APPENDIX 2G

STATIC DYNAMIC ROCK PROPERTIES

The information contained in this appendix was not revised, but has been extracted from the original FSAR and is provided for historical information.

APPENDIX 2G

STATIC AND DYNAMIC ROCK PROPERTIES

TABLES

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TABLE 2G-1

UNCONFINED COMPRESSION TESTS

Test No.	Location	Hole No.	Depth (ft)	Rock Type	Unconfined Compressive Strength q_u (psi)	Axial Strain@ Failure %	Initial Tangent Modulus (psi)	Secant Modulus @ 50% q_u (psi)	Poisson's Ratio Initial Load	Poisson's Ratio Secant Value @ 50% qu
E1A	Reactor 1	E1-1	31.4- 31.8	Diorite	22,400	.21	12 x 106	12 x 106	.29	.25
E1D			78.3- 78.7	Diorite	19,520					
E1F			79.1- 79.5	Diorite	19,820	.21	9.3 x 10^6	9.3 x 106	.25	.25
E1G			79.5- 79.9	Diorite	19,400	.20	13 x 106	11 x 106	---	---
E2A	Reactor 2	E2-1	49.6- 50.0	Diorite	18,020	.20	12 x 106	10 x 106	.36	.28
E2B			50.0- 50.4	Diorite	Failed by splitting. Do not report.					
E2C			50.4- 50.8	Diorite	15,530	.17	12 x 106	9.9 x 106	.18	.20
E2G			138.7-139.1	Diorite	5,970					
E2J			139.4-139.8	Diorite	11,610	.21	12 x 106	9.7 x 106	.21	.23
E2M			141.9-142.3	Diorite	18,610	.20	10 x 106	10 x 10^6	.23	.25
B7B	Near Reactors	B7	27.8- 28.2	Schist	17,940	.20	11 x 106	10 x 106	.17	.19
B42D	Contact	B42	123.5-123.9	Diabase	27,600	.27	11 x 106	10 x 106	.21	.26
B42F			141.3-141.7	Schist	16,500	.21	9.1 x 106	8.0 x 106	.18	.21
B42H			142.7-143.1	Schist	11,970	.18	10 x 106	7.4 x 106	---	---
F1A	Tunnel	F1A	127.5-127.9	Diorite	16,130	.19	11 x 10^6	9.9 x 106	.33	.28
F1B			127.9-128.3	Diorite	13,950					
F2A	Tunnel	F2	246.3-246.7	Schist	6,060					
F2C			247.2-247.6	Schist	6,000					
F2F			260.3-260.7	Schist	6,330					

NOTE: In tests for which values of axial strain at failure, modulus, and Poisson's ratio are omitted, the strain-gage readings appear to be unreliable, No stress-strain curves are plotted for these tests.

TABLE 2G-2

LABORATORY COMPRESSION WAVE VELOCITY MEASUREMENTS

Test No.	Location	Hole No.	Depth (Feet)	Rock Type	Density (gm/cm^3)	Laboratory Compression Wave Velocity @ 0 psi	@ 3000 psi
E 1 H	Reactor 1	E 1 - 1	79.9 - 80.3	Diorite	2.81	19,460	19,880
E 2 E	Reactor 2	**E 2 - 1**	51.2 - 51.6	Diorite	2.83	18,860	19,090
E 2 H	Reactor 2	**E 2 - 1**	139.1 - 139.4	Diorite	2.77	20,050	20,300
B 42 B	Contact	B 42	122.5 - 123.0	Diabase	2.84	18,600	18,800
B 42 G	Contact	B 42	141.8 - 142.3	Schist	2.77	16,960	17,320
F 1 D	Tunnel	**F 1 A**	128.7 - 129.2	Diorite	2.79	20,050	20,340
F 2 D	Tunnel	F2	259.0 - 259.4	Schist	2.86	18,110	18,370

TABLE 2G-3

STRENGTH, VELOCITY, AND HARDNESS DATA
SAMPLES FROM TUNNEL ALIGNMENTS
SERIES 1

Boring No.	Depth, ft.	Rock Mechanics Laboratory Number	Unit Weight Dry gm/cc	Sonic Velocity, fps (Dry) Axial Load psi: 0	100	500	1000	Ultimate Unconfined Compressive Strength psi	L/D Ratio	Modulus of Elasticity psi x 10^6: E_i	E_{t50}	H_R	Rock Hardness: H_S	H_A	H_T	A_R	Rock Description	Remarks
M - 1	167.0-267.1	73-49	2.93	17,564	17,606	17,494	17,691	23,964	3.72	0.24	1.21	52	ID	6.0	132	16.7	Diorite - fine grained; some quartz, feldspar, mafics, and iron sulfides	Failed along iron stained joint
ADT-2	266.6-267.6	73-50	2.66	16.892	16.492	16.193	16,568	22,587	2.76	0.94	4.m	49	01	6.06	120	I8.8	Diorite - coarse grained; primarily feldspar and biotite; slight foliation developed	
ADT-2	267.0-267.7	73-51	2.m	16.271	16.312	16.437	16.478	15,580	3.26	1.46	6.32	36	68	4.01	772	16.0	Quartz diorite - very fine grained; quartz, feldspars, & lcrr. andmafics; med. gray	
ADT-4	250.0-250.8	73-52	2.73	16.370	15,434	16.496	16.631	19.306	4.83	0.80	6.01'	32	62	3.61	61'	9.9	Diorite - medium to fine grained; highly micaceous; quartz, feldspar, mica, mafics; lite gray; some foliation developed.	
M - I	256.4-256.8	73-53	2.11	16.410	16.616	16,570	16,67C	20,095	2.26	0.81	4.84	33	71	6.00	7Y	6.9	Diorite - medium grained; quartz, feldspar, & lcal. mafics; medium gray; somewhat slickersided.	Failed along pre-existing but healed fracture
ADT-11	222.8-223.5	73-64	---	14.996	16.014	15.014	16.071	10,060	2.61	0.39	2.M	34	00	'5.00	76'	12.1	Schistose diorite - fine grained; high biotite content; foliation developed tc fair degree	
ADT-13	213.0-213.7	73-66	2.71	17.063	16,996	17.336	17.611		2.71			47	88	6.94	125'	9.1	Diorite - med. to coarse grained; quartz, feldspar, biotite, mafics; and iron sulfides	
M-17	189.0-189.8	73-w	3.01	17,007	17.007	17,079	17.07,	7.026	4.04	0.62	5.46	60	12	4.66	108	16.4	Diabase - fine grained; feldspar, pyrite and mafics; dark gray	Failed along calcite filled joint
AIT-1	250.0-250.9	73-67	2.89	16.343	16.423	16.747	16,624	21,290	3.42	1.44	6.16	61	Is	4.66	108'	0.(	Quartz diorite - coarse grained; high quartz-feldspar content, also & lcu; rd. to lite gray	Failed along pa- rlst,nF but healed fracture
AIT-7	198.8-199.8	73-I)		14,682	14,682	14,789	14,84(	6.910	2.61	0.31	1.1)	46	67	4.76	99	10.:	Biotite schist - med. to fine grained; quartz, feldspar, and mafics; fine foliation all developed	Failed along iron stained joint
AIT-8	196.0-196.2	73-69	2.83	17,686	17,686	17.624	17.911	18.183	2.72	1.43	2.611	37	88	6.13	83	11.(	Biotite schist - rd. grained; well developed fine foliation with quartz-rich layers; med. gray	
F-6	196.3-196.9	73-60	2.11	16.662	16.648	16,684	16.771	22,312	3.16	1.36	6.11 :	46	73	4.88	101'	16.:	Schistose quartz diorite - fine to med. grained; quartz, feldspar biotite; foliation fair; med. to &. gr	
F-5	205.3-205.9	73-61	2.78	16,989	15,989	16.096	16.111	24,796	3.41	1.22	4.87	66	70	3.33	84'	11.(	Diabase - very fine grained; primarily feldspar and mafics; dark gray	Failed along pre-existing but healed fracture
AIT-16	141.2-142.3	73-62	2.82	16,493.	16.627	16.627	16.621	19,838	4.01	1.07	6.36	:39	71	3.23	78'	7.(	Quartzitic Schist - rd. grained; mostly quartz, feldspar, and biotite with iron sulfides; foliation only fairly developed; med. gray	

