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DIVISION OF STRUCTURAL ENGINEERING
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STRUCTURES AND MATERIALS RESEARCH DEPARTMENT OF CIVIL ENGINEERING

# STUDIES OF CONCRETE FOR MILLSTONE UNIT No.2 NUCLEAR CONTAINMENT VESSEL

FINAL REPORT

by

DAVID PIRTZ

FEBRUARY 1972

STRUCTURAL MATERIALS LABORATORY
UNIVERSITY OF CALIFORNIA
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COLLEGE OF ENGINEERING DEPARTMENT OF CIVIL ENGINEERING DIVISION OF STRUCTURAL ENGINEERING AND STRUCTURAL MECHANICS

BERKELEY, CALIFORNIA 94720

February 9, 1972

Bechtel Corporation Post Office Box 607 15740 Shady Grove Road Gaitersburg, Maryland 20760

Attention: Mr. J. L. Turdera

#### Gentlemen:

Concrete Properties of Millstone Unit No. 2 Nuclear Containment Vessel, FINAL REPORT.

Transmitted herewith is the final report entitled, "Studies of Concrete for Millstone Unit No. 2 Nuclear Containment Vessel - Coarse Aggregate: Wallingford Basalt."

This report contains compressive strength; splitting tensile strength, elastic properties, diffusivity, thermal coefficient of expansion, and creep for concrete loaded at ages of 28, 212 and 365 days.

Sincerely yours,

David Pirtz

Professor of Civil Engineering Solven College College

Richmond, CA 90, 4011 St. CA 94804 4638 USA

DP:ib Enclosure cc: D. Graham

### Final Report

### STUDIES OF CONCRETE FOR MILLSTONE UNIT NO. 2 NUCLEAR CONTAINMENT VESSEL

COARSE AGGREGATE: WALLINGFORD BASALT

### TEST PROGRAM

The purpose of the testing program is to establish some of the mechanical and thermal properties of the concrete using 1 1/2-in. maximum size aggregate to be used in the construction of the Millstone Unit No. 2 Nuclear Power Plant's containment structure.

The test program comprises of the evaluation of the properties of the concrete:

- a. Compressive Strength to be determined on sealed concrete specimens stored at  $73^{\circ}F$  at ages of 7, 28, 180 and 365 days on three each of 6-in. x 12-in. cylinders.
- b. Modulus of Elasticity and Poisson's Ratio to be determined on sealed concrete specimens stored at 73°F at ages of 28, 180 and 365 days.
- c. Diffusivity to be determined on sealed concrete specimens at age of 28 days for two each of 8 1/2-in. x 17-in. cylinders.
- d. Coefficient of Thermal Expansion to be determined on sealed concrete specimens stored at  $73^{\circ}F$  at ages of 28, 180 and 365 days on two cylinders of 6-in. x 18-in.
- e. <u>Tensile Strength</u> to be determined on sealed concrete specimens stored at 73°F at age of 28 days by the splitting tension method.
- f. <u>Creep</u> characteristic of sealed concrete specimens to be determined at a sustained load of 1530 psi initially applied at 28, 180 and 365 days.

Observations for Autogeneous Strain change shall be determined for 1 year on creep specimens that are to be loaded at age of 1 year. The creep tests shall be carried out on three frames containing 2 each 6-in.  $\times$  16-in. cylinders per frame at  $73^{\circ}F$ .

### CONCRETE MIX

The mix design and data for the concrete mixes used in casting the specimens are shown in Table A and B. In Table B the weight of cement, water, sand, 3/4-in. and 1 1/2-in. aggregate per cu. yd. of concrete was computed using the measured unit weight of the concrete and the batch weight of each material.

The aggregates used in casting the specimens were shipped to Davis Hall on the University of California campus at Berkeley. The aggregates were placed in steel drums and soaked for 24 hours then air dried and blended to about saturated surface dry conditions (sand + 1.65%, 3/4-in. agg. + 0.46%, and 1 1/2-in. agg. + 0.16%.) Bulk specific gravities and absorption capacities of the aggregates as determined at Berkeley are shown in Table C.

The concrete was mixed in a 2 cu. ft. capacity pan-type mixer with each batch making approximately 1.70 cu. ft. of concrete.

Hand-held internal vibrators were used in the casting to insure proper compaction of the concrete.

#### MANUFACTURE OF SPECIMENS

Creep and thermal expansion specimens were cast in 6-in. x 16-in. machined split cast iron molds. A 10-in. Carlson Strain Meter was centered on the axis of the cast iron mold with its lead wire being brought out through a hole in the center of the 2-inch thick base plate which has an "O" ring seal for the lead wire. A 1/8-in. x 8-in. metal rod was placed

diametrically across the top of this mold to serve as support for a wire which held the meter in an axial position during casting. After casting, the wire was cut off and the rod removed.

The creep and thermal expansion specimens were allowed about 5 hours time for the bleeding water to rise to the surface, and then a conical-shaped layer of mortar made from the original mix was formed on the top of each cylinder. The 2-in. thick steel top-plates were then worked back and forth into position until the mortar appeared to be spread uniformly between the plate and the specimen. A square was used to assure that each top-plate was perpendicular to the axis of the specimen. The creep and thermal expansion specimens were then moved to the 73°F constant temperature room.

Split cast iron molds were stripped from the creep and thermal expansion specimens at the age of one day. Within 3 minutes after removal of the cast iron mold a 1/16-in. thick butyl rubber sheet was wrapped and bonded to the top and bottom steel plate with rubber cement. A 4-in. wide butt-splice was used to join the butyl rubber sheet. Large hose clamps were placed over the butyl rubber and the end steel plates to assure that the specimens would be internally sealed.

Compressive strength specimens were cast in 6-in. by 12-in. metal cans provided with lids to internally seal the specimen. All compressive strength specimens remained in mold cans in the fog room until just prior to testing, at which time they were stripped, capped, and covered with saran wrapping to ensure water retention through the test period.

Splitting tension specimens were cast in 6-in. by 12-in. metal cans provided with lids to internally seal the specimens. All splitting tension specimens remained in metal cans in the fog room until just prior to testing.

Specimens for thermal diffusivity tests were cast in 8 1/2-in. by 17-in. 0.020 in. thick copper cans. They were cast solid except for a 3/8-in. diameter by 8 1/2-in. deep thermometer well centered on the axis of the specimen. The external metal container was left on the cylinders throughout the duration of the test.

### TEST PROCEDURES AND RESULTS

### Compressive Strength and Elastic Properties

Compressive strength was determined at the ages of 7, 28, 212 and 365 days. Each strength determination represents the average obtained for three 6-in. by 12-in. cylinders. The same three 6-in. by 12-in. concrete cylinders were used in the determination of compressive strength, modulus or elasticity (E), and Poisson's ratio (µ) for the 28, 212 and 365-day-old concrete. The modulus of elasticity and Poisson's ratio were determined by use of an XYY' recorder employing differential transformers. This arrangement produces a continuous plot of both longitudinal stress vs. longitudinal strain and longitudinal strain vs. lateral strain from which both the modulus of elasticity and Poisson's ratio were computed. The loading rate used was 60,000 lbs. per minute which is equivalent to 36 psi/sec., for the 6-in. diameter specimens.

Compressive strengths, modulus of elasticity, and Poisson's ratio for sealed concrete specimens stored at  $73^{\circ}F$  are shown in Table D.

Splitting tensile strength was determined on three 6-in.  $\times$  12-in. concrete cylinders at age of 28 days by A.S.T.M. C496-66 method. Data for splitting tension is shown in Table D.

### Thermal Diffusivity

The 28-day thermal diffusivity, as determined on two 8 1/2-in. diameter by 17-in. long concrete cylinders, was 0.029 ft<sup>2</sup>/hr. The hot water bath and

the cold water bath were approximately 120°F and 40°F, respectively, for the thermal diffusivity tests.

Thermal diffusivity determined by cooling test as described on pages 66 through 86 and pages 133 through 143 in "Thermal Properties of Concrete," Bulletin 1, United States Bureau of Reclamation, Boulder Canyon Project, Final Report, 1940.

### Thermal Coefficient of Expansion

The two 6-in. by 16-in. thermal coefficient of expansion specimens were cycled several times from 40°F to 90°F. Specimens were left for at least 24 hours at each temperature before strain readings were taken. At the end of the cycling period the specimens were stored at 73°F. The average linear thermal expansion for the two specimens at age of 28, 215 and 365 days was 5.1, 5.0, and 5.2 micro-strain per 1°F temperature change, respectively.

### Creep Tests

Creep characteristics for the concrete were determined on sealed 6-in. by 16-in. cylinders with centrally embedded Carlson Strain Meters. Two specimens each were initially loaded at the ages of 28, 212 and 365 days all at a temperature of 73°F. Two specimens which were loaded at 365 days were used to determine the autogenous strain for the 28 and 212-day loaded creep specimens. Autogenous strain change after the age of 365 days were very small and assumed to be zero.

A stress level of 1530 psi was applied to all loaded creep specimens by a hydraulic system with an automatic controller which was used to maintain a constant stress level.

Sustained modulus of elasticity, creep characteristics, and autogenous strains for sealed concrete specimens stored at  $73^{\circ}F$  are shown in Table E

for concrete loaded at age of 28 days, in Table F for concrete loaded at age of 212 days, and in Table G for concrete loaded at age of 365 days. The total load was applied within 30 seconds and the first strain reading taken within another 30 seconds or 1 minute after the load was started to be applied. Specimens loaded at 28 days were under stress for 338 days and then unloaded to zero stress and those loaded at 212 days were under stress for 154 days and then unloaded to zero stress. Specimens loaded at age of 365 days have been under stress for 100 days. Sustained modulus of elasticity was computed by dividing the applied stress of 1530 psi by the sum of the elastic, creep, and autogenous strains at 1 minute after the load was started to be applied and at various other times. Creep plus autogenous strains and creep strains only starting from one minute and 10 minutes after load was applied are shown. Autogenous strains shown are those starting from the time the load was applied were taken as zero. Creep plus autogenous strains and creep strains per psi of stress starting from 10 minutes after load was applied were taken as zero are shown.

Elastic, creep, plus autogenous strains; creep plus autogenous strains from 10 minutes after load was applied; and creep strains from 10 minutes after load was applied are all shown plotted vs log of time for the average of two sealed concrete specimens stored at 73°F in Figure 1 for specimens loaded at age of 28 days, in Figure 2 for specimens loaded at age of 212 days, and in Figure 3 for specimens loaded at age of 365 days.

Elastic, creep, plus autogenous strains for specimens loaded at age of 28 and 212 days up to 365 days and for specimens loaded at age 365 days for 100 days are shown plotted vs time in days for the average of two sealed concrete specimens stored at 73°F in Figure 4. Strains for the 28 days and 212 days loaded specimens which were unloaded at age of 365 days are also shown for 100 days.

The complete computer calculations for determining the strains due to loading and unloading the sealed concrete specimens are shown in Tables H and I for specimens initially loaded at age of 28 days and Tables J and K for specimens initially loaded at age of 212 days. Tables L and M show the complete calculations for determining the autogenous strains up to age of 365 days and then the strain due to loading the sealed concrete specimens at age of 365 days.

TABLES

### TABLE A

### MIX DESIGN FOR MILLSTONE UNIT NO. 2 CONCRETE

Material Source

Cement: ASIM C150 Type II Lehigh Portland Cement Company

Pozzolan: Northeast Utilities Company

Sand: Wauregan Alluvial Glacial

3/4-in. Gravel: Wallingford basalt

1 1/2-in. Gravel:

WRA Admixture: MBHC Master Builders

AEA Admixture: Vinsol Resin Air Master Builders

Entraining Agent

### Specifications:

f'c (at 28 days) 5,000 psi

Slump: 2 to 3 inches

Air: 4 percent

### One Cubic Yard Batch, SSD Weights as given by Mr. D. E. Graham, Bechtel Corporation (San Francisco office)

	Wallingford <u>Basalt</u>
Cement, 1bs	559
Pozzolan, 1bs	99
Sand, 1bs	1130
3/4-in. Gravel, 1bs	1035
1 1/2-in. Gravel, 1bs	966
Water, 1bs	283
WRA, oz.	8.93
AEA, oz.	5.95

TABLE B

### CASTING DATA

### WALLINGFORD BASALT

Date	October 27, 1970												
Specimens Cast	2 - 6x16-in 15 - 6x12-in Modulu 3 - 6x12-in	creep speci thermal exp compressive s and Poisso splitting to	e strength, on's ratio cylingers on cyline c	Young's Ylinders Iders									
Batch No. (a)	1 <sup>(b)</sup>	2	3	4	Avg.								
Cement, pcy	570	570 565 565 560 565											
Fly Ash, pcy	101	100	100	99	100								
Water, pcy	263 253 257 255 257												
Sand, pcy S.S.D.	1172	1161	1162	1152	1162								
3/4-in. aggregate, pcy S.S.D.	1061	1051	1052	1043	1054								
1 1/2-in. aggregate, pcy S.S.D.	987	978	979	970	979								
Unit wt., pcf	153.9	152.2	152.5	151.1	152.4								
Slump, inches	3	2 1/2	3	3 1/4	3								
Air, % by Vol.	3.0	3.5	4.0	4.5	4. 0								
AEA, oz. pcy	6.07 7.16 7.72 7.72 7.16												
W.R.A. oz. pcy	9.10	9.03	9.03	8.96	9.03								
Temp. o <sub>F</sub> (c)	63	63	63	65	63								

- (a) Each batch approximately 1.70 cu. ft.
- (b) Used in the bottom quarter of all specimens.
- (c) Water, cement, and fly ash stored at  $38^{\circ}F$ .

