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USNRC



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OFFICE OF THE SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

**PRESENTATION OF CONE PENETRATION TESTING RESULTS**  
**OF SOILS AT THE**  
**PRIVATE FUEL STORAGE FACILITY**  
**SKULL VALLEY, UTAH**

Report No. 05996.02-G (P030) Rev. 1

Prepared for:


Stone & Webster Engineering Corporation

Prepared by:

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Salt Lake City, Utah


May 1999

Prepared by:

  
ConeTec, Inc.

5/27/99  
Date

Reviewed by:

  
ConeTec, Inc.

5/27/99  
Date

NUCLEAR REGULATORY COMMISSION  
NUCLEAR REGULATORY COMMISSION  
72-22 238  
Docket No. 72-22  
In the matter of PS  
Official Exh. No. IDENTIFIED ✓  
RECEIVED ✓  
Applicant ✓  
Intervenor  
Cont'g Off'r  
Contractor  
Other  
DA Witness  
Witness  
Reporter  
G. P. P. P.

Soil stress calculations performed in the interpretations are based on a soil unit weight assigned to the specific soil behavior type zones. The soil unit weights used in the interpretations are based on laboratory tests performed by SWEC on borings CTB-N, CTB-S, CTB-5(OW) and CTB-4, which are located adjacent to CPT locations CPT-37 and CPT-38. The unit weights were determined by taking an average of the laboratory unit weights corresponding to the soil behavior type zone from the corresponding CPT test. Where soil behavior type zones do not correspond with laboratory data, unit weights were interpolated to correspond with the laboratory data, or are based on typical values published by Lunne, et al (1997). A summary of the values assigned to the soil behavior type zones is presented in Table 2.

**Table 2 – SBT Assigned Values**

Zone	SPT Qt/N	Unit Wt. (kN/m <sup>3</sup> )	Unit Wt. (pcf)	K (cm/s)	Description
0	1.0	19.5	124.1	$1 \times 10^{-15}$	Undefined
1	2.0	11.7	74.5	$1.7 \times 10^{-7}$	Sensitive Fines
2	1.0	11.0	70.0	$5 \times 10^{-6}$	Organic Soil
3	1.0	11.7	74.5	$5 \times 10^{-8}$	Clay
4	1.5	12.5	79.6	$5 \times 10^{-7}$	Silty Clay
5	2.0	13.4	85.3	$5 \times 10^{-6}$	Clayey Silt
6	2.5	15.5	98.7	$5 \times 10^{-5}$	Silt
7	3.0	15.5	98.7	$5 \times 10^{-4}$	Sandy Silt
8	4.0	16.0	101.9	$5 \times 10^{-3}$	Silty Sand/Sand
9	5.0	16.0	101.9	$5 \times 10^{-2}$	Sand
10	6.0	20.0	127.3	5.0	Gravelly Sand
11	1.0	20.5	130.5	$1 \times 10^{-5}$	Stiff Fine Grained
12	2.0	19.0	120.9	$1 \times 10^{-5}$	Cemented Sand

The undrained shear strength calculations were determined based on an estimated  $N_{kt}$  value of 12.5. This  $N_{kt}$  factor was determined based on the average of the individual  $N_{kt}$  factors calculated from laboratory shear strength tests performed on samples from borings B-1, B-3, B-4, C-2, CTB-N and CTB-S, and corresponding  $Q_t$  valued observed in the nearest CPT test. The laboratory shear strengths were determined from CU triaxial tests performed by SWEC. The  $N_{kt}$  factor is calculated using the following equation:

$$S_u = \frac{Q_t - \sigma_v}{N_{kt}}$$

where:

- $S_u$  = Undrained shear strength
- $Q_t$  = Corrected total cone resistance
- $\sigma_v$  = Total soil stress
- $N_{kt}$  = Correction Factor

ConeTec Inc. - CPT Interpretation  
 Interpretation Output - Release 1.00.18

Page: 1a

Run No: 99-0525-1349-4199

No: 99-315

Client: Stone &amp; Webster Engineering

Project: Private Fuel Storage Facility

Site: CPT-10

Location: PFSF (05996.02)

Cone: 20 TON A 070

CPT Date: 99/27/04

CPT Time: 08:58

CPT File: 315CP10.COR

Northing (m): 0.000

Easting (m): 0.000

Elevation (m): 0.000

Water Table (m): 38.10 (ft): 125.0

Su Nkt used: 12.50

Averaging Increment (m): 0.0 (Every Data Point)

