MAY 3 0 1979

Docket Nos. 50-280
and 50-281

LICENSEE: VIRGINIA ELECTRIC AND POWER COMPANY (VEPCO)

FACILITY: SURRY UNIT 1 AND 2

SUBJECT: SUMMARY OF MEETING HELD ON MAY 24, 1979 TO DISCUSS PIPE STRESS ANALYSES

The subject meeting was held with VEPCO and Stone & Webster (S&W) to discuss the use of soil structure interaction in the pipe stress analyses for Surry.

A list of attendees is attached.

The primary purpose of the meeting was to provide information upon which the NRC could base a conservatism on the use of soil structure interaction. VEPCO provided a response to our May 18, 1979 letter and information requested in our May 22, 1979, meeting at Stone & Webster. Attached is information not provided in the VEPCO letter dated May 24, 1979. The attached information shows the ratios of low strain ARS and G+50%ARS to last iteration of the SHAKE program for the soil properties at Surry, and, shows soil structure data for Surry.

Using the submitted information the NRC staff concluded that soil structure interaction methodology may be used for Surry provided that seismic stresses calculated are increased by a factor of 1.5. This factor applies to the seismic stresses derived from amplified response spectra using 1% damping. It was also acknowledged that certain individual analyses may require consideration on a case-by-case basis. A letter was sent to VEPCO on May 25, 1979 stating this position.

A proposal was also made to use, as an alternative, reanalyses at 1/2% damping. It was stated that this method could require additional time in the reanalysis process to prove acceptability. It was concluded that it would be more expedient to use the 1.5 "bump" factor.

7907110738

OFFICE➤						
SURNAME➤						
DATE➤						

VEPCO also provided a response to enclosure 1 of the NRC April 2, 1979, letter.

J. D. Neighbors, Project Manager
Operating Reactors Branch #1
Division of Operating Reactors

Enclosure:
List of Attendees

cc: w/enclosure
See next page

OFFICE➤	DOR:ORB1					
SURNAME➤	JDNeighbors					
DATE➤	05/ /79 jc					

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket Nos. 50-280
and 50-281

MAY 3 0 1979

LICENSEE: VIRGINIA ELECTRIC AND POWER COMPANY (VEPCO)

FACILITY: SURRY UNIT 1 AND 2

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J D Neighbors

J. D. Neighbors, Project Manager
Operating Reactors Branch #1
Division of Operating Reactors

Enclosure:
List of Attendees

cc: w/enclosure
See next page

Docket Files
NRC PDR
Local PDR
ORB1 Reading
NRR Reading
H. Denton
E. Case
V. Stello
D. Eisenhut
B. Grimes
R. Vollmer
A. Schwencer
D. Ziemann
P. Check
G. Lainas
D. Davis
B. Grimes
T. Ippolito
R. Reid
V. Noonan
G. Knighton
D. Brinkman
Project Manager
OELD
OI&E (3)
C. Parrish
ACRS (16)
NRC Participants
J. Buchanan
TERA
Licensee
Mr. Michael W. Maupin
Hunton and Williams
Post Office Box 1535
Richmond, Virginia 23213

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College of William and Mary
Williamsburg, Virginia 23185

Donald J. Burke
U. S. Nuclear Regulatory Commission
Region II
Office of Inspection and Enforcement
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

ENCLOSURE

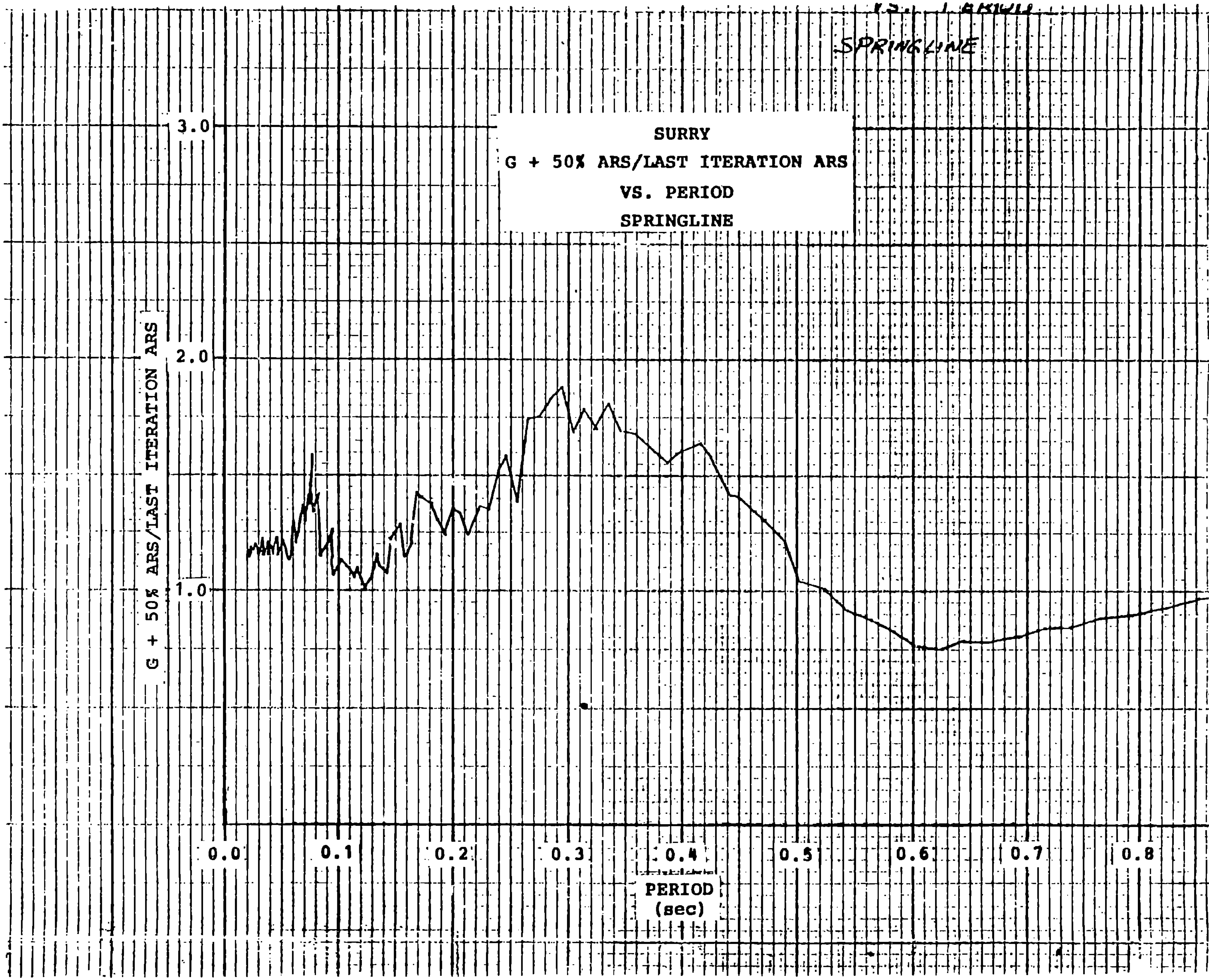
LIST OF ATTENDEES
AT MAY 24, 1979 MEETING

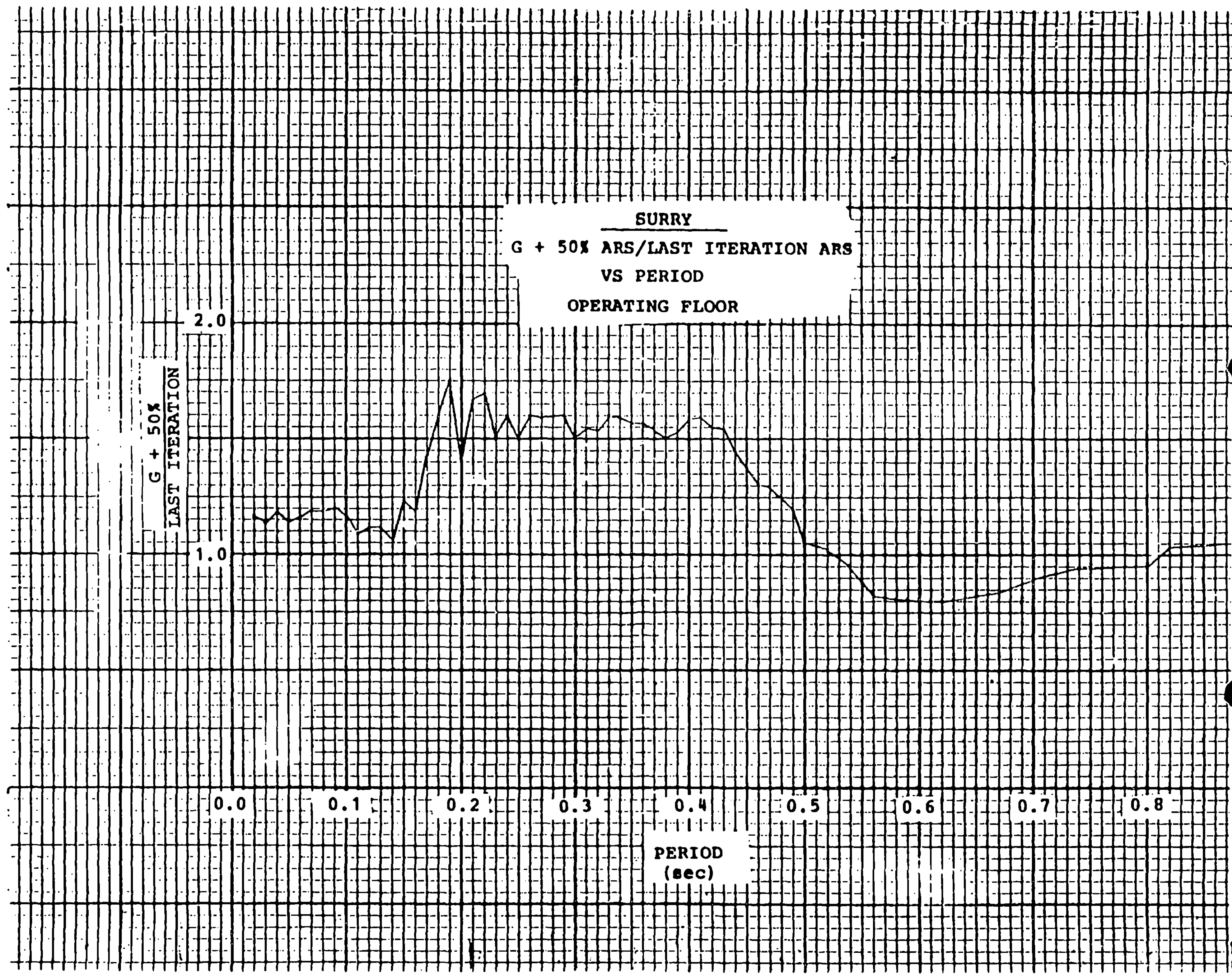
NRC
D. Neighbors
W. Russell
P. Riehm
F. Schauer
J. Martore
J. Greeves
K. Herring
L. Heller
J. Kane
S. Chan
R. Jackson
H. Polk
J. Giannelli
E. Igne
B. D. Liaw
P. T. Kuo
A. Lee
S. Lewis
J. Knight