TABLE C

MILLSTONE NUCLEAR CONTAINMENT VESSEL CONCRETE

BULK SPECIFIC GRAVITY AND ABSORPTION CAPACITY

Aggregate	BULK SPECIFIC GRAVITY - Saturated Surface Dry	ADSORPTION CAPACITY, percent
Wauregan alluvial glacial sand	2.70	1.21
3/4-in. Wallingford basalt	2.90	1.46
1 1/2-in. " "	2.90	1,16

TABLE D

MECHANICAL AND THERMAL PROPERTIES

Age, Days	7	28	212	365
Compressive strength, (a) psi	3950	5810	8050	7680
Poisson's ratio (a)	_	0.21	0.22	0.23
Modulus of Elasticity, (a) psi x 10 <sup>6</sup>	<b></b> .	4.7	5.5	5.6
" " ,(b) psi x 10 <sup>6</sup>		4.5	5.0	5.2
Splitting tensile strength (a), psi		535	-	
Diffusivity, ft <sup>2</sup> /hr		0.029	_	
Linear thermal expansion Micro-strain per <sup>OF</sup>		5.1	5.0	5.2

<sup>(</sup>a) Average of three  $6 \times 12$ -in. cylinders.

<sup>(</sup>b) Average of two creep specimens.

### TABLE E

### MILLSTONE NUCLEAR CONTAINMENT VESSEL -

### ELASTIC, CREEP, AND AUTOGENOUS STRAINS -

### COARSE AGGREGATE: WALLINGFORD BASALT

Maximum size of aggregate: 1 1/2-in.

Specimen size: 6-in. by 16-in. (Sealed)

Temperature: 73 ± 3°F
Age of loading: 28 days
Applied stress: 1530 psi

Compressive strength: 5810 psi at age 28 days

			Micro-strain Cross												
Time under	Sustained Modulus of	Elastic, Creep	l	eep plus togenous	3	Autog-	Cr	еер							
stress,	Elasticity,	plus			l applied	enous	Time after load applie								
Days	psi x 10 <sup>6</sup>	Autog-		10 mir				10 mi	n.						
	(a)	enous	1 min.		per		1 min.		per psi (b)						
					psi (b)	<b> </b>			P31 (0)						
0	-	0			<del>gi</del>				4						
0.0007	4.46	-343	0			0	-0								
0.0035	4.32	-354	-11			0	-11								
0.0069	4.27	-358	<b>-</b> 15	0	0	0	-15	0	0						
0.115	3.96	-386	-43	-28	-0.0183	0	-43	-28	-0.0183						
0.694	3.71	-412	-69	-54	-0.0353	0	-69	-54	-0.0353						
1	3.62	-423	-80	-65	-0.0425	0	-80	-65	-0.0425						
2	3.52	-435	-92	-77	-0.0503	0	-92	-77	-0.0503						
. 3	3.41	-449	-106	-91	-0.0595	0	-106	-91	-0.0595						
4	3.36	-455	-112	-97	-0.0634	-1	-111	-96	-0.0627						
5	3.30	-464	-121	-106	-0.0692	-1	-120	-105	-0.0686						
4 5 7	3.22	-475	-132	-117	-0.0765	-2	-130	-115	-0.0751						
15	2.97	-516	-173	-158	-0.103	-3	-170	-155	-0.101						
29	2.78	-551	-208	-193	-0.126	-5	-203	-188	-0.123						
39	2.70	-566	-223	-208	-0.136	-6	-217	-202	-0.132						
55	2.62	-584	-241	-226	-0.147	-7	-241	-219	-0.143						
77	2.53	-605	-262	-247	-0.161	-8	-254	-239	-0.156						
93	2.49	-614	-271	-256	-0.167	-9	-262	-247	-0.161						
105	2.46	-621	-278	-263	-0.172	-10	-270	-253	-0.165						
119	2.43	-630	-287	-272	-0.178	-13	-274	-259	-0.169						
133	2.41	-634	-291	-276	-0.180	-10	-281	-266	-0.174						
154	2.39	-641	-298	-283	-0.185	-8	-290	-275	-0.180						
168	2.37	-646	-303	-288	-0.188	-8	-295	-280	-0.183						
182	2.35	-652	-309	-294	-0.192	-9	-300	-285	-0.185						
196	2.33	-657	-314	-299	-0.195	-9	-305	-290	-0.189						

- (a) Sustained Modulus of Elasticity computed as follows: 1530 psi divided by sum of elastic, creep, and autogenous strains.
- (b) Micro-strain 1530 psi.

### TABLE E (Contd.)

### MILLSTONE NUCLEAR CONTAINMENT VESSEL -

### ELASTIC, CREEP, AND AUTOGENOUS STRAINS -

### COARSE AGGREGATE: WALLINGFORD BASALT

Maximum size of aggregate:  $1 \frac{1}{2-in}$ . Specimen size: 6-in. by 16-in. (Sealed) Temperature:  $73 \pm 3^{\circ}F$ 

Temperature:  $73 \pm 3^{\circ}F$ Age of loading:  $\overline{28}$  days
Applied stress: 1530 psi

Compressive strength: 5810 psi at age 28 days

		:		Mi	cro-stra	in					
Time	Sustained	Elastic,	Cr	eep plus	3		Cr	еер			
under	Modulus of	Creep	Au	togenous	3	Autog-					
stress,	Elasticity,	p1us	Time af	ter load	l applied	enous	Time after load applie				
Days	psi x 10 <sup>6</sup>	Autog-		10 mir	1.			10 mi			
	(a)	enous	1 min.		per		1 min.		per		
					psi (b)				psi (b)		
210	2.31	-662	-319	-304	-0.199	-9	-310	-295	-0.193		
224	2.30	<b>-</b> 665	-322	-307	-0.201	-11	-311	-296	-0.193		
238	2.29	-667	-324	-309	-0.202	-11	-313	-298	-0.195		
252	2.27	-672	-329	-314	-0.205	-12	-317	-302	-0.197		
266	2.26	<b>-</b> 676	-333	-318	-0.208	-13	-320	-305	-0.199		
280	2.25	-678	-335	-320	-0.209	-15	-320	-305	-0.199		
295	2.24	-684	-341	-326	-0.213	-16	-325	-310	-0.203		
309	2.23	-685	-342	<b>-</b> 327	-0.214	-17	-325	-310	-0.203		
325	2.23	-687	-344	-329	-0.215	-17	-327	-312	-0.204		
338	2.22	-689	-346	-331	-0.216	-17	-329	-314	-0.205		

- (a) Sustained Modulus of Elasticity computed as follows: 1530 psi divided by sum of elastic, creep, and autogenous strains.
- (b) Micro-strain 1530 psi.

### TABLE F

### MILLSTONE NUCLEAR CONTAINMENT VESSEL -

### ELASTIC, CREEP, AND AUTOGENOUS STRAINS -

### COARSE AGGREGATE: WALLINGFORD BASALT

Maximum size of aggregate: 1 1/2-in. Specimen size: 6-in. by 16-in. (Sealed)

Temperature:  $73 \pm 3^{\circ}F$ Age of loading: 212 days Applied stress: 1530 psi

Compressive strength: 5810 psi at age 28 days

Time	Sustained	Elastic,	Cr	eep plus	3		Cr	еер				
under	Modulus of	Creep	Au	togenous	\$	Autog-						
stress,	Elasticity,	plus	Time af	ter load	lapplied	enous	Time after load appli					
Days	psi x 10 <sup>6</sup>	Autog-		10 mir	1.			10 mi	a.			
	(a)	enous	1 min.		per		1 min.		per			
					psi (b)				psi (b)			
0		0		·		0	707					
0.0007	4.97	-302	0			0	0					
0.0035	4.93	-30 <del>2</del>	<b>-</b> 7			0	_ <del>7</del>					
0.0069	4.91	<b>-</b> 311	_9 _9	0	0	Ŏ.	_ <del>9</del>	0	0			
0.0208	4.81	-318	-16	-7	-0.0045	Ō	-16	-7	-0.0045			
0.0416	4.75	-322	-20	-11	-0.0071	0	-20	-11	-0.0071			
0.1298	4.65	-329	-27	-18	-0.0117	0	-27	-18	-0.0117			
1	4.49	-341	-39	-30	-0.0196	0	-37	-30	-0.0196			
2	4.41	-349	-47	-38	-0.0248	0	-47	-38	-0.0148			
3	4.35	-352	<b>-</b> 50	-41	-0.0267	. 0	-50	-41	-0.0267			
4	4.30	<del>-</del> 356	-54	<del>-</del> 45	-0.0294	-1	-53	-44	-0.0287			
5 7	4.26	<b>-</b> 359	<b>-</b> 57	-48	-0.0313	-1	-56	-47	-0.0307			
1	4.27	-363	-61	-52	-0.0339	-1	-60	-51	-0.0333			
12	4.12	-371	-69	-60	-0.0392	-1	-68	<b>-</b> 59	-0.0385			
26	3.95	-387	-85	-76	-0.0496	-2	-83	-74	-0.0483			
40	3.84	-398	<b>-</b> 96	-87	-0.0568	-2	-94	-85	-0.0555			
54	3.81	-402	-100	-91	-0.0594	-2	-98	-89	-0.0581			
68	3.70	-413	-111	-102	-0.0666	-4	-107	-98	-0.0640			
82	3.64	-420	-118	-109	-0.0712	-6	-112	-103	-0.0673			
111	3.55	-431	-129	-120	-0.0784	t	-122	-113	-0.0738			
125	3.52	-435	-133	-124	-0.0810	-8	-125	-118	-0.0771			
141	3.48	-440	-138	-129	-0.0843	-8	-130	-123	-0.0803			
154	3.45	-444	-142	-133	-0.0869	-8	-134	-187	-0.0830			

<sup>(</sup>a) Sustained Modulus of Elasticity computed as follows: 1530 psi divided by sum of elastic, creep, and autogenous strains.

<sup>(</sup>b) Micro-strain ÷ 1530 psi.

### TABLE G

### MILLSTONE NUCLEAR CONTAINMENT VESSEL -

### ELASTIC, CREEP, AND AUTOGENOUS STRAINS -

### COARSE AGGREGATE: WALLINGFORD BASALT

Maximum size of aggregate:  $1 \frac{1}{2-in}$ .

Specimen size: 6-in. by 16-in. (Sealed)

Temperature: 73 ± 3°F Age of loading: 365 days Applied stress: 1530 psi

Compressive strength: 5810 psi at age 28 days

				Mi			PLANTAGE AND				
Time	Sustained	Elastic,	Cr	eep plus	3		Cr	еер			
under	Modulus of	Creep	Au	togenous	3	Autog-					
stress,		plus	Time af	ter load	l applied	enous	Time after load appli				
Days	psi x 10 <sup>6</sup>	Autog-		10 mir	l.			10 mi	10 min.		
	(a)	enous	1 min.		per		1 min.		per		
					psi (b)				psi (b)		
		_				_					
0	-	0	_ 1			0					
0.0007	5.20	-294	0			0	0				
0.0035	5.10	-300	-6			0	-6				
0.0069	5.05	-303	<b>-</b> 9	0	0	0	-9	0	0		
0.031	4.97	-308	-14	-5	-0.0032	0	-14	-5	-0.0032		
0.069	4.89	<b>-</b> 313	-19	-10	-0.0065	0	-19	-10	-0.0065		
0.273	4.83	-317	<b>-</b> 23	-14	-0.0091	0	-23	-14	-0.0091		
1	4.71	-325	-31	-22	-0.0143	0	-31	-22	-0.0143		
2	4.65	-329	<b>-</b> 35	-26	-0.0169	0	-35	-26	-0.0169		
3	4.61	-332	<b>-</b> 38	<b>-</b> 29	-0.0189	0	-38	-29	-0.0189		
2 3 5 8	4.54	<del>-</del> 337	-43	-34	-0.0222	0	-43	-34	-0.0222		
	4.46	-343	-49	-40	-0.0261	0	-49	-40	-0.0261		
10	4.42	<b>-</b> 346	<b>-</b> 52	<b>-</b> 43	-0.0281	0	<b>-</b> 52	-43	-0.0281		
12	4.35	-352	<b>-</b> 58	-49	-0.0320	0	-58	-49	-0.0320		
19	4.29	-357	<b>-</b> 63	<b>-</b> 54	-0.0352	0	-63	-54	-0.0352		
35	4.20	-364	-70	-61	-0.0450	0	-70	-69	-0.0450		
68	4.07	-376	-82	73	-0.0477	0	-82	-73	-0.0477		
100	3.97	-385	-91	-82	-0.0535	0	-91	-82	-0.0535		
				.,							

- (a) Sustained Modulus of Elasticity computed as follows: 1530 psi divided by sum of elastic, creep, and autogenous strains.
- (b) Micro-strain ÷ psi.

