

Table 2.5.2-1. EPRI-SOG EST GCSZ updates from the STP Unit 3 and 4 COLA. (FSAR Table 2.5.2-209)

EPRI-SOG EST	SOURCE	DESCRIPTION	PROBABILITY OF ACTIVITY	M_{max} DISTRIBUTIONS EPRI-SOG (1989) m_b [WEIGHTS]	UPDATED M_{max} DISTRIBUTIONS STP Unit 3 and 4 (STPNOC, 2008) m_b [WEIGHTS]
Bechtel Group	BZ1	Gulf Coast	1.0	5.4 [0.1] 5.7 [0.4] 6.0 [0.4] 6.6 [0.1]	6.1 [0.1] 6.4 [0.4] 6.6 [0.5]
Dames & Moore	20	South Coastal Margin	1.0	5.3 [0.8] 7.3 [0.2]	5.5 [0.8] 7.3 [0.2]
Law Engineering	126	South Coastal Block	1.0	4.6 [0.9] 4.9 [0.1]	5.5 [0.9] 5.7 [0.1]
Roudout Associates	51	Gulf Coast to Bahamas Fracture Zone	1.0	4.8 [0.2] 5.5 [0.6] 5.8 [0.2]	6.1 [0.3] 6.3 [0.55] 6.5 [0.15]
Weston Geophysical Corporation	107	Gulf Coast	1.0	5.4 [0.71] 6.0 [0.29]	6.6 [0.89] 7.2 [0.11]
Woodward-Clyde Consultants	B43	Central US Backgrounds	NA	4.9 [0.17] 5.4 [0.28] 5.8 [0.27] 6.5 [0.28]	No update

Table 2.5.2-2. Deaggregation Earthquake Parameters (FSAR Table 2.5.2-221)

FREQUENCY RANGE (Hz)	MEAN ANNUAL FREQUENCY OF EXCEEDANCE	DEAGGREGATION EARTHQUAKES (DE)		
		MAGNITUDE (m_b)	DISTANCE (km [mi])	WEIGHT
1 and 2.5	10^{-4}	5.5	20.2 (12.5)	0.105
		6.3	72 (45)	0.052
		7.1	459 (285)	0.843
5 and 10	10^{-4}	5.4	27.7 (17.2)	0.320
		6.2	70 (43)	0.077
		7.1	455 (282)	0.603
1 and 2.5	10^{-5}	5.6	12.2 (7.5)	0.218
		6.4	45 (28)	0.112
		7.2	456 (283)	0.670
5 and 10	10^{-5}	5.4	13.6 (8.4)	0.615
		6.3	29 (18)	0.156
		7.2	453 (281)	0.229
1 and 2.5	10^{-6}	5.7	8.9 (5.5)	0.400
		6.5	32 (20)	0.240
		7.2	455 (282)	0.360
5 and 10	10^{-6}	5.4	8.9 (5.5)	0.681
		6.4	15 (9.3)	0.297
		7.2	450 (279)	0.022

Table 2.5.2-3. Percent Change in LNP Site Ground Motions at Finished Grade Elevation Resulting from the Use of a M_{max} Distribution of 6.1 [0.1], 6.6 [0.4], 6.9 [0.4], 7.2 [0.1] (RAI 02.05.02-22 Table 1)

SPECTRUAL FREQUENCY (Hz)	PERCENT CHANGE IN LNP SITE GROUND MOTIONS AT FINISHED GRADE ELEVATION
0.5	+2
1.0	+4
2.5	+4
5.0	+6
10.0	+6
25.0	+7
100.0	+7

Table 2.5.4-1. Summary of Rock Samples (Data Compiled from FSAR Tables 2.5.4.2-211 through 2.5.4.2-215)