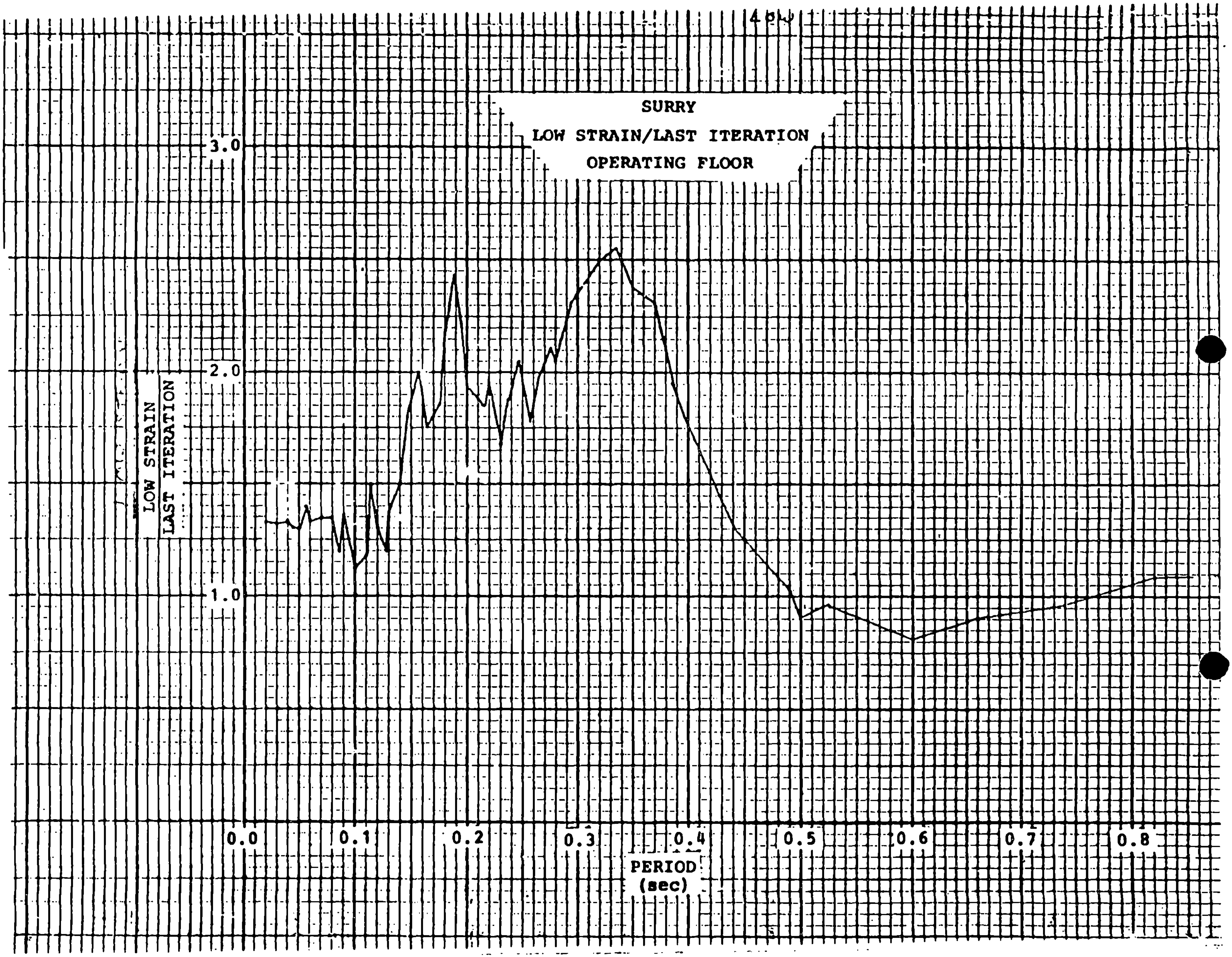
VEPCO
W. Earl
A. Baum
W. Spencer
C. M. Robinson
T. Peebles

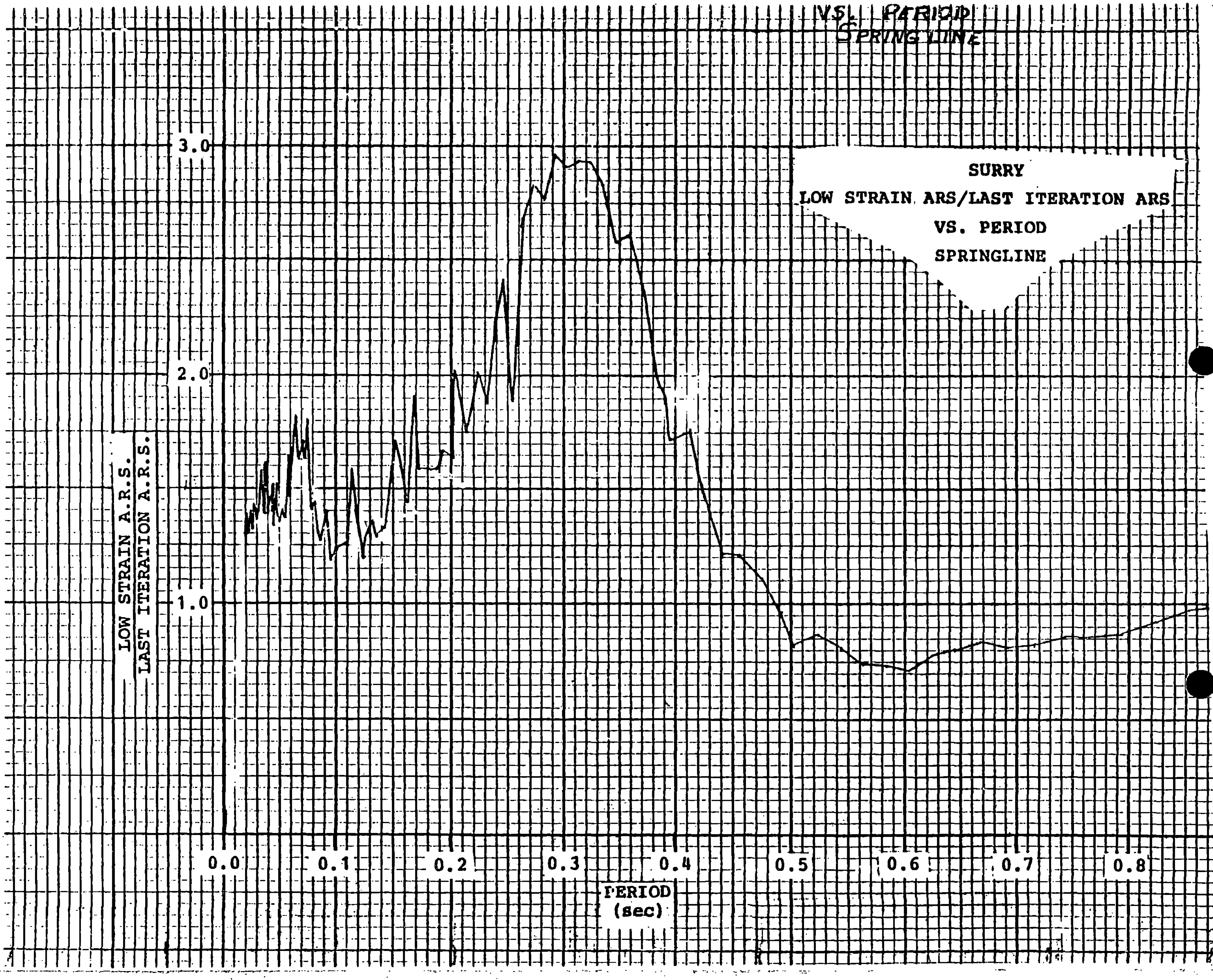
S&W
A. L. Van Sickel
K. Condon
C. Reeves
P. Wild
S. Rossier
A. Lucks
J. Christian

Duquesne Light Co.
G. Moore
J. Carey
B. Churchill (Shaw, Pittman)


SPRINGLINE
SURRY
G + 50% ARS/LAST ITERATION ARS
VS. PERIOD
SPRINGLINE
G + 50% ARS/LAST ITERATION ARS
3.0
2.0
1.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
PERIOD
(sec)


SURRY
G + 50% ARS/LAST ITERATION ARS
VS PERIOD
OPERATING FLOOR
G + 50%
LAST ITERATION
2.0
1.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
PERIOD
(sec)


SURRY
LOW STRAIN/LAST ITERATION
OPERATING FLOOR
3.0
2.0
1.0
LOW STRAIN
LAST ITERATION
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
PERIOD
(sec)


VS. PERIOD
SPRING LINE
SURRY
LOW STRAIN ARS/LAST ITERATION ARS
VS. PERIOD
SPRINGLINE
LOW STRAIN A.R.S.
LAST ITERATION A.R.S.
3.0
2.0
1.0
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
PERIOD
(sec)

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

4501061

J.O./W.O./CALCULATION NO.	REVISION	PAGE
12241 [illegible]		

PREPARER/DATE	REVIEWER/CHECKER/DATE	INDEPENDENT REVIEWER/DATE
[illegible] 5/23/79		

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
Fundamental Freq for Group I Problems	

ITEM	PROB #	FUND. FREQ (HZ)	ITEM	PROB #	FUND. FREQ. (HZ)	ITEM	PROB #	FUND FREQ (HZ)
1	555	4.56	22	544	3.78	43	503	3.09
2	1555	4.07	23	544A	5.43	44	554	2.41
3	706A	2.69	24	544B	4.84	45	465	4.28
4	707A	2.32	25	751	7.67	46	1030	9.29
5	708	2.22	26	322/34	NA	47	CV-1	4.35
6	731A	4.75	27	745	NA	48	746	NA
7	731B	4.22	28	755	NA	49	1040	5.2
8	743	4.37	29	756	9.2			
9	1000A	7.65	30	323A	7.05			
10	1010A	5.96	31	322A	7.69			
11	1020A	5.0	32	334A	7.26			
12	1020B	3.97	33	346	4.07			
13	1020C	3.05	34	323B	2.55			
14	537	NA	35	322B	6.01			
15	735	3.7	36	334B	2.95			
16	525A	5.17	37	417	5.17			
17	547	2.71	38	607	5.56			
18	541/560	NA	39	611	4.06			
19	744/754	NA	40	[illegible]	NA			
20	545A	1.5	41	[illegible]	NA			
21	545B	2.2	42	[illegible]	5.93			

Freq 1 → 2 Hz
1 Problem

Freq 2 → 3 Hz
3 Problems

Freq 3 → 4 Hz
5 Problems

Freq 4 → 5 Hz
10 Problems

Freq 5 → 6 Hz
3 Problems

Freq 6 → 7 Hz
1 Problem

Freq 7 → 8 Hz
5 Problems

Freq 9 → 10 Hz
2 Problems

CALCULATION SHEET

A5010.61

STONE & WEBSTER ENGINEERING CORPORATION

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PREPARER/DATE	REVIEWER/CHECKER/DATE	INDEPENDENT REVIEWER/DATE
BRB 5/22/79	C Khadyal 5/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
SURRY CONTAINMENT - ARS COMPARISON	