STRAIN METER NO. X I

PROJECT MILLSTONE B Y65901 LOADED TO 1530PSI AT AGE 28 DAYS
LOCATION DAVIS HALL ROOM 360A 73F DATE CAST 10-27-70

CALIBRATIONS

METER RESISTANCE AT 0.0 DEGREES F. 46.92 OHMS
CHANGE IN TEMP. PER OHM CHANGE IN RESIS. 11.88 DEGREES F.
HISSELL BANGE 96.9-102.2 RATIO IN PERCENT
OFICINAL CALIBRATION CONSTANT 3.33 MICROSTRAIN PER 0.01
PERCENT RATIO CHANGE

CALIBRATION CONSTANT CORR. FOR LEAD

3.33 MICROSTRAIN PER 0.01
PERCENT RATIO CHANGE
5.1 MICROSTRAIN PER DEGREE F.
7.5 MICROSTRAIN PER DEGREE F. TEMPTRATURE COPRESTION CONCRETE FXPANSION

* * ** **	A T.1154	METEO A	*****	DECLET	# COANCE #	TOTAL		MICODET	RAIN TEMPE	OATHOE CO	1000000	
7 <b>A T</b> "		METER #	1 E 9 F = #		* CHANGE * *IN RATIO*			MICKOSI	TIME AFTER		RKELTED	
	* ±		F. *		*PERCENT *			. 0	* 1 MIN.*		+ 10 MIN.+	IO MIN.
	* *	*			* *	9.13.71.11	*DAY CAST*				*1530 PSI*	
****	****	***	***	****	* * * * * * * * * *	****						
11 -3-70	# 1330*	53.04 *	72.7 *	100.815	<b>≠</b> • <b>*</b>	0.	* 0. *	•	* *		* *	
11 -6-70	* 815*	53.02 *	72.5 *	100.800	*015 *	~6.	* -4. *	¢ .	* *		* *	
11-11-70		53.03 *	72.6 *			-9.			* *		* *	
11-24-70		53.03 *	72.6 *		*061 #					COMPANIE CHEMICAL PRINCIPLE CONTRACTOR OF THE CO	*	
11-24-72		53.03 #	72.6 *		* -1.155 *						* *	
11-24-70	-	53.03 *	72,6 *	•	* -1.181 *	-394.				0057 · 0091 ·		0
11-24-70		53.03 * 53.03 *	72.6 * 72.6 *		* -1.197 * * -1.284 *	-399. -428.				0281		0189
11-25-70	_	53.02 <b>*</b>	72.5 *		* -1.370 *					0466		0375
11-25-70		53.01 #	72.3 *		* -1.401 *	-468.				0532		0440
11-26-70		53.00 *	72.2 *		* -1.448 *	-485.				0632		0541
11-27-73		53.01 *	72.3 *		* -1.488 *	-497.				0721	* -96. *	0630
11-28-70	* 1700*	52.95 #	71.6 *	99.306	* -1.509 *	-598.	* ~500· *	-480.	* -116. <b>*</b>	0756	* -102. *	0664
11-29-79	<b>*</b> 1640 <b>*</b>	52,98 #	72.0 *	99.277	* -1.538 *	-516.	* -510. *			0824		
12 -1-70	* 1200*	52.97 *	71.9 *	99.240	* -1.575 <b>*</b>	-529.				0903		
12 -9-72		53.01 ¥	72.3 *	many problems in property or in the object of the first	<u>* -1.692                                    </u>	-565.		American de la constitución de l		·1165 ·		THE AMERICAN THE THE PARTY OF THE PARTY.
12-23-70		52.98 *	72.0 *		* -1.739 *					1371		
1 -2-71		52.98 *	72.0 *		* -1.851 *					·1506 · ·1619 ·		
	* 1005*	52.95 *	71.8 *		* -1.905 * * -1.964 *	-639. -556.				1757		
	* 1330* * 1055*	53.01 * 53.02 *	72.3 * 72.5 *		* -1.993 *				-	1822		
	* 1445*	53.01 #	72.3 #		* -2.014 *	-672.				1866		
	* 1540*		72.8 *		* -2.038 *					1926		
	* 1000*		72.8 *		* -2.052 *					1956		
	* 1200*	53.03 *	72.6 #		* -2.074 *	-591.	* -590. *	-670.	* -306. *	2000	* -292. *	1909
5-11-71	<b>* 1</b> 430≠	53.02 ≠	72.5 *	98,726	≠ -2.089 *	-697.	* ~695. *	-675.		2031		
	# 1200 <b>*</b>	53.03 *	72.6 *		* -2-107 *	-702.				2072		
\$871,		53.04 #	72.7 ±	<del></del>	<u>* -2.122 *</u>	<u>-707.</u>				·2107 ·		
	* 1200*	53.06 *	77.9 *		* -2.137 *	-710.				2143		
	* 1330*	53.03 * 53.06 *	72.6 * 72.9 *		* -2.148 * * -2.152 *	-716. -715.				2161 <sup>-</sup> 2176 <sup>-</sup>		
	* 1000* * 1400*	53.07 *	73.1 #		* -2.170 *					2217		
3-17-71		53.38 *	73.2 *		* -2.181 *	•				2242		
	* 1345*	53.07 *	73.1 *		# -2.187 <b>#</b>					2254		
9-15-71	<b>* 1600*</b>	53.11 *	73.5 *	98.615	* -2.200 *	-728.	* <b>-735.</b> *	-715.	* -350 ·	2289	× -336. *	2198
	# 1410#	53.04 *	72.7*	98.612	* -2.203 *	-734.	<b>*</b> -734. <b>*</b>	-714.		2283		
10-14-71			73.1 #		# -2.213 <b>*</b>					2310		
19-27-71		53.05 * 53.05 *	72.8 * 72.8 *		* -2.218 * * -1.394 *	-738. -464.				·2317 : ·0524 :		2220
13-27-71		53.05 *	72.8 *		* -1.379 *	-459.				0491		0400
10-27-71		53.01 *	72.3 *		≠ -1.322 *	-442.				0360		0268
10-27-71		53.02 *	72.5 *		* -1.337 *	-446.				0394		0303
15-28-71		53,01 *	72.3 *		* -1.318 *	-441.				0351	CONTRACTOR OF THE STATE OF THE	0260
10-20-71	* 1445*	53.00 *	72.2 #	99.507	* -1.308 *	-438.	* -434. *	-414.	* ~50· *	0327	<b>*</b> −36, *	0236
10-30-71		53.01 *	72.3 *		* -1.299 *	-434.	<b>*</b> −432. <b>*</b>	-412.	# -47. *	0310	× -33. *	0218
11 -1-71		53.01 *	72.3 *		* -1.289 *	<b>-431</b>				0288		0197
11 -4-71		53.03 *	72.6 *		* -1.280 *	-427.				0272		0181
11 -6-71		53.03 *	72.6 *		* -1.276 *	-+26.	The same of the sa		remande et exemplem to encomment of continues of	0263		0172
11-11-71		53.01 * 53.02 *	72.3 * 72.5 *		* -1.264 * * -1.249 *					0234 ·		0142
12 -1-71	-	53.01 *	72.3 *		* -1.237 *	-417. -414.				0203		0111
	# 1450*	52.98 *	72.0 *		* -1.201 *		<b>*</b> −398. *			~.0091		.0001
	* 1445*		71.8 *		* -1.189 *		÷ -394. ∗			0061		
										<b>-</b>		

CALIBRATIONS
WETTP RESISTANCE AT 0.0 DEGREES F. 46.59 DHMS
CHANGE IN TEMP. PER DHM CHANGE IN RESIS. 12.01 DEGREES F.
USFEUL RANGE 97.0-102.1 RATIO IN PERCENT 3.31 MICROSTRAIN PER 0.01 DEIGINAL CALIBRATION CONSTANT PERCENT RATIO CHANGE 3.31 MICROSTRAIN PER 0.01 CALIBRATION CONSTANT CORR. FOR LEAD

CONCRETE EXPANSION

PERCENT RATIO CHANGE
TEMPERATURE CORRECTION 5.1 MICROSTRAIN PER DEGREE F. 7.5 MICROSTRAIN PER DEGREE F.