Phi Method: Robertson and Campanella, 1983

Dr Method: Jamiolkowski - All Sands

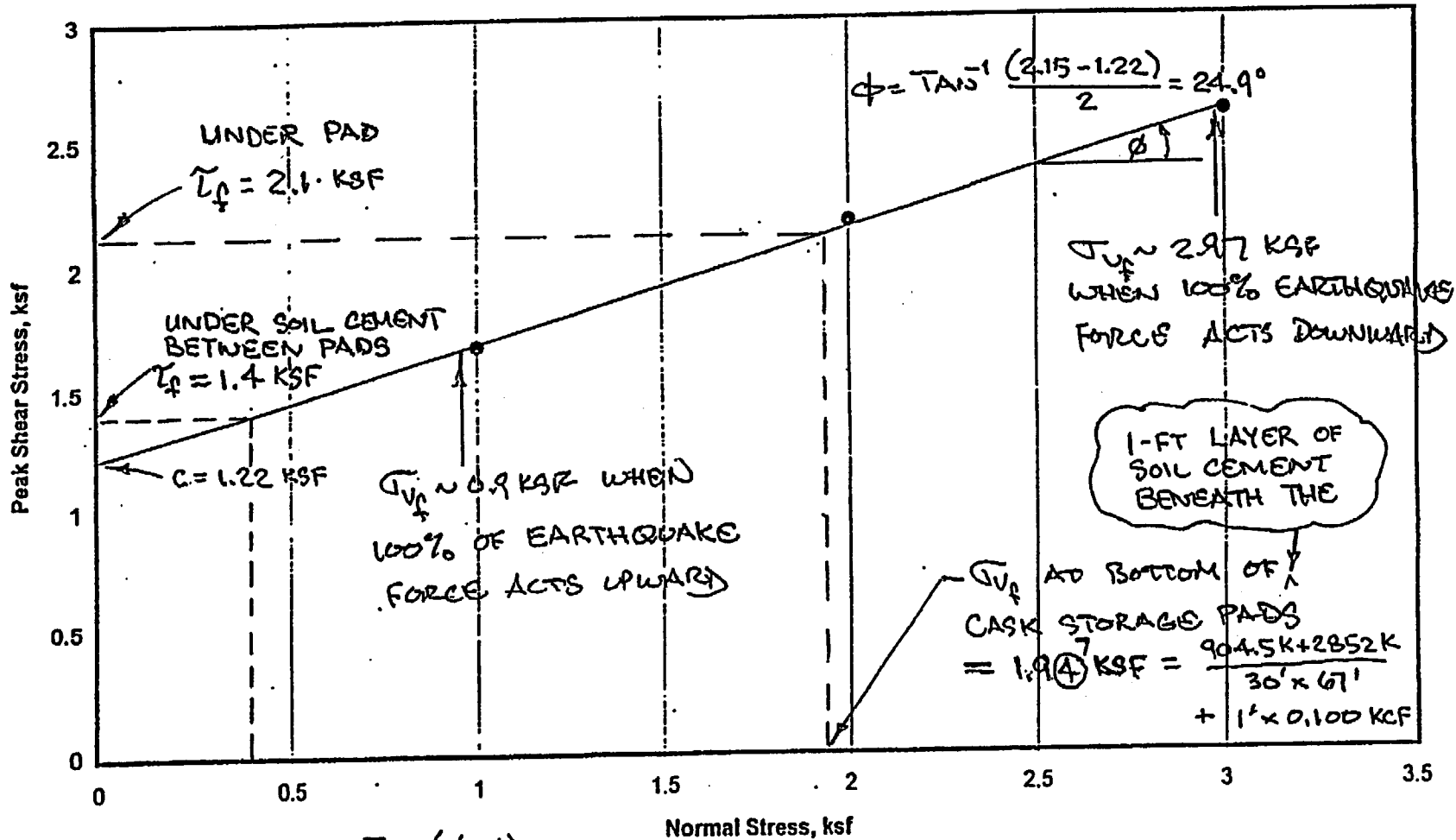
State Parameter M: 1.20

Used Unit Weights Assigned to Soil Zones

Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	ESTress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60	Su (tsf)	CRR
0.16	2.0	0.02	1.00	0.2	1	74.5	0.01	0.01	0.00	2.00	1.0	1.9	0.16	0.00
0.33	4.6	0.02	0.44	0.2	1	74.5	0.01	0.01	0.00	2.00	2.2	4.4	0.37	0.00
0.49	9.5	0.02	0.21	-0.3	6	98.7	0.02	0.02	0.00	2.00	3.6	7.3	0.76	0.00
0.66	14.4	0.02	0.14	-0.4	6	98.7	0.03	0.03	0.00	2.00	5.5	11.1	1.15	0.00
0.82	13.5	0.02	0.15	-0.2	6	98.7	0.04	0.04	0.00	2.00	5.2	10.3	1.08	0.00
0.98	12.4	0.02	0.16	-0.3	6	98.7	0.04	0.04	0.00	2.00	4.7	9.5	0.99	0.00
1.15	12.8	0.02	0.16	-0.3	6	98.7	0.05	0.05	0.00	2.00	4.9	9.8	1.02	0.00
1.31	17.2	0.02	0.12	-0.1	7	98.7	0.06	0.06	0.00	2.00	5.5	11.0	UnDef	0.08
1.48	24.1	0.02	0.08	-0.1	7	98.7	0.07	0.07	0.00	2.00	7.7	15.4	UnDef	0.09
1.64	29.0	0.02	0.07	-0.3	7	98.7	0.08	0.08	0.00	2.00	9.3	18.5	UnDef	0.10
1.80	29.3	0.02	0.07	-0.3	7	98.7	0.08	0.08	0.00	2.00	9.4	18.7	UnDef	0.10
1.97	25.9	0.02	0.08	-0.4	7	98.7	0.09	0.09	0.00	2.00	8.3	16.5	UnDef	0.09
2.13	22.6	0.02	0.09	-0.3	7	98.7	0.10	0.10	0.00	2.00	7.2	14.4	UnDef	0.09
2.30	22.1	0.02	0.09	-0.3	7	98.7	0.11	0.11	0.00	2.00	7.1	14.1	UnDef	0.09
2.46	21.8	0.02	0.09	-0.1	7	98.7	0.12	0.12	0.00	2.00	7.0	13.9	UnDef	0.09
2.62	18.1	0.02	0.11	0.1	7	98.7	0.12	0.12	0.00	2.00	5.8	11.6	UnDef	0.08
2.79	16.8	0.02	0.12	0.0	7	98.7	0.13	0.13	0.00	2.00	5.4	10.7	UnDef	0.08
2.95	18.6	0.02	0.11	0.2	7	98.7	0.14	0.14	0.00	2.00	5.9	11.9	UnDef	0.08
3.12	26.7	0.05	0.19	0.3	7	98.7	0.15	0.15	0.00	2.00	8.5	17.1	UnDef	0.09
3.28	29.1	0.24	0.83	-0.1	7	98.7	0.16	0.16	0.00	2.00	9.3	18.6	UnDef	0.10
