GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[X] ORIGINAL [ ] REVISION NO. ______

Project No. E-20-695 (R-6099-0A0) GTRC/~~GIT~~ DATE 3 / 10 / 86

Project Director: N. D. Williams School/~~Lab~~ Civil Engineering

Sponsor: Armco Construction Products Division
Middletown, Ohio 45042

Type Agreement: Grant: See award letter of 11/20/85

Award Period: From 1/1/86 To ~~2/28/86~~ 12-31-86 (Performance) 2/28/86 (Reports)

Sponsor Amount: This Change / Total to Date

Estimated: $ ______ $ ______

Funded: $ 3,900 $ 3,900

Cost Sharing Amount: $ N/A Cost Sharing No: N/A

Title: Evaluation of STRIPDRAIN Properties

ADMINISTRATIVE DATA

OCA Contact Ralph Grede x-4820

1) Sponsor Technical Contact:

Mr. David E. Beck, P. E.
Technology & Business Development
Armco Construction Products Division
1001 Grove Street
Middletown, Ohio 45042

2) Sponsor Admin/Contractual Matters:

(Same)

Defense Priority Rating: ______ Military Security Classification: N/A

(or) Company/Industrial Proprietary: N/A

RESTRICTIONS

See Attached N/A Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with Sponsor -- No equipment is proposed.

COMMENTS:

A request for extention from 2/28/86 to 12/31/86 has been submitted to Armco as requested by the Project Director.

COPIES TO: SPONSOR'S I. D. NO. 02.200.000.86.004

Project Director
Research Administrative Network
Research Property Management
Accounting

Procurement/GTRI Supply Services
Research Security Services
Reports Coordinator (OCA)
Research Communications (2)

GTRC
Library
Project File
Other Jones / Legal

GEORGIA INSTITUTE OF TECHNOLOGY

OFFICE OF CONTRACT ADMINISTRATION

SR669

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 1/7/87

Project No. E-20-695

School/~~Lab~~ CE

Includes Subproject No.(s) N/A

Project Director(s) N. D. Williams

GTRC / ~~GIT~~

Sponsor Armco Construction Products Division, Middletown, Ohio 45042

Title Evaluation of STRIPDRAIN Properties

Effective Completion Date: 12/31/86 (Performance) (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [x] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

Continues Project No.

Continued by Project No.

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Other Ina Lashley
Angela Jones
Russ Embry

FORM OCA 69.285

December 8, 1986

David E. Beck, P.E.
ARMCO Construction Products Division
1001 Grove Street
Middletown, Ohio 45043

FINAL REPORT FOR TRANSMISSIVITY AND CREEP ANALYSES

Dear David,

The Final Report presents the results of the transmissivity and creep analyses which you requested in your letter of September 8, 1986. The transmissivity analysis was performed on the Georgia Tech transmissivity device using falling head analytical procedures. The specimen configuration for the analysis was as follows:

AL PL/SOIL/MIRADRAIN 6000/RUBBER/AL PL

The transmissivity test was conducted at normal stresses of 200, 1000, 2000, 5000 and 10000 psf and gradients of 0.25, 0.50, 0.75 and 1.00. The original thickness of the MIRADRAIN 6000 was 0.466 inches prior to compression.

The results of the transmissivity analyses are summarized on the attached tables and figures. The creep test was performed at stress levels of 40, 60, 70, 75, and 80 percent, based on the compressive strength of 15062 psf. The compressive strength was measured in a compression/deformation test at a strain rate of 1 mm/min.

The specimens loaded to 80, 75 and 70 percent stress levels experienced complete collapse after approximately 0.0008, 0.004 and 8 days, respectively. The specimens loaded to 40 and 60 percent stress levels did not collapse during the 1000 hour test duration.

The results of the analyses are summarized on the atached figures and tables. Figure 1 summarizes the results of the compression/deformation analyses at strain rates of 1 mm/min and 10 mm/min. Figures 2 through 6 show the relationship between sample height and time for each stress level. Figure 7 shows the relationship between the strain and time for each of the stress levels. Examination of this figure shows that the core became unstable at a total compressive strain of about 15 to 16 percent at stress levels of 70, 75 and 80 percent.

The strain rate of the specimen was also plotted as a function of log time as shown in Figures 8 and 9. Though there is considerable scatter in the data, the relationship between the log of the strain rate and the log of time can be approximated by a straight line of slope, m, where m is given by:

$$m = \left| \frac{d \ln \dot{\epsilon}}{d \ln t} \right| \tag{1}$$

The log of the strain rate was also plotted as a function of the stress level, $\bar{D}$, as shown in Figure 10. At stress levels of 70 percent and below (prior to failure) the relationship between the log of the strain rate and the stress level can be approximated with straight lines at all times except 1000 hrs. The poor data correlation at 1000 hrs is likely due to small strains and strain rates which were approaching the accuracy of the dial gage. An equation for the 1 hour line would be as follows:

$$\ln \dot{\epsilon} = \ln A + \alpha \bar{D} \tag{2}$$

Where A = the intercept at $\bar{D}$ = 0.
α = the slope of the line.

$$\alpha = \frac{d \ln \dot{\epsilon}}{d \bar{D}} \tag{3}$$

t = the elapsed time.

If the strain rate at t = 1 hour is substituted into equation (2), and equations (1) and (2) are combined, a hyperbolic relationship is derived between the strain rate, the stress level and elapsed time.

$$\dot{\epsilon} = \frac{d\epsilon}{dt} = A e^{\alpha \bar{D}} \tag{4}$$

The expression can be integrated with respect to time to give the constitutive equation for strain as a function of the time and stress level.

$$\epsilon = \frac{A e^{\alpha \bar{D}}}{(1-m)} t^{(1-m)} + C \tag{5}$$

If $\epsilon = \epsilon_1$, at t = 1, then:

$$\epsilon = \epsilon_1 + \frac{A e^{\alpha \bar{D}}}{(1-m)} \left[t^{(1-m)} - 1 \right] \tag{6}$$

This expression is only valid prior to instability of the core. For the creep analysis of MIRADRAIN 6000, the following values of the creep parameters were measured from the attatched graphs:

m = 0.9393
α = 2.120
A = .00060

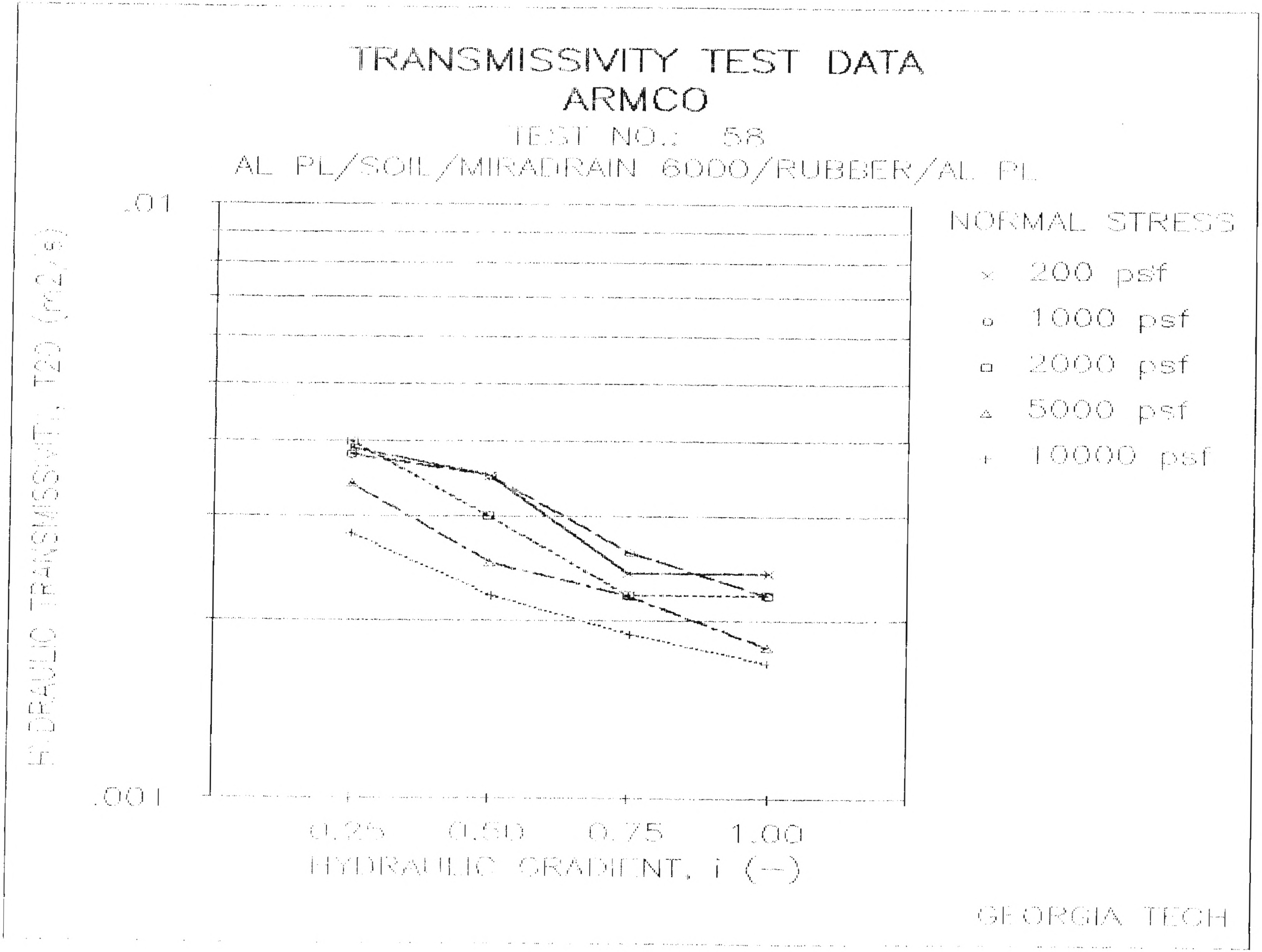
When these values are substituted into equation 6, the strain may be estimated as a function of the stress level and time. The calculated values of the strain for stress levels of 40, 60 and 70 percent are summarized in Table 1 and plotted with the data in Figures 12.

The data indicate that at a stress level of 60% the core was beginning to become unstable. Due to the small difference in total strain between the analyses at stress levels of 40, 60 and 70 percent, the hyperbolic model cannot be used to predict the strain at which failure is likely to occur. However, it appears that the design load should be less that 50% of the compressive strength at a rate of deformation of 1 mm/min. This corresponds to a safe design load of about 7500 psf.