DBE 1% Equipment Damping

Period	Frequency	Last Iteration ARS	SPRING LINE G+50% ARS	G+50% ARS / Last Iteration ARS
.02	50	.126676	.1477	1.165 ✓
.0207	48.31	.126394	.1483	1.173 ✓
.02142	46.69	.129856	.1509	1.161
.02217	45.11	.130209	.1505	1.155
.02295	43.57	.130495	.1504	1.152 ✓
.02375	42.11	.129149	.1493	1.156 ✓
.02459	40.67	.128211	.1466	1.143
.02545	39.29	.132174	.1561	1.180 ✓
.02634	37.97	.134441	.1567	1.165
.02726	36.68	.130109	.1486	1.142
.02821	35.45	.132489	.1551	1.170 ✓
.02920	34.25	.133148	.1541	1.157
.03022	33.09	.132580	.1528	1.152 ✓
.03128	31.97	.132601	.1533	1.156
.03238	30.88	.130824	.1561	1.193 ✓
.03351	29.84	.140238	.1646	1.174 ✓
.03468	28.84	.132738	.1589	1.197
.03590	27.86	.128389	.1544	1.202 ✓
.03715	26.92	.136605	.1552	1.136
.03845	26.01	.131485	.1638	1.245
.03980	25.13	.135363	.1603	1.183 ✓
.04119	24.28	.131878	.1626	1.232
.04263	23.46	.132347	.1661	1.255
.04413	22.66	.131189	.1549	1.180
.04567	21.90	.150101	.1801	1.199
.04727	21.16	.135508	.1655	1.221 ✓
.04893	20.44	.138925	.1605	1.155 ✓
.05064	19.75	.148172	.1760	1.187
.05241	19.08	.136396	.1652	1.211 ✓
.05425	18.43	.149072	.1748	1.172
.05614	17.81	.146203	.1677	1.147 ✓
.05811	17.21	.141752	.1771	1.249
.06014	16.63	.133404	.1759	1.318 ✓
.06225	16.06	.146091	.1785	1.221
.06443	15.52	.148450	.1787	1.203 ✓
.06668	15.00	.145884	.2010	1.377 ✓
.06902	14.49	.141502	.1828	1.291 ✓
.07143	14.00	.155137	.2206	1.422 ✓
.07393	13.53	.155201	.2146	1.382
.07652	13.07	.155418	.2477	1.593 ✓
.07920	12.63	.166478	.2158	1.296 ✓
.08197	12.20	.174668	.2448	1.401 ✓
.08484	11.79	.206547	.2563	1.241
.08781	11.39	.184099	.2116	1.149 ✓
.09089	11.00	.153325	.1937	1.263

CALCULATION SHEET

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STONE & WEBSTER ENGINEERING CORPORATION

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E.R.S 5/22/79	[illegible] 5/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
Surry Containment - ARS Comparison	

DBE 1% Equipment Damping @ Springline

Period	Frequency	Last Iteration	G+50% ARS	G+50% ARS / Last Iteration ARS
.09407	10.63	.167715	.2124	1.266 ✓
.09736	10.27	.173085	.1845	1.065 -
.10077	9.92	.170639	.1846	1.082
.10430	9.59	.165451	.1789	1.080
.10795	9.26	.169200	.1940	1.146 ✓
.11173	8.95	.171177	.1976	1.154
.11564	8.65	.175416	.1871	1.066 ✓
.11968	8.36	.208542	.2286	1.096
.12387	8.07	.208169	.2082	1.000 ✓
.12821	7.80	.244938	.2503	1.022
.13270	7.54	.220477	.2559	1.160
.13734	7.28	.243167	.2695	1.108
.14215	7.03	.238789	.2574	1.077
.14713	6.80	.170302	.2104	1.235
.15228	6.57	.213755	.2747	1.284
.15761	6.34	.273711	.3143	1.148
.16312	6.13	.302428	.3676	1.215
.16883	5.92	.202753	.2904	1.431
.17474	5.72	.273465	.3865	1.413
.18086	5.53	.264425	.3674	1.389
.18719	5.34	.302439	.3950	1.306
.19375	5.16	.271263	.3372	1.242
.20053	4.99	.228541	.3106	1.359
.20755	4.82	.187119	.2497	1.334
.21481	4.66	.204124	.2546	1.247 ✓
.22233	4.50	.243617	.3332	1.367
.23011	4.35	.291315	.3952	1.356
.23817	4.20	.314907	.4788	1.520
.24651	4.06	.303669	.4826	1.589
.25513	3.92	.272694	.3767	1.381
.26407	3.79	.258685	.4512	1.744
.27331	3.66	.321519	.5631	1.751
.28288	3.54	.317514	.5839	1.839
.29278	3.42	.353228	.6655	1.884 ←
.30303	3.30	.399893	.6740	1.685
.31363	3.19	.480836	.8599	1.788
.32461	3.08	.488482	.8329	1.705
.33598	2.98	.413890	.7307	1.765
.34774	2.88	.423871	.7171	1.691
.35991	2.78	.801520	1.3518	1.686
.37351	2.68	.641235	1.0395	1.621
.38555	2.59	.592686	.9250	1.560
.39904	2.51	.630102	1.0135	1.608
.41301	2.42	.591388	.9702	1.640

CALCULATION SHEET

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STONE & WEBSTER ENGINEERING CORPORATIO

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RRB 5/22/79	CPKadyal 5/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
SURRY CONTAINMENT - ARS COMPARISON	

DBE 1% Equip. Damping @ Springline

Period	Frequency	Last Iteration	G+50% ARS	G+50% ARS / Last Iteration ARS
.42747	2.34	.802322	1.2722	1.585
.44243	2.26	.874019	1.2288	1.405
.45792	2.18	.744084	1.0439	1.402
.47395	2.11	.686023	.8997	1.311
.49054	2.04	.837367	1.0061	1.201
.50771	1.97	.784078	.8212	1.047
.52549	1.90	.740378	.7439	1.004
.54388	1.84	.729576	.6715	.920
.56292	1.78	.780407	.6545	.838
.58262	1.72	1.05688	.8307	.785
.60302	1.66	.881424	.6734	.764
.62413	1.60	.772803	.5887	.761
.64597	1.55	.561940	.4475	.796
.66859	1.50	.515313	.4092	.794
.69199	1.45	.614556	.4948	.805
.71621	1.40	.587272	.4951	.843
.74128	1.35	.625723	.5315	.849
.76723	1.30	.484470	.4250	.877
.79409	1.26	.399423	.3560	.891
.82189	1.22	.3990014	.3695	.926
.85066	1.18	.460646	.4470	.970
.88044	1.14	.456775	.4510	.987
.91125	1.10	.390433	.3927	1.005
.94315	1.06	.347571	.3504	1.008
.97617	1.024	.331403	.3249	.980
1.01034	.9898	.313059	.3034	.969
1.04570	.9563	.315629	.3221	1.020
1.08231	.9239	.330078	.3284	.994
1.12020	.8927	.318299	.3115	.978
1.15941	.8625	.287444	.2791	.971
1.2000	.8333	.291990	.2892	.990

CALCULATION SHEET STONE & WEBSTER ENGINEERING CORPORATION

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[illegible]	[illegible] 5/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
Surry Containment - ARS Comparison	

DBE 1% Equipment Damping SPRING LINE

Period	Frequency	Last Iteration ARS	Low Strain ARS	Low Strain ARS / Last Iteration ARS
.02	50	.126676	.175313	1.384
.0207	48.31	.126394	.176152	1.394
.02142	46.69	.129856	.177764	1.446 1.369
.02217	45.11	.130209	.176388	1.355
.02295	43.57	.130495	.177359	1.359
.02375	42.11	.129149	.178273	1.381
.02459	40.67	.128211	.176179	1.374
.02545	39.29	.132174	.177616	1.343
.02634	37.97	.134491	.179824	1.338
.02726	36.68	.130109	.178568	1.373
.02821	35.45	.132489	.182064	1.374
.02920	34.25	.133148	.178929	1.334
.03022	33.09	.132580	.179281	1.352
.03128	31.97	.132601	.189120	1.426
.03238	30.88	.130224	.191632	1.465
.03351	29.84	.140228	.184619	1.317
.03468	28.84	.132738	.202221	1.524
.03590	27.86	.128389	.202515	1.577
.03715	26.92	.136605	.191055	1.399
.03845	26.01	.131495	.212475	1.616
.03980	25.13	.135363	.187180	1.383
.04119	24.28	.131278	.194921	1.478
.04263	23.46	[illegible]	.196681	1.487
.04413	22.66	[illegible]	.189831	1.447
.04567	21.90	.150101	.199970	1.332
.04727	21.16	.135508	.206722	1.525
.04893	20.44	.138925	.195638	1.408
.05064	19.75	.148172	.193487	1.306
.05241	19.08	.136396	.195921	1.195 1.436
.05425	18.43	.147572	.206029	1.382
.05614	17.81	.146203	.204330	1.397
.05811	17.21	.141752	.233967	1.650
.06014	16.63	.133404	.197203	1.478
.06225	16.06	.146091	.214037	1.465
.06443	15.52	.148450	.214461	1.444
.06668	15.00	[illegible]	.266370	1.826
.06902	14.49	.141502	.230750	1.631
.07143	14.00	.155127	.265031	1.709
.07393	13.53	.155201	.252891	1.630
.07652	13.07	.155418	.281354	1.810
.07920	12.63	.166478	.234198	1.407
.08197	12.20	.174668	.250153	1.432
.08484	11.79	.206547	.268485	1.300
.08781	11.39	.184099	.232946	1.265
.09089	11.00	.153325	.209139	1.364

CALCULATION SHEET — STONE & WEBSTER ENGINEERING CORPORATION

5010.61

J.O./W.O./CALCULATION NO.	REVISION	PAGE
12846.22		2

PREPARER/DATE	REVIEWER/CHECKER/DATE	INDEPENDENT REVIEWER/DATE
23 May 79 [illegible]	[illegible] 5/21/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
SURRY CONTAINMENT ARS COMPARISON	

DBE 1% Equipment Damping @ Springline

Period	Frequency	Last Iteration	Low Strain ARS	Low Strain ARS / Last Iteration ARS
.09407	10.63	.167715	.245382	1.463
.09736	10.27	.173285	.207713	1.199
.10077	9.92	.170639	.212409	1.245
.10430	9.59	.165451	.209649	1.266
.10795	9.26	.169200	.213181	1.260
.11173	8.95	.171177	.216830	1.266
.11564	8.65	.175416	.278907	1.590
.11968	8.36	.208542	.293626	1.408
.12377	8.07	.208169	.250336	1.202
.12821	7.80	.244938	.306557	1.251
.13270	7.54	.220477	.298648	1.354
.13734	7.28	.243167	.303077	1.246
.14215	7.03	.238773	.316904	1.327
.14713	6.80	.170302	.267009	1.567
.15228	6.57	.213755	.366622	1.714
.15761	6.34	.273711	.436219	1.593
.16312	6.13	.302428	.438333	1.449
.16883	5.92	.202753	.365617	1.802
.17474	5.72	.273565	.433848	1.586
.17976	5.53	.264445	.418352	1.582
.18719	5.34	.302439	.482443	1.595
.19375	5.16	.271263	.455042	1.677
.20053	4.99	.228541	.376482	1.647
.20755	4.82	.187119	.378052	2.020
.21481	4.66	.204124	.362494	1.776
.22233	4.50	.243617	.492525	2.021
.23011	4.35	.291315	.547411	1.879
.23817	4.20	.314907	.701353	2.227
.24651	4.06	.303669	.731963	2.410
.25513	3.92	.272694	.516964	1.895
.26407	3.79	.258685	.697245	2.695
.27331	3.66	.321519	.907770	2.823
.28288	3.54	.317514	.879484	2.770
.29278	3.42	[illegible]	1.04999	2.972
.30303	3.30	.399913	1.16112	2.903
.31368	3.19	.480836	1.41380	2.940
.32461	3.08	.488482	1.43140	2.930
.33598	2.98	.413890	1.17402	2.836
.34774	2.88	.423971	1.09253	2.577
.35991	2.78	.801520	2.08939	2.606
.37251	2.68	.641235	1.51408	2.361
.38555	2.59	.592826	1.17740	1.986
.39904	2.51	.630102	1.08479	1.721
.41321	2.42	.591422	1.04092	1.760