## 1   Fig. 6   Times   Figs. 2   Figs. 3   Resist, ** Change   Fig. 14   Series   Microstrain   Temperature Characteristics   Fig. 6   Artin   Series   Figs. 4   Artin   Series   Fig		, , , , , , ,											
**************************************	DATE	* TIME*	METER *	TEMP. *	RESIST.	* CHANGE *	TOTAL	*	MICROS			RECTED	
**************************************		* +	RESIST.#	F. *									
## 1 -1-77 * 1 123* \$2.64 = 72.7 * 101.000 *		* *	3H45 *	*	PERCENT	#PERCENT #	STRAIN	* FROM	* C				
1117 * 1330 52.6 * 72.7 * 101.003 * 0. * 0. * 0. * * * * 11-11-7 * 015 52.6 * 72.5 * 100.979 *211 * -5. * -3. * * * * * * * 11-11-7 * 015 52.6 * 72.5 * 100.979 *211 * -5. * -3. * * * * * * * * * * * * * * * * * * *		* *		*		* *		#DAY CAS	T #	*1530 PSI	1 PSI *	1530 PSI*	1 PSI
1117 * 1330 52.6 * 72.7 * 101.003 * 0. * 0. * 0. * * * * 11-11-7 * 015 52.6 * 72.5 * 100.979 *211 * -5. * -3. * * * * * * * 11-11-7 * 015 52.6 * 72.5 * 100.979 *211 * -5. * -3. * * * * * * * * * * * * * * * * * * *	*** * * * * * * * * * * * * * * * * * *	****	****	***	***	****	****	******	***	****	***	****	** ** **
11 - 2-71							. 0.	* 0.	*	* *	*	*	
11-17-70				72.4 *	100.989	*011 *	~5.	<b>*</b> -3.	*	<b>*</b> *	*	傘	
11-2-77 x 17302									*	* 4	*	*	
11-24-77										* *	*	<b>*</b>	
1-2-71   1708   52.65   72.8   99.937   1-1063   -351     -352     -334       -12     -0076											0. *	· *	
11-24-71 * 17110* \$2,65 *** 72.8 *** 99.923 ***-1.077 *** -356. *** -357. *** -338. *** -16. ***-0106 **** 0. *** 0. 11-24-71 *** 1795** 52.65 *** 72.8 *** 99.772 ***-1.228 ***-066. ***-047. ***-388. ***-66. ***-0433 ***-50. ***-0.327 ***-1.228 ***-066. ***-047. ***-388. ***-66. ***-0433 ***-50. ***-0.327 ***-1.228 ***-066. ***-047. ***-388. ***-66. ***-0433 ***-50. ***-0.327 ***-1.228 ***-066. ***-047. ***-388. ***-66. ***-0433 ***-50. ***-0.327 ***-1.228 ***-066. ***-047. ***-388. ***-66. ***-0433 ***-50. ***-0.327 ***-1.228 ***-066. ***-047. ***-388. ***-66. ***-0433 ***-50. ***-0.327 ***-1.228 ***-1.228 ***-040. ***-0407. ***-399. ***-77. ***-05071 ***-05071 ***-0											0076 *	*	
11-92-70 ** 1949*** \$2,65 ** 72,8 ** 99,82 ** -1.158 ** -383. ** -384. ** -365. ** -43. ** -0281 ** -27. ** -0.175 11-57-71 ** 1739*** 52,65 ** 72.8 ** 99,772 ** -1.228 ** -406. ** -407. ** -386. ** -66. ** -0.433 ** -50. ** -0.327 11-57-71 ** 1739*** 52.6 ** 72.7 ** 99,770 ** -1.260 ** -617. ** -617. ** -517. ** -590. ** -77. ** -0.500 ** -60. ** -0.337 11-57-70 ** 1690*** 52.6 ** 72.7 ** 99,707 ** -1.260 ** -617. ** -617. ** -409. ** -877. ** -0.500 ** -60. ** -0.351 11-97-70 ** 1690*** 52.6 ** 72.7 ** 99,667 ** -1.353 ** -628. ** -628. ** -409. ** -877. ** -0.550 ** -685. ** -48. ** -0.552 11-97-70 ** 1703*** 52.6 ** 72.7 ** 99,667 ** -1.333 ** -641. ** -441. ** -423. ** -101. ** -0.658 ** -84. ** -0.552 11-97-70 ** 1640*** 52.6 ** 72.7 ** 99,667 ** -1.379 ** -657. ** -455. ** -431. ** -116. ** -0.756 ** -93. ** -0.052 11-97-70 ** 1540** 52.6 ** 72.7 ** 99,625 ** -1.515 ** -570. ** -668. ** -443. ** -116. ** -0.756 ** -93. ** -0.052 11-97-70 ** 1550** 52.0 ** 72.4 ** 99,555 ** -1.615 ** -570. ** -668. ** -443. ** -116. ** -0.756 ** -93. ** -0.052 11-97-70 ** 1550** 52.0 ** 72.4 ** 99,555 ** -1.615 ** -570. ** -668. ** -443. ** -116. ** -0.756 ** -93. ** -0.052 11-97-70 ** 1550** 52.0 ** 72.4 ** 99,555 ** -1.615 ** -570. ** -580. ** -580. ** -580. ** -127. ** -0.082 ** -111. ** -0.082 11-97-70 ** 1639** 52.6 ** 72.5 ** 99,355 ** -1.522 ** -502. ** -560. ** -580. ** -527. ** -114. ** -0.082 ** -											0106 *	0. *	0.
11-35-71 * 225 * 52.65 * 72.8 * 99.777 * -1.228 * -066 * -067 * -388 * -66 * -0433 * -50. * -0327 * -1.55-71 * 1736 * 5.46 * 72.7 * 99.767 * -1.228 * -666 * -617 * -617 * -399 * -77 * (-0500 * -60 * -0344 * -1.228 * -62													0175
1-22-71 0 1736 57.46 2 72.7 2 99.740 4 -1.260 4 -617. 8 -399 8 -77. 8 -0.930 8 -60. 8 -0.934 11-22-71 1 1739 8 29.64 8 72.7 2 99.661 4 -1.333 4 -641. 8 -441. 8 -423. 8 -101. 8 -0.658 8 -38. 8 -0.552 11-21. 1739 8 22.60 8 72.2 8 99.661 8 -1.335 8 -651. 8 -441. 8 -423. 8 -101. 8 -0.658 8 -38. 8 -0.552 11-20-71 8 1500 8 2.64 8 72.5 8 99.661 8 -1.335 8 -651. 8 -447. 8 -429. 8 -107. 8 -0.668 8 -98. 8 -0.552 11-20-70 8 1500 8 2.63 8 72.5 8 99.621 8 -1.379 8 -657. 8 -455. 8 -449. 8 -17. 8 -0.0668 8 -99. 8 -0.050 12 -1.20 8 2.62 8 72.4 8 99.551 8 -1.415 8 -470. 8 -469. 8 -17. 7 -0.060 8 -99. 8 -0.050 12 -1.20 8 2.62 8 72.4 8 99.551 8 -1.415 8 -470. 8 -469. 8 -17. 7 -0.060 8 -99. 8 -0.050 12 -1.20 8 2.62 8 72.5 8 99.316 8 -1.532 8 -305. 8 -598. 8 -499. 8 -167. 8 -1094 8 -151. 8 -0.075 12 -1.20 8 1558 52.63 8 72.5 8 99.316 8 -1.532 8 -305. 8 -598. 8 -499. 8 -167. 8 -1094 8 -151. 8 -0.098 12 -21.0 8 1568 52.63 8 72.5 8 99.316 8 -1.684 8 -558. 8 -557. 8 -529. 8 -207. 8 -1350 8 -150. 8 -1309 1 -127. 9 1.065 8 52.63 8 72.5 8 99.316 8 -1.684 8 -558. 8 -557. 8 -539. 8 -217. 8 -1.145 8 -200. 8 -1.1309 1 -127. 1 1.058 52.65 8 72.63 8 72.5 8 99.316 8 -1.694 8 -558. 8 -557. 8 -539. 8 -217. 8 -1.145 8 -200. 8 -1.1557 2 -29.7 1 1.058 52.65 8 72.63 8 72.5 8 99.316 8 -1.684 8 -558. 8 -557. 8 -557. 8 -529. 8 -207. 8 -1.356 8 -217. 8 -1.1557 2 -29. 7 1 1.058 52.65 8 72.6 8 72.9 8 99.004 8 -1.766 8 -593. 8 -595. 8 -577. 8 -254. 8 -1.663 8 -238. 8 -1.157 2 -29.7 1 1.058 52.6 8 72.9 8 99.004 8 -1.800 8 -1.004												-50. *	0327
11-25-7) = 1770* 52.65 * 72.7 * 99.707 * -1.293 * -628 * -428 * -409 * -87. * -0571 * -71. * -0.065 * -88. * -0.055 * 11-27-70 * 1703* 52.65 * 72.7 * 99.665 * -1.355 * -451. * -441. * -423. * -101. * -0.058 * -88. * -0.055 * 11-20-70 * 1703* 52.60 * 72.7 * 99.665 * -1.355 * -451. * -447. * -423. * -101. * -0.058 * -88. * -0.055 * 11-20-70 * 1703* 52.60 * 72.5 * 99.665 * -1.355 * -451. * -447. * -423. * -101. * -0.058 * -88. * -0.055 * -1.05 * -99. * -0.050 * -1.00 * 1703* 52.60 * 72.4 * 99.555 * -1.415 * -670. * -468. * -449. * -127. * -1094 * -121. * -0.0726 * -12. * -									± -399.	≠ -77. ×			
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,									± -409.	* -87. ¥		~71. *	0465
11-01-77 * 1707 * 67.00 * 72.7 * 79.665 * -1.355 * -6.51. * -4.47. * -4.29. * -10.7. * -0.698 * -91. * -0.592 11-01-77 * 1.601* \$72.0 * 77.5 * 99.621 * -1.355 * -5.67. * -456. * -433. * -116. * -0.7756 * -99. * -0.650 12-01-70 * 1.201* \$72.0 * 72.4 * 99.595 * -1.415 * -670. * -468. * -449. * -127. * -0.832 * -111. * -0.0726 12-01-70 * 1.559* \$2.07 * 73.0 * 99.595 * -1.415 * -670. * -468. * -449. * -167. * -10.94 * -151. * -0.988 12-01-70 * 1.601* \$72.0 * 72.7 * 99.347 * -1.653 * -505. * -508. * -527. * -207. * -1.150 * -109. * -1.													
13 -1 -70 * 1 100 * 57.63 * 72.5 * 99.621 * -1.379 * -457. * -455. * -433. * -116. *0756 * -99. * -0550 13 -1 -70 * 1 203 * 52.62 * 72.4 * 99.55 * -1.165 * -507. * -468. * -493. * -117. * * -032 * -111. * -0.726 12 -9 -71 * 1 1553 * 52.64 * 72.7 * 99.347 * -1.653 * 547. * 557. * -530. * -167. * -1904 * -151. * -0.098 12 -9 -71 * 1 1563 * 57.63 * 77.5 * 99.347 * -1.653 * 547. * 557. * -530. * -217. * -1.150 * * -109. * -1.1244 13 -9 -71 * 1 1 1373 * 57.63 * 77.5 * 99.248 * -1.735 * -575. * -575. * -575. * -576. * -233. * -1.1526 * -207. * -1.1420 1-16 -71 * 1 1373 * 57.63 * 77.5 * 99.25 * -1.735 * -575. * -576. * -556. * -233. * -1.1526 * -217. * -1.1420 1-16 -71 * 1 1373 * 57.63 * 77.5 * 99.25 * -1.735 * -575. * -576. * -556. * -233. * -1.1526 * -217. * -1.1420 1-16 -71 * 1 1575 * 57.65 * 73.0 * 99.204 * -1.735 * -575. * -577. * -556. * -233. * -1.163 * -238. * -1.157 2-2-71 * 1 1575 * 57.65 * 73.0 * 99.177 * -1.823 * -602. * -604. * -577. * -254. * -1.163 * -238. * -1.157 2-72-71 * 1 1575 * 57.65 * 73.0 * 99.133 * -1.867 * -516. * -612. * -601. * -279. * -1821 * -202. * -1.1715 3-9-71 * 1 1500 * 57.66 * 73.1 * 99.133 * -1.867 * -516. * -612. * -601. * -279. * -1821 * -202. * -1.1715 3-72-71 * 1 1000 * 57.68 * 73.1 * 99.133 * -1.867 * -516. * -612. * -612. * -299. * -1896 * -274. * -1.1790 5-11-71 * 1 1430 * 57.66 * 72.9 * 99.065 * -1.935 * -533. * -655. * -612. * -299. * -1896 * -274. * -1.189 5-2-71 * 1 1901 * 57.66 * 72.9 * 99.065 * -1.935 * -533. * -651. * -612. * -299. * -1896 * -274. * -1.189 5-2-71 * 1 1901 * 57.66 * 72.9 * 99.065 * -1.935 * -533. * -651. * -612. * -299. * -1896 * -274. * -1.189 5-2-71 * 1 1901 * 57.66 * 72.9 * 99.065 * -1.935 * -533. * -641. * -622. * -301. * -1964 * -248. * -1.189 5-2-71 * 1 1901 * 57.66 * 72.9 * 99.065 * -1.935 * -533. * -641. * -622. * -301. * -1964 * -248. * -1.189 5-2-71 * 1 1901 * 57.66 * 73.1 * 99.39 * -1.902 * -556. * -646. * -622. * -301. * -204. * -273. * -1.189 5-2-71 * 1 1901 * 57.66 * 73.1 * 99.39 * -1.902 * -556. * -631. * -612. * -531. * -612. * -622.													
12 - 1 - 7													
12 - 2 77 * 155 0* \$2.67 * 73.0 * 99.468 * -1.632 * -505. * -508. * -508. * -167. * -1094 * -151. * -0.998 12 - 2 71 * 16 16 16 16 16 17 * -1094 * -151. * -1.244 12 - 2 71 * 16 16 16 16 17 * -1094 * -151. * -1.244 13 - 2 71 * 16 16 16 17 * -1111 * -1111 * -1000 * -1.124 14 17 18 18 18 18 18 18 18 18 18 18 18 18 18													
12-2-70										,			
1 - 2 - 7   6													
1-1-7	12=23=70	* 1439*	52+64 *										
2 -0-71 & 13376 52.66 * 72.0 * 99.204 * -1.796 * -593. * -595. * -577. * -254. * -1.663 * -238. * -1.518 2 -0-71 * 16558 52.67 * 73.0 * 99.177 * -1.823 * -602. * -604. * -51724 * -248. * -1.618 3 -9-71 * 16458 52.67 * 73.0 * 99.155 * -1.844 * -509. * -611. * -593. * -271. * -1.769 * -254. * -1.163 3 -23-71 * 16459 52.66 * 73.1 * 99.133 * -1.867 * -516. * -619. * -601. * -279. * -1.824 * -262. * -1.713 4 -27-71 * 1200* 52.68 * 73.1 * 99.129 * -1.880 * -620. * -623. * -603. * -609. * -283. * -1.849 * -261. * -1.743 4 -27-71 * 1200* 52.68 * 73.1 * 99.993 * -1.902 * -527. * -631. * -617. * -290. * -1.896 * -274. * -1.1743 5 -1.71 * 1200* 52.66 * 72.9 * 99.083 * -1.917 * -633. * -611. * -295. * -1.125 * -273. * -1.819 5 -26-71 * 9156 52.66 * 72.9 * 99.083 * -1.935 * -539. * -641. * -623. * -630. * -630. * -1.996 * -289. * -1.890 6 -22-71 * 1200* 52.68 * 73.1 * 99.039 * -1.961 * -547. * -650. * -632. * -301. * -1.964 * -284. * -1.858 6 -2-71 * 1200* 52.66 * 72.9 * 99.039 * -1.971 * -650. * -650. * -632. * -310. *2024 * -293. * -1.990 6 -22-71 * 1200* 52.69 * 73.1 * 99.039 * -1.961 * -547. * -650. * -632. * -310. *2024 * -293. * -1.1940 7 -6-71 * 1339 * 52.69 * 73.1 * 99.022 * -1.978 * -550. * -650. * -632. * -310. *2024 * -293. * -1.1940 7 -6-71 * 1339 * 52.69 * 73.3 * 99.008 * -1.992 * -556. * -664. * -662. * -320. * -2039 * -304. * -1.1987 8 -1-71 * 1409 * 52.69 * 73.3 * 99.008 * -1.992 * -556. * -661. * -662. * -320. * -2039 * -304. * -1.1987 8 -1-71 * 1409 * 52.69 * 73.3 * 99.008 * -1.992 * -566. * -665. * -638. * -316. *2065 * -300. * -1.1987 9 -1-71 * 1409 * 52.69 * 73.3 * 99.008 * -1.992 * -566. * -665. * -646. * -324. * -2119 * -3008 * -2022 9 -15-71 * 1409 * 52.69 * 73.3 * 99.808 * -2.002 * -566. * -665. * -646. * -324. * -2119 * -3008 * -2022 9 -15-71 * 1409 * 52.69 * 73.3 * 99.808 * -2.002 * -566. * -665. * -638. * -316. * -2039 * -304. * -1.1987 9 -1-71 * 1409 * 52.69 * 73.3 * 99.808 * -1.092 * -566. * -665. * -666. * -638. * -316. * -2039 * -304. * -1.1987 9 -1-71 * 1409 * 52.69 * 73.3 * 99.8													