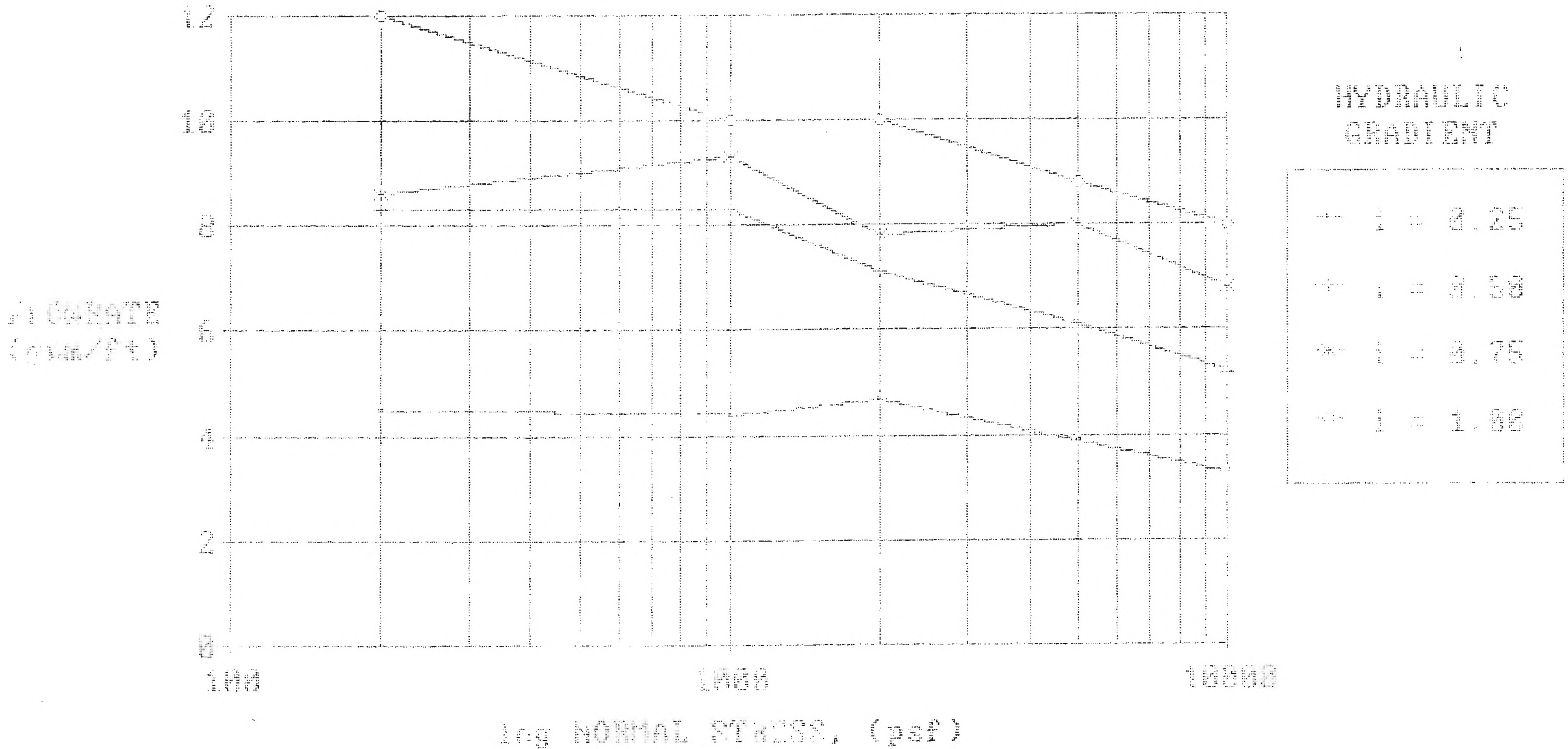
Please contact me if you have any questions regarding the results of the analyses.

Very truly yours,

Neil D. Williams, Ph.D., P.E.
Assistant Professor
Georgia Institute of Technology


TRANSMISSIVITY TEST DATA
ARMCO
TEST NO.: 58
AL PL/SOIL/MIRADRAIN 6000/RUBBER/AL PL
.01
.001
HYDRAULIC TRANSMISSIVITY, T20 (m2/s)
NORMAL STRESS
200 psf
1000 psf
2000 psf
5000 psf
10000 psf
0.25
0.50
0.75
1.00
HYDRAULIC GRADIENT, i (–)
GEORGIA TECH

FLOWRATE DATA
ARMCO
TEST NO.: 58
AL PL/SOIL/MIRADRAIN 6000/RUBBER/AL PL



TRANSMISSIVITY TEST DATA

DATE: 9-22-86
PROJECT NO.: ARMCO
TEST NO.: 58
AO: 151.5000 NPI: 5

THE NORMAL STRESS = 200.00
TEMP (DEG C) = 30.00

L (IN)	WIDTH (IN)	ETIME (SEC)	HIN (IN)	HOUT (IN)	HYDR GRAD	TRANT (M2/S)	TRAN20 (M2/S)	FLOWRATE (GPM/FT)
12.00	10.75	.0	18.00	3.10	1.242			
12.00	10.75	8.1	15.00	3.10	.992	.30E-02	.24E-02	.12E+02
12.00	10.75	18.6	12.00	3.10	.742	.30E-02	.24E-02	.86E+01
12.00	10.75	28.8	9.00	3.10	.492	.44E-02	.35E-02	.83E+01
12.00	10.75	44.7	6.00	3.10	.242	.49E-02	.39E-02	.45E+01

THE NORMAL STRESS = 1000.00
TEMP (DEG C) = 30.00

L (IN)	WIDTH (IN)	ETIME (SEC)	HIN (IN)	HOUT (IN)	HYDR GRAD	TRANT (M2/S)	TRAN20 (M2/S)	FLOWRATE (GPM/FT)
12.00	10.75	.0	18.00	3.10	1.242			
12.00	10.75	9.1	15.00	3.10	.992	.27E-02	.22E-02	.10E+02
12.00	10.75	18.8	12.00	3.10	.742	.33E-02	.26E-02	.93E+01
12.00	10.75	29.1	9.00	3.10	.492	.44E-02	.35E-02	.83E+01
12.00	10.75	45.4	6.00	3.10	.242	.48E-02	.38E-02	.44E+01

THE NORMAL STRESS = 2000.00
TEMP (DEG C) = 30.00

L (IN)	WIDTH (IN)	ETIME (SEC)	HIN (IN)	HOUT (IN)	HYDR GRAD	TRANT (M2/S)	TRAN20 (M2/S)	FLOWRATE (GPM/FT)
12.00	10.75	.0	18.00	3.10	1.242			
12.00	10.75	9.1	15.00	3.10	.992	.27E-02	.22E-02	.10E+02
12.00	10.75	20.7	12.00	3.10	.742	.27E-02	.22E-02	.78E+01
12.00	10.75	32.7	9.00	3.10	.492	.37E-02	.30E-02	.71E+01
12.00	10.75	48.0	6.00	3.10	.242	.51E-02	.40E-02	.47E+01

THE NORMAL STRESS = 5000.00
TEMP (DEG C) = 30.50

L (IN)	WIDTH (IN)	ETIME (SEC)	HIN (IN)	HOUT (IN)	HYDR GRAD	TRANT (M2/S)	TRAN20 (M2/S)	FLOWRATE (GPM/FT)
12.00	10.75	.0	18.00	3.10	1.242			
12.00	10.75	10.6	15.00	3.10	.992	.23E-02	.18E-02	.88E+01

12.00	10.75	35.7	9.00	3.10	.492	.32E-02	.25E-02	.61E+01
12.00	10.75	53.8	6.00	3.10	.242	.43E-02	.34E-02	.39E+01

THE NORMAL STRESS = 10000.00
TEMP (DEG C) = 30.50

L (IN)	WIDTH (IN)	ETIME (SEC)	HIN (IN)	HOUT (IN)	HYDR GRAD	TRANT (M2/S)	TRAN20 (M2/S)	FLOWRATE (GPM/FT)
12.00	10.75	.0	18.00	3.10	1.242			
12.00	10.75	11.6	15.00	3.10	.992	.21E-02	.17E-02	.80E+01
12.00	10.75	24.8	12.00	3.10	.742	.24E-02	.19E-02	.68E+01
12.00	10.75	40.9	9.00	3.10	.492	.28E-02	.22E-02	.52E+01
12.00	10.75	62.4	6.00	3.10	.242	.36E-02	.28E-02	.33E+01

