPT	SM								32.4																		
B-301	218.5	SPT	CL	50.7	0.0						47.9																		
B-301	228.5	SPT	SC	46.9	0.0						54.0																		
B-301	238.5	SPT	CL	72.9	0.0						56.8																		
B-301	253.5	SPT	MH	64.6	0.0	137	87	50			72.7																		
B-301	263.5	SPT	CL	85.2	0.0						100.9																		
B-301	273.5	SPT	MH			199	119	80			102.0																		
B-301	283.5	SPT	CL	73.5	0.0						91.3																		
B-301	293.5	SPT	MH	73.1	0.0	117	73	44			64.4																		
B-301	303.5	SPT	SC	44.6	0.0						24.8																		
B-301	313.5	SPT	SC	26.6	1.7						20.0																		
B-301	323.5	SPT	SC	22.1	11.4						27.8																		
B-301	333.5	SPT	SC								31.8																		
B-301	343.5	SPT	SC	17.9	14.0	47	24	23			22.9																		
B-301	353.5	SPT	SC	18.0	0.2	58	22	36			36.1																		
B-301	363.5	SPT	SM	28.6	1.4	54	36	18			37.2																		

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Project Name: Constellation Generation Group COLA Project
Calvert Cliffs Nuclear Power Plant (CCNPP)
Calvert County, Maryland

Project Number: 06120048.00

SUMMARY OF SOIL LABORATORY TEST RESULTS[1]

Boring / Test Pit No.	Sample Top Depth (ft.)	Sample Type[2]	USCS Sample Class. (D 2487)[3]	Sieve Results (D 422)		Atterberg Limits[4] (D 4318)				Organic Content (%)	Natural Moisture (%) (D 2216)	Moist Unit Weight (PCF)	Specific Gravity (D 854)	Moisture-Density Relationship (D 1557)		Bearing Ratio (D 1883)		Specimen		Shear Strength						Consolidation (D 2435)			
																					Total		Effective						
				Percent Passing No. 200	Percent Retained No. 4	LL	PL	PI	Oven Dried LL					Dry Unit Wt. (PCF)	Optium Moisture (%)	Dry	Soaked	Intact	Compacted	Test Type[5]	f deg.	C psi	f deg.	C' psi	Failure Criterion[6]	Ccr	Cec	eo	Pp' tsf
B-301	373.5	SPT	SC	16.0	0.0	61	26	35			30.3																		
B-301	388.5	SPT	SC	15.7	0.0						32.7																		
B-301	398.5	SPT	SC								33.7																		
B-304	0.0	SPT	SM								17.1																		
B-304	2.5	SPT	SM								25.9																		
B-304	5.0	SPT	ML								29.4																		
B-304	7.5	SPT	CH	71.8	0.0	57	23	34			34.1																		
B-304	10.5	SPT	CH	57.4	0.0	59	19	40			31.4																		
B-304	13.5	SPT	CH			63	23	40			31.7																		
B-304	18.5	SPT	CH	96.9	0.0	62	21	41			32.1																		
B-304	23.5	SPT	CL			38	20	18			25.6																		
B-304	28.5	SPT	SM								32.3																		
B-304	33.5	SPT	SP								20.1																		
B-304	38.5	SPT	SP-SM	8.5	1.3						19.3																		
B-304	43.5	SPT	SP-SM								21.9																		
B-304	48.5	SPT	GM-GC			25	18	7			14.5																		
B-304	53.5	SPT	SM								13.5																		
B-304	58.5	SPT	SM	12.4	5.4	NP	NP	NP			29.1																		
B-304	63.5	SPT	SM	14.6	3.8	30	23	7			29.4																		
B-304	68.5	SPT	SM								29.5																		
B-304	78.5	SPT	SC			32	19	13			16.3																		