	LNP 1			LNP 2			
	SAV*-1	SAV-2	SAV-3	NAV**-1	NAV-2	NAV-3	NAV-4
UCS, Elastic Moduli, Poisson's Ratio and Index Test Results							
Average UCS, MPa (psi)	25.9 (3,760)	5.07 (736)	25.4 (3,690)	16.6 (2,414)	20.2 (2,938)	16.9 (711)	17.4 (2,526)
Poisson's Ratio – Secant	0.29	0.50	0.22	0.34	0.30	0.36	0.16
Bulk Density, kg/m ³ (pcf)	2,210 (138)	2,002 (125)	2,306 (144)	2,146 (134)	2,178 (136)	1,890 (118)	2,162 (135)
Moisture Content, %	10	23	13	14	11	23	20
Poisson's Ratio – Tangent	0.36	0.51	0.32	0.44	0.37	0.53	0.16
Tensile Strength Test Results							
Tensile Strength, kPa (psi)	4,840 (702)	n/a	4,536 (658)	1,640 (238)	3,874 (562)	158.5 (23)	1,130 (164)
Bulk Density, kg/m ³ (pcf)	2,290 (143)	n/a	2,418 (151)	2,098 (131)	2,194 (137)	1,954 (122)	1,938 (121)
Moisture Content, %	9	n/a	10	17	12	27	21
Hoek-Brown Rock Mass Strength Parameters							
Unit Weight, kg/m ³ (pcf)	2,210 (138)	2,002 (125)	2,306 (144)	2,146 (134)	2,178 (136)	1,890 (118)	2,162 (135)
Representative UCS of Intact Rock, MPa (psi)	25.5 (3,700)	4.82 (700)	24.8 (3,600)	16.5 (2,400)	19.9 (2,900)	4.82 (700)	17.2 (2,500)
GSI	31	21	27	37	38	22	31
Rock Mass Cohesion, kPa (psi)	186 (27)	144 (21)	565 (82)	179 (26)	365 (53)	137 (20)	496 (72)
Rock Mass Friction Angle	24	15	22	24	25	16	21
Suspension Logging							
V _s , m/s (fps)	1,198 (3,932)	893 (2,932)	1,170 (3,839)	1,115 (3,660)	1,406 (4,614)	943 (3,097)	1,207 (3,963)
V _p , m/s (fps)	893 (9601)	2,366 (7,763)	2,756 (9,045)	2,549 (8,365)	3,022 (9,916)	2,440 (8,008)	2,775 (9,105)
Poisson's Ratio	0.39	0.41	0.38	0.38	0.35	0.41	0.38
Young's Modulus, kPa (ksi)	9,507 (1,379)	4,660 (676)	8,990 (1,304)	7,535 (1,093)	11,948 (1,733)	4,881 (708)	8,928 (1,295)
E_m Values by Method Used, kPa (ksi)							
V _s , m/s (fps)	690 (4,757)	338 (2,330)	652 (4,495)	547 (3,771)	867 (5,977)	354 (2,440)	647 (4,460)
Rock PMT	834 (121)	-	-	427 (62)	-	-	-
UCS Testing ^a	1,048 (152)	268 (39)	1,640 (238)	875 (127)	1,758 (255)	351 (51)	2,868 (416)
UCS Testing ^b	1,172 (170)	179 (26)	1,075 (156)	979 (142)	1,489 (216)	234 (34)	1,799 (261)

* SAV is a rock unit of the Avon Park formation at the south reactor site

** NAV is a rock unit of the Avon Park formation at the north reactor site

^a Hoek and Diederichs (2006)

^b Yang (2006)

Table 2.5.4-2. Estimated Properties of Soils above the Top of Rock (Modified from FSAR Tables 2.5.4.2-216 and 2.5.4.2-217)

	North Reactor LNP 2			South Reactor LNP 1		
	S-1	S-2	S-3	S-1	S-2	S-3
Based on Laboratory Index Properties						
Avg. f'_{cv} , deg.	31	30	29	31	n/a	-
OCR	1.7	1.0	2.0	4.4	n/a	-
s_u kPa (psf)	21.4 (449)	30.4 (636)	70.4 (1,471)	36.8 (769)	n/a	-
C_c	0.31	0.34	0.38	0.30	n/a	-
C_r	0.05	0.07	0.08	0.06	n/a	-
C_{ea}	0.003	0.004	0.004	0.002	n/a	-
Based on SPT N-values						
Mean SPT N-value, bpf	10	43	85	9	43	82
N_{60} , bpf	11	45	86	11	52	86
Moist Unit Weight, kg/m^3 (pcf)	1,762 (110)	1,922 (120)	2,082 (130)	1,762 (110)	1,922 (120)	2,082 (130)
Relative Density, %	25	50	90	25	50	90
Effective Friction Angle	28	31	36	28	31	36
Effective Cohesion	0					
Elastic Modulus ^a , MPa (psi)	5.57 (808)	22.8 (3,307)	43.5 (6,319)	5.57 (808)	26.3 (3,821)	43.5 (6,319)
Elastic Modulus ^b , MPa (psi)	11.9 (1,736)	27.7 (4,028)	47.8 (6,944)	11.4 (1,667)	27.7 (4,028)	46.4 (6,736)
Elastic Modulus ^c , MPa (psi)	4.70 (683)	14.8 (2,148)	27.1 (3,940)	4.41 (640)	14.8 (2,148)	26.2 (3,812)
Shear Modulus, MPa (psi)	2.43 (353)	9.57 (1,389)	17.2 (2,498)	2.43 (353)	11.0 (1,605)	17.2 (2,498)