FIGURE 1

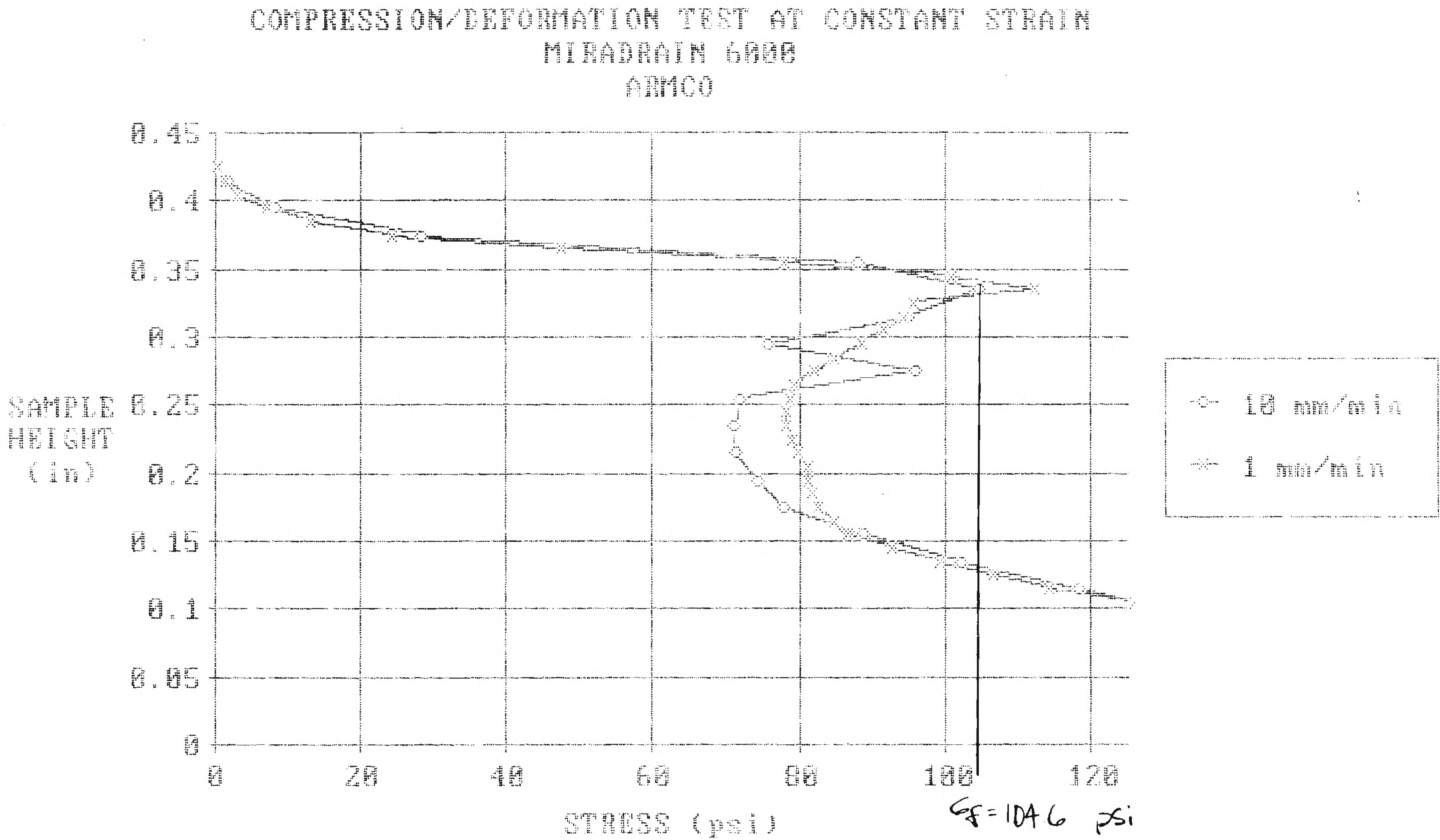

COMPRESSION/DEFORMATION TEST AT CONSTANT STRAIN
MIRADRAIN 6000
ARMCO
SAMPLE HEIGHT (in)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
20
40
60
80
100
120
STRESS (psi)
10 mm/min
1 mm/min
σ_f = 104.6 psi

FIGURE 2

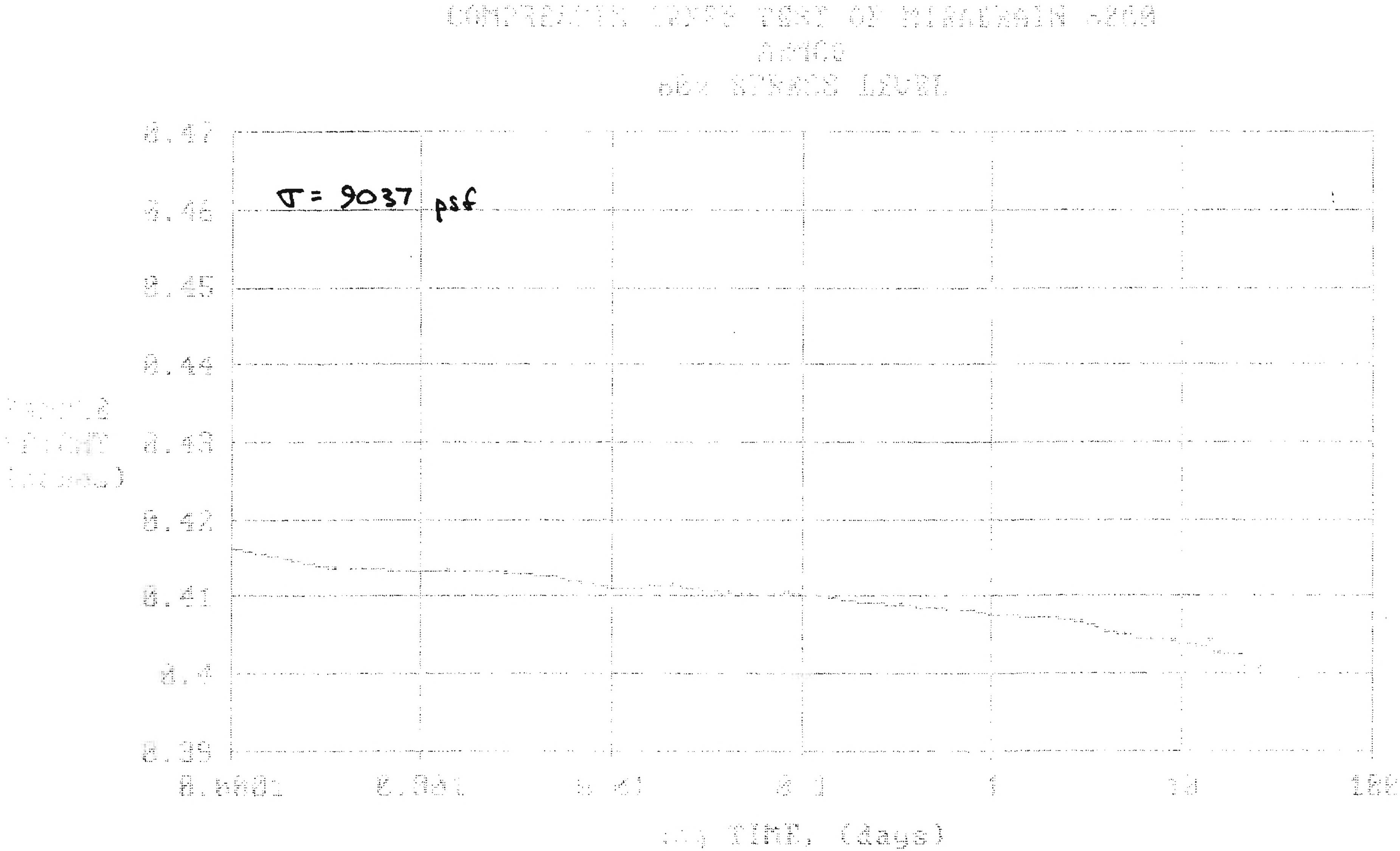

STRESS LEVEL
σ = 9037 psf
0.47
0.46
0.45
0.44
0.43
0.42
0.41
0.4
0.39
0.0001
0.001
0.01
0.1
1
10
100
TIME, (days)

FIGURE 3

COMPRESSION CREEP TEST OF [illegible]