E_i - Initial tangent modulus

E_{t50} - tangent modulus at 50% of the ultimate unconfined strength.

H_R - Schmidt (L-type) Rebound Hardness

H_S - Shore Scleroscope (C-2 type) Hardness

H_A - Modified Taber Abrasion Hardness

H_T - $H_R/\sqrt{H_A}$

A_R - Rock Abrasiveness

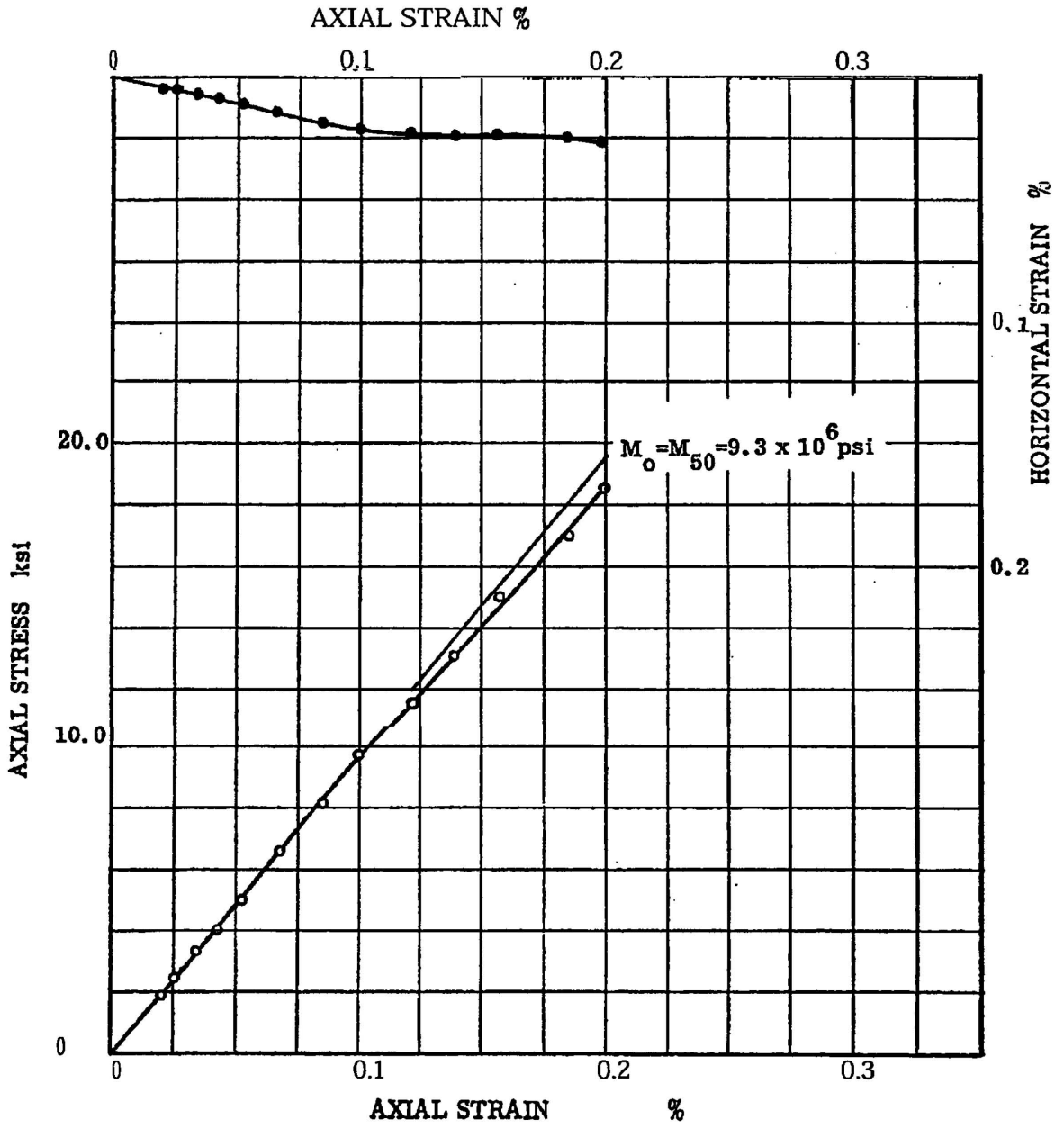
APPENDIX 2G

STATIC AND DYNAMIC ROCK PROPERTIES

FIGURES

Figure	Title
2G-1	Unconfined Test E1F Stress-Strain Curve
2G-2	Unconfined Test E1G Stress-Strain Curve
2G-3	Unconfined Test E2A Stress-Strain Curve
2G-4	Unconfined Test E2C Stress-Strain Curve
2G-5	Unconfined Test E2J Stress-Strain Curve
2G-6	Unconfined Test E2M Stress-Strain Curve
2G-7	Unconfined Test B7B Stress-Strain Curve
2G-8	Unconfined Test B42D Stress-Strain Curve
2G-9	Unconfined Test B42F Stress-Strain Curve
2610	Unconfined Test B42H Stress-Strain Curve
2611	Unconfined Test F1A Stress-Strain Curve