2-25-71 * 1035* 52.57 * 73.0 * 99.157 * -1.823 * -602. * -604. * -586. * -264. * -1.724 * -248. * -1618 3 -6-71 * 1495* 52.66 * 73.1 * 99.133 * -1.867 * -516. * -601. * -593. * -271. * -1.769 * -254. * -1633 3-23-71 * 1200* 52.68 * 73.1 * 99.133 * -1.867 * -516. * -619. * -601. * -277. * -1.821 * -262. * -1715 4 -6-71 * 1200* 52.68 * 73.1 * 99.120 * -1.880 * -620. * -623. * -605. * -283. * -1.849 * -267. * -1743 4-27-71 * 1200* 52.66 * 72.9 * 99.083 * -1.917 * -633. * -631. * -612. * -290. * -1.836 * -274. * -1.179 5-11-71 * 1430* 52.66 * 72.9 * 99.085 * -1.935 * -539. * -641. * -623. * -301. * -1.964 * -284. * -1.858 5 -8-71 * 1910* 52.68 * 73.1 * 99.099 * -1.902 * -623. * -664. * -623. * -301. * -1.964 * -284. * -1.858 5 -8-71 * 1910* 52.68 * 73.1 * 99.099 * -1.991 * -650. * -650. * -652. * -301. * -1.964 * -284. * -1.858 5 -8-71 * 1200* 52.68 * 73.1 * 99.099 * -1.991 * -650. * -650. * -632. * -310. * -2.024 * -293. * -1.918 7 -6-71 * 1333* 52.68 * 73.1 * 99.029 * -1.971 * -650. * -650. * -632. * -310. * -2.024 * -293. * -1.918 7 -6-71 * 1333* 52.68 * 73.1 * 99.022 * -1.971 * -650. * -650. * -632. * -310. * -2.024 * -293. * -1.918 7 -70-71 * 1000* 52.70 * 73.4 * 99.022 * -1.978 * -551. * -650. * -633. * -310. * -2.046 * -297. * -1.199 8 -3-71 * 1000* 52.70 * 73.4 * 99.022 * -1.978 * -551. * -650. * -633. * -315. * -2.05 * -300. * -1.959 9 -3-71 * 1400* 52.69 * 73.3 * 99.008 * -1.992 * -556. * -661. * -642. * -320. * -2.093 * -300. * -1.991 8 -17-71 * 8439* 52.70 * 73.4 * 98.997 * -2.003 * -559. * -665. * -646. * -324. * -2.119 * -308. * -2.013 8 -15-71 * 1400* 52.77 * 73.4 * 98.998 * -2.022 * -564. * -671. * -653. * -331. * -2.164 * -315. * -2.026 9 -15-71 * 14109* 52.69 * 73.3 * 99.086 * -2.022 * -564. * -672. * -665. * -646. * -324. * -2.119 * -308. * -2.013 9 -15-71 * 14109* 52.67 * 73.0 * 98.978 * -2.025 * -666. * -666. * -642. * -320. * -2.039 * -304. * -1.997 10-27-71 * 1409* 52.69 * 73.3 * 99.086 * -2.034 * -570. * -675. * -665. * -646. * -324. * -2.119 * -308. * -2.013 10-27-71 * 1409* 52.66 * 72.9 *	1-19-70	* 1:305*	52,63 🖘										
3 -9 -71 * 1494* 52 -66 * 73.1 * 99.133 * -1.867 * -516. * -619. * -601. * -279. * -1821 * -262. * -1613 * -617. * 1000* 52.68 * 73.1 * 99.120 * -1.880 * -620. * -623. * -605. * -283. * -1849 * -267. * -1743 * -277.11 * 1200* 52.68 * 73.1 * 99.120 * -1.880 * -620. * -623. * -605. * -283. * -1849 * -267. * -1743 * -277.11 * 1200* 52.68 * 73.1 * 99.098 * -1.902 * -527. * -631. * -612. * -290. * -1896 * -274. * -1179 * -1711 * 1430* 52.66 * 72.9 * 99.083 * -1.917 * -633. * -635. * -617. * -295. * -1925 * -278. * -1819 * -274. * -274. * -1819 * -274. * -27	2 -4-71	* 1337#											
3-2-7-1	? - 25 - 71		52.67 *	73.0 *									
4-6-71 * 1000 * 52.68 * 73.1 * 99.120 * -1.880 * -620. * -623. * -605. * -283. * -1.849 * -267. * * -1.174   4-7-71 * 1200 * 52.68 * 73.1 * 99.093 * -1.902 * -527. * -631. * -612. * -290. * -1.896 * -274. * -1.179   5-11-71 * 1430 * 52.66 * 72.9 * 99.083 * -1.917 * -633. * -635. * -617. * -295. * -1.925 * -278. * -1.819   5-25-71 * 1200 * 52.66 * 72.9 * 99.065 * -1.935 * -637. * -641. * -623. * -301. * -1.964 * -284. * -1.858   5-8-11 * 615 * 52.67. * 73.0 * 99.055 * -1.949 * -643. * -641. * -623. * -301. * -1.964 * -284. * -1.859   6-22-71 * 1200 * 52.68 * 73.1 * 99.039 * -1.961 * -547. * -650. * -632. * -310. *2024 * -293. * -1.940   7-6-71 * 1300 * 52.69 * 73.1 * 99.029 * -1.971 * -650. * -653. * -313. * -2.046 * -297. * -1.940   7-20-71 * 1400 * 52.69 * 73.3 * 99.003 * -1.941 * -547. * -650. * -632. * -310. *2024 * -293. * -1.940   8-13-71 * 1400 * 52.69 * 73.3 * 99.003 * -1.971 * -650. * -656. * -638. * -316. * -2.065 * -330. * -1.959   8-13-71 * 1400 * 52.69 * 73.3 * 99.003 * -1.992 * -556. * -661. * -642. * -320. * -2.033 * -310. * -2.024   8-11-11 * 1400 * 52.69 * 73.3 * 98.997 * -2.003 * -559. * -665. * -646. * -324. * -2119 * -308. * -2013   8-11-11 * 1400 * 52.69 * 73.3 * 98.997 * -2.003 * -559. * -665. * -646. * -326. * -21132 * -310. * -2026   9-15-71 * 1400 * 52.69 * 73.3 * 98.997 * -2.003 * -559. * -665. * -646. * -326. * -21132 * -310. * -2026   9-15-71 * 1410 * 52.69 * 73.3 * 98.997 * -2.034 * -570. * -667. * -649. * * -326. * -21132 * -310. * -2026   9-15-71 * 1410 * 52.69 * 73.3 * 98.997 * -2.034 * -570. * -667. * -649. * -326. * -21132 * -310. * -2058   9-15-71 * 1410 * 52.69 * 73.3 * 98.997 * -2.034 * -570. * -668. * -667. * -648. * -326. * -21132 * -310. * -2058   9-15-71 * 1410 * 52.69 * 73.3 * 99.896 * -2.035 * -668. * -667. * -649. * -336. * -2119 * -308. * -2013   10-27-71 * 1410 * 52.69 * 73.3 * 99.896 * -2.035 * -668. * -667. * -649. * -336. * -2119 * -308. * -2058   10-27-71 * 1410 * 52.69 * 73.4 * 98.997 * -2.035 * -668. * -667. * -649. * -336. * -2119 * -308. * -2011   10-27	3 -9-71	# 1445K	52.£7. t_	73.0 *							1(69		
4-27-71	3-23-71	* 1547#	52.68 *	73 - 1 *									
5-11-71 * 1430* 52.66 * 72.9 * 99.083 * -1.917 * -633. * -635. * -617. * -295. * -1925 * -278. * -1819 5-25-71 * 1200* 57.66 * 72.9 * 99.085 * -1.935 * -539. * -641. * -623. * -301. * -1964 * -284. * -1858 5-8-71 * 915* 52.57 * 73.0 * 99.083 * -1.917 * -659. * -646. * -627. * -305. * -1996 * -289. * -1890 6-2-71 * 1200* 52.68 * 73.1 * 99.039 * -1.961 * -547. * -650. * -632. * -310. *2024 * -293. *1918 7-6-71 * 1300* 52.68 * 73.1 * 99.039 * -1.971 * -650. * -650. * -655. * -313. * -2046 * -297. * -1940 7-0-71 * 1300* 52.69 * 73.4 * 99.022 * -1.978 * -551. * -650. * -655. * -316. * -2004 * -297. * -1940 3-3-71 * 1400* 52.70 * 73.4 * 99.038 * -1.902 * -556. * -661. * -642. * -320. * -2093 * -304. * -1987 8-17-71 * 345* 52.69 * 73.3 * 99.088 * -1.902 * -559. * -665. * -646. * -224. * -2119 * -308. * -2013 8-17-71 * 1345* 52.69 * 73.3 * 98.997 * -2.010 * -562. * -667. * -646. * -224. * -2119 * -308. * -2013 8-17-71 * 1400* 52.70 * 73.4 * 98.997 * -2.022 * -664. * -667. * -648. * -326. * -2.132 * -310. *2026 9-15-71 * 1610* 52.77 * 73.4 * 98.997 * -2.022 * -664. * -670. * -653. * -331. * -2.164 * -315. * -2.058 9-15-71 * 1610* 52.70 * 73.4 * 98.997 * -2.022 * -664. * -670. * -655. * -648. * -326. * -2.132 * -310. *2026 10-27-71 * 1400* 52.70 * 73.3 * 99.896 * -2.023 * -668. * -670. *	4 -6-71	⇒ 1000≠	52.68 *										
5-16-71 * 1700 * 52.66 * 72.9 * 99.065 * -1.935 * -537. * -641. * -623. * -301. *1964 * -284. *1858   5-8-71 * 1200 * 52.67 * 73.0 * 99.051 * -1.949 * -643. * -646. * -627. * -305. *1996 * -289. *1890   5-2-71 * 1200 * 52.68 * 73.1 * 99.039 * -1.961 * -547. * -650. * -632. * -310. *2024 * -293. *1918   7-6-71 * 1330 * 52.68 * 73.1 * 99.029 * -1.971 * -650. * -654. * -632. * -310. *2046 * -297. *1940   7-0-71 * 1300 * 52.69 * 73.4 * 99.022 * -1.978 * -551. * -656. * -638. * -316. *2065 * -2093 *1959   3-3-71 * 1400 * 52.69 * 73.3 * 99.008 * -1.992 * -556. * -661. * -642. * -320. *2093 * -304. *1987   8-31-71 * 3438 * 52.79 * 73.4 * 98.997 * -2.003 * -559. * -665. * -646. * -324. * -2119 * -308. * -2013   8-31-71 * 1400 * 52.70 * 73.4 * 98.997 * -2.010 * -662. * -667. * -646. * -324. * -2119 * -308. * -2013   8-31-71 * 1400 * 52.77 * 73.6 * 98.998 * -2.022 * -664. * -667. * -668. * -324. * -2119 * -308. * -2013   8-31-71 * 1400 * 52.77 * 73.4 * 98.997 * -2.025 * -668. * -671. * -653. * -331. * -2164 * -315. * -2058   9-15-71 * 1400 * 52.77 * 73.4 * 98.966 * -2.025 * -668. * -671. * -653. * -331. * -2166 * -318. * -2080   10-77-71 * 1400 * 52.69 * 73.3 * 99.806 * -2.034 * -570. * -675. * -656. * -334. * -2119 * -320. * -2080   10-77-71 * 1400 * 52.69 * 73.3 * 99.806 * -2.039 * -572. * -676. * -658. * -334. * -2166 * -318. * -2080   10-77-71 * 1413 * 52.69 * 73.3 * 99.806 * -2.039 * -572. * -676. * -658. * -334. * -2165 * -320. * -2089   10-77-71 * 1413 * 52.69 * 73.3 * 99.806 * -1.174 * -386. * -340. * -371. * -49. * -00523 * -33. * -0217   10-77-71 * 1413 * 52.69 * 73.3 * 99.806 * -1.174 * -386. * -340. * -371. * -49. * -00523 * -33. * -0217   10-77-71 * 1420 * 52.65 * 72.8 * 99.85 * -1.105 * -3670. * -3676. * -568. * -340. * -2195 * -320. * -2089    10-77-71 * 1420 * 52.65 * 72.8 * 99.85 * -1.105 * -3670. * -3676. * -368. * -340. * -2195 * -320. * -2045 * -318. * -2065    11-77-71 * 1420 * 52.65 * 72.8 * 99.85 * -1.105 * -3670. * -368. * -340. * -2195 * -318. * -2025 * -318. *	4-27-71	* 1200#	52.69 *	73.1 *	99.098	* -1.902 #							
5 -8-71 * 915* 52.67 * 73.0 * 99.051 * -1.949 * 643. * -646. * -627. * -305. * -1996 * -289. *1890 6 -29-71 * 1200* 52.68 * 73.1 * 99.039 * -1.961 * -547. * -650. * -632. * -310. *2024 * -293. *1918 7 -6-71 * 1303* 52.68 * 73.1 * 99.029 * -1.971 * -650. * -650. * -635. * -313. * -2046 * -297. * -1940 7 -9.1-1 * 1000* 52.70 * 73.4 * 99.022 * -1.978 * -551. * -650. * -636. * -313. * -2046 * -297. * -1940 7 -9.1-71 * 1400* 52.69 * 73.3 * 99.008 * -1.992 * -556. * -661. * -642. * -320. *2093 * -304. *1987 8 -17-71 * 8431* 52.70 * 73.4 * 98.997 * -2.003 * -559. * -665. * -664. * -642. * -320. *2093 * -304. *1987 8 -31-71 * 1395* 52.69 * 73.3 * 98.999 * -2.010 * -662. * -667. * -666. * -632. * -2119 * -308. * -2013 8 -31-71 * 1600* 52.72 * 73.6 * 98.997 * -2.022 * -664. * -672. * -653. * -331. * -2164 * -315. * -2058 9 -15-71 * 1610* 52.67 * 73.0 * 98.998 * -2.022 * -664. * -672. * -653. * -331. * -2161 * -314. * -2058 9 -17-71 * 1403* 52.69 * 73.3 * 98.966 * -2.034 * -570. * -675. * -676. * -653. * -331. * -2161 * -314. * -2055 10-14-71 * 1403* 52.69 * 73.3 * 99.866 * -2.034 * -570. * -675. * -676. * -678. * -334. * -2186 * -318. * -2089 11-27-71 * 1403* 52.69 * 73.3 * 99.866 * -2.034 * -570. * -675. * -676. * -698. * -336. * -2195 * -320. * -2089 11-27-71 * 1403* 52.69 * 73.3 * 99.826 * -1.174 * -336. * -390. * -372. * -49. * -0.0323 * -33. * -0.0217 11-77-71 * 1413* 52.69 * 73.3 * 99.826 * -1.174 * -336. * -390. * -372. * -49. * -0.0323 * -33. * -0.0217 11-27-71 * 1405* 52.60 * 72.8 * 99.857 * -1.163 * -370. * -378. * -360. * -370. * -0.0455 11-27-71 * 1405* 52.60 * 72.8 * 99.857 * -1.163 * -370. * -378. * -360. * -370. * -0.0455 11-27-71 * 1406* 52.61 * 72.3 * 99.857 * -1.164 * -373. * -371. * -49. * -0.0323 * -33. * -0.0217 11-27-71 * 1406* 52.61 * 72.3 * 99.857 * -1.164 * -370. * -368. * -340. * -25. * -0.0161 * -6. * -0.0055 11-17-11 * 1500* 52.62 * 72.4 * 99.856 * -1.105 * -360. * -359. * -341. * -19. * -0.022 * -15. * -0.0035 11-17-11 * 1500* 52.62 * 72.4 * 99.856 * -1.106 * -360. * -359	5-11-71	* 1430*	52.65 #	72.9 *	99.083	* -1.917	-633.						