ARMCO

[illegible] STRESS LEVEL

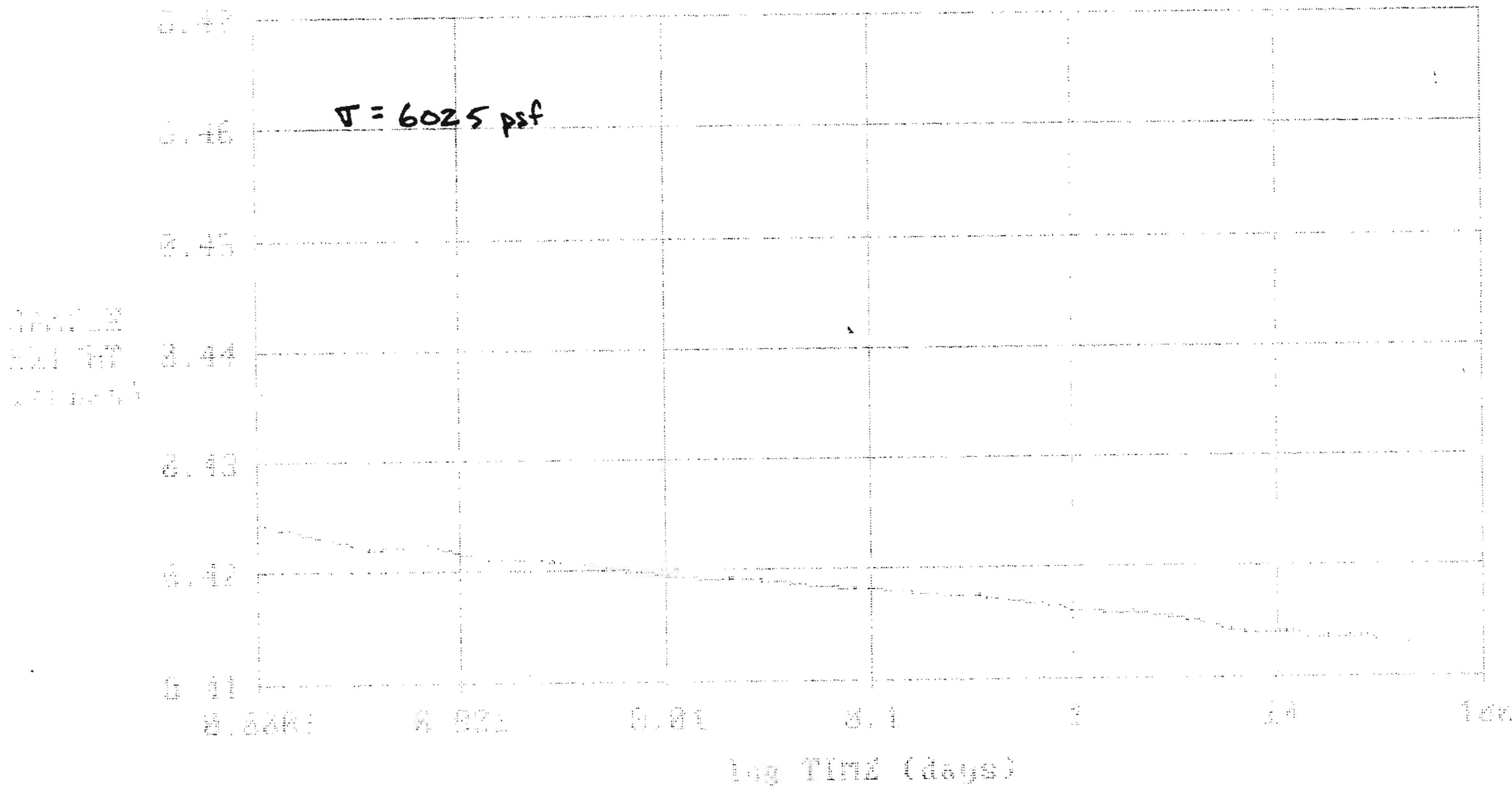


FIGURE 4

[illegible] CREEP TEST OF [illegible]
ARMCO
[illegible] STRESS LEVEL

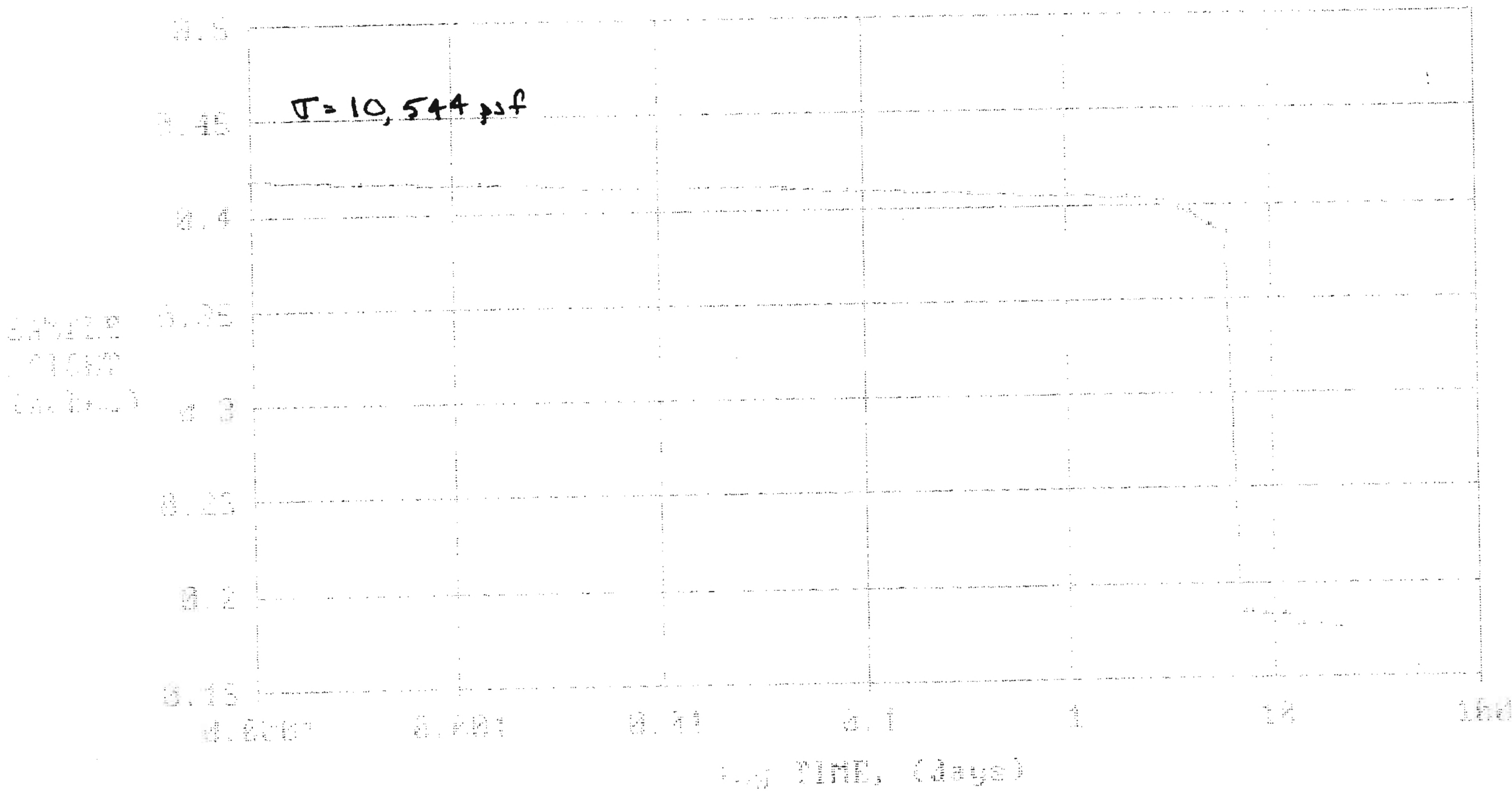


Figure 5

COMPRESSION CREEP TEST OF [illegible]

[illegible]

75% STRESS LEVEL

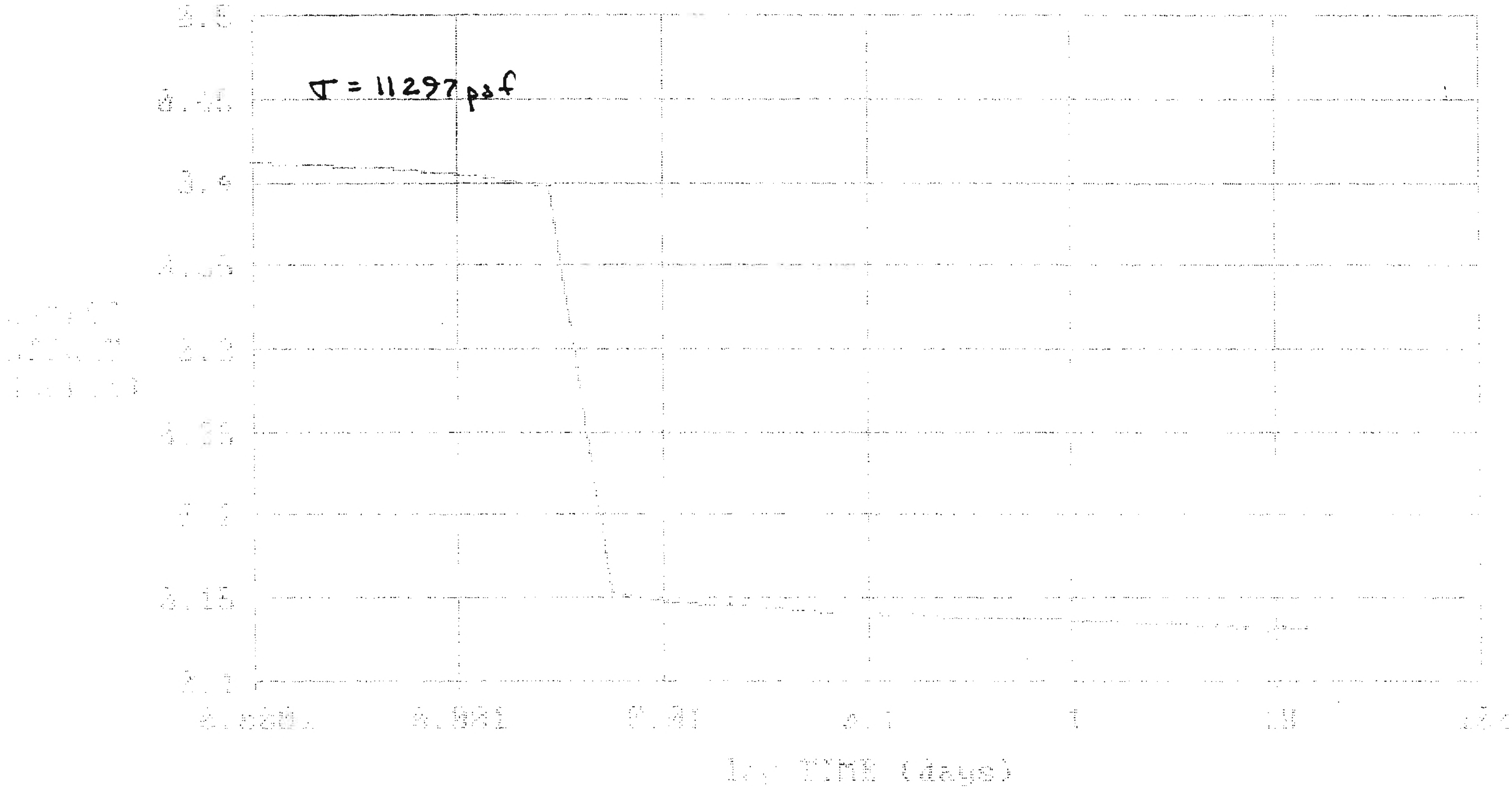
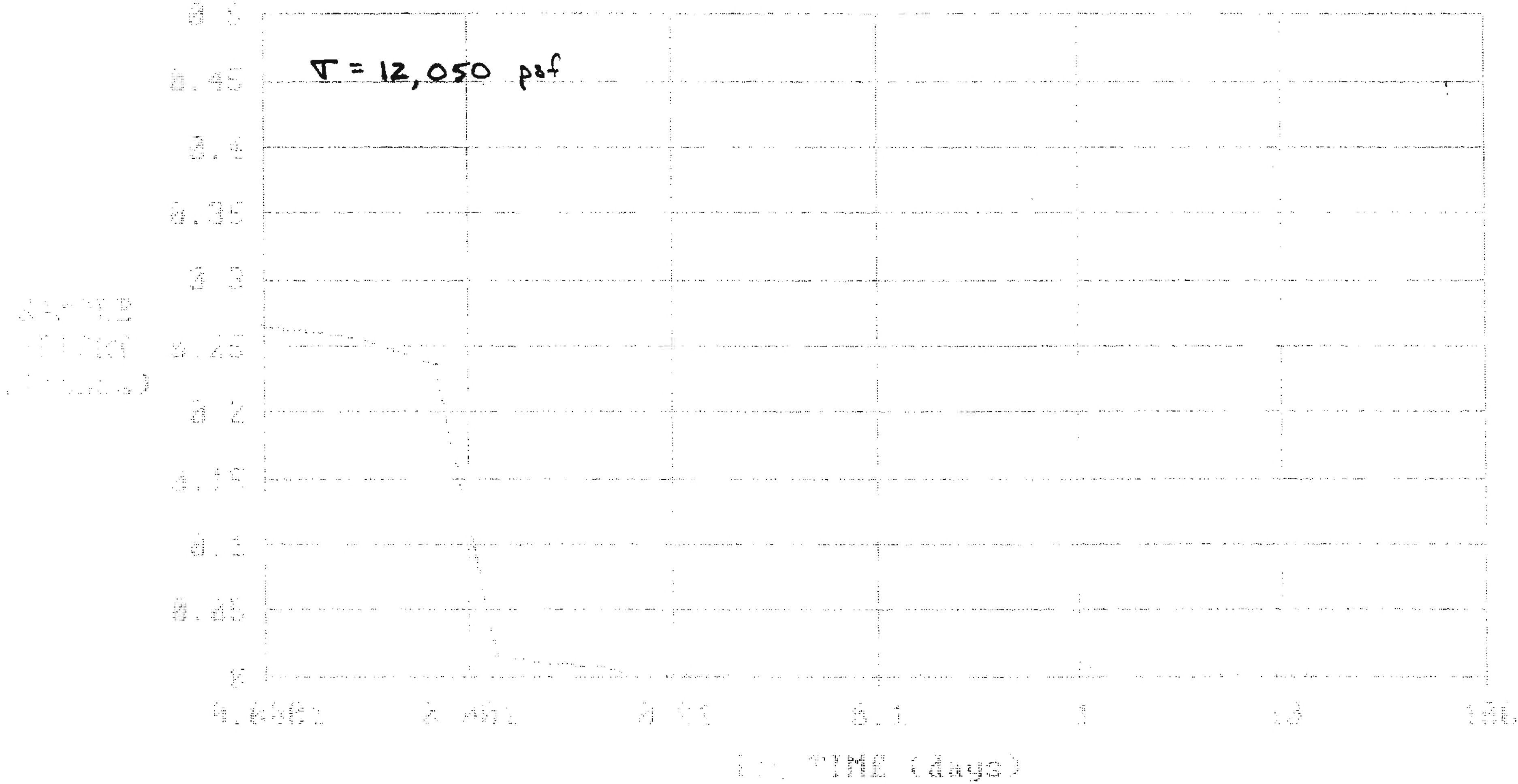