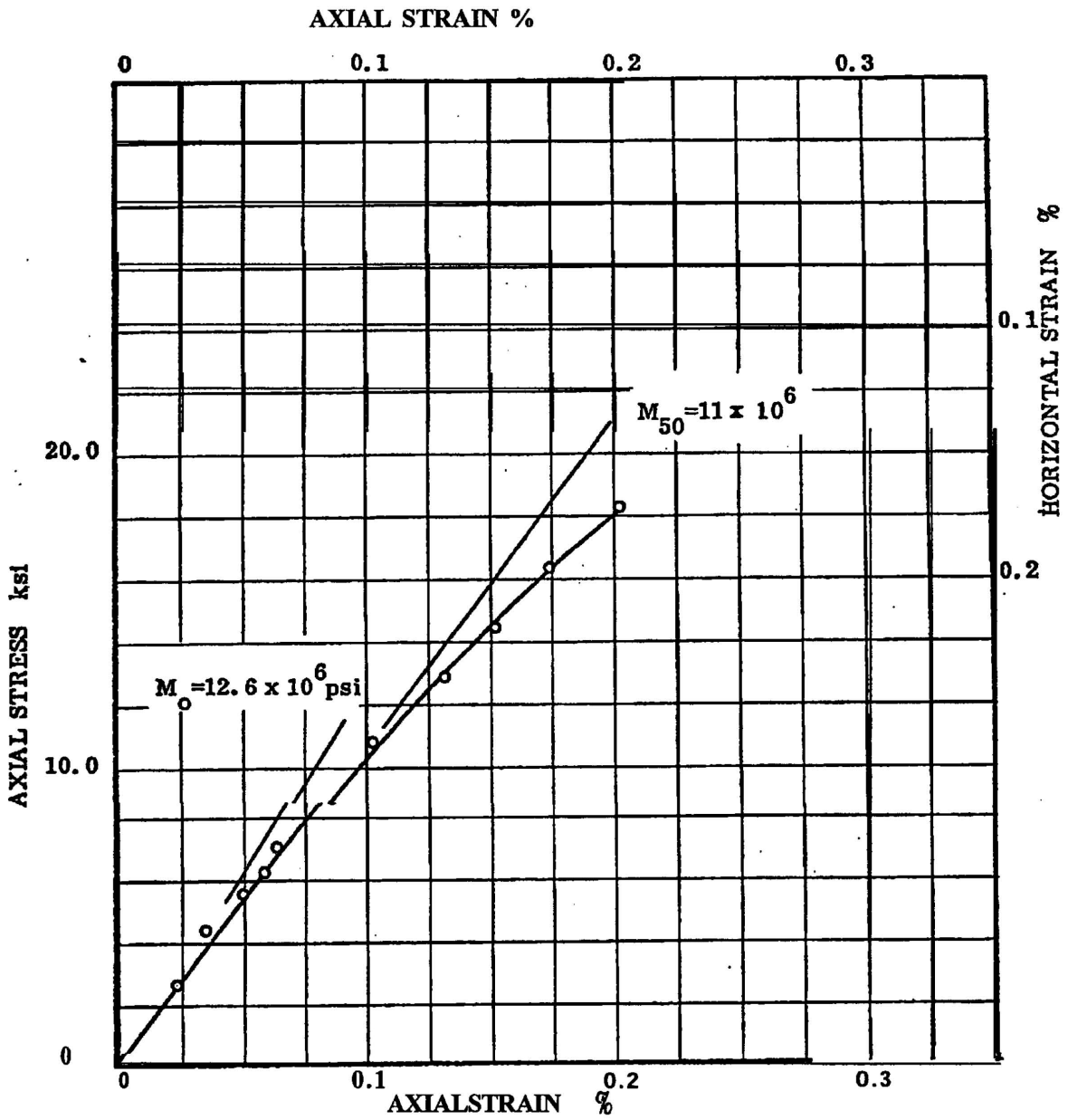
NOTE: The stress-strain curves shown in Figures 2G-1 through 2G-11 are terminated at the last strain reading before sudden, brittle failure. The maximum compressive load at failure was recorded by the testing machine and was used to calculate the compressive strengths contained in Table 2G-1.