6-27-71 * 1200 * 52.68 * 73.1 * 99.039 * -1.961 * -547. * -650. * -632. * -310. *2024 * -293. *1918 7 -6-71 * 1330 * 52.68 * 73.1 * 99.029 * -1.971 * -650. * -654. * -635. * -313. * -2046 * -297. * -1940 7 -20-71 * 1900 * 52.70 * 73.4 * 99.022 * -1.978 * -651. * -656. * -633. * -313. * -2046 * -297. * -1959 3 -3-71 * 1400 * 52.69 * 73.3 * 99.008 * -1.992 * -556. * -661. * -642. * -320. *2093 * -304. * -1987 8 -17-71 * 340 * 52.70 * 73.4 * 98.997 * -2.003 * -559. * -665. * -646. * -324. * -2119 * -308. * -2013 8 -31-71 * 1450 * 52.69 * 73.3 * 98.990 * -2.010 * -662. * -667. * -648. * -326. * -2132 * -310. * -2026 9 -15-71 * 1600 * 52.72 * 73.6 * 98.978 * -2.022 * -564. * -667. * -648. * -326. * -2132 * -310. * -2055 1 -14-71 * 1400 * 52.67 * 73.0 * 98.978 * -2.022 * -564. * -672. * -653. * -331. * -2164 * -315. * -2058 1 -1-71 * 1400 * 52.70 * 73.3 * 99.826 * -2.034 * -570. * -675. * -655. * -334. * -2186 * -318. * -2080 1 -27-71 * 1401 * 52.69 * 73.3 * 99.826 * -2.034 * -570. * -675. * -658. * -334. * -2186 * -318. * -2080 1 -27-71 * 1401 * 52.69 * 73.3 * 99.826 * -1.174 * -386. * -390. * -372. * -49. * -0323 * -330. * -0217 1 -27-71 * 1401 * 52.69 * 73.3 * 99.826 * -1.175 * -338. * -389. * -371. * -49. * -0323 * -33. * -0217 1 -27-71 * 1420 * 52.65 * 72.8 * 99.827 * -1.142 * -373. * -371. * -353. * -31. * -0202 * -15. * -00139 1 -29-71 * 1445 * 52.69 * 72.3 * 99.837 * -1.113 * -370. * -368. * -334. * -2202 * -15. * -0096 1 -29-71 * 1445 * 52.61 * 72.3 * 99.837 * -1.113 * -370. * -368. * -347. * -49. * -0318 * -32. * -0012 1 -27-71 * 1450 * 52.62 * 72.4 * 99.897 * -1.109 * -364. * -365. * -344. * -22. * -0141 * -5. * -0096 1 -1-71 * 1350 * 52.62 * 72.4 * 99.994 * -1.096 * -364. * -365. * -344. * -22. * -0141 * -5. * -0096 1 -1-71 * 1350 * 52.62 * 72.4 * 99.994 * -1.096 * -364. * -355. * -331. * -2101 * -9. * -0022 * -15. * -0005 1 -1-71 * 1560 * 52.52 * 72.4 * 99.994 * -1.096 * -364. * -355. * -334. * -2003 * -2003 * -2003 * -2003 * -2003 * -2003 * -2003 * -2003 * -2003 * -2003 * -2003 * -2003 * -2003	5-25-71		52.66 *	72.9 *	99.065	* -1.935 *	-539.						
6-29-71 * 1200				73.0 *	99.051	* -1.949	-643.						
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3 -3-71 * 1400* 52.69 * 73.3 * 99.008 * -1.992 * -556. * -661. * -642. * -320. *2093 * -304. *1987 8-17-71 * 843* 52.70 * 73.4 * 98.997 * -2.003 * -559. * -665. * -646. * -324. *2119 * -308. *2013 8-31-71 * 1355* 52.69 * 73.3 * 98.990 * -2.010. * -662. * -667. * -648. * -326. *2132 * -310. *2026 9-15-71 * 1600* 52.77 * 73.6 * 98.978 * -2.022 * -564. * -672. * -653. * -331. *2164 * -315. *2058 9-17-71 * 1610* 52.67 * 73.0 * 98.975 * -2.025 * -668. * -671. * -653. * -331. *2161 * -314. * -2055 10-14-71 * 1400* 52.70 * 73.4 * 98.966 * -2.034 * -570. * -675. * -656. * -334. * -2186 * -318. *2080 10-27-71 * 1403* 52.69 * 73.3 * 98.961 * -2.039 * -572. * -676. * -658. * -336. * -2195 * -320. *2089 11-27-71 * 1403* 52.69 * 73.3 * 99.826 * -1.174 * -386. * -390. * -372. * -49. *0323 * -333. * -2017 11-27-71 * 1420* 52.65 * 72.8 * 99.826 * -1.174 * -386. * -389. * -371. * -49. *0323 * -33. * -0217 11-28-71 * 1445* 52.69 * 72.8 * 99.857 * -1.143 * -379. * -378. * -360. * -371. * -49. *0318 * -32. * -0012 11-28-71 * 1445* 52.61 * 72.3 * 99.876 * -1.124 * -373. * -371. * -353. * -31. * -0202 * -15. * -0096 11-29-71 * 1459 * 52.62 * 72.4 * 99.895 * -1.105 * -367. * -365. * -347. * -25. * -0161 * -8. * -0055 11-27-71 * 1576* 52.62 * 72.4 * 99.895 * -1.105 * -367. * -365. * -347. * -25. * -0161 * -8. * -0055 11-17-71 * 1350* 52.63 * 72.5 * 99.914 * -1.086 * -360. * -359. * -341. * -19. * -00122 * -2. * -0016 11-6-71 * 1330* 52.64 * 72.7 * 99.914 * -1.086 * -358. * -358. * -340. * -18. * -0015 * -1. * -0009 11-11-71 * 1400* 52.61 * 72.4 * 99.992 * -1.071 * -356. * -359. * -331. * -2005 * 7. * -0047 11-18-71 * 1640* 52.62 * 72.4 * 99.992 * -1.071 * -356. * -359. * -331. * -0015 * -0.005 * 7. * -0.005 * 7. * -0.005 11-19-71 * 1500* 52.62 * 72.4 * 99.994 * -1.011 * -356. * -359. * -331. * -0.005 * 7. * -0.005 * 7. * -0.005 11-19-71 * 1500* 52.62 * 72.4 * 99.994 * -1.096 * -356. * -350. * -331. * -0.005 * 7. * -0.005 11-19-71 * 16408 52.60 * 72.4 * 99.994 * -1.011 * -356. * -350. * -331. *					99.022	* -1.978 *	-551.	* -656.	<b>* -638.</b>	* ~316. ·	*2065 *		
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98.975 * -2.025 * -668. * -671. * -653. * -331. *2161 * -314. *2055  12-14-71 * 1400* 52.67 * 73.4 * 98.966 * -2.034 * -570. * -675. * -555. * -334. *2186 * -318. *2080  12-27-71 * 1403* 52.69 * 73.3 * 98.966 * -2.039 * -572. * -676. * -658. * -336. *2195 * -320. *2089  12-27-71 * 1401* 52.69 * 73.3 * 99.716 * -1.284 * -422. * -425. * -408. * -86. *0561 * -70. *0455  12-27-71 * 1413* 52.69 * 73.3 * 99.826 * -1.174 * -386. * -390. * -372. * -49. *0323 * -33. *0217  12-27-71 * 1420* 52.65 * 72.8 * 99.825 * -1.175 * -388. * -389. * -371. * -49. *0318 * -32. *0212  12-27-71 * 2125* 52.63 * 72.5 * 99.857 * -1.143 * -379. * -378. * -360. * -37. * -02045 * -21. *0139  12-29-71 * 1445* 52.62 * 72.4 * 99.876 * -1.124 * -373. * -371. * -353. * -31. *0202 * -15. *0096  10-29-71 * 1445* 52.61 * 72.3 * 99.887 * -1.113 * -370. * -368. * -349. * -27. *0176 * -11. *0070  10-30-71 * 1575* 52.62 * 72.4 * 99.99 * -1.096 * -364. * -362. * -344. * -22. *0141 * -5. *0035  11 -4-71 * 1350* 52.62 * 72.4 * 99.91 * -1.096 * -364. * -362. * -344. * -22. *0141 * -5. *0035  11 -6-71 * 1350* 52.62 * 72.4 * 99.91 * -1.096 * -358. * -359. * -341. * -19. *0122 * -2. * *0016  11 -6-71 * 1350* 52.62 * 72.7 * 99.91 * -1.086 * -350. * -359. * -341. * -19. *0122 * -2. * *0016  11 -1-71 * 1609* 52.61 * 72.3 * 99.929 * -1.071 * -356. * -359. * -341. * -19. *0059 * -1. * -0009  11-11-71 * 1609* 52.62 * 72.4 * 99.942 * -1.058 * -350. * -359. * -341. * -19. * -00159 * 7. * -0007  12-1-17 * 1609* 52.62 * 72.4 * 99.942 * -1.058 * -350. * -350. * -331. * -9. *0059 * 7. * -0047  12-1-71 * 1650* 52.62 * 72.4 * 99.954 * -1.058 * -350. * -350. * -331. * -9. *0059 * 7. * -0047  12-1-71 * 1650* 52.62 * 72.4 * 99.994 * -1.071 * -356. * -350. * -331. * -9. *0059 * 7. * -0047  12-1-71 * 1650* 52.52 * 72.4 * 99.994 * -1.071 * -356. * -350. * -331. * -9. *0059 * 7. * -0047  12-1-71 * 1650* 52.53 * 71.9 * 99.989 * -1.011 * -338. * -333. * -314. * 8. * -0050 * 24. * -00156									<b>*</b> -653.				
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13-27-71 * 1403* 52.69 * 73.3 * 98.961 * -2.039 * -572. * -676. * -658. * -336. * -2195 * -320. * -2089 13-27-71 * 1403* 52.69 * 73.3 * 99.716 * -1.284 * -422. * -425. * -408. * -86. *0561 * -70. *0455 13-27-71 * 1420* 52.69 * 73.3 * 99.826 * -1.174 * -336. * -390. * -372. * -49. * -0323 * -33. *0217 13-27-71 * 1420* 52.65 * 72.8 * 99.825 * -1.175 * -388. * -389. * -371. * -49. *0318 * -32. *0212 13-27-71 * 1420* 52.63 * 72.5 * 99.857 * -1.143 * -379. * -378. * -360. * -37. *0245 * -21. *0139 13-28-71 * 1445* 52.62 * 72.4 * 99.876 * -1.124 * -373. * -371. * -353. * -31. *0202 * -15. *0029 10-30-71 * 1575* 52.62 * 72.4 * 99.897 * -1.113 * -370. * -368. * -349. * -27. * -0116 * -11. *0070 10-30-71 * 1575* 52.62 * 72.4 * 99.995 * -1.105 * -367. * -365. * -347. * -25. *0161 * -8. *0055 11 -4-71 * 1350* 52.62 * 72.4 * 99.996 * -1.096 * -364. * -362. * -344. * -22. *0141 * -5. *0055 11 -4-71 * 1350* 52.63 * 72.5 * 99.914 * -1.086 * -360. * -359. * -340. * -18. *0115 * -1. *0009 11-11-71 * 1409* 52.61 * 72.3 * 99.929 * -1.071 * -356. * -356. * -340. * -18. *0115 * -1. *0009 11-11-71 * 1409* 52.62 * 72.4 * 99.994 * -1.053 * -356. * -356. * -340. * -18. *0115 * -1. *0009 11-11-71 * 1500* 52.62 * 72.4 * 99.942 * -1.053 * -356. * -356. * -340. * -18. *0015 * -1. *0009 11-11-71 * 1500* 52.62 * 72.4 * 99.942 * -1.053 * -351. * -356. * -340. * -18. *0015 * -1. *0009 11-11-71 * 1500* 52.62 * 72.4 * 99.942 * -1.053 * -351. * -356. * -327. * -5. *0033 * 11. *0073 1 -3-72 * 1450* 52.52 * 72.4 * 99.954 * -1.011 * -338. * -330. * -314. * 8. * * -0050 * 24. * -0156					98.966				<b>*</b> -656.				
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10-27-71					99.716	* -1.284	× -422.	<b>*</b> -425.	* -408.	<b>*</b> -86.	* - <b>.</b> 0561 *	-70. *	0455
19-77-71 * 1429* 52.65 * 72.8 * 99.825 * -1.175 * -388. * -389. * -371. * -49. *0318 * -32. *0212 19-77-71 * 2125* 52.63 * 72.5 * 99.857 * -1.143 * -370. * -378. * -360. * -37. *0245 * -21. *0139 19-28-71 * 1445* 52.62 * 72.4 * 99.876 * -1.124 * -373. * -371. * -353. * -31. *0202 * -15. *0096 10-29-71 * 1445* 52.61 * 72.3 * 99.887 * -1.113 * -370. * -368. * -349. * -27. *0176 * -11. *0070 10-30-71 * 1575* 52.62 * 72.4 * 99.897 * -1.105 * -367. * -368. * -349. * -27. *0176 * -11. *0070 10-30-71 * 1575* 52.62 * 72.4 * 99.994 * -1.105 * -367. * -365. * -347. * -25. *0161 * -8. *0055 11 -4-71 * 1350* 52.62 * 72.4 * 99.994 * -1.096 * -364. * -352. * -344. * -22. *0141 * -5. *0035 11 -4-71 * 1330* 52.63 * 72.5 * 99.914 * -1.086 * -360. * -359. * -341. * -19. *0122 * -2. *0016 11 -6-71 * 1330* 52.65 * 72.7 * 99.918 * -1.098 * -358. * -358. * -340. * -18. *0115 * -1. *0009 11-11-71 * 1409* 52.62 * 72.4 * 99.929 * -1.071 * -356. * -356. * -335. * -13. *0085 * 3. * .0021 11-18-71 * 1649* 52.62 * 72.4 * 99.954 * -1.058 * -351. * -350. * -331. * -9. *0085 * 7. * .0047 12-1-71 * 1550* 52.52 * 72.4 * 99.954 * -1.071 * -336. * -346. * -327. * -5. *0033 * 11. * .0073 1-3-72 * 1450* 52.53 * 71.9 * 99.989 * -1.011 * -338. * -333. * -314. * 8. * .0050 * 24. * .0156								<b>*</b> -390.	<b>*</b> ~372.	<b>*</b> -49.	×0323 ≠	-33, *	0217
$\begin{array}{cccccccccccccccccccccccccccccccccccc$					99.825	* -1.175	× -388.	<b>*</b> -389.	* ~371.	* -49.	*0318 *	-32. *	0212
10-28-71 * 1445* 52.62 * 72.4 * 99.876 * -1.124 * -373. * -371. * -353. * -31. *0202 * -15. *0096 10-20-71 * 1445* 52.61 * 72.3 * 99.887 * -1.113 * -370. * -368. * -349. * -27. *0176 * -11. *0070 10-30-71 * 1576* 52.62 * 72.4 * 99.895 * -1.105 * -367. * -365. * -347. * -25. *0161 * -8. *0055 11 -1-71 * 1350* 52.62 * 72.4 * 99.994 * -1.096 * -364. * -362. * -344. * -22. *0141 * -5. *0035 11 -4-71 * 1350* 52.63 * 72.5 * 99.914 * -1.086 * -360. * -359. * -341. * -19. *0122 * -2. *0016 11 -0-71 * 1330* 52.54 * 72.7 * 99.918 * -1.082 * -358. * -358. * -340. * -18. *0115 * -1. *0009 11-11-71 * 1400* 52.61 * 72.3 * 99.929 * -1.071 * -356. * -354. * -335. * -13. *0085 * 3. * .0021 11-12-71 * 1640* 52.62 * 72.4 * 99.942 * -1.058 * -351. * -350. * -331. * -9. *0059 * 7. * .0047 12-1-71 * 1550* 52.52 * 72.4 * 99.954 * -1.046 * -347. * -346. * -327. * -5. *0033 * 11. * .0073 1-3-72 * 1450* 52.53 * 71.9 * 99.989 * -1.011 * -338. * -333. * -314. * 8. * .0050 * 24. * .0156									<b>*</b> -360.	* -37.	*0245 *	-21. *	0139
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10-30-71 * 1575* 52.62 * 72.4 * 99.895 * -1.105 * -367. * -365. * -347. * -25. *0161 * -8. *0055  11 -1-71 * 1350* 52.62 * 72.4 * 99.904 * -1.096 * -364. * -362. * -344. * -22. *0141 * -5. *0035  11 -4-71 * 1350* 52.63 * 72.5 * 99.914 * -1.086 * -360. * -359. * -341. * -19. *0122 * -2. *0016  11 -6-71 * 1330* 52.54 * 72.7 * 99.913 * -1.032 * -358. * -358. * -340. * -18. *0115 * -1. *0009  11-11-71 * 1400* 52.61 * 72.3 * 99.929 * -1.071 * -356. * -354. * -335. * -314. * -9. *0085 * 3. * .0021  11-12-71 * 1640* 52.62 * 72.4 * 99.942 * -1.058 * -351. * -350. * -331. * -9. *0059 * 7. * .0047  12-1-71 * 1550* 52.52 * 72.4 * 99.954 * -1.046 * -347. * -346. * -327. * -5. *0033 * 11. * .0073  1 -3-72 * 1450* 52.53 * 71.9 * 99.989 * -1.011 * -338. * -333. * -314. * 8. * .0050 * 24. * .0156											*0176 *	-11. *	0070
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5 -d-15 # 1441m 35700 w 15.4 # 100,030 w ±5.000 # 335. # 355. # 317.												= -	
	2 -4-12	. + 144 <sup>1</sup> *	72 a 70 74	/£.7 *	100.039		. ورو						