Figure 6



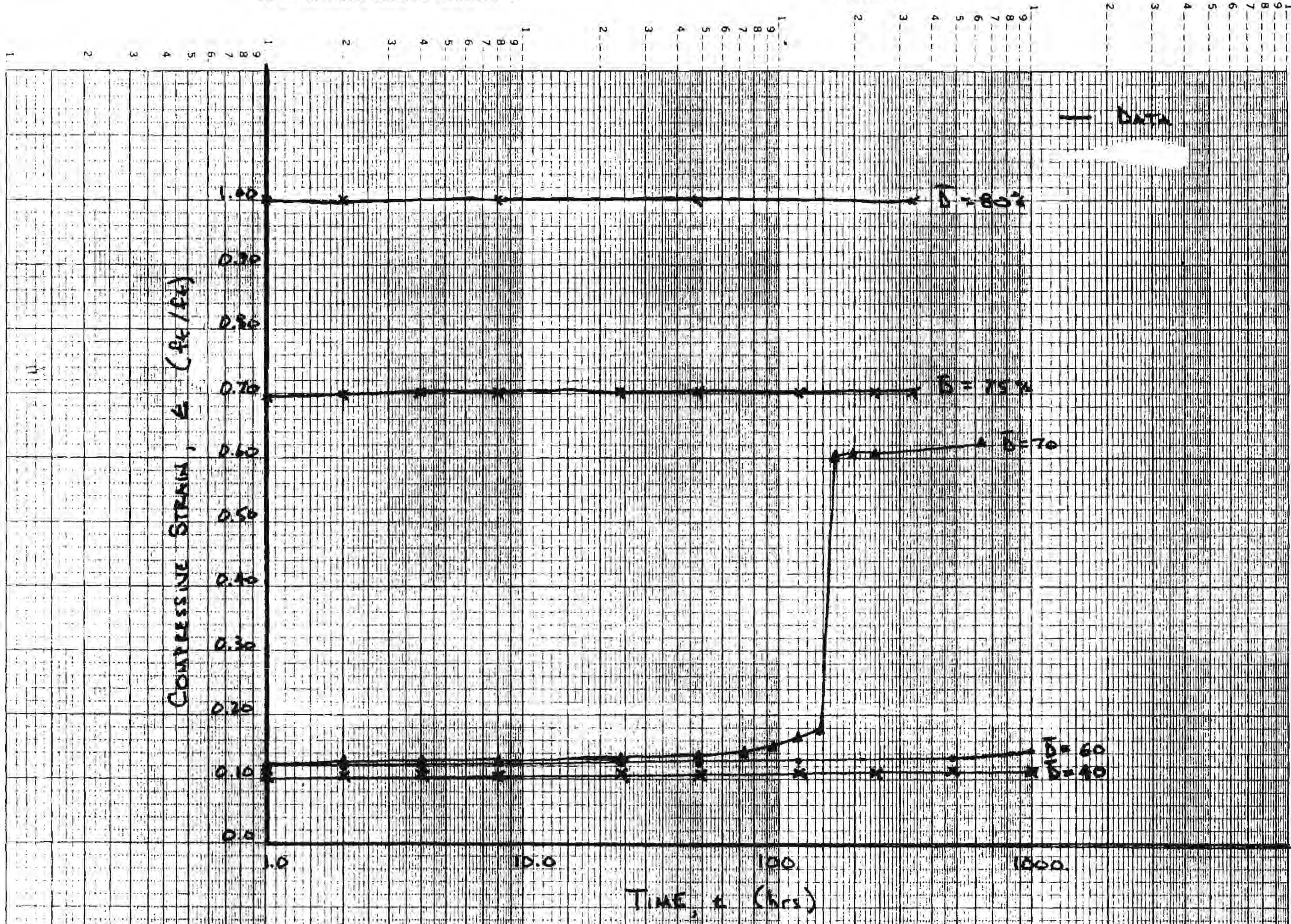


FIGURE 7. SUMMARY OF CREEP DATA FOR EACH STRESS LEVEL

Figure 8.

COMPRESSION CREEP TEST OF MIRADRAIN 6000
ARMCO
COEFFICIENT m

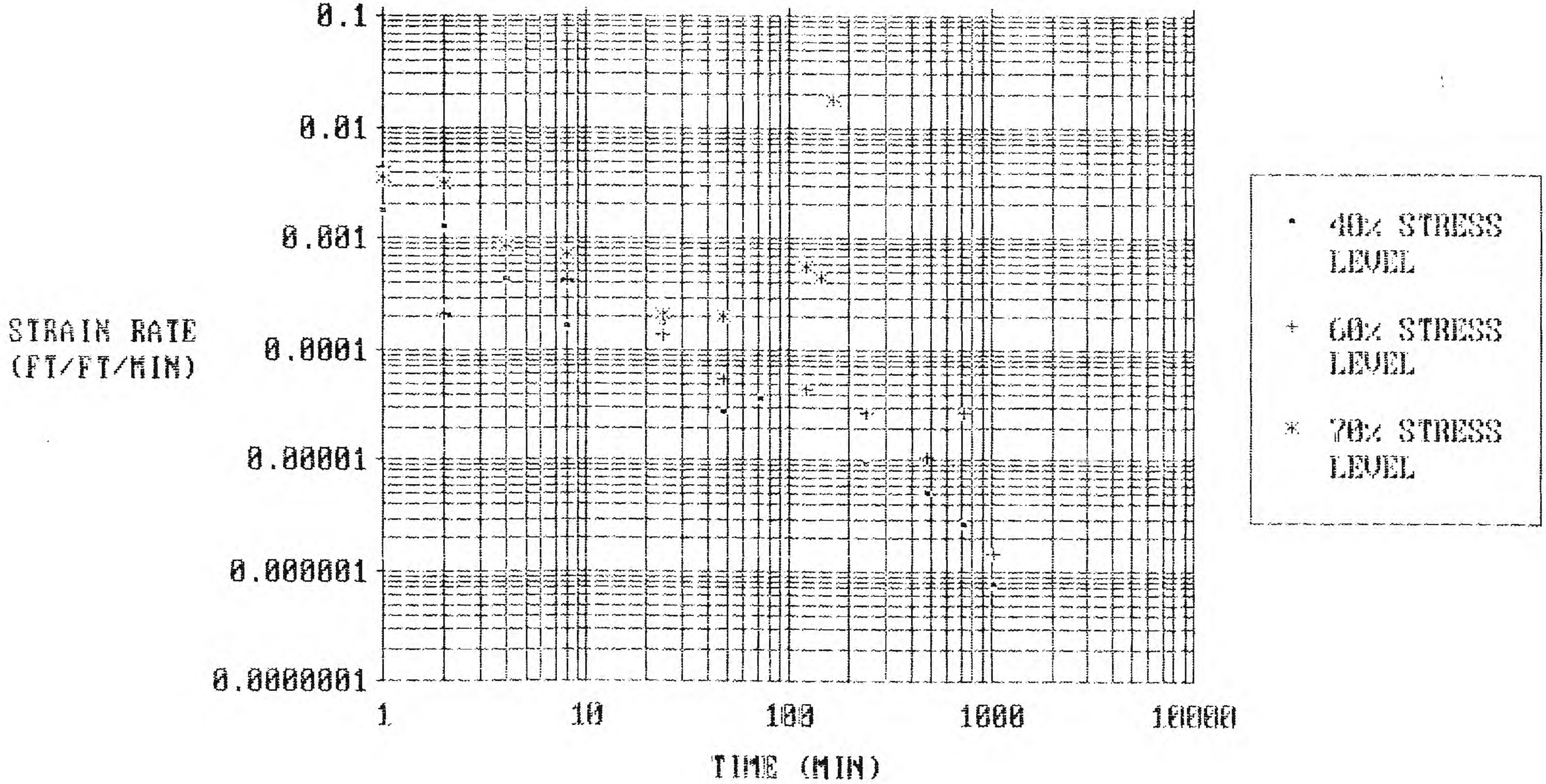
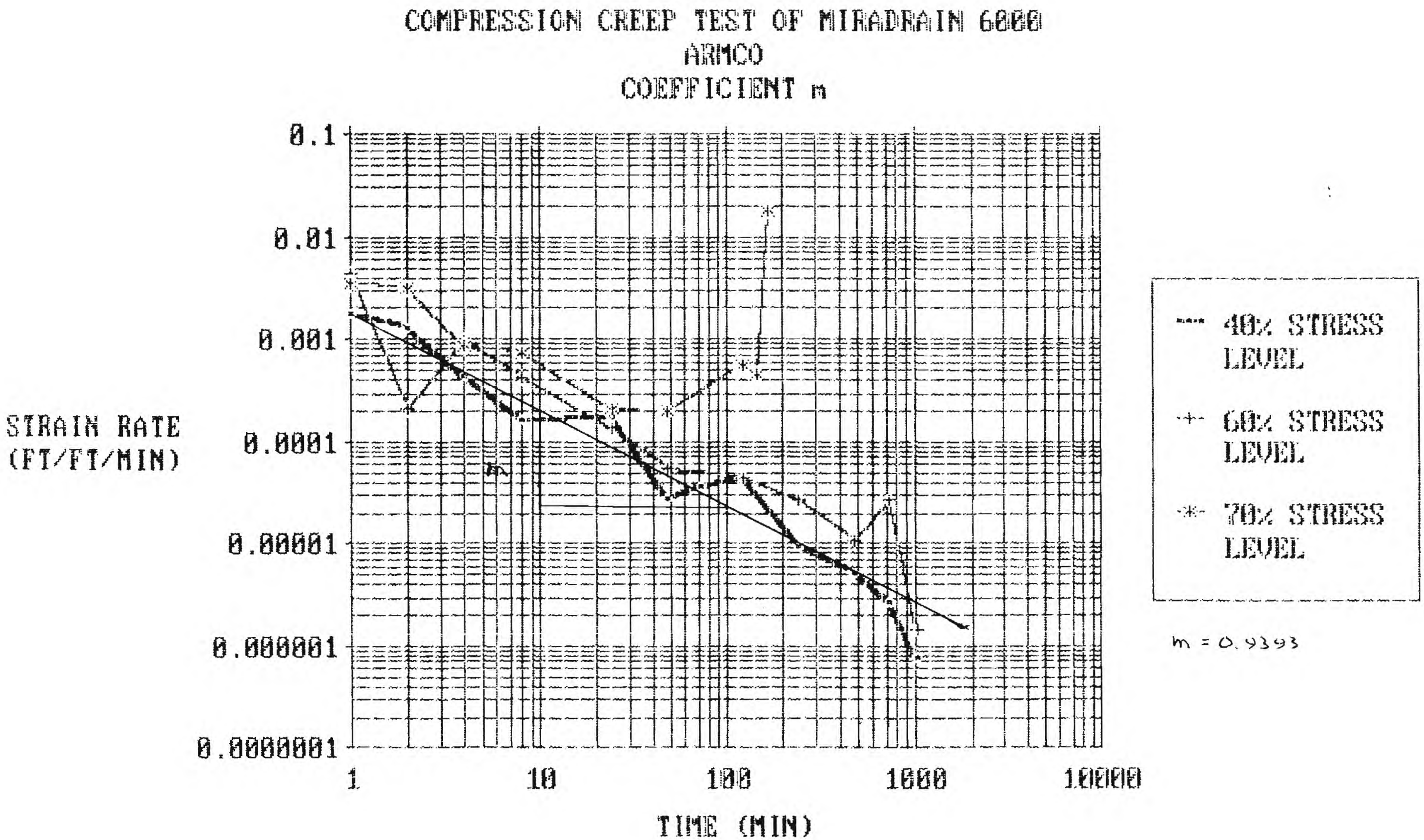