M = Modulus of Deformation

Diorite
Borehole El-1 Depth 79.1 to 79.5 **ft**

UNCONFINED TEST E 1 F STRESS -STRAIN CURVE
FIGURE 2G-1



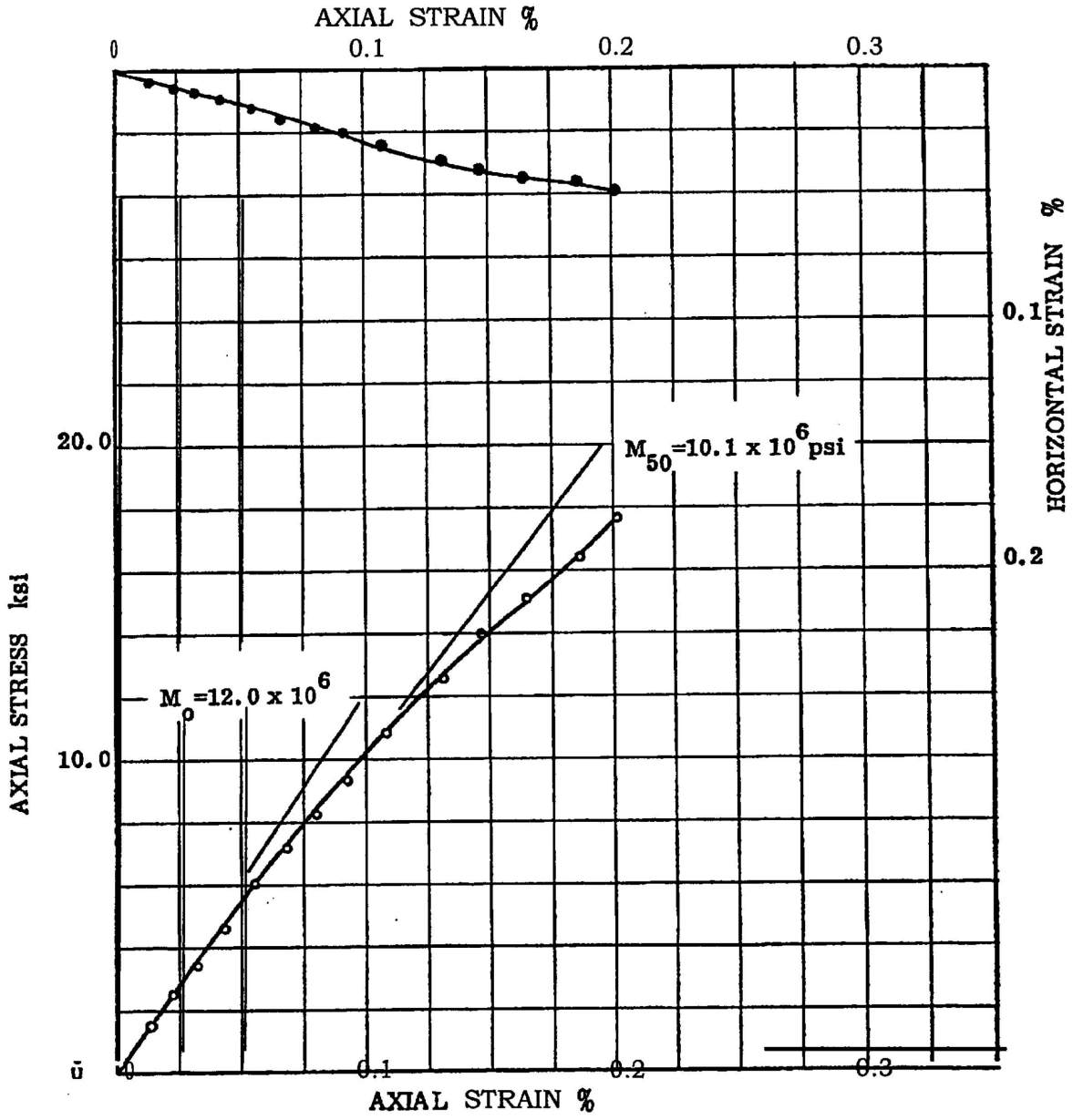
Diorite

M = Modulus of Deformation

Borehole E1-1 Depth 79.5 to 79.3 ft

UNCONFINED TEST E1G STRESS-STRAIN CURVE

FIGURE 2G-2

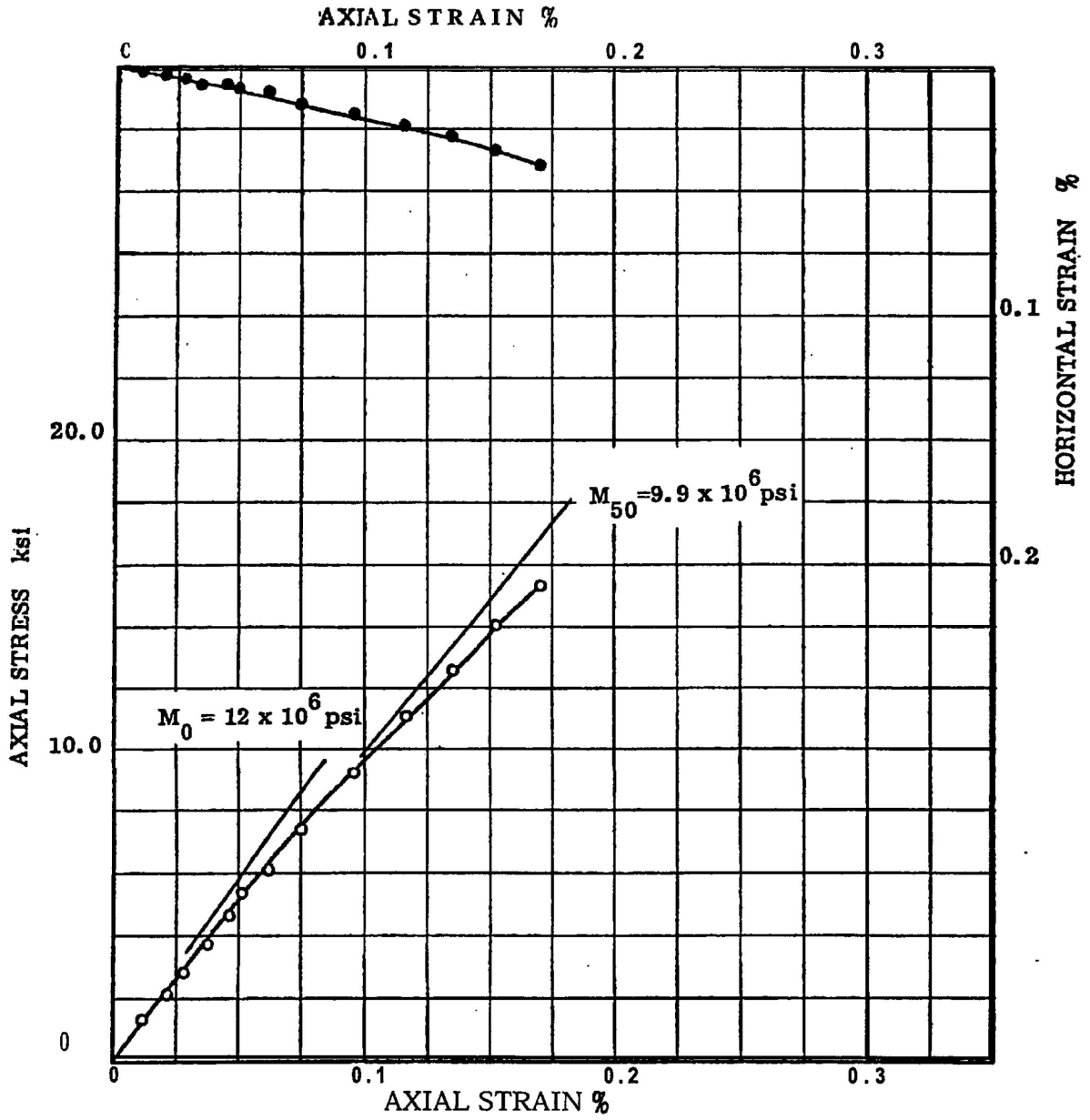