3.44	25.2	0.35	1.39	0.1	6	98.7	0.16	0.16	0.00	2.00	9.7	19.3	2.01	0.10
3.61	21.5	0.42	1.96	0.0	6	98.7	0.17	0.17	0.00	2.00	8.2	16.4	1.70	0.10
3.77	17.6	0.24	1.36	-0.9	6	98.7	0.18	0.18	0.00	2.00	6.8	13.5	1.40	0.09
3.94	12.3	0.09	0.73	-0.6	6	98.7	0.19	0.19	0.00	2.00	4.7	9.4	0.97	0.00
4.10	10.5	0.02	0.19	-0.6	6	98.7	0.20	0.20	0.00	2.00	4.0	8.0	0.82	0.00
4.27	8.7	0.02	0.23	-0.1	1	74.5	0.20	0.20	0.00	2.00	4.2	8.3	0.68	0.00
4.43	8.6	0.02	0.23	0.1	1	74.5	0.21	0.21	0.00	2.00	4.1	8.2	0.67	0.00
4.59	9.6	0.02	0.21	0.0	6	98.7	0.22	0.22	0.00	2.00	3.7	7.4	0.75	0.00
4.76	10.8	0.02	0.19	0.1	6	98.7	0.23	0.23	0.00	2.00	4.1	8.3	0.85	0.00
4.92	11.4	0.02	0.18	-0.2	6	98.7	0.23	0.23	0.00	2.00	4.4	8.8	0.90	0.00
5.09	12.7	0.02	0.16	-0.1	6	98.7	0.24	0.24	0.00	2.00	4.8	9.7	0.99	0.00
5.25	13.3	0.02	0.15	-2.2	6	98.7	0.25	0.25	0.00	2.00	5.1	10.2	1.04	0.00
5.41	12.8	0.02	0.16	-2.5	6	98.7	0.26	0.26	0.00	1.97	4.9	9.7	1.01	0.00
5.58	13.2	0.02	0.15	-0.2	6	98.7	0.27	0.27	0.00	1.94	5.0	9.8	1.03	0.00
5.74	11.6	0.02	0.17	-0.2	6	98.7	0.27	0.27	0.00	1.91	4.4	8.5	0.90	0.00
5.91	12.6	0.02	0.16	-0.4	6	98.7	0.28	0.28	0.00	1.88	4.8	9.1	0.98	0.00
6.07	13.2	0.02	0.15	-0.4	6	98.7	0.29	0.29	0.00	1.86	5.1	9.4	1.03	0.00
6.23	12.8	0.02	0.16	-0.3	6	98.7	0.30	0.30	0.00	1.83	4.9	9.0	1.00	0.00
6.40	13.2	0.02	0.15	-1.7	6	98.7	0.31	0.31	0.00	1.81	5.1	9.1	1.03	0.00
6.56	13.2	0.04	0.30	-0.2	6	98.7	0.31	0.31	0.00	1.78	5.1	9.0	1.03	0.00
6.73	13.0	0.06	0.46	0.2	6	98.7	0.32	0.32	0.00	1.76	5.0	8.7	1.01	0.00
6.89	13.1	0.06	0.46	-3.8	6	98.7	0.33	0.33	0.00	1.74	5.0	8.7	1.02	0.00

FIGURE 7  
DIRECT SHEAR TEST  
Boring C-2, Sample U-1C  
PAD EMPLACEMENT AREA



CALC 05996.02-G(B)-05-1

P 32

BETWEEN PADS  $\bar{\tau}_v \sim (3' + 1') 0.100 \text{ KCF}$   
 $= 0.4 \text{ KSF}$

ATTACHMENT C P 62  
CALC 05996.02-G(B)-04-9

REF SAR APP 2A ATT 7