Figure 9.


COMPRESSION CREEP TEST OF MIRADRAIN 6000
ARMCO
COEFFICIENT m
STRAIN RATE
(FT/FT/MIN)
0.1
0.01
0.001
0.0001
0.00001
0.000001
0.0000001
1
10
100
1000
10000
TIME (MIN)
m
40% STRESS LEVEL
60% STRESS LEVEL
70% STRESS LEVEL
m = 0.9393

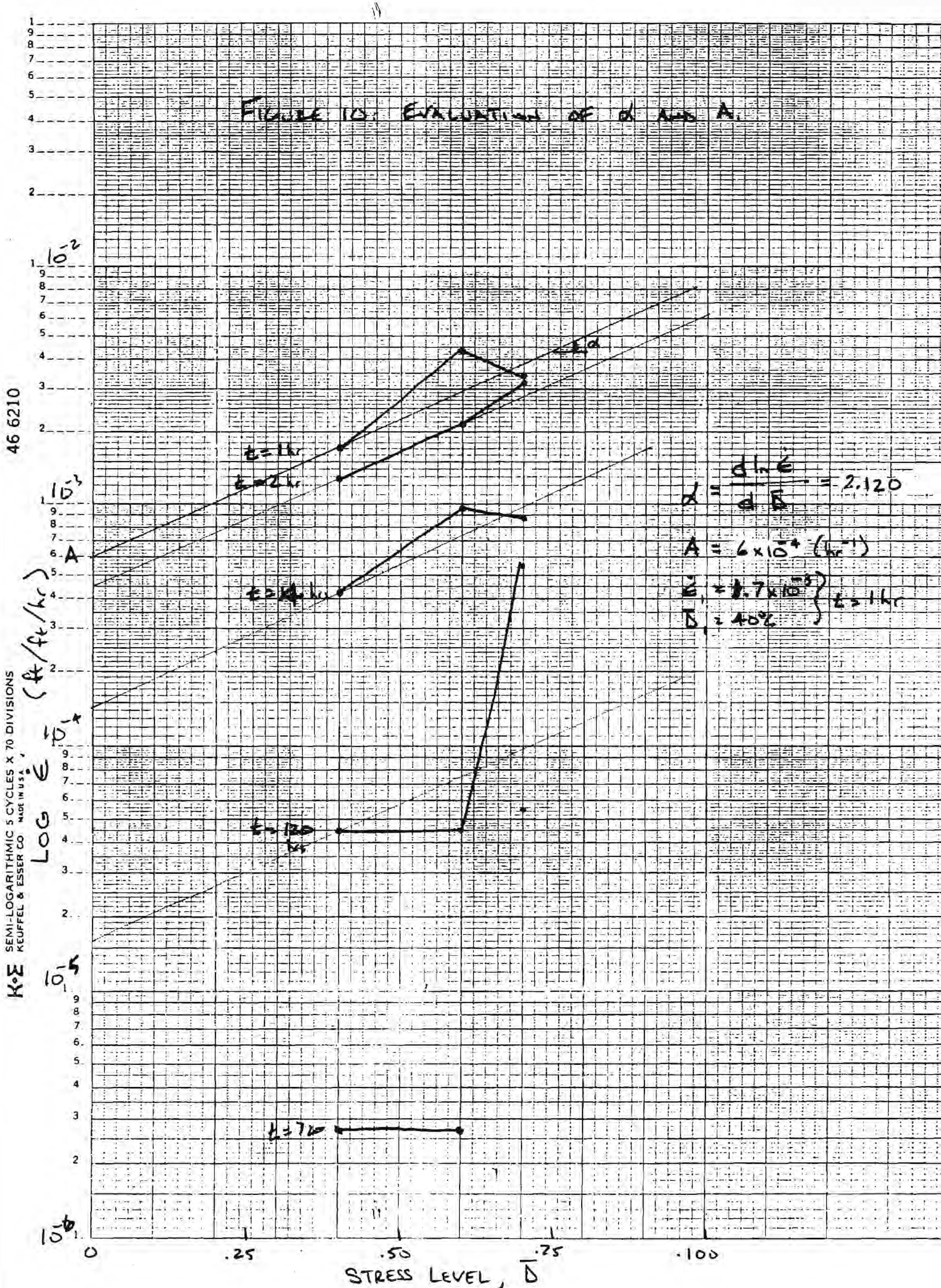


FIGURE 10: EVALUATION OF α AND A.