STRAIN METER NO. X 4 PROJECT MILLSTONE B Y65901 LOADED TO 1530PSI AT AGE 212 DAYS LOCATION DAVIS HALL ROOM 3604 73F DATE CAST 10-27-70

PERCENT RATIO CHANGE

CALIBRATION CONSTANT CORR. FOR LEAD

3.33 MICROSTRAIN PER 0.01
PERCENT RATIO CHANGE
5.1 MICROSTRAIN PER DEGREE F.

TEMPERATURE CORRECTION CONCRETE EXPANSION

7.5 MICROSTRAIN PER DEGREE F.

C1 34500 11	V. H (3.7 m)	•											
		WETER *	TEMP. ≠	DECICT	* CHANGE	# TOTAL	*	MICROS	TRAIN	TEMPE	RATURE CO	RRECTED	
TATE								• • •			LOADING		
	* *	RESIST.#	F. #	RATIU	*IN RATIO	* NTD45H		* O			1 MIN.	IN MIN. 4	COMEN.
	<b>ў 4</b>	PHMS #	*	PERCENT	#PERCENT		* PKUM	. <del>-</del>			1 PSI +		
	# #	*	#		*	*	*DAY CAST	*	*103	U P51*	1 731 7	1000 1017	1 631
存存和作者作者的	***	*****	* * * * * * * * * * * * *	***	*****	* * * * * * * * * *	****	****	***	***	****	****	***
11 -3-70			73.0 *	100.485	*	* O.	<b>*</b> 0.	*	*	*		-	
			72.7 #	100.471		* ~6.			*	*	: #	x غ	F.
11 -6-70									*	*	× 1	<u>ب</u> غ	*
11-11-73			72.8 *	100.46)					*	*		r 1	g.
11-25-70	쓰 1735회	52.74 ≠	72.2 *	100.431					*				£
12 -1-70	<b>* 1200*</b>	52.79 *	71.8 *	100.428					*	4			*
12 -9-70			72.2 ≄	100.420									
12-23-70			71.9 *	100.417	*068	<b>*</b> -28.			*	*			
1 - 71			71.8 *	100.413	#072	<b>= -30.</b>	* -21.	*	*	4	_		<i>-</i>
1-18-73			71.8 *	100.410	*075	* -31.	* -22.	*	*	4			F
			72.1 *	100.408				*	*	4	¥ ¥	1	<b>*</b>
? -0-71				100.405		Carried Section 1911		*	*	#	* " " *	۶ ۶	*
2-25-71			72.4 #						#	4	<b>*</b> *	<b>k</b> 1	<b>*</b>
3 -9-71	* 1445*		72.2 *	100.407					*	*		<b>k</b> 4	¥
3-23-71	# 1540#	52 <b>.7</b> 9 *	72.8 *	100.402					*	4		* *	<b>*</b>
4 -6-71	* 1000*	52.76 ≠	72.5 *	100.405					*			. :	dz.
4-27-71		52.73 *	72.1 *	100.410					*				*
5-11-71			72.0 *	100.409	*075	<del>* -30.</del>		*	*		ř		
5-25-71			72.1 *	100.404	* - 081	* <b>-31</b> .	<b>*</b> −25.	*	*	*		•	*
5-27-71			72.0 *	100.404	*081	* -32.	* -25 <sub>•</sub>	* 0.	. *	4		¥ . :	*
5-27-71			72.0 *	99.526		# -324.	* -317 <b>.</b>	<b>*</b> -292,	. *		* O.	=	*
			72.0 *	99.505			* -324.	<b>+</b> -299.	. *	-7.	* <b></b> 0046 <sup>:</sup>	<b>*</b> .	*
5-27-71			72.0 *		*986			* -301·	. *	-9,	* <b>0</b> 059	* 0. '	* 0
5-27-71	-				* -1.012				. *	-16.	*0106	<b>≠</b> -7•	*0047
5-27-71			71.4 *		* -1.020						*0140 ·		*0082
5-27-71			72.5 *								<b>+0186</b>		<b>*</b> - 0127
	# 1545#		72.5 *		* -1.041						·0280	a -34.	*0221
5-28-71		: 52 <b>.7</b> 4 *	72.2 *		* -1.086				-		*0319		*0261
5-29-71	* 1330*	52.74 *	72.2 ¥		* -1.104				-		* - 0354		<b>*</b> - 0295
5-30-71	* 1,330*	52.76 #	72.5 *		* -1.118						* ^303		*0323
5-31-71	* 1330*	52.77 *	72.6. *		* -1.130					-56.	*0382		*0340
	# 1330#		72.6 *	99.347	* -1.138						<b>*</b> ~.0399		*0369
	# 1330*		72.5 *	99.333	* -1.152	* -386.					*0428		
	'« 915¢		72.5 *	99,309	* -1.176	* -394.	<b>*</b> -390,				<b>*</b> 0480		*0421
	* 1203		72.6 *		* -1.223		<b>*</b> -405.				<b>*0584</b>		*0525
	* 1330*		72.7 *		* -1.257		* -418.	* -393			<b>+0660</b>		*0601
					* -1.269		* -421.	<b>*</b> −396	. *	-104.	<b>÷</b> −.0678		*0620
_7+20=31					* -1.301				. * -	-116.	<b>*0756</b>	* ~107 <b>.</b>	<b>*</b> 0697
	* 1400* * 340*		72.8 #		* -1.321		* -440.	<b>* -415</b>	. * -	-123.		* -114.	*0742
8-17-71			72.7 *		* -1.335		* -440. * -444.	# -419	*	-127.	*0830	* -118.	* ~.0//1
	* 13459		72.7 *		* -1.354				. * •	-133.	*0871		* -,0812
	* 1600*		72.6 *		* -1.365				. *	-137.	+0893	* -128.	<b>*</b> 0834
	* 14194				* -1.378					-141.	*0923	* -132.	*0865
19-14-71			72.7 *								*0950		*0891
10-27-71					* -1.391					129.			* ,0905
10-27-71				99.919	Constitution of the Spirit Street Str						* .0806		
17-27-71	# 1432	< 52.91 #		99,913						136.			
10-27-71	# 14376	# 52 <b>.</b> 74 *		99.935									
10-28-71	* 1445	¢ 52 <b>.</b> 75 ≠	72.4 *	99.993						154.			
10-29-71			72.2 *	99.999						157.	* .1026		
10-30-71				100.006						159.			
11 -1-71				100.015	*470					162.			
11 -4-71								* -128	*	164.	* .1072		
11 -6-71								. * <b>-</b> 127	*	165.			
11-11-71						* -152 ·		, * <b>-12</b> 3	. *	170.	<b>*</b> .1109		
		-						<b>*</b> -120	. *	173.	* .1129	<b>*</b> 182.	
11-13-71									. *	176.	* .1153		
12 -1-71						* -136.	* -128			189.	* .1238		
J 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	# 1450:				* T 7 9 9	¥ _1 35	<i>∓</i> −127.	* -102		190	# 1245	<b>*</b> 199.	* .1303
2 -4-72	* 1445	# 52.71 #	· : [ • 7 *	1001071									

STRAIN METER NO. MILLSTONE B Y65901 LOADED TO 1530PSI AT AGE 212 DAYS penject LOCATION DAVIS HALL ROOM 3604 73F DATE CAST 10-27-70 WELFT RESISTANCE AT 0.0 DEGREES F. 46.82 DHMS
THANGE IN TEMP. PER OHM CHANGE IN RESIS. 11.99 DEGREES F. 96.7-102.1 RATIO IN PERCENT ISSE'IL PANGE 3.28 MICROSTRAIN PER 0.01 BEIGINAL CALIBRATION CONSTANT PERCENT RATIO CHANGE 3.28 MICROSTRAIN PER 0.01 CALIBRATION CONSTANT CORR. FOR LEAD PERCENT RATIO CHANGE
5.1 MICROSTRAIN PER DEGREE F. TEMPERATURE CORRECTION 7.5 MICROSTRAIN PER DEGREE F. CONCRETE FXPANSION MICROSTRAIN TEMPERATURE CORRECTED
TIME AFTER LOADING \* FROM \* 0 \* 1 MIN.\* 1 MIN.\* 10 MIN.\* 10 MIN. \*DAY CAST\* \*1530 PSI\* 1 PSI \*1530 PSI\* 1 PSI \*\*\*\* \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 0. \* 11 -6-70 \* 915\* 11-11-70 \* 915\* -4. \* -8. \* 72.8 \* 100.982 \* -.027 \* -10. \* 52.89 \* 72.2 \* 100.949 \* -.060 \* 71.7 \* 100.945 \* -.064 \* 52.84 \* 52.80 \* -18. \* -24 · \* 11-25-70 # 1735\* -18. \* 12 -1-70 \* 1200\* -22. \* -28. \* 12 -0-70 \* 1550\* 72.2 \* 100.937 \* -.072 \* 52.84 # -22. \* 71.8 \* 100.934 # --.075 \* -31. \* 12-23-70 \* 1430\* 52.81 \* -23. \* -33. \* 1 -2-71 \* 71.7 \* 100.930 # -.079 # -35. \* -24. \* 100.926 # -.083 # 1-18-77 \* 1005\* 52.79 \* 71.6 \* -25. \* -32. \* -9-71 \* 13304 52 - 84 空 72.2 \* 100.923 \* -.086 \* -27. \* -33. \* 100.921 \* 2-25-71 \* 1055\* 52.35 72.3 \* -.088 -.087 -27. \* 100.922 \* 3 -9-71 \* 1445\* 52.85 \* 72.3 \* 72.8 # -32. **\*** -30. \* 100.915 # -.094 2-73-71 \* 1540# 52.89 # -.092 \* -29. # -33. \* 4 -4-71 \* 1000\* 72.5 # 100.917 \* 52.87 \* 100.922 \* -33. \* -27. \* 72.2 \* --087 \* 4-27-71 \* 1200\* 52.84 \* 100.929 \* 100.915 \* -27. \* -28. \* 52.83 ± -.089 -.093 -34 · \* 5-11-71 \* 1430\* 5-25-71 \* 1200\* -35. \* 0. \* 100.913 \* -.096 \* -35. \* - 30 . \* 72.3 \* 5-27-71 # 1338\* 52.85 \* -312. \* 0. \* 0. -342. \* 99.951 \* -1.048 \* -347. \* 72.3 \* 5-27-71 \* 1339\* 52.85 ≠ -6. # -.0039 # -8. # -.0049 # -318. \* 99.943 # -1.066 \* -353. # -348. \* 5-27-71 \* 1343\* 52.85 # 72.3 \* 0. \* 0. -320. \* 99.938 \* -1.071 \* -355. \* -350. \* 5-27-71 \* 13484 52.85 \* 72.3 \* -16. \* -.0104 \* -18. \* -.0119 \* -8. \* -.0055 -11. \* -.0070 99.916 \* -1.093 \* -328. \* -360. \* -358. \* 5-27-71 \* 1403\* 52.89 # 72.8 \* -360. × -330. \* 99.909 # -1.100 -362. \* 5-27-71 \* 1438\* 52.89 \* 72.8 \* -17. \* -.0113 -25. # -.0162 # -369. \* 99.889 \* -1.120 \* -367 \* -337. \* 5-27-71 \* 1645\* 52.89 \* 72.8 \* -35. \* -.0231 \* -28. \* -.0182 99.855 \* -1.154 -377. \* -348. \* -381. \* 5-28-71 \* 1350\* 52.87 \* 72.5 \* -41. \* -.0267 \* -33. \* -.0218 -353. \* 99.838 \* -1.171 \* -387. \* -383. \* 72.5 \* 9-29-71 \* 1330\* 52.87 \* -358. \* -46. \* -.0299 \* -38. \* -.0250 72.8 \* 99.825 \* -1.184 \* -390. \* -388 \* 52.89 \* 5-30-71 + 1330# -49. \* -.0320 \* -53. \* -.0343 \* -41. \* --0271 -361. \* 99.816 \* -1.193 \* -392. \* -391 . \* 5-31-7L t 1330t. 52.90 \* 72.9 \* -45. # -.0294 -365. \* -395. \* 99.807 \* -1.292 \* -394. \* 73.1 \* 52.92 \* 5 -1-71 \* 1330\* -49. \* -.0321-369. \* -57. \* -.0370 \* -400. \* -399. \* 5 -3-71 \* 1330\* 99.792 \* -1.217 \* 52.89 \* 72.8 \* -65. \* -.0423 \* -57. \* -.0374 -377. \* 99.768 # -1.241 # -407. ¥ -408. # 5 -8-71 \* C15# 72.9 \* -72. \* -.0472 -80. \* -.0522 \* -422 \* -392. \* 99.722 \* -1.287 \* -423. \* 5-22-71 # 1200# 52.90 \* 72.9 \* -83. \* -.0545 -91. \* -.0594 \* 99.689 \* -1.320 \* -403· \* -433. \* -433. # 7 -6-71 \* 1330\* 52.91 # 73.0 \* -88. # -.0576 -96. \* -.0625 \* 99.673 \* -1.336 \* 99.643 \* -1.366 \* 99.621 \* -1.388 \* -408. \* -439. \* -438. \* 7-29-71 \* 1000\* 52,<u>89</u>,\* 72.8 \* -106. \* \* -.0644 \* -.0693 -418. -.0693 -448. \* -455, \* -448. 3 -3-71 \* 1409\* 4-17-71 \* 840\* 73.0 \* 73.1 \* 73.1 \* 52.91 \*
52.92 \*
52.92 \* -426. ± -114. \* -.0742 \* -106. 99.621 \* -1.388 \* 99.586 \* -1.423 \* -456. -117. # -.0768 -125. # -.0817 # -466. 0-15-71 \* 1600\* -121. \* -.0794 -129. \* -- 0843 \* 99.573 # -1.436 # -471. \* -471. \* -441. \* 9-29-71 \* 1410\* 52.91 # 73.0 \* -125. \* -.0817 -133. \* -.0867 \* 99.562 \* -1.447 \* -475. \* -475. × -445. \* 73.0 \* 10-14-71 \* 1400\* 52.01 \* -.0901 # -130. \* -.0852 -138. \* 99.546 \* -1.463 \* -480. \* -483. ¥ -450. \* 52.91 \* 73.0 \* 10-27-71 # 1427# 159. \* .1041 152. \* .0992 \* 73.0 \* 100.429 \* -.580 \* -190. \* -190. \*-160. \* 52.91 \* 13-27-71 \* 1428\* .1008 \* .1058 -158. \* 52.86 \$ 72.7 \* 72.4 \* 100.434 \* -.575 \* -190. \* -188. \* 10-27-71 \* 1437\* 10-27-71 \* 2125\* .1147 -144-\* 176. \* -174. \* 168 100.474 \* -.535 -179 · \* 183. \* .1196 175. \* .1147 \* -167. \* -137. \* 100.496 \* -.513 \* -172. \* 72.3 \* 10-28-71 # 1445\* 52 +85 \* .1170 \* 187. \* .1220 -169. \* -163. \* -133. \* 179. \* 100.506 \* -.503 \* 72.2 \* 10-29-71 \* 1445\* .1190 \* 190. \* .1239 ~130. \* 182. \* -165. \* -160. \* 10-30-71 \* 1575\* 72.3 \* 100.516 \* -.493 \* 52.85 \* .1211 \* 193. # .1261 185. \* 100.526 # -.483 # -162. \* -157. \* -127. \* 52.85 # 72.3 \* 11 -1-71 \* 1350\* 187. .1222 \* 195. .1272 -125. -155. \* 100.533 \* 11 -4-71 \* 1350\* 72.5. \* .1283 11 -6-71 # 1337# 52,87 100.533 \* -.471 \* -157. -153. -124. 139. 72.5 .1258 200. \* .1308 193. \* -.461 \* -155. \* -149. \* -120. \* 72.3 \* 100,548 \* 11-11-71 \* 1400\* 52.85 \* 197. \* .1287 .1336 204. -145. 100.562 \* -.447 -150. \* -115. \* 72.4 \* 52.86 \* 11-13-71 # 1640# .1359 200. \* 208. \* .1310 \* -112. \* 52.85 100.572 \* -.437 \* -147. \* -142. \* 72.3 \* 12 -1-71 \* 1550\* .1433 212. \* 219. \* -101. \* 100.602 \* -.407 \* -140. \* -130. 52.90 ± 71.7 \* 1 -3-72 \* 1450\* 219. 211. .1379 .1429 100.600 \* -.409 \* -141. -131. -101. -4-72 \* 1445\* 52.80 \* 71.7 \*