M= Modulus of Deformation

Diorite
Borehole E2-2 Depth 49. 6 to 50. Oft

UNCONFINED TEST E2A STRESS-STRAIN CURVE

FIGURE 2G-3



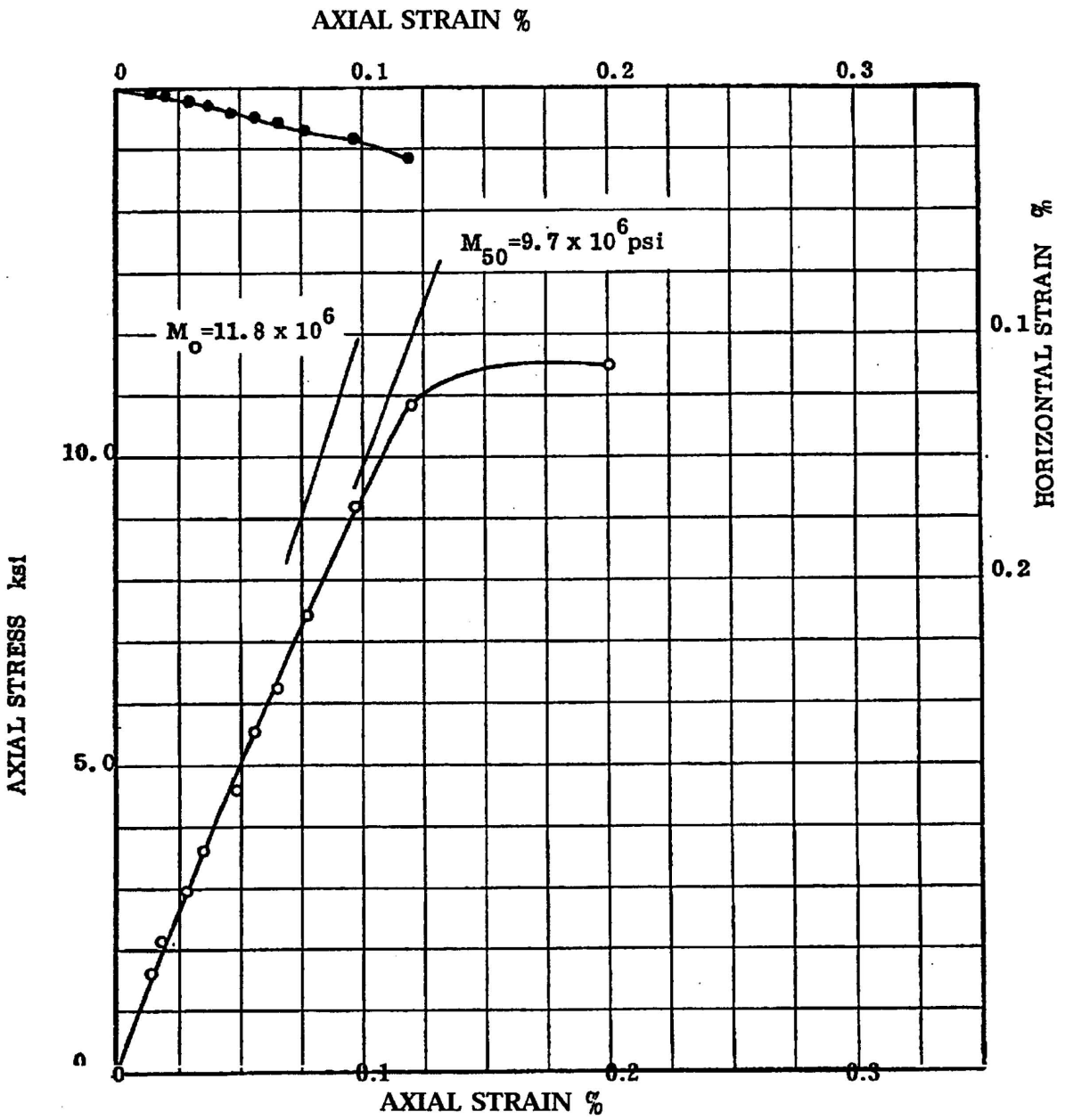
M = Modulus of Deformation

Diorite

Borehole E2-2 Depth 50.4 to 50.8 ft

UNCONFINEDTEST E2C STRESS-STRAIN CURVE

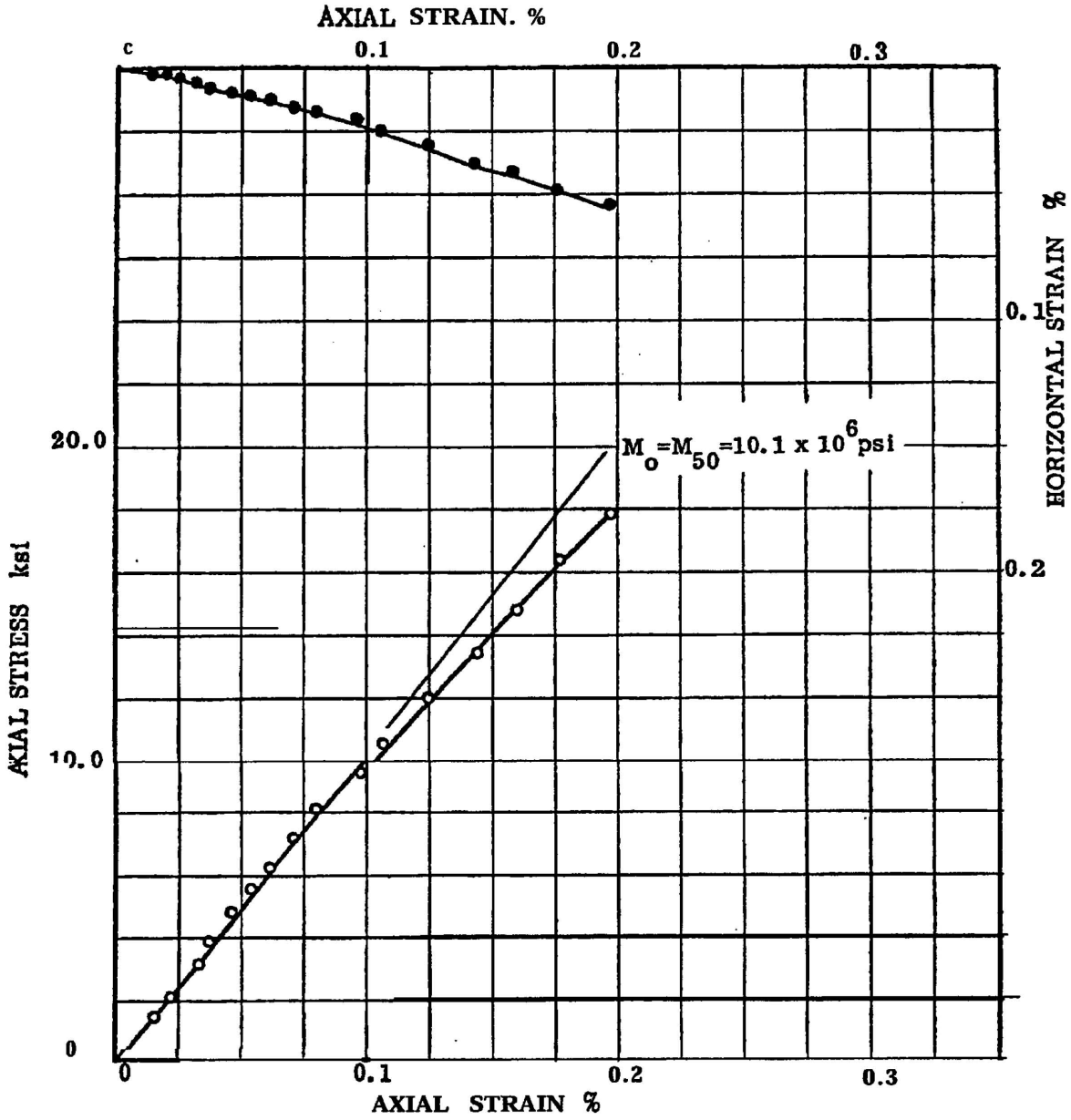
FIGURE 2G-4



M = Modulus of Deformation

Schist