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SUBJECT/TITLE	QA CATEGORY/CODE CLASS
Surry Containment - ARS Comparison	

DBE 1% Equip. Damping @ Springline

Period	Frequency	Last Iteration	Low Strain ARS	Low Strain ARS
.42747	2.34	.802322	1.17941	1.470
.44243	2.26	.874019	1.06780	1.222
.45792	2.18	.744084	.896054	1.204
.47395	2.11	.626023	.770846	1.124
.49054	2.04	.837367	.797663	.953
.50771	1.97	.984078	.657457	.839
.52549	1.90	.740378	.645183	.871
.54388	1.84	.729576	.600444	.823
.56292	1.78	.780407	.583362	.748
.58262	1.72	1.05688	.778755	.737
.60302	1.66	.881424	.636430	.722
.62413	1.60	.772803	.584395	.756
.64597	1.55	.561940	.451706	.804
.66859	1.50	.515313	.405783	.787
.69199	1.45	.614556	.499553	.813
.71621	1.40	.587272	.486220	.828
.74128	1.35	.625723	.534282	.854
.76723	1.30	.484470	.416426	.860
.79409	1.26	.397473	.350653	.878
.82189	1.22	.390014	.372950	.935
.85066	1.18	.460646	.446613	.970
.88044	1.14	.456775	.456137	.999
.91125	1.10	.390433	.394611	1.011
.94315	1.06	.347571	.347968	1.001
.97611	1.024	.331493	.321048	.969
1.01034	.9898	.313059	.302251	.965
1.04570	.9563	.315629	.319338	1.012
1.08231	.9239	.330078	.323093	.979
1.12020	.8927	.318299	.307058	.965
1.15941	.8625	.287444	.277384	.965
1.2000	.8333	.291990	.289349	.991

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SUBJECT/TITLE	QA CATEGORY/CODE CLASS
SURRY CONTAINMENT - ARS COMPARISON	

SURRY CONTAINMENT : COMPARISON OF LOW STRAIN ARS VS. LAST ITER ARS @ THE EL. 86 OPER. FLR

1% OSC. DAMPING DBE

PERIOD (SEC)	FREQ. (HZ)	ACCn (g) LAST ITERATION (#404)	ACCn (g) LOW STRAIN (#832)	LOW STRAIN / LAST ITER
.02	50.	.1185	.1579	1.332
.02070	48.31	.1185	.1581	1.334
.02142	46.69	.1187	.1584	1.334
.02217	45.11	.1189	.1579	1.328
.02295	43.57	.1190	.1583	1.330
.02375	42.11	.1187	.1586	1.336
.02459	40.67	.1189	.1579	1.328
.02545	39.29	.1181	.1584	1.341
.02634	37.97	.1195	.1589	1.330
.02726	36.68	.1192	.1581	1.326
.02821	35.45	.1191	.1583	1.329
.0292	34.25	.1196	.1589	1.329
.03022	33.09	.1197	.1582	1.322
.03128	31.97	.1196	.1583	1.324
.03238	30.88	.1194	.1607	1.346
.03351	29.84	.1208	.1599	1.324
.03468	28.84	.1197	.1621	1.354
.03590	27.86	.1191	.1626	1.365
.03715	26.92	.1196	.1610	1.346
.03845	26.01	.1187	.1640	1.382
.03980	25.13	.1194	.1596	1.337
.04119	24.28	.1199	.1619	1.350
.04263	23.46	.1187	.1612	1.358
.04413	22.66	.1191	.1596	1.340
.04567	21.90	.1224	.1601	1.308
.04727	21.16	.1207	.1633	1.353
.04893	20.44	.1213	.1607	1.325
.05064	19.75	.1227	.1594	1.299
.05241	19.08	.1211	.1621	1.339
.05425	18.43	.1231	.1646	1.337
.05614	17.81	.1222	.1636	1.339
.05811	17.21	.1181	.1659	1.405
.06014	16.63	.1203	.1613	1.341
.06225	16.06	.1216	.1628	1.339
.06443	15.52	.1232	.1618	1.313
.06668	15.00	.1234	.1621	1.314
.06902	14.49	.1198	.1614	1.347
.07143	14.00	.1233	.1625	1.318
.07393	13.53	.1210	.1613	1.333
.07652	13.07	.1234	.1669	1.353
.07926	12.63	.1200	.1615	1.346

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W.E.H 5-22-79	Chakaya 5/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
OPER. FLR : 1% EL 86'-0"	

SURRY CONTAINMENT - ARS COMPARISON

PERIOD	FREQ	LAST ITERATION	LOW STRAIN	LOW STRAIN/LAST ITER
.08197	12.20	.1260	.1694	1.344
.08484	11.79	.1376	.1651	1.200
.08781	11.39	.1284	.1765	1.375
.09089	11.00	.1264	.1723	1.363
.09407	10.63	.1468	.1998	1.361
.09736	10.27	.1536	.1744	1.135
.10077	9.92	.1552	.2012	1.296
.10430	9.59	.1582	.1841	1.164
.10795	9.26	.1552	.1820	1.173
.11173	8.95	.1482	.1749	1.180
.11563	8.65	.1429	.2226	1.558
.11968	8.36	.1480	.2248	1.519
.12387	8.07	.1584	.2145	1.354
.12821	7.80	.1796	.2164	1.205
.13270	7.54	.1661	.2286	1.376
.13734	7.28	.1700	.2322	1.366
.14215	7.03	.1683	.2652	1.576
.14713	6.80	.1397	.2583	1.849
.15228	6.57	.1668	.3132	1.878
.15761	6.34	.1741	.3514	2.018
.16312	6.13	.1766	.3095	1.753
.16883	5.92	.1715	.3049	1.778
.17474	5.72	.2211	.4122	1.864
.18086	5.53	.2394	.5262	2.198
.18719	5.34	.3000	.7313	2.438
.19375	5.16	.3227	.7135	2.211
.20053	4.99	.3485	.6707	1.925
.20755	4.82	.3303	.6398	1.937
.21481	4.66	.4123	.7666	1.859
.22233	4.50	.3931	.7732	1.967
.23011	4.35	.4390	.7393	1.684
.23817	4.20	.4743	.8957	1.888
.24651	4.06	.4167	.8532	2.048
.25513	3.92	.3136	.5563	1.774
.26407	3.79	.3274	.6480	1.979
.27331	3.66	.3946	.8363	2.119
.28288	3.54	.4040	.8245	2.041
.29278	3.42	.4108	.9547	2.324
.30303	3.30	.4478	1.0355	2.312
.31363	3.19	.5255	1.2591	2.396
.32461	3.08	.5030	1.2525	2.490
.33598	2.98	.4113	1.0455	2.542 ←
.34774	2.88	.4057	.9662	2.382
.35991	2.78	.7532	1.8359	2.437
.37251	2.68	.5727	1.3303	2.325

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WSH 5-22-79	C Phalyal 5/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
OPER. FLR: 1% @ EL 86'-0"	

PERIOD	FREQ.	ACCn LAST ITERATION (Run # 404)	ACCn LOW STRAIN (Run # 832)	LOW STRAIN / LAST ITER.
.38555	2.59	.5358	1.0411	1.943
.39904	2.51	.5502	.9576	1.740
.41301	2.42	.5139	.9161	1.783
.42747	2.34	.6928	1.0418	1.504
.44243	2.26	.7388	.9616	1.302
.45792	2.18	.6396	.7980	1.248
.47395	2.11	.5857	.6915	1.181
.49054	2.04	.6951	.7122	1.025
.50771	1.97	.6528	.5954	.912
.52549	1.90	.6097	.5905	.969
.54388	1.84	.6033	.5527	.916
.56292	1.78	.6429	.5422	.843
.58262	1.72	.8702	.7229	.831
.60302	1.66	.7271	.5972	.821
.62413	1.60	.6379	.5447	.854
.64597	1.55	.4706	.4230	.899
.66859	1.50	.4250	.3830	.901
.69199	1.45	.5097	.4751	.932
.71621	1.40	.4896	.4607	.941
.74128	1.35	.5255	.5055	.962
.76723	1.30	.4045	.3972	.982
.79409	1.26	.3393	.3366	.992
.82189	1.22	.3284	.3585	1.092
.85066	1.18	.4000	.4339	1.085
.88044	1.14	.3975	.4396	1.106
.91125	1.10	.3431	.3808	1.110
.94315	1.06	.3088	.3382	1.095
.97617	1.024	.2952	.3124	1.058
1.01034	.9898	.2817	.2947	1.046
1.04570	.9563	.2851	.3114	1.092
1.08231	.9239	.2991	.3159	1.056
1.12020	.8927	.2908	.3020	1.039
1.15941	.8625	.2646	.2732	1.032
1.2000	.8333	.2712	.2829	1.043

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S. K. Calcado 5-23-79	S. P. Singh 5/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
SURRY CONTAINMENT - ARS COMPARISON	

SURRY CONTAINMENT : COMPARISON OF G+50% VS. LAST ITER @ THE OPER. FLR.
1% OSC. DAMPING

PERIOD (SEC)	FREQ. (Hz)	LAST ITERATION (#404)	G+50% #835	G+50 / LAST ITER
.02	50.	.1185	.1378	1.1629
.02070	48.31	.1185	.1378	1.1629
.02142	46.69	.1187	.1378	1.1609
.02217	45.11	.1189	.1374	1.1556
.02295	43.57	.1190	.1375	1.1555
.02375	42.11	.1187	.1378	1.1609
.02459	40.67	.1189	.1380	1.1606
.02545	39.29	.1181	.1395	1.1812
.02634	37.97	.1195	.1382	1.1565
.02726	36.68	.1192	.1380	1.1577
.02821	35.45	.1191	.1389	1.1662
.0292	34.25	.1196	.1379	1.1530
.03022	33.09	.1197	.1374	1.1479
.03128	31.97	.1196	.1376	1.1505
.03238	30.88	.1194	.1389	1.1633
.03351	29.84	.1208	.1386	1.1474
.03468	28.84	.1197	.1384	1.1562
.03590	27.86	.1191	.1390	1.1671
.03715	26.92	.1196	.1382	1.1555
.03845	26.01	.1187	.1407	1.1853
.03980	25.13	.1194	.1408	1.1792
.04117	24.28	.1199	.1382	1.1526
.04263	23.46	.1187	.1408	1.1862
.04413	22.66	.1191	.1406	1.1805
.04567	21.90	.1224	.1424	1.1634
.04727	21.16	.1207	.1400	1.1599
.04893	20.44	.1213	.1379	1.1369
.05064	19.75	.1227	.1402	1.1426
.05241	19.08	.1211	.1380	1.1396
.05425	18.43	.1231	.1395	1.1332
.05614	17.81	.1222	.1368	1.1195
.05811	17.21	.1181	.1442	1.2210
.06014	16.63	.1203	.1404	1.1671
.06225	16.06	.1216	.1401	1.1521
.06443	15.52	.1232	.1377	1.1193
.06668	15.00	.1234	.1424	1.1540
.06902	14.49	.1198	.1423	1.1878
.07143	14.00	.1233	.1445	1.1719
.07393	13.53	.1210	.1405	1.1612
.07652	13.07	.1234	.1427	1.1564
.07920	12.63	.1200	.1417	1.1808