FIGURE 11

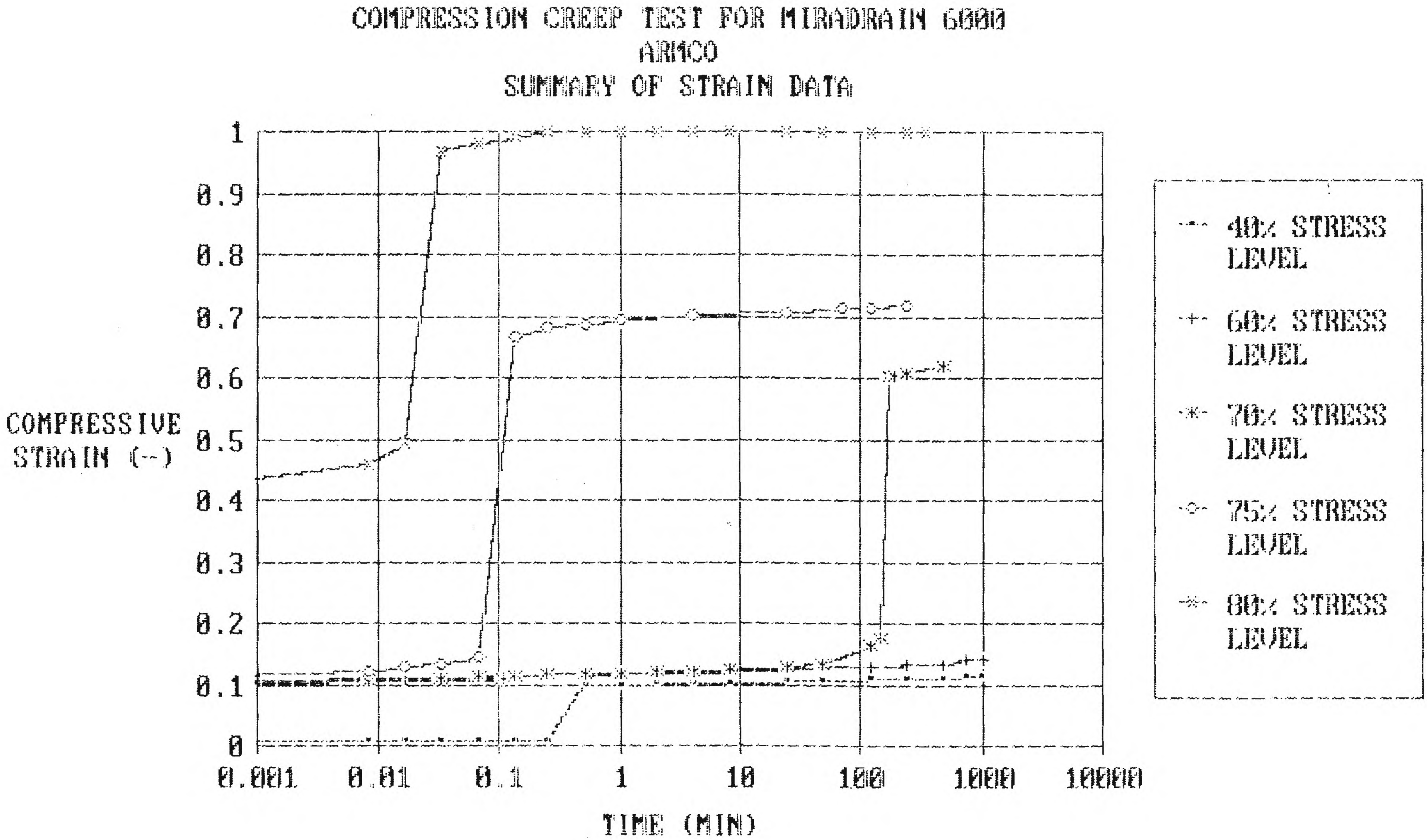
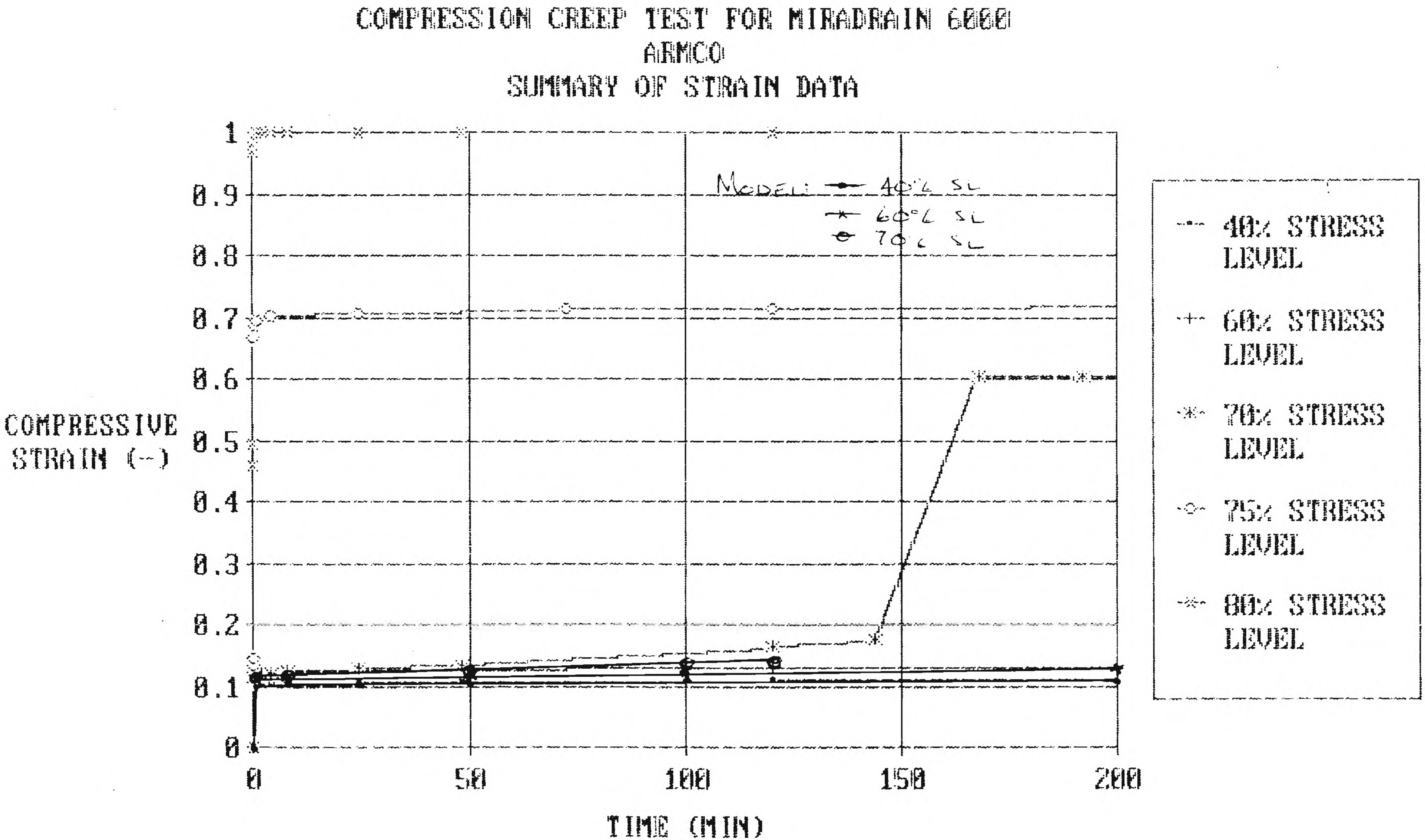

COMPRESSION CREEP TEST FOR MIRADRAIN 6000
ARMCO
SUMMARY OF STRAIN DATA
COMPRESSIVE STRAIN (--)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.001
0.01
0.1
1
10
100
1000
10000
TIME (MIN)
40% STRESS LEVEL
60% STRESS LEVEL
70% STRESS LEVEL
75% STRESS LEVEL
80% STRESS LEVEL

FIGURE 12


COMPRESSION CREEP TEST FOR MIRADRAIN 6000
ARMCO
SUMMARY OF STRAIN DATA
COMPRESSIVE STRAIN (--)
TIME (MIN)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
50
100
150
200
MODEL: 40% SL
60% SL
70% SL
40% STRESS LEVEL
60% STRESS LEVEL
70% STRESS LEVEL
75% STRESS LEVEL
80% STRESS LEVEL

COMPRESSION TEST MIRADRAIN 6000 1 mm/min

AREA= 48 SQI
INITIAL HEIGHT= .4353 IN.

READING [IN]	LOAD. [LBS]	SAMPL. HT. [IN]	STRAIN [-]	STRESS [PSI]
1.210	26.000	0.425	0.023	0.542
1.220	74.000	0.415	0.046	1.542
1.230	148.000	0.405	0.069	3.083
1.240	342.000	0.395	0.092	7.125
1.250	638.000	0.385	0.115	13.292
1.260	1173.000	0.375	0.138	24.438
1.270	2285.000	0.365	0.161	47.604
1.280	3735.000	0.355	0.184	77.813
1.290	4831.000	0.345	0.207	100.646
1.300	5391.000	0.335	0.230	112.313
1.310	4589.000	0.325	0.253	95.604
1.320	4529 000	0.315	0.276	94.354
1.330	4396.000	0.305	0.299	91.583
1.340	4242.000	0.295	0.322	88.375
1.350	4063.000	0.285	0.345	84.646
1.360	3933.000	0.275	0.368	81.938
1 370	3804.000	0.265	0.391	79.250
1.380	3780.000	0.255	0.414	78.750
1.390	3748.000	0.245	0.436	78.083
1.400	3748.000	0.235	0.459	78.083
1.410	3796.000	0.225	0.482	79.083
1.420	3834.000	0.215	0.505	79.875
1.430	3891.000	0.205	0.528	81.063
1.440	3897.000	0.195	0.551	81.188
1.450	3915.000	0.185	0.574	81.563
1.460	3954.000	0.175	0.597	82.375
1.470	4069.000	0.165	0.620	84.771
1 480	4158.000	0.155	0.643	86.625
1.490	4439.000	0.145	0.666	92.479
1.500	4758.000	0.135	0.689	99.125
1.510	5118.000	0.125	0.712	106.625
1.520	5476.000	0.115	0.735	114.083
1.530	6043.000	0.105	0.758	125.896
1.540	6571.000	0.095	0.781	136.896
1.550	7359.000	0.085	0.804	153.313
1.560	8699.000	0.075	0.827	181.229
1.570	10468.000	0.065	0.850	218.083
1.580	14203.000	0.055	0.873	295.896
1.590	20151.000	0.045	0.896	419.813

OMPRESSION TEST : MIRADRAIN 6000 10mm/min

REA= 48 SQI
NITIAL HEIGHT= .4353 IN.

READING [IN]	LOAD [LBS]	SAMPL. HT. [IN]	STRAIN [-]	STRESS [PSI]
1.120	91.000	0.415	0.046	1.896
1.140	396.000	0.395	0.092	8.250
1.160	1374.000	0.375	0.138	28.625
1.180	4226.000	0.355	0.184	88.042
1.200	5020.000	0.335	0.230	104.583
1.720	4551.000	0.315	0.276	94.813
1.240	3630.000	0.295	0.322	75.625
1.260	4597.000	0.275	0.368	95.771
1.280	3447.000	0.255	0.414	71.813
1.300	3412.000	0.235	0.459	71.083
1.320	3422.000	0.215	0.505	71.292
1.340	3564.000	0.195	0.551	74.250
1.360	3742.000	0.175	0.597	77.958
1.380	4263.000	0.155	0.643	88.813
1.400	4897.000	0.135	0.689	102.021
1.420	5670.000	0.115	0.735	118.125
1.440	6400.000	0.095	0.781	133.333
1.460	8147.000	0.075	0.827	169.729
1.480	13666.000	0.055	0.873	284.708
1.494	20669.000	0.041	0.905	430.604

40-1

... COMPRESSION CREEP TEST

40% STRESS LEVEL

t (Hrs)	--ELAPSED TIME-- [DAYS]	[illegible] [IN]	--THICKNESS-- [IN]	--STRAIN-- [-]	$\dot{\epsilon}$ (in/in/hr)
	0	.0435	.4[illegible]	0	
.0083	3.472222E-04	.044	.412	7.4[illegible]E-02	
.0167	[illegible]E-04	.0435	.4115	9.37476[illegible]	
.0333	[illegible]E-03	.043	.41[illegible]	[illegible]	
.0667	[illegible]E-03	.0428	.4108	[illegible]	
.1333	[illegible]E-03	.0421	.41[illegible]	[illegible]	
.25	1.041667E-02	.0415	.4105	9.[illegible]E-02	
.50	2.083333E-02	.0410	.4102	.1004[illegible]	
1.00	4.166667E-02	.0405	.4108	.101[illegible]	$1.72 \times 10^{-}$
2.00	8.333334E-02	.0402	.4182	.101[illegible]	$1.29 \times 10^{-}$
4.00	.1666667	.0398	.4172	.103[illegible]	4.292×1
8.00	.3333334	.0395	.4170	.1040773	δε 1.61×10
24	1	.0388	.4162	.106067	1.74×10
48	2	.0377	.4155	.1073108	2.68×10
72	3	.0373	.4155	.1083392	3.57×10
96	4	.0372	.4152	.1090125	
—	5	.0367	.4147	.1100808	4.47×10^{-5}
	6	.0362	.4141	.1111588	
	7	.036	.414	.11133	
	8	.036	.414	.11133	
	9	.036	.414	.11133	
240	10	.0359	.4139	.11[illegible]	8.94×10^{-6}
	11	.0359	.4139	.11[illegible]026	
	12	.0357	.4137	.11[illegible]	
	13	.0357	.4137	.11[illegible]25	
	14	.0356	.4136	.112[illegible]	
	15	.0355	.4135	.1126[illegible]	
	16	.0355	.4135	.11[illegible]	
	17	.0355	.4135	.1126[illegible]	
	18	.0355	.4135	.112[illegible]	
	19	.0355	.4135	.1126[illegible]	
480	20	.0355	.4135	.11[illegible]	5.11×10^{-6}
	21	.0355	.4135	.112[illegible]	
	22	.0351	.4131	.11[illegible]	
	23	.0355	.4135	.112[illegible]	
	24	.0355	.4135	.112[illegible]	
	25	.0355	.4135	.1126[illegible]	
	26	.0355	.4135	.112[illegible]	
	27	.0352	.4132	.1125[illegible]	
	28	.0355	.4135	.1126[illegible]	
	29	.0352	.4132	.1130[illegible]7	
720	30	.0352	.4132	.11[illegible]	2.68×10^{-6}
	31	.0351	.4131	.113[illegible]	
	32	.0351	.4131	.113[illegible]	
	33	.0351	.4131	.1135194	
	34	.0351	.4131	.11[illegible]4	
	35	.0351	.4131	.11[illegible]94	
	36	.0351	.4131	.11[illegible]4	
	37	.0351	.4131	.1135194	