B-304	83.5	SPT	SM								21.8																		
B-304	88.5	SPT	SM	35.9	0.0	49	28	21			38.7																		
B-304	93.5	SPT	SM								33.0																		
B-304	98.5	UD	SC	47.3	0.0	79	28	51			42.1	113.2	2.65					X	-	Qu	NA	26.0	NA	NA	Dev	0.003	0.251	1.03	20
B-304	103.5	SPT	SC	35.4	0.0						44.0																		
B-304	108.5	SPT	SM	28.2	2.4						33.8																		
B-304	113.5	SPT	SC	36.3	0.4						43.9																		
B-304	118.5	SPT	SC								47.9																		
B-304	123.5	SPT	ML								60.2																		
B-304	128.5	SPT	SC	42.7	0.3						34.9																		
B-304	133.5	SPT	ML								45.0																		
B-304	138.5	UD	SC	45.7	0.0	43	26	17			36.5	113.4	2.65					X	-	Qu	NA	36.4	NA	NA	Dev	0.003	0.143	0.95	16
B-304	143.5	SPT	CH	91.3	0.0	134	49	85			70.0																		
B-304	148.5	SPT	MH								72.1																		
B-304	153.5	SPT	MH								70.9																		
B-304	158.5	SPT	MH	59.1	0.0	92	53	39			55.1																		
B-304	163.5	SPT	MH								47.2																		

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Boring / Test Pit No.	Sample Top Depth (ft.)	Sample Type[2]	USCS Sample Class. (D 2487)[3]	Sieve Results (D 422)		Atterberg Limits[4] (D 4318)				Organic Content (%)	Natural Moisture (%) (D 2216)	Moist Unit Weight (PCF)	Specific Gravity (D 854)	Moisture-Density Relationship (D 1557)		Bearing Ratio (D 1883)		Specimen		Shear Strength						Consolidation (D 2435)			
																					Total		Effective						
				Percent Passing No. 200	Percent Retained No. 4	LL	PL	PI	Oven Dried LL					Dry Unit Wt. (PCF)	Optium Moisture (%)	Dry	Soaked	Intact	Compacted	Test Type[5]	f deg.	C psi	f' deg.	C' psi	Failure Criterion[6]	Ccr	Cec	eo	Pp' tsf
B-304	168.5	SPT	MH								62.9																		
B-304	173.5	SPT	MH	94.0	0.0	158	84	74			84.0																		
B-304	178.5	SPT	SC								27.5																		
B-304	183.5	SPT	SC	43.6	0.0						39.2																		
B-304	188.5	SPT	SC								42.8																		
B-304	193.5	SPT	CL								51.1																		
B-304	198.5	SPT	CL	55.9	0.0						55.8																		
B-305	39.5	UD	Not yet available (Fugro)																										
B-306	68.0	UD	Not yet available (Fugro)																										
B-307	5.0	SPT	SC	38.4	0.6						11.6																		
B-307	13.5	SPT	SM			NP	NP	NP			7.9																		
B-307	23.5	SPT	SP-SM	11.2	3.3						13.0																		
B-307	33.5	SPT	SM			NP	NP	NP			14.5																		
B-307	43.5	SPT	SM								24.8																		
B-307	48.5	SPT	CL								25.1																		
B-307	53.5	SPT	CH								28.1																		
B-307	58.5	SPT	CH	60.5	0.3	62	20	42			33.1																		
B-307	63.5	SPT	CH			52	18	34			35.5																		
B-307	68.5	SPT	CH	98.5	0.0	66	23	43			34.0																		
B-307	73.5	SPT	SC								24.9																		
B-307	83.5	SPT	SM	13.0	0.6						20.6																		
B-307	88.5	SPT	ML			NP	NP	NP			21.5																		