Borehole E2-2 Depth 139.4 to 139.8

UNCONFINED TEST E2 J STRESS-STRAIN CURVE
FIGURE 2G-5



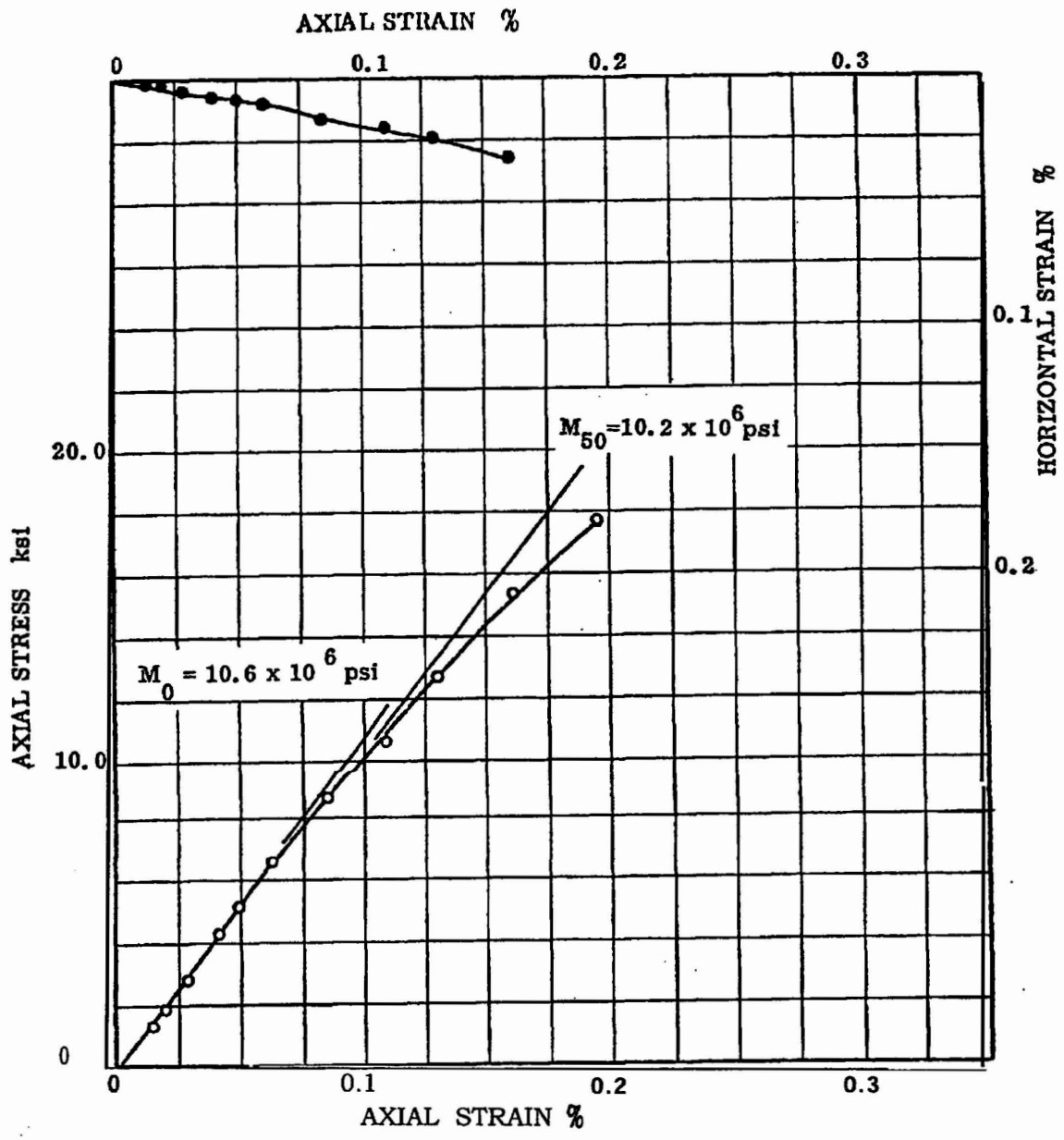
Schist

M = Modulus of Deformation

Borehole E2-2 Depth 141.9 to 142.3 ft

UNCONFINED TEST E2M STRESS -STRAIN CURVE

FIGURE 2G-6



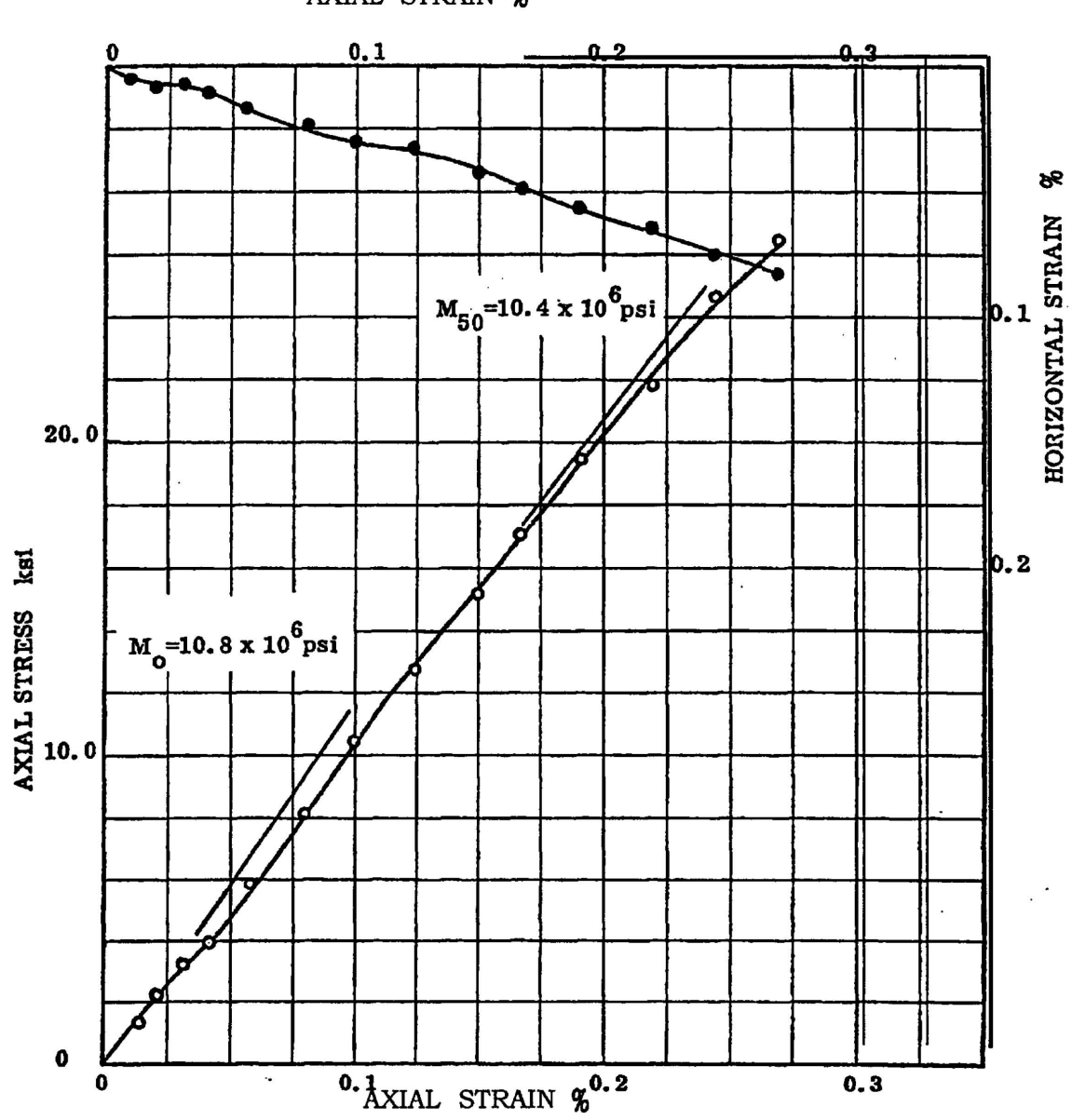
M = Modulus of Deformation

Schist