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SUBJECT/TITLE: OPER. FLR : 1%

QA CATEGORY/CODE CLASS

PERIOD	FREQ	LAST ITERATION (#404)	G+50% (#835)	G+50 / LAST ITER
.08197	12.20	.1260	.1512	1.2000
.08484	11.79	.1376	.1564	1.1366
.08781	11.39	.1284	.1418	1.1044
.09089	11.00	.1264	.1537	1.2160
.09407	10.63	.1468	.1616	1.1008
.09736	10.27	.1536	.1607	1.0462
.10077	9.92	.1552	.1805	1.1630
.10430	9.59	.1582	.1804	1.1403
.10795	9.26	.1552	.1715	1.1050
.11173	8.95	.1482	.1625	1.0965
.11563	8.65	.1429	.1603	1.1218
.11968	8.36	.1480	.1663	1.1236
.12387	8.07	.1584	.1870	1.1806
.12821	7.80	.1796	.1989	1.1075
.13270	7.54	.1661	.1884	1.1343
.13734	7.28	.1700	.1867	1.0982
.14215	7.03	.1683	.1808	1.0743
.14713	6.80	.1397	.1891	1.3536
.15228	6.57	.1668	.2073	1.2428
.15761	6.34	.1741	.2531	1.4538
.16313	6.13	.1766	.2110	1.1948
.16883	5.92	.1715	.2483	1.4478
.17474	5.72	.2211	.3256	1.4726
.18086	5.53	.2394	.3879	1.6203
.18719	5.34	.3000	.5293	1.7643 ←
.19375	5.16	.3227	.5447	1.6879
.20053	4.99	.3485	.5116	1.4680
.20755	4.87	.3303	.5413	1.6388
.21481	4.66	.4123	.6885	1.6699
.22233	4.50	.3931	.6715	1.7082
.23011	4.35	.4390	.6603	1.5041
.23817	4.20	.4743	.7871	1.6595
.24651	4.06	.4167	.6922	1.6611
.25513	3.92	.3136	.4682	1.4930
.26407	3.79	.3274	.5249	1.6032
.27331	3.66	.3946	.6247	1.5831
.28288	3.54	.4040	.6463	1.5998
.29278	3.42	.4108	.6726	1.6373
.30303	3.30	.4478	.6753	1.5080
.31363	3.19	.5255	.8249	1.5697
.32461	3.08	.5030	.7655	1.5219
.33598	2.98	.4113	.6605	1.6059
.34774	2.88	.4057	.6358	1.5672
.35991	2.78	.7532	1.1818	1.5690
.37251	2.68	.5727	.8816	1.5407

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[illegible]	S. P. [illegible] 3/23/79	

SUBJECT/TITLE	QA CATEGORY/CODE CLASS
OPER. FLR: 1%	

PERIOD	FREQ.	LAST ITERATION (#404)	G+50% (#835)	G+50 / LAST ITER
.38555	2.59	.5358	.8058	1.5039
.39904	2.51	.5502	.8583	1.5600
.41301	2.42	.5139	.8208	1.5972
.42747	2.34	.6928	1.0711	1.5460
.44243	2.26	.7388	1.0491	1.4200
.45792	2.18	.6396	.8874	1.3874
.47395	2.11	.5857	.7669	1.3094
.49054	2.04	.6951	.8383	1.2060
.50771	1.97	.6528	.6886	1.0548
.52549	1.90	.6097	.6321	1.0367
.54388	1.84	.6033	.5731	.9499
.56292	1.78	.6429	.5592	.8698
.58262	1.72	.8702	.7155	.8222
.60302	1.66	.7271	.5809	.7989
.62413	1.60	.6379	.5135	.8050
.64597	1.55	.4706	.3956	.8406
.66259	1.50	.4250	.3600	.8471
.69197	1.45	.5097	.4396	.8625
.71621	1.40	.4896	.4393	.8973
.74128	1.35	.5255	.4743	.9026
.76723	1.30	.4045	.3815	.9431
.79409	1.26	.3393	.3221	.9493
.82189	1.22	.3284	.3384	1.0305
.85066	1.18	.4000	.4175	1.0438
.88044	1.14	[illegible]	.4191	1.0543
.91125	1.10	.3451	.3660	1.0667
.94315	1.06	.3088	.3291	1.0657
.97617	1.024	[illegible]	.3068	1.0393
1.01034	.9898	.2817	.2862	1.0160
1.04570	.9563	.2851	.3044	1.0677
1.08231	.9239	.2991	.3111	1.0401
1.12020	.8927	.2908	.2979	1.0244
1.15941	.8625	.2646	.2689	1.0163
1.2000	.8333	.2712	.2780	1.0251