B-307	93.5	SPT	SM	17.9	4.6						27.7																		
B-307	108.5	SPT	SP-SM	9.8	2.7	NP	NP	NP			29.2																		
B-307	118.5	SPT	SM	17.9	0.6	32	25	7			28.9																		
B-307	123.5	UD	SC	30.0	6.4	35	19	16			29.8	123	2.70					X	-	CIU-bar	Test Not Performed								
B-307	133.5	SPT	SM	21.8	0.3						26.0																		
B-307	143.5	SPT	MH			59	33	26			36.8																		
B-307	148.5	SPT	MH								50.6																		
B-307	153.5	SPT	SM	24.4	0.0	58	37	21			38.8																		
B-307	178.5	UD	SC	37.7	0.0	41	25	16			33.5	117	2.67					X	-	DS	NA	NA	35	0	NA				
B-307	188.5	SPT	SM	45.6	0.0	61	39	21			43.0																		
B-307	200.0	SPT	MH	66.2	0.0	137	61	76			68.7																		
B-310	78.5	UD	Not yet available (Fugro)																										
B-313	0.0	SPT	SM								9.9																		
B-313	2.5	SPT	CL-ML			19	14	5			11.8																		
B-313	5.0	SPT	CH			67	21	46			27.6																		
B-313	7.5	SPT	CL			30	17	13			15.1																		

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Boring / Test Pit No.	Sample Top Depth (ft.)	Sample Type[2]	USCS Sample Class. (D 2487)[3]	Sieve Results (D 422)		Atterberg Limits[4] (D 4318)				Organic Content (%)	Natural Moisture (%) (D 2216)	Moist Unit Weight (PCF)	Specific Gravity (D 854)	Moisture-Density Relationship (D 1557)		Bearing Ratio (D 1883)		Specimen		Shear Strength						Consolidation (D 2435)			
																					Total		Effective						
				Percent Passing No. 200	Percent Retained No. 4	LL	PL	PI	Oven Dried LL					Dry Unit Wt. (PCF)	Optium Moisture (%)	Dry	Soaked	Intact	Compacted	Test Type[5]	f deg	C psi	f deg	C' psi	Failure Criterion[6]	Ccr	Cec	eo	Pp' tsf
B-313	10.5	SPT	ML								27.0																		
B-313	13.5	SPT	ML								31.5																		
B-313	18.5	SPT	SP-SM								23.1																		
B-313	23.5	SPT	SM			NP	NP	NP			21.1																		
B-313	26.5	SPT	SM			NP	NP	NP			18.2																		
B-313	33.5	SPT	CL			38	21	17			28.1																		
B-313	38.5	SPT	SM								17.1																		
B-313	43.5	SPT	ML			34	27	7			29.3																		
B-313	48.5	SPT	SM								27.9																		
B-313	53.5	SPT	SM			NP	NP	NP			31.5																		
B-313	63.5	SPT	CL			33	17	16			26.2																		
B-313	73.5	SPT	ML								28.4																		
B-313	83.5	SPT	MH								37.3																		
B-313	88.5	SPT	MH			98	47	51			55.0																		
B-313	93.5	UD	CL			49	25	24			35.6	116	2.69					X	-	UU	NA	38.8	NA	NA	Dev	0.005	0.166	1.07	16
																		X	-	DS	NA	NA	29	11	NA				
B-313	98.5	SPT	ML			42	28	14			32.4																		
B-313	103.5	SPT	MH			70	45	25			43.4																		
B-313	108.5	SPT	MH			106	55	51			57.7																		
B-313	113.5	SPT	MH			72	46	26			44.3																		
B-313	118.5	SPT	MH			81	42	39			43.5																		
B-313	123.5	UD	SC			44	26	18			33.1	116	2.67					X	-	UU	NA	41.3	NA	NA	Dev	0.002	0.205	0.98	23
																		X	-	DS	Test Not Performed								