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	[illegible]	.[illegible]351	.4131	.1135194
	[illegible]	.8[illegible]1	.4131	.1135194
	[illegible]	.[illegible]	.[illegible]	.11[illegible]179
$\frac{984}{1008}$	[illegible]	.[illegible]1	.[illegible]	.[illegible]	2.45×10^{-7}
	[illegible]	.8[illegible]	.[illegible]	.[illegible]

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[illegible] COMPRESSION CREEP TEST

[illegible]0% STRESS LEVEL

ELAPSED TIME (DAYS)	[illegible] (IN)	[illegible]DIAMETER (IN)		[illegible]	6
[illegible]	.8435	.456		0	
[illegible]E-04	.7[illegible]	.4153001		.1120668	
5.944449E-04	.7678	.4133		.1130701	
1.[illegible]E-03	.7598	.413[illegible]		.113[illegible]	
2.[illegible]778E-03	.7575	.413		.1157337	
5.[illegible]E-03	.7587	.4124		.1160214	
1.[illegible]E-02	.7575	.41[illegible]0001		.1180256	
[illegible]E-02	.788	.41[illegible]5		.1169[illegible]26	
[illegible]E-02	.787	.4105	1.0	.1190937	4.29×10^{-3}
[illegible]E-02	.7869	.4104	2.0	.1193133	2.15×10^{-4}
.16[illegible]667	.785	.4095	4.0	.1212446	7.66×10^{-4}
.[illegible]	.7852	.4087	8.0	.1229613	4.29×10^{-4}
1	.7342	.4077	24	.1251072	1.34×10^{-4}
2	.7838	.4073	48	.1257656	~~[illegible].68 × 10^-5~~ 5.37×10^{-5}
[illegible]	.783	.4065		.1276824	
[illegible]	.782	.4055		.1298285	
5	.7815	.405	120	.1307013	4.47×10^{-5}
[illegible]	.781	.404[illegible]		.1319742	
[illegible]	.7808	.4043		.1324034	
[illegible]	.780[illegible]	.4043		.13[illegible]	
[illegible]	.7803	.404		.13304[illegible]	
[illegible]	.7802	.4037	240	~~.13[illegible]~~	2.68×10^{-5}
1[illegible]	.7802	.4037		.13[illegible]09	
11	.78	.40[illegible]		.1[illegible]41[illegible]	
1[illegible]	.78	.4035		.1311[illegible]01	
[illegible]	.7800	.404		.1[illegible]	
[illegible]	.7791	.4027		.13383[illegible]9	
1[illegible]	.779	.4025		.13[illegible]61	
17	.779	.4015		.1332[illegible]61	
[illegible]	.779	.4025		.1332661	
[illegible]9	.779	.4025		.1332661	
20	.779	.4025	480	.1332661	1.07×1[illegible]
21	.7778	.4013001		.1388[illegible]11	
22	.7775	.401		.13[illegible]98[illegible]	
23	.7771	.4008001		.1403432	
2[illegible]	.777	.4005		.1[illegible]	
25	.777	.4005		.1405577	
[illegible]6	.777	.4005		.1405579	
[illegible]7	.7763	.4003		.1409871	
[illegible]	.7763	.4003		.14[illegible]9871	
[illegible]7	.776	.3993001		.1427058	
.30	.[illegible]74	.3992001	720	.1427039	2.68×1[illegible]
[illegible]	.77[illegible]	.3995001		.1427038	
[illegible]	.77[illegible]	.399[illegible]001		.14270[illegible]	
[illegible]	.775	.39[illegible]5001		.1427[illegible]96	
[illegible]	[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]		[illegible]	

38	.7759	.3554		.1429134
39	.7750	.3773		.142153
40	[illegible]	.37[illegible]		.14[illegible]
41	.7750	.3772		.140173
42	.77[illegible]	.3[illegible]3	last	.1[illegible]

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$1{,}49 \times 10^{6}$

[illegible] COMPRESSION CREEP TEST

70% STRESS LEVEL

ELAPSED TIME (DAYS)	[illegible] (IN)	THICKNESS (IN)		STRAIN (-)	
0	.4[illegible]	.446		0	
1.7[illegible]E-04	.5[illegible]	.4[illegible]6		.1071[illegible]62	
4.[illegible]E-[illegible]	.[illegible]1	.4[illegible]9999		.1074422	
1.[illegible]E-03	.3815	.41[illegible]5		.11[illegible]131	
[illegible].7[illegible]E-03	.3721	.4132		.11[illegible]7047	
5.[illegible]E-03	.3745	.4115		.11[illegible]722	
[illegible]E-03	.3773	.41[illegible]3		.117331	
[illegible]E-02	.3773	.4113		.117131	
4.[illegible]E-02	.3760	.4105	1	.119[illegible]703	3.43×10^{-3}
8.3[illegible]E-02	.373	.409	2	.12[illegible]177	3.22×10^{-3}
.1[illegible]6667	.3732	.4051999	4	.1240345	8.58×10^{-4}
.333333[illegible]	.3723	.4066	8	.127[illegible]387	7.51×10^{-4}
1	.3712	.4057	24	.1304721	2.15×10^{-4}
2	.3[illegible]	.403	48	.1351732	1.97×10^{-4}
3	.3[illegible]7	.4009999		.1374851	
4	.3611	.3952		.1517314	
5	.3555	.337	120	.16[illegible]261	5.54×10^{-4}
[illegible]	.35[illegible]	.334	144	.1759657	
[illegible]	.35[illegible]	.[illegible]04	168	.6051503	
[illegible]	.3450	.1830	192	.606[illegible]	
[illegible]	.34[illegible]	.183		.6072762	
10	.34[illegible]5	.182[illegible]	240	.6077251	
11	.34[illegible]32	.18[illegible]32		.6076[illegible]	
12	.3470	.1[illegible]		.611152[illegible]	
13	.3453	.1773		.[illegible]16455	
14	.343	.177		.620171[illegible]	
15	.3426	.1756		.621036[illegible]	
16	.3426	.1761		.621[illegible]	
17	.3436	.1755		.6210301	
18	.3426	.1766		.6210[illegible]	
19	.3404	.1764		.6219[illegible]	
20	.3421	.1764	480	.6219[illegible]	
21	.342	.176		.622[illegible]77	

MIRADRAIN 6000 COMPRESSION CREEP TEST

75% STRESS LEVEL

ELAPSED TIME [DAYS]	READING [IN]	THICKNESS [IN]		STRAIN [-]
0	1.016	.466		6.395348E-08
3.472222E-04	.9582	.4081999		.1240345
6.944445E-04	.9555	.4054999		.1298285
1.388889E-03	.953	.403		.1351732
2.777778E-03	.9482	.3981999		.1454937
5.555556E-03	.704	.1539999		.6695281
1.041667E-02	.6973	.1473		.6839057
2.083333E-02	.695	.1449999		.6888413
4.166667E-02	.6926	.1425999	1	.6939916
8.333334E-02	.6908	.1407999	2	.6978543
.1666667	.689	.1389999	4	.7017168
.3333334	.687	.1369999	8	.7060088
1	.6858	.1358	24	.7085838
2	.6843	.1342999	48	.7118028
3	.6838	.1337999	72	.7128758
4	.6835	.1334999		.7135195
5	.6832	.1331999	120	.7141633
6	.6832	.1331999		.7141633
7	.681	.1309999		.7188843
8	.6805	.1304999		.7199573
9	.6803	.1302999		.7203854
10	.6805	.1304999	240	.7199573
11	.6808	.1308		.7173134
12	.681	.1309999		.7188843
13	.681	.1309999		.7188843
14	.6812	.1312		.718455

MIRADRAIN 6000 COMPRESSION CREEP TEST

80% STRESS LEVEL

ELAPSED TIME [DAYS]	READING [IN]	THICKNESS [IN]		STRAIN [-]
0	.945	.466		0
3.472222E-04	1.159	.2519999		.4592277
6.944445E-04	1.175	.236		.4935622
1.388887E-03	1.396	1.499993E-02		.9678114
2.777778E-03	1.4025	8.499921E-03		.9817599
5.555556E-03	1.407	4.000008E-03		.9914162
1.041667E-02	1.4105	4.999042E-04		.9989272
2.083333E-02	1.4125	-1.50007E-03		1.003219
4.166667E-02	1.415	-4.000008E-03	1	1.008584
8.333334E-02	1.417	-6.000102E-03	2	1.012876
.1666667	1.4192	-8.19999E-03	4	1.017597
.3333334	1.4215	-1.050001E-02	8	1.022532
1	1.4222	-1.120001E-02	24	1.024034
2	1.4238	-1.280004E-02	48	1.027468
3	1.4245	-1.350004E-02	72	1.02897
4	1.425	-.014		1.030043
5	1.4252	-1.420003E-02	120	1.030472
6	1.4252	-1.420003E-02		1.030472
7	1.428	-1.700002E-02		1.036481
8	1.428	-1.700002E-02		1.036481
9	1.4283	-1.730007E-02		1.037125
10	1.4285	-.0175001	240	1.037554
11	1.429	-1.800007E-02		1.038627
12	1.4395	-2.850002E-02		1.061159
13	1.43	-1.899999E-02		1.040773
14	1.4302	-1.920003E-02	336	1.041202