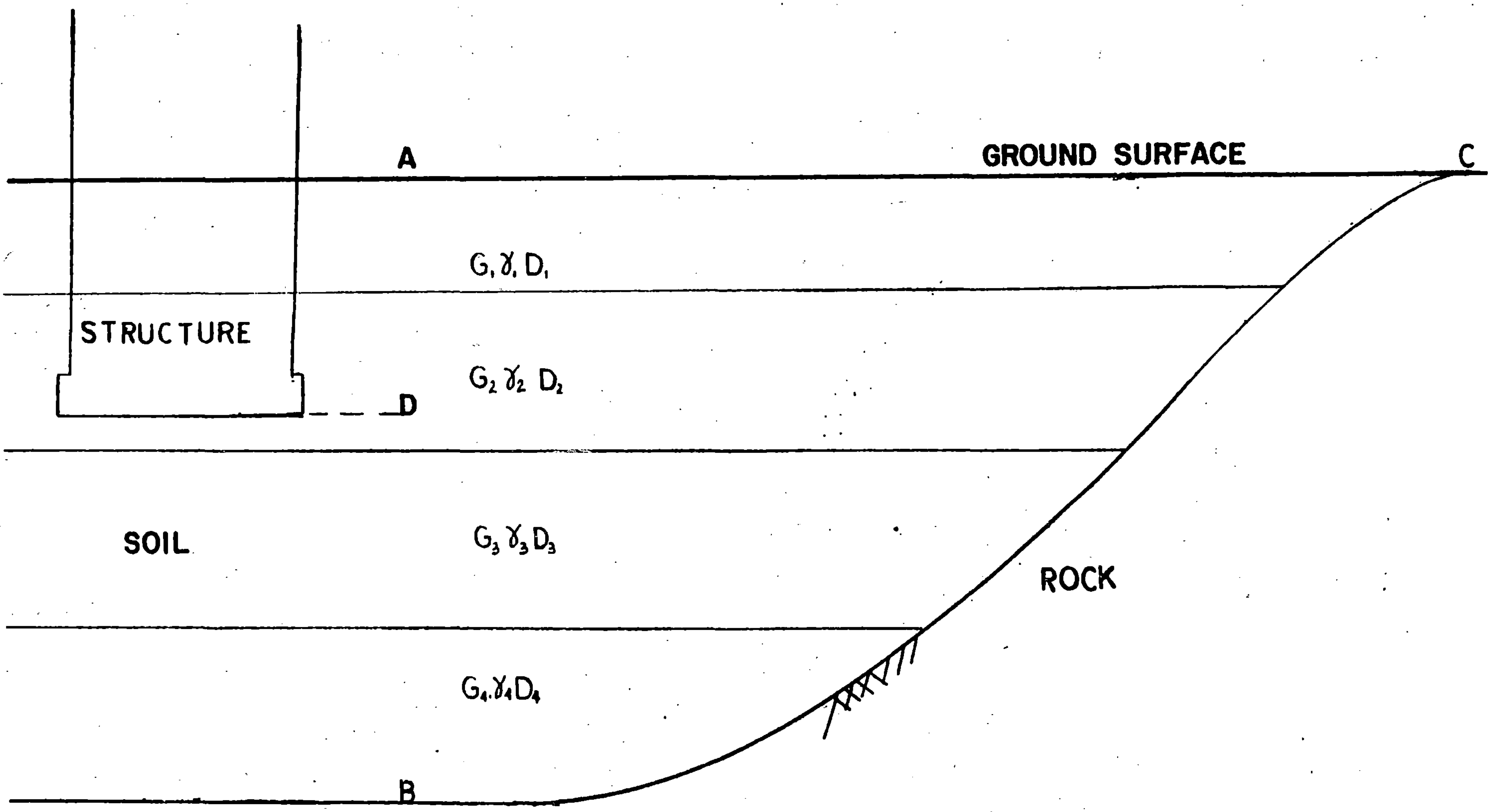


FIG. I
GENERALIZED SECTION

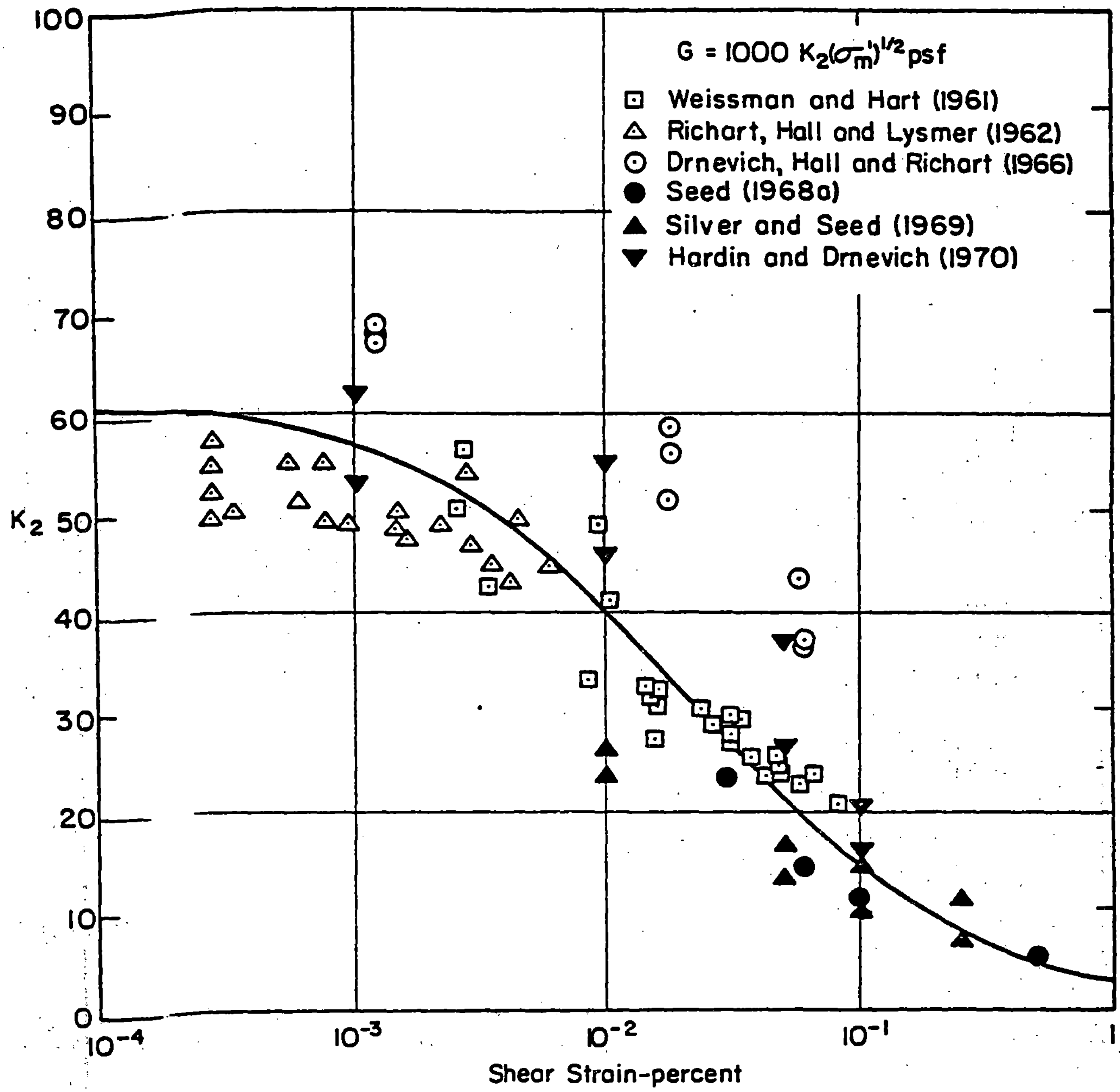


Fig. 5.2 SHEAR MODULI OF SANDS AT RELATIVE DENSITY OF ABOUT 75 %.

(From Seed and Idriss, 1970 c)

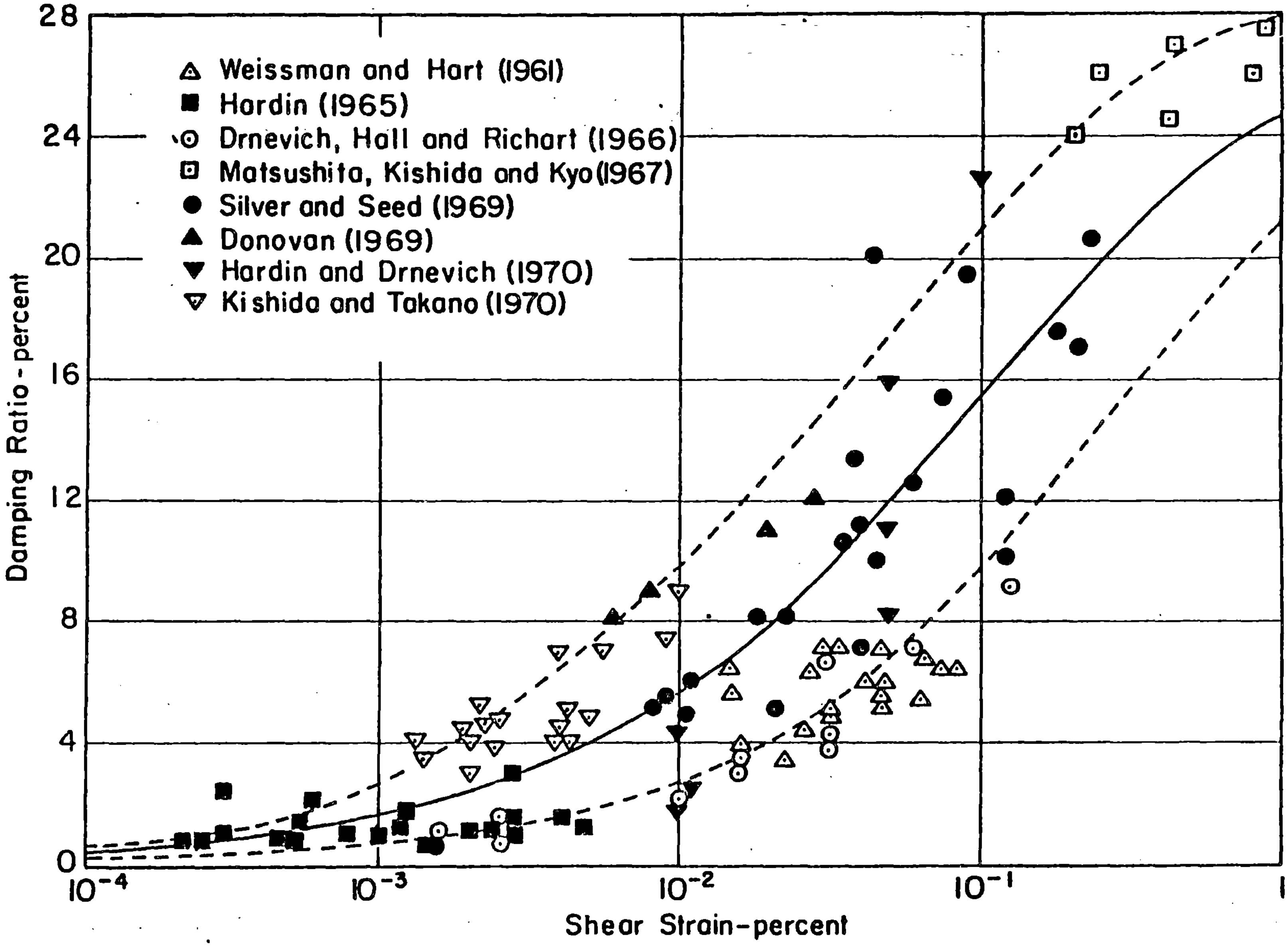


Fig. 5.9 DAMPING RATIOS FOR SANDS.

(From Seed and Idriss, 1970c)

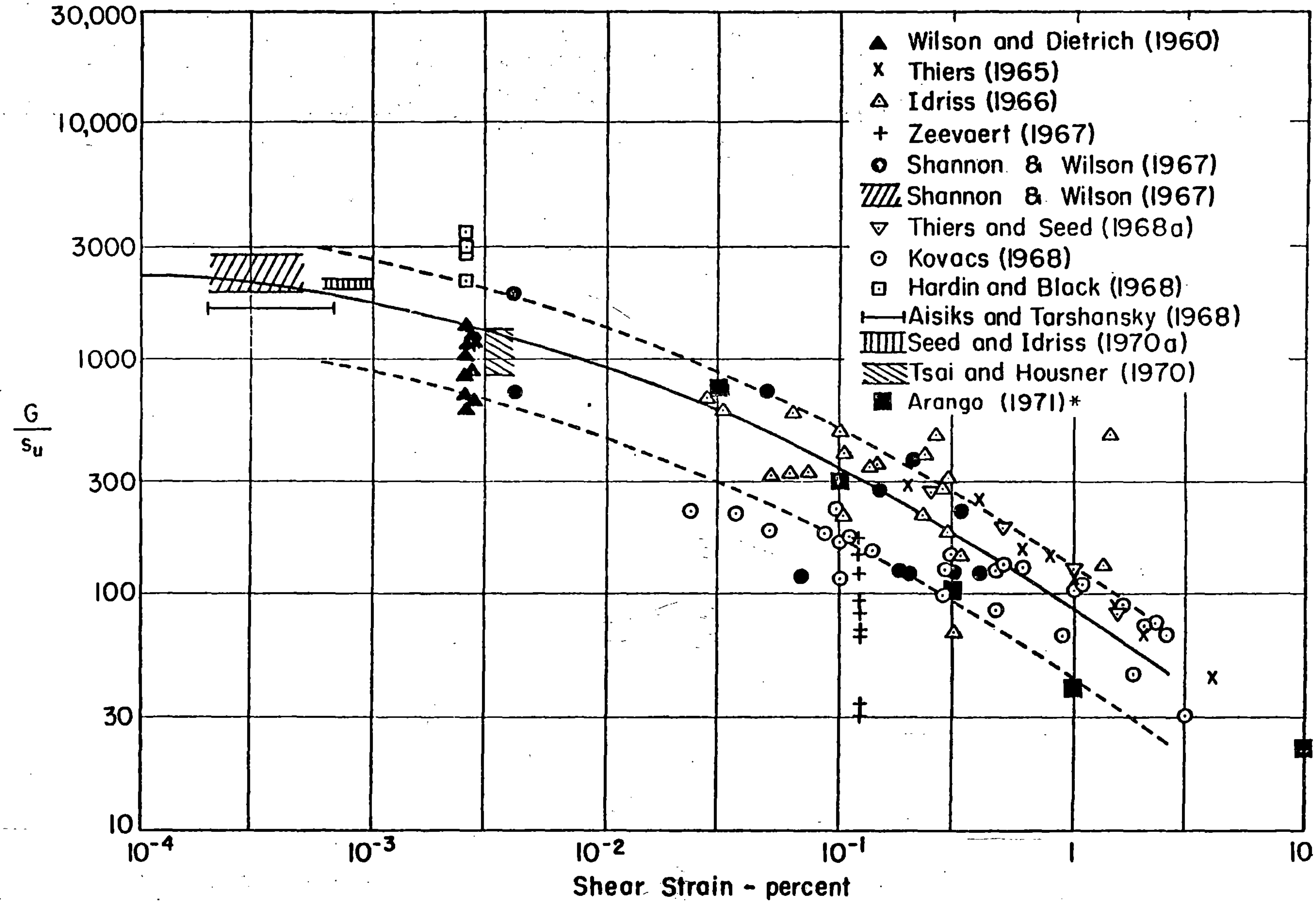


Fig. 5.12 IN-SITU SHEAR MODULI FOR SATURATED CLAYS.