B-313	128.5	SPT	MH			132	60	72			66.0																		
B-313	133.5	SPT	MH								69.1																		
B-313	138.5	SPT	MH			106	51	55			62.9																		
B-313	143.5	SPT	CH								49.1																		
B-313	148.5	SPT	CH			103	30	73			49.4																		
B-314	0.4	SPT	SM								9.7																		
B-314	2.5	SPT	SM			NP	NP	NP			14.1																		
B-314	5.0	SPT	CH			73	25	48			35.0																		
B-314	7.5	SPT	CH			59	21	38			41.2																		
B-314	10.5	SPT	CH			73	25	48			26.2																		
B-314	13.5	UD	SC	35.0	0.0	54	11	43			25.9	119	2.74					X	-	UU	Test Not Performed					0.010	0.110	0.86	10.5

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Boring / Test Pit No.	Sample Top Depth (ft.)	Sample Type[2]	USCS Sample Class. (D 2487)[3]	Sieve Results (D 422)		Atterberg Limits[4] (D 4318)				Organic Content (%)	Natural Moisture (%) (D 2216)	Moist Unit Weight (PCF)	Specific Gravity (D 854)	Moisture-Density Relationship (D 1557)		Bearing Ratio (D 1883)		Specimen		Shear Strength						Consolidation (D 2435)			
																					Total		Effective						
				Percent Passing No. 200	Percent Retained No. 4	LL	PL	PI	Oven Dried LL					Dry Unit Wt. (PCF)	Optimum Moisture (%)	Dry	Soaked	Intact	Compacted	Test Type[5]	f deg.	C psi	f deg.	C' psi	Failure Criterion[6]	Cer	Cec	eo	Pp' tsf
B-314	18.5	SPT	SM								24.2																		
B-314	23.5	SPT	SM			NP	NP	NP			22.6																		
B-314	28.5	SPT	SM								20.3																		
B-314	33.5	SPT	CL			42	22	20			25.4																		
B-314	38.5	SPT	SM			NP	NP	NP			26.8																		
B-314	43.5	SPT	SM								31.9																		
B-314	48.5	SPT	SM								25.4																		
B-314	53.5	SPT	SM			NP	NP	NP			32.8																		
B-314	58.5	SPT	SP			NP	NP	NP			33.0																		
B-314	63.5	SPT	CH			59	24	35			40.3																		
B-314	68.5	SPT	ML			NP	NP	NP			19.5																		
B-314	73.5	SPT	ML			NP	NP	NP			27.9																		
B-314	78.5	SPT	ML			NP	NP	NP			36.5																		
B-314	83.5	SPT	MH			57	36	21			41.2																		
B-314	88.5	SPT	CH			68	20	48			34.3																		
B-314	93.5	SPT	SM								36.4																		
B-314	98.5	SPT	SM								31.0																		
B-315	7.5	SPT	SP-SM	8.3	3.2						5.6																		
B-315	13.5	SPT	SM	14.0	0.0						28.3																		
B-315	18.5	SPT	SC								28.3																		
B-315	23.5	UD	SC	35.0	0.0	41	11	30			23.3	126	2.73					X	-	UU	NA	17	NA	NA	Dev	0.020	0.170	0.92	10.2
B-315	28.5	SPT	SM								27.6																		
B-315	38.5	SPT	SM	13.2	6.9	NP	NP	NP			22.2																		
B-315	53.5	SPT	ML			NP	NP	NP			25.6																		
B-315	63.5	SPT	SP-SM	14.9	0.3	NP	NP	NP			29.4																		
B-315	73.5	SPT	CH			58	18	40			36.3																		
B-315	83.5	SPT	SM	28.6	0.1	NP	NP	NP			29.6																		
B-315	93.5	SPT	SM								35.6																		
B-316	2.5	SPT	CL			35	16	19			19.1																		