^a Kulhawy and Mayne (1990)

^b Webb (1969)

^c Begemann (1974)

Table 2.5.4-3. As-Built Engineering Properties of Backfill and Structural Fill (FSAR Table 2.5.4.5-201)

Backfill Type	Strength Parameters, MPa (psi)	V_s , m/s (fps)
RCC Bridging Mat	1-Year Compressive Strength: 17.2 (2,500)	1,066 (3,500)
CLSM Backfill	28-Day Compressive Strength: 3.4 (500)	304 (1,000)

Table 2.5.4-4. (from Marinos and Hoek, 2000)

Rock type	Class	Group	Texture			
			Coarse	Medium	Fine	Very fine
SEDIMENTARY	Clastic		Conglomerates *	Sandstones 17 ± 4	Siltstones 7 ± 2	Claystones 4 ± 2
			Breccias *		Greywackes (18 ± 3)	Shales (6 ± 2) Marls (7 ± 2)
	Non-Clastic	Carbonates	Crystalline Limestone (12 ± 3)	Sparitic Limestones (10 ± 2)	Micritic Limestones (9 ± 2)	Dolomites (9 ± 3)
		Evaporites		Gypsum 8 ± 2	Anhydrite 12 ± 2	
Organic					Chalk 7 ± 2	

* indeterminate range of values

Table 2.5.4–5. Bearing Capacity Sensitivity Results (Table RAI 2.5.4.7-1)

		North (LNP 2)						South (LNP 1)					
		I*			II**			I			II		
		Mean UCS	Median UCS	Lower bound UCS	Mean UCS	Median UCS	Lower bound UCS	Mean UCS	Median UCS	Lower bound UCS	Mean UCS	Median UCS	Lower bound UCS
Rock Mass Properties	Unit Weight, kg/m ³ (pcf)	2,013 (125.7)			1,890 (118.0)			2,116 (132.1)			2,002 (125.0)		
	Cohesion, kPa (ksf)	201 (4.2)	158 (3.3)	90.9 (1.9)	143 (3.0)	114 (2.4)	71.8 (1.5)	167 (3.5)	143 (3.0)	86.1 (1.8)	153 (3.2)	138 (2.9)	86.1 (1.8)
	Friction Angle, degrees	20.0	18.3	14.8	16.3	14.8	11.6	20.3	19.2	15.8	15.5	14.8	11.9
USACE (1996) General Shear Failure	Ultimate Bearing capacity, kPa (ksf)	3,662 (76.5)	2,896 (60.5)	1,790 (37.4)	4,184 (87.4)	3,490 (72.9)	2,451 (51.2)	3,543 (74.0)	3,016 (63.0)	1,915 (40.0)	4,634 (96.8)	4,280 (89.4)	3,078 (64.3)
	FS	6.0	4.8	2.9	6.2	5.2	3.6	5.8	5.0	3.2	6.2	5.7	4.2
USACE (1996) Local Shear Failure	Ultimate Bearing Capacity, kPa (ksf)	2,743 (57.3)	2,078 (43.4)	1,158 (24.2)	-	-	-	2,599 (54.3)	2,145 (44.8)	1,235 (25.8)	-	-	-
	FS	4.5	3.4	1.9	-	-	-	4.3	3.5	2.0	-	-	-
Hoek et al. (2002)	Ultimate Bearing Capacity, kPa (ksf)	3,614 (75.5)	2,834 (59.2)	1,723 (36.0)	3,940 (82.3)	3,246 (67.8)	2,240 (46.8)	3,868 (80.8)	3,164 (66.1)	1,915 (40.0)	4,337 (90.6)	3,983 (83.2)	2,805 (58.6)
	FS	6.0	4.7	2.8	5.9	4.8	3.3	6.4	5.2	3.1	5.8	5.3	3.8
Serrano-Otalla (1994)	Ultimate Bearing Capacity, kPa (ksf)	5,362 (112.0)	4,036 (84.3)	2,259 (47.2)	4,893 (102.2)	3,974 (83.0)	2,523 (52.7)	5,798 (121.1)	4,591 (95.9)	2,552 (53.3)	5,305 (110.8)	4,802 (100.3)	3,184 (66.5)
	FS	8.8	6.6	3.7	7.3	5.9	3.8	9.5	7.6	4.2	7.1	6.4	4.3

*I refers to the bearing capacity at the top of the Avon Park Formation NAV-1 for (LNP2) and SAV-1 for (LNP1).

**II refers to the bearing capacity at the top of the lower strength zones NAV-3 (LNP2) and SAV-2 (LNP1).