* Data added subsequent to the referenced publication

(From Seed and Idriss, 1970c)

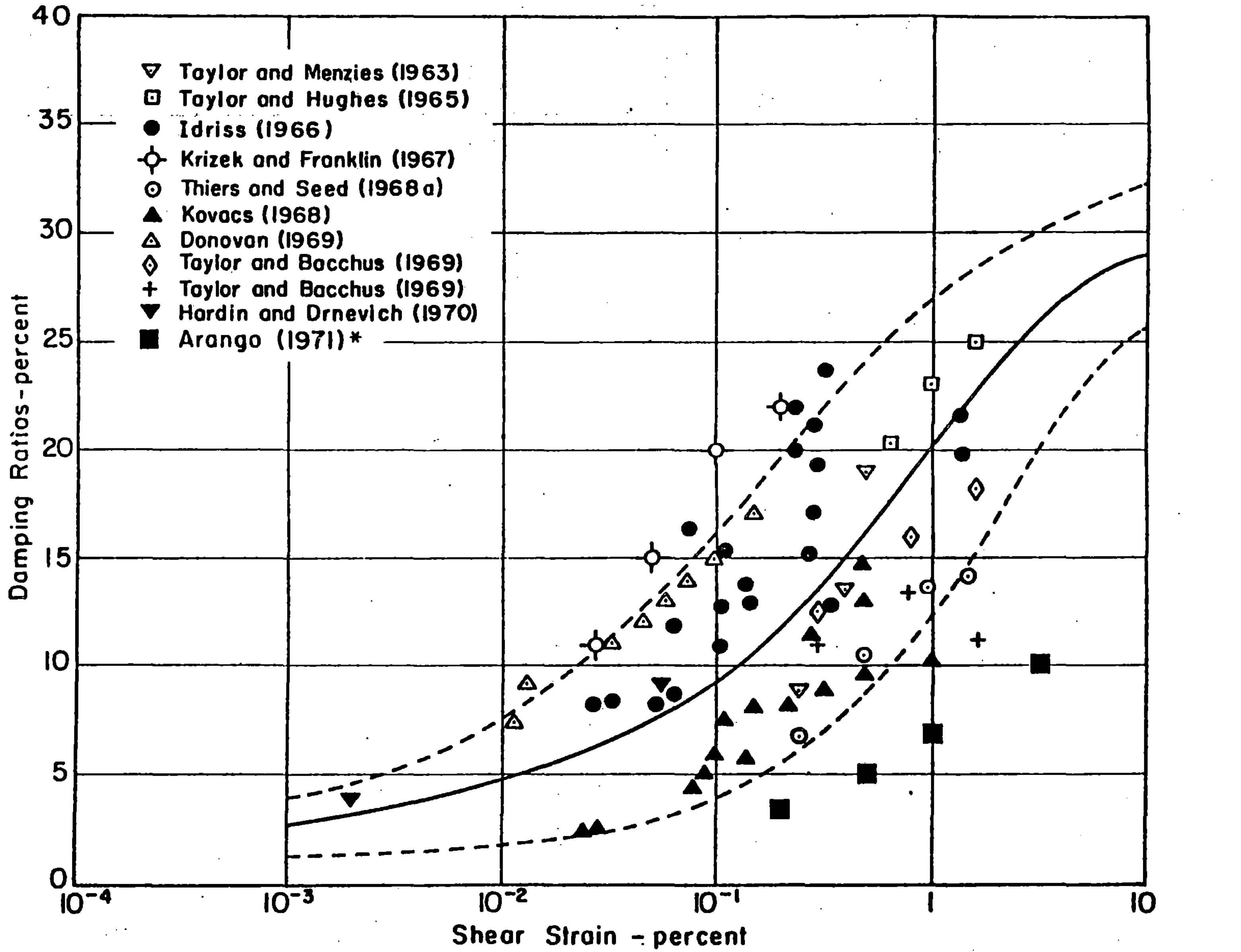
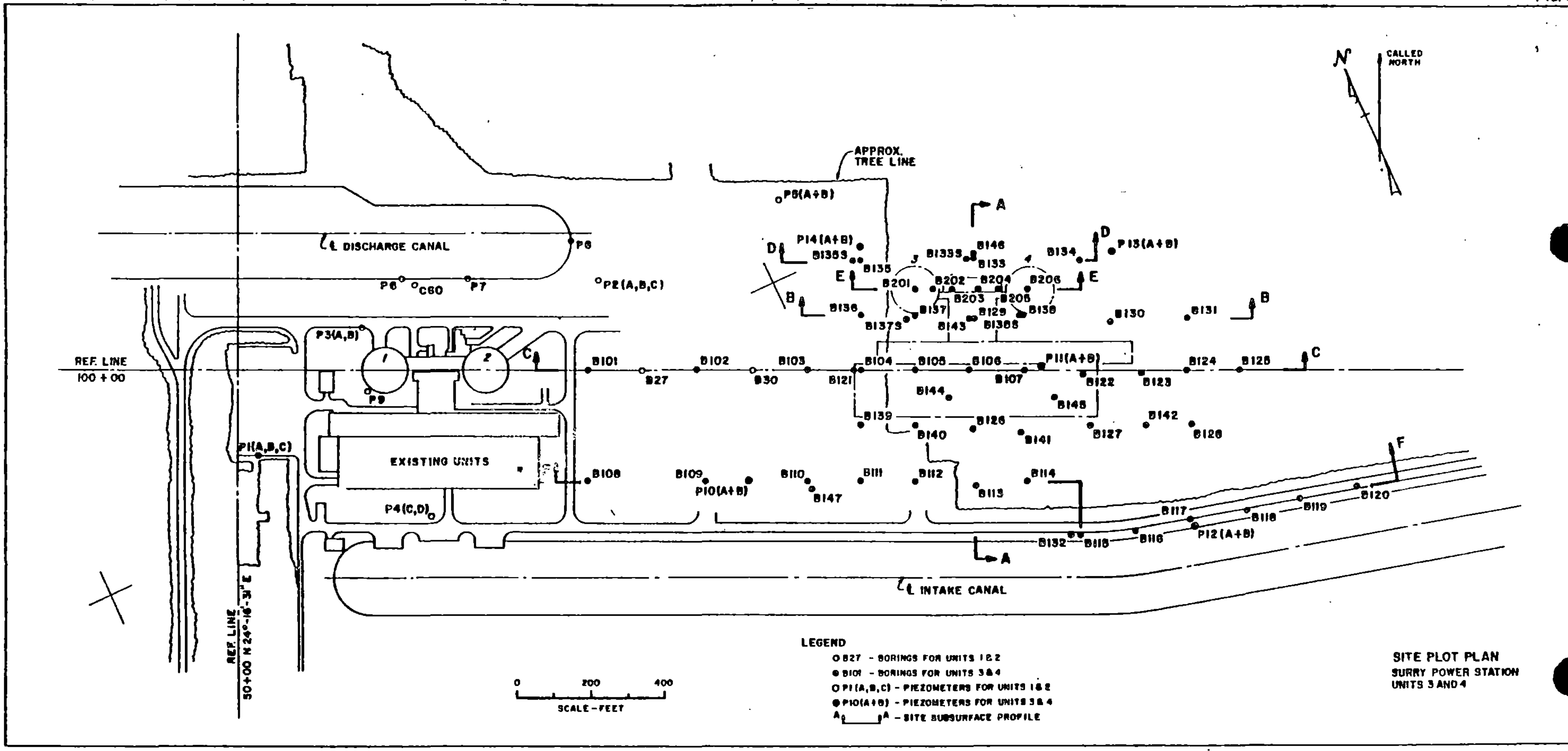


Fig. 5.14 DAMPING RATIOS FOR SATURATED CLAYS.

* Data added subsequent to the referenced publication

(From Seed and Idriss, 1970c)



SITE PLOT PLAN
SURRY POWER STATION
UNITS 3 AND 4

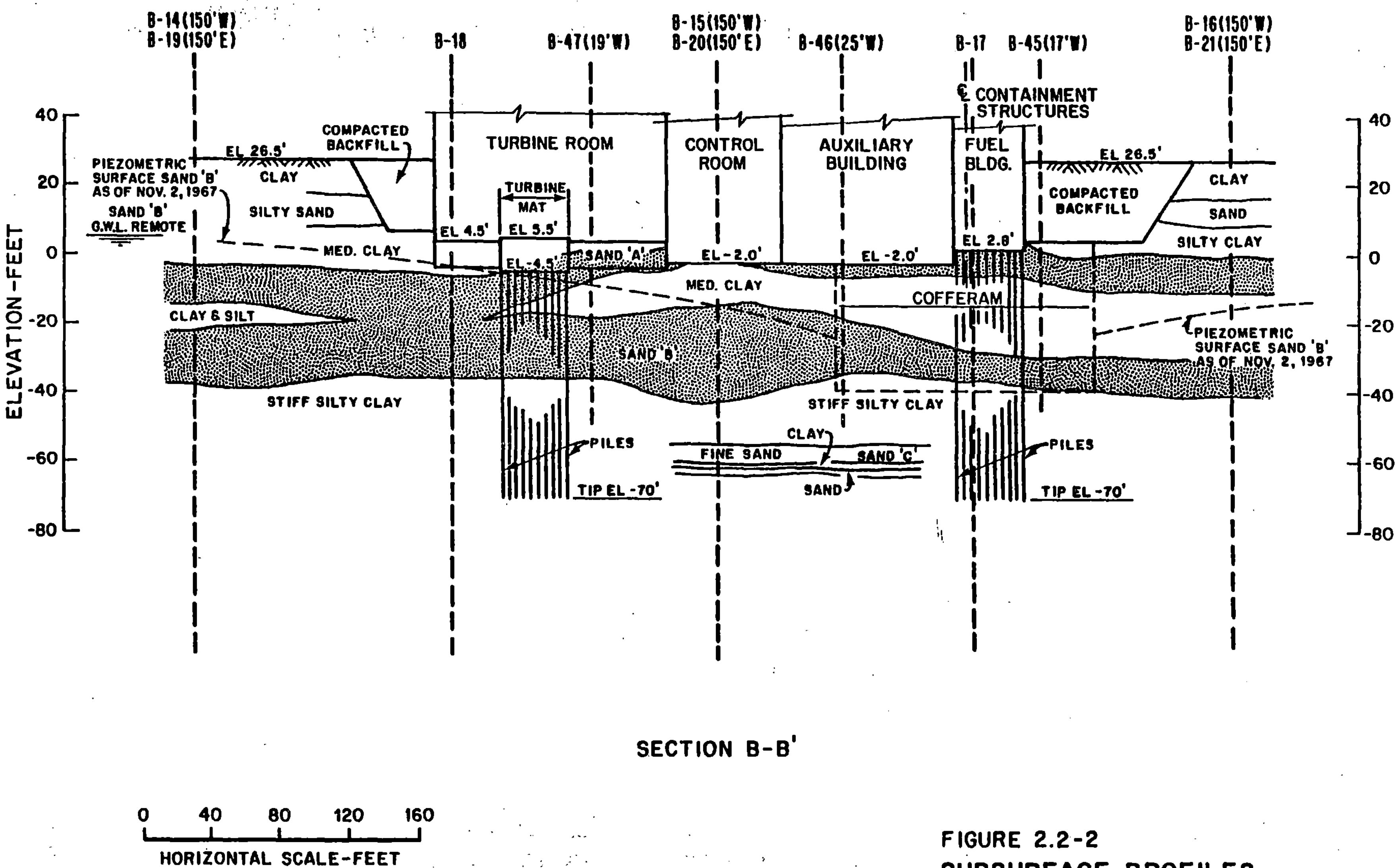
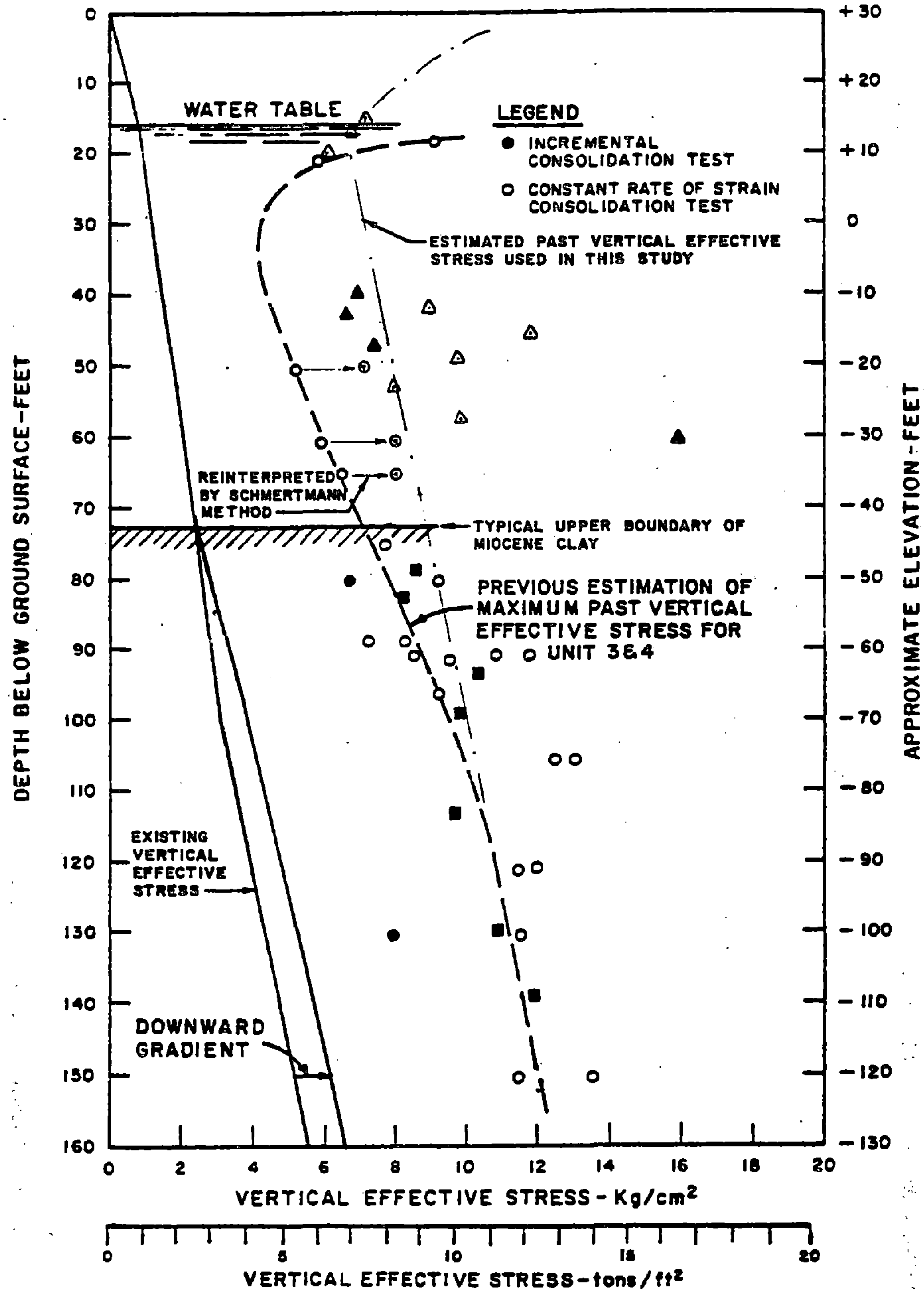