Borehole B7 Depth 27.8 to 28.2 ft

UNCONFINED TEST B7B STRESS-STRAIN CURVE

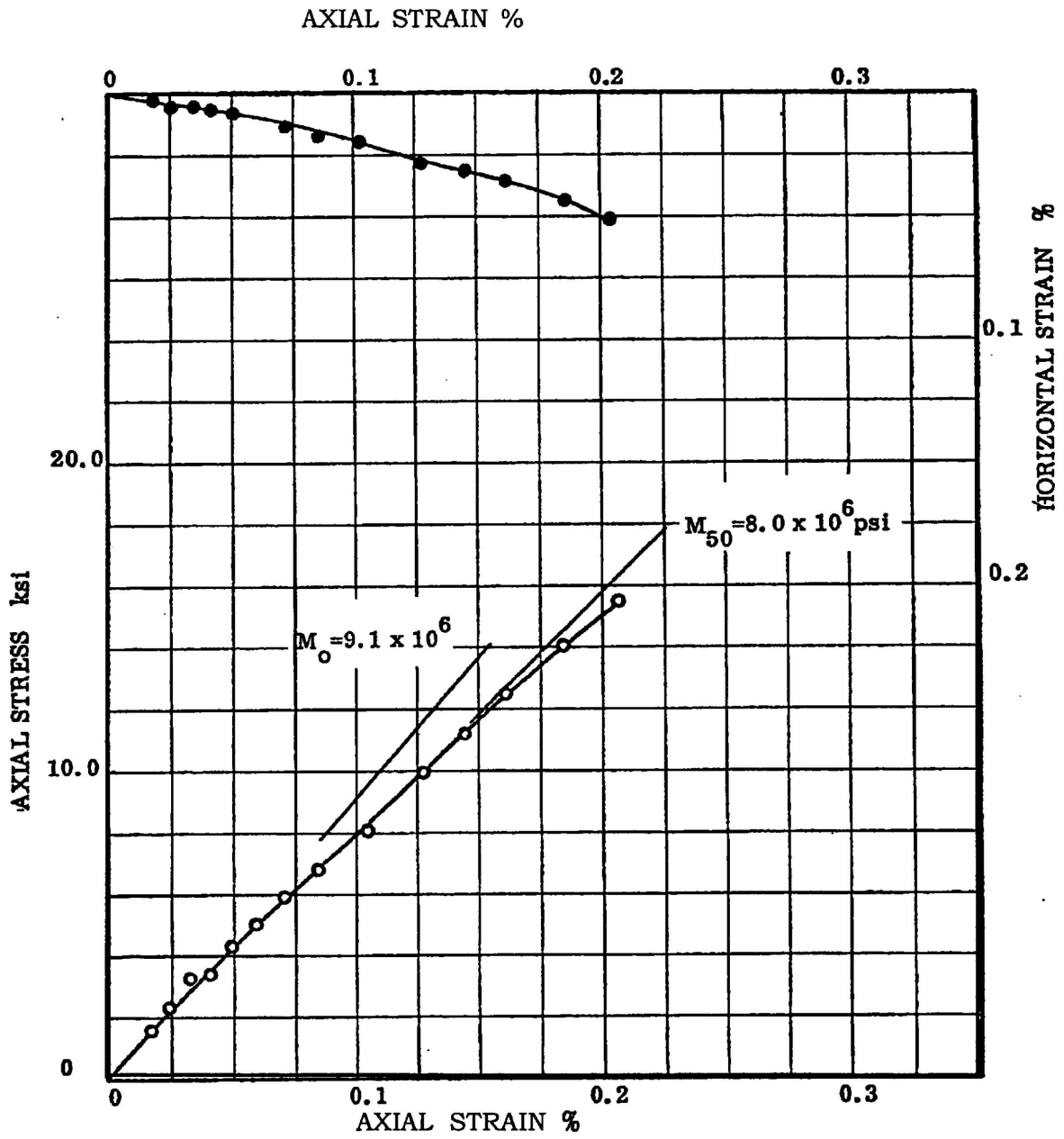
FIGURE 2G- 7



M = Modulus of Deformation

Diabase
Borehole B-12 Depth 123.5 to 123.9 ft

UNCONFINED TEST B42D STRESS-STRAIN CURVE
FIGURE 2G-8

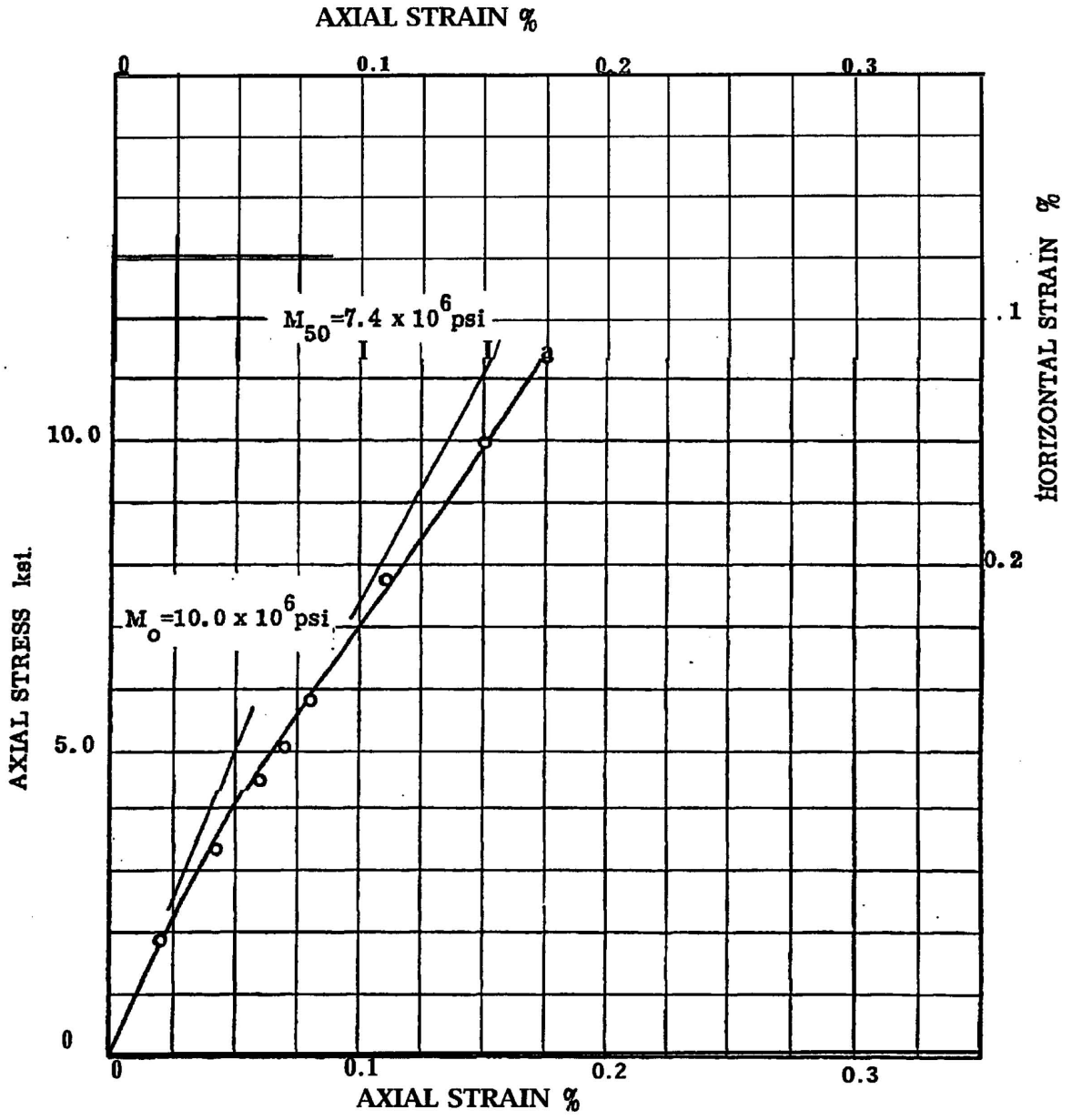


M = Modulus of Deformation

Schist
Borehole B42 Depth 141.3 to 141.7 ft