B-316	7.5	SPT	CL	55.5	0.0						14.5																		
B-316	23.5	SPT	SP-SM	8.8	0.0	NP	NP	NP			20.9																		
B-316	33.5	SPT	SP-SM	11.3	1.6	43	17	26			20.1																		
B-316	38.5	SPT	CL								28.5																		
B-316	43.5	UD	CL	71.0	0.0	44	16	28			28.6	121	2.79					X	-	Qu	NA	7.9	NA	NA	Dev	0.017	0.266	0.94	9.3
																		X	-	UU	NA	9.9	NA	NA	Dev				
B-316	48.5	SPT	MH	69.5	0.0						38.0																		

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																					Total		Effective						
				Percent Passing No. 200	Percent Retained No. 4	LL	PL	PI	Oven Dried LL					Dry Unit Wt. (PCF)	Optimum Moisture (%)	Dry	Soaked	Intact	Compacted	Test Type[5]	f deg	C psi	f' deg	C' psi	Failure Criterion[6]	Ccr	Cec	eo	Pp' tsf
B-316	53.5	UD	CL	50.0	1.0	33	11	22			26.2	103	2.77					X	-	DS	NA	NA	30.1	4.5	NA				
																		X	-	CIU-bar	12.5	14.3	32.1	6.84	PSR				
B-316	58.5	SPT	SC								24.4																		
B-316	63.5	SPT	SC								34.3																		
B-316	68.5	SPT	SM	16.5	0.1						19.8																		
B-316	73.5	SPT	SP								21.2																		
B-316	93.5	SPT	SC	17.7	0.5						32.0																		
B-316	98.5	SPT	SC								27.7																		
B-317	23.5	SPT	ML								28.4																		
B-317	28.5	UD	CL	97.8	2.2	27	19	8			31.7	122.3	2.75					X	-	CIU-bar	17	5	31	3.1	PSR				
B-317	33.5	SPT	CH								30.2																		
B-317	48.5	UD	CL	69.8	0.0	35	17	18			22.8	125.5	2.7					X	-	CIU-bar	19.5	8.2	33.5	4.2	PSR				
B-317	58.5	SPT	SP-SM								26.0																		
B-317	73.5	SPT	SC								22.3																		
B-319	2.5	SPT	SP-SM	8.1	0.2						5.7																		
B-319	7.5	SPT	SP			NP	NP	NP			4.7																		
B-319	13.5	SPT	SP-SM	8.6	1.3						7.6																		
B-319	23.5	SPT	SC	20.0	1.4						19.8																		
B-319	28.5	SPT	SC								24.5																		
B-319	33.5	UD	CL	72.0	0.0	49	12	37			29.2	120	2.67					X	-	UU	NA	10.1	NA	NA	Dev	0.010	0.190	0.85	5.4
																		X	-	DS	NA	NA	24.9	6.2	NA				
B-319	38.5	SPT	CH								27.9																		
B-319	43.5	UD	CH	87.0	0.0	58	13	45			32.1	121	2.73					X	-	UU	NA	12	NA	NA	Dev	0.040	0.280	0.82	12
																		X	-	DS	NA	NA	20.8	9.1	NA				
B-319	48.5	SPT	CH			79	27	52			38.6																		
B-319	58.5	SPT	ML			40	32	8			26.7																		
B-319	73.5	SPT	SM	13.6	4.6						17.5																		
B-319	83.5	SPT	SM	25.7	14.0						18.2																		
B-319	88.5	SPT	SM	18.9	1.4						29.8																		
B-319	98.5	SPT	SM	12.9	0.6	NP	NP	NP			30.0																		
B-320	2.5	SPT	SP-SM								10.4																		
B-320	7.5	SPT	SP								6.3																		
B-320	18.5	SPT	SP								9.1																		
B-320	33.5	SPT	SC	42.5	0.0	33	18	15			26.1																		
B-320	38.5	UD	SC	49.0	0.0	36	16	20			29.4	124	2.63					X	-	CIU-bar	13.3	8.03	27.9	3.79	PSR				
																		X	-	DS	NA	NA	26.0	2.9	NA				
B-320	43.5	SPT	CH	60.7	0.0	56	19	37			30.0																		