FIGURE 2.2-2
SUBSURFACE PROFILES
SURRY POWER STATION-UNITS 1 AND 2

FROM: SURRY 1 & 2 FSAR, FIG. 2.4-4



■ INCREMENTAL CONSOLIDATION TEST FROM UNIT 1&2 ENVIRONMENTAL STUDIES REPORT.

△ CONSTANT RATE OF STRAIN CONSOLIDATION TEST FROM UNIT 1&2 CONDENSATE POLISHER STUDIES.

▲ INCREMENTAL CONSOLIDATION TEST FROM UNIT 1&2 CONDENSATE POLISHER STUDIES.

FIGURE 2.3-4
PRECONSOLIDATION STRESSES IN CLAYS

SURRY POWER STATION
UNITS 1 AND 2

FROM: SURRY 3&4 GEOTECHNICAL REPORT, FIG. 33

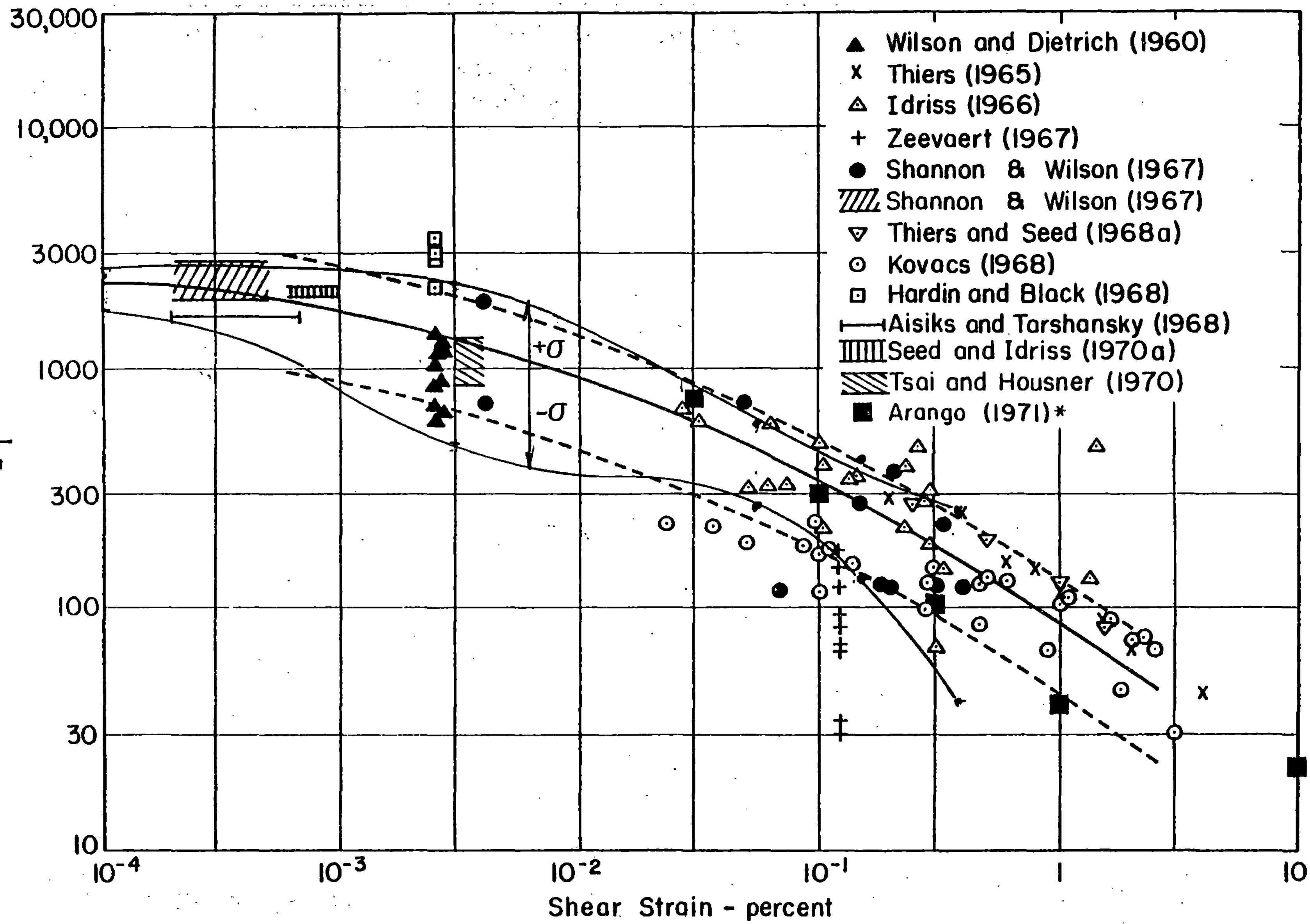
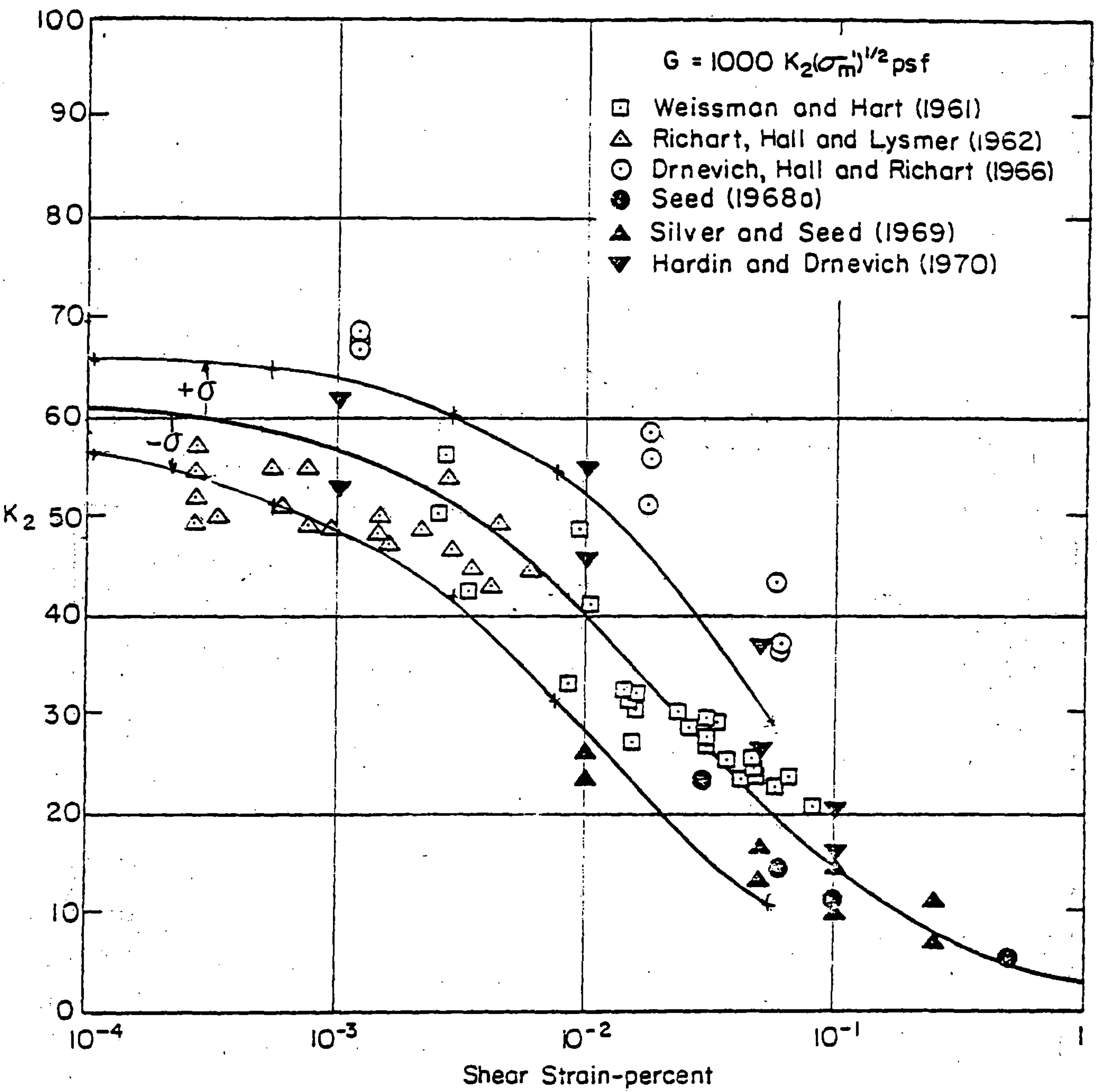


Fig. 4 IN-SITU SHEAR MODULI FOR SATURATED CLAYS.

* Data added subsequent to the referenced publication

(From Seed and Idriss, 1970c)



SHEAR MODULI OF SANDS AT RELATIVE DENSITY OF ABOUT 75 %.

(From Seed and Idriss, 1970 c)

FIG. 1