UNCONFINED TEST B42F STRESS-STRAIN CURVE

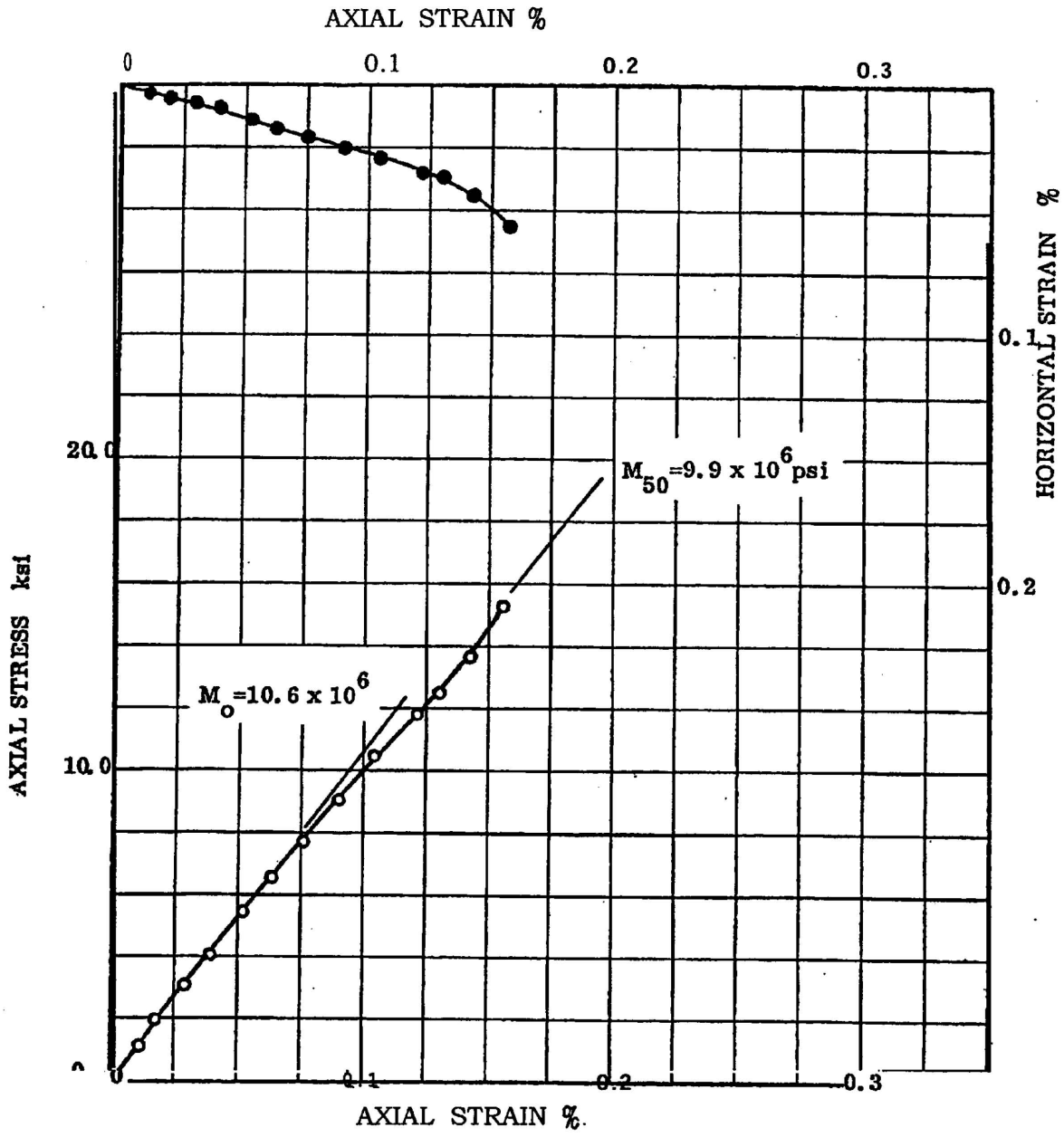
FIGURE 2G-9



M = Modulus of Deformation

Schist
Borehole B42 Depth 142.7 to 143.1 ft

UNCONFINED TEST B42H STRESS-STRAIN CURVE
FIGURE 2G-10



M = Modulus of Deformation

Diorite
Borehole F1A Depth 127.5 to 127. ? ft

UNCONFINED TEST F IA STRESS-STRAIN CURVE

FIGURE 2G-1 1