SIRATH MEIFR NE partiff Milistone B y65901 proation davis hall room 360a 73f date CAST 10-27-70

CALIBRATIONS
WITTER RESISTANCE AT 0.0 DESPEES F. 46.76 OHMS
CHANGE IN TEMP. PER DHM CHANGE IN RESIS. 11.93 DEGREES F.
DISTERS PANCE 97.3-102.4 RATIO IN PERCENT 3.30 MICROSTRAIN PER 0.01 DEIDINAL CALIPRATION CONSTANT TYPERATURE CORRECTION

CONSTANT CORR. FOR LEAD

CA\_IPRATION CONSTANT CORR. FOR LEAD

TYPERATURE CORRECTION

CONCERTS SYPANSION

3.30 MICROSTRAIN PER 0.01
PERCENT RATIO CHANGE

TYPERATURE CORRECTION

5.1 MICROSTRAIN PER DEGREE F.
CONCERTS SYPANSION

7.5 MICROSTRAIN PER DEGREE F.

COVERETE EXPANSION

4.6.00																				
5 A T -	4	TIME	PE TER	क कहा	<b>ч</b> р :	ė.	RESIST.	* CH	ANCE *	FOTAL	*		MI	CROST	RAIN TE	MPE	RATURE CO	RRECTED		
	*		PESISE.		, ,					MICRO-		1	-		TIME AF	TER	LOADING			
		#	JH42			*	PERCENT					ERMY	*	0	* 1 47	N *	1 MIN.	F 10 MIN	.* 1	O MIN.
,			ŭ., 9"	år		* <b>:</b> :		*	<u> </u>			AY CAST	*				1 PSI *			
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11 -3-70			52,88		3.0				.012 *	-5.		-4.			*	*	2	¥	*	
11 -5-70			52.87		2.9		101,203		.024 *	-9.		-8.			xtx	*		¥	*	
11-11-70			52.27		2 + 9 3		101-131			-21.		-17.			*	*	*		本	
11-25-73			52.84				101.160		<u>.055</u> * .060 ≠	-25.		-17.			≄	*			*	
12 -1-79			92. <b>7</b> 9		1.9				*068 *	-25.		-21.			*	*			\$	
12 -9-70			52,93		2.3		101.147					-22.			*	*			*	
12-23-79			52.30		2.1:		101,140		.075 *	-30*					*	*			*	
f - 3 - 3.1			52.79		1.9		101.137		.078 #	-31. -32.		-23. -23.			*	*		×	*	
1-18-70			52.78		1.8		101.136		-079 <del>*</del>						*	rêr.	3		#	
2 -0-71		-	52.87		2.3		101.133			-31.		25+			*	×		*		
2-25-71			55.83		2.4		191-132			~30.		-26.			<i>~</i>	*			*	
9 -9-71			52.83		2.4		101.132		* 680			~ 26 »				*		¢	*	
9-23-71			53.87		2.9		101.120		.095 *	~32.		~31.			<b>本</b>	*			*	
4 -0-71			52,34		2.5		101.129		·086 *	-31.		-27.			*	*		*	*	
4-77-71			52,22		2.3		191.134		* 18C.	-30.		-25.				*		\$ ·	*	
5-11 <b>-71</b>	20	1430*	52 • 8 <u>l</u> .		2.2		101,135		<u>.080</u> *	-31.		-24.			<b>在</b>			*	*	
5-25-71			52,92		2.3		101.129		∗086 <b>*</b>			-27.			<b>年</b>	*		p. Ar	*	
9-29-71			52.91		2.2		101.130		.085 *			-26.			* *	*		\$c	*	
§ = 2 4 = 7 }			52.81		5.3		101.130		.085 *			-26.			*	*		 \$	ak.	
9-30-7 <u>1</u>			52.92		2.3		101.131		.084 *			-26-				*		*	*	
c - 7 1 - 7 1					2.5		101.129		.086 #	-31.		-27.			* *	*		*	±	
S -3-71			52 📲		2 + 5		101.129		<u>.086</u> *			- 27 <sub>.*.</sub>			.** **	*		"	*	
4 -3-71			92,91		2.2		101,130		.085 *			-25.			*	*		# #	*	
- :- 71					2.1		101.129		.086. <b>≭</b>			-25.			*			· *	*	
6-22-71			52∢ମଞ୍		2.3		101.126		* 680°			-28.			*	*		ф.	*	
7 -6-71					2.3		101,124		~091 ÷			-28. -28.			*	*		er	本	
7 -3-71			52.82		2.3		101-125		-290 <b>*</b>						*	*		* <b>-</b>	*	
·· - 1 * - 7 1			52,433,		2 * 4		101.121		.094 €			-30 -				*		*	*	
I-7t					2.3		101.119		.096 *			-30.			*	*		` \$	*	
5-15-71					2.5		101.113		* 097 *			-31.			*	*		*	±	
2-20-71					2.1		101.119		.096 *			-29. -30.			*	*		#x	4	
10-14-71					2 • 2		101.117					-31		0.		**		*	*	
13-27-71					2.3.		101.117							-294.				<b>ж</b>	\$	
10-27-71					13.		100.219					-325. -330.		-299 <b>.</b>			0035	*	*	
10-07-71					71.3		100.203	* 1	* ∆12. * 0.10.			-335.		-304.			-10068		* 0	١.,
10-27-71					72,7 72,7		100.179					-341		-310.			0107		*	.0039
10-27-71 10-27-71					12.8		100.160					-348.		-317.		. 4	0150	* <b>-12</b>	*	.0082
10-17-71					72.8		100.149					-351.		-321.			0173		. ⇒	.0105
					77.8		100.126					-359.		-3.28.		. 4	-,0223	* ~24.	. + -	.0155
10-39-71					72.8		100,110							-333.			0258		, *	.0190
10-10-71					72.3		100.101					-367.		-336.	* -42		0277	* -32	. *	•0209
11 1 71					14.23 12.38		[30.083					-373.		-342.			0316		, *	.0248
11 -1-71					73.0		100.053							-348.			0352		, *	.0284
11 -6-71					73.0		100.062					-380.		-350.		. *	0365	* ~45	. *	.0297
11-11-71					72.5		100.040					-387.		-356.		. 4	0405	* <del>-5</del> 2.	. * ~	0337
11-13-71					72.9		100.024							-362.	<b>*</b> -68	}, :	× -,0445	<b>*</b> -58	, * ~	.0377
12 -1-71					72.3		100.000						淬	-370.			0495			.0427
3-72					12.3		99.950					-412		-382.~	* -88	, 1	0574			.0506
2 -4-72					72.2		99,928					-423.		-392.	* -98	} ?	*0641	88- #	, ×	.0573

PROJECT MILLSTONE B Y65991 LOCATION DAVIS HALL RODM 360A 73F DATE CAST 10-27-70

CALIBRATIONS
METER RESISTANCE AT 0.0 DEGREES E.
CHANGE IN TEMP. PER OHM CHANGE IN RESIS.
USEFUL RANGE
97
ORIGINAL CALIBRATION CONSTANT

46-74 OHMS
S. 12-04 DEGREES F.
97.3-162.7 RATIO IN PERCENT
3-27 MICROSTRAIN PER 0.01

CALTARATION CONSTANT CORR. FOR LEAD

PERCENT RATIO CHANGE 3.27 MICROSTRAIN PER 0.01

TEMPERATURE CORRECTION CONCRETE EXPANSION

PERCENT RATIO CHANGE
5.1 MICROSTRAIN PER DEGREE F.
7.5 MICROSTRAIN PER DEGREE F.

RESIST. \* CHANGE \* TOTAL \* RATIO \*IN RATIO\* MICRO- \* PERCENT \*PERCENT \* STRAIN \* DATE # TIME# METER # TEMP. # MICROSTRAIN TEMPERATURE CORRECTED TIME AFTER LOADING # RESIST # F. \* 1 MTN.\* 1 MIN.\* 10 MIN.\* 10 MIN. \*1530 PSI\* 1 PSI \*1530 PSI\* 1 PSI FROM OHMS O \*DAY CAST \* 1330# 100,983 \* 100,969 \* 11 -3-76 # 52.80 \* 0 . \* -5 . # 73.0 \* A . . =5. **♦** 11 -5-70 52.80 815# --014 # 73.0 # 100.957 \* 100.925 \* 100.922 \* 11-11-70 915\* -9a # -9. s 52.90 73.0 ¥ w.026 # 52.75 \* 52.72 \* 11-25-70 1735# -- 058 -22 4 -18. 72.4 8 -25 p 12 -1-70 1500\* --061 -18-72.0 \* -26° 1550# 52.75 100.913 --070 -21. 72.4 1430\* 52.73 # --075 -29 4 12-23-70 72.1 100,908 ŏ -23. 1 -2-71 955\* 52.72 # 100.904 # --079 -31. -24. 72.0 1-18-70 1005# 52.72 \* 100.901 # --082 -32. ø -25. 72.0 52,75 \* 100.897 \* --086 -31 a 2 -9-71 1330\* -27. 72.4 2-25-71 1055# 52.76 \$ 72.5 \* 100.896 me 087 -31. -27. # 52.76 \* 100.892 3 -9-71 14454 72.5 ---=32 -29. 52.81 # -30. 1540# 100.890 # 3-23-71 73.1 # - .093 W -31. 100.892 \* 52.77 \* -- 091 # -32. 6 4 -6-71 -29. 1000\* 72.6 \* 100.897 =32<u>•</u> 4-27-71 52.74 \* 52.73 \* 72.2 \* -- 086 1200# -26. 5-11-71 -32, \* 1430\* -- 086 -20. -.092 -34. 5-25-71 1200# 52.74 100.591 -28. 72.2 71\_8حـ5 100.892 52.73 \* --091 -34. -29. ٠ 1350# 72.1 52.74 # 100.893 # 5-29-71 1330# --090 -33. -28. 72.2 5-30-71 1330# 52.74 \* 72.2 # 100.893 \* --090 -33. .. 28. 5-31-71 52.76 \* 1330\* 72.5 4 100.891 \* -- 692 4 -73. -29. 52.76 \* 52.73 \* 6 -1-71 --094 ~30 » 1330\* 72.5 # 100.889 -33. 1330# 100.892 --091 4 =3=71 - 34 £ 72.1 # -28. 915\* --092 -34. 6 -8-71 52.73 100.891 -28. 72.1 6-22-71 1200# 52.74 100,886 --097 -35. -30. \* 72.2 --097 -35 7 -6-71 1330\* 52.74 72.2 100.886 -30° 100.895 # 7-20-71 1000\* 52.70 \* --088 -35. 71.8 -26. 100.885 \* -36 · 52,74 # -.098 a \_3\_71 1400# 72.2 -30 · 8-17-71 52.75 # 840# 72.4 100.881 --102 - 36 --32. 52.75 \* 8-31-71 1345# 100.880 \* --163 -37. -32° 72.4 9-15-71 1600# 52.76 \* 72.5 \* 100.878 --105 -37. -33· 52.73 \* 9-29-71 1410# 72.1 \* 100.880 --103 - 18. ø -32. 10-14-71 -38. 1400# 52.74 72.2 # 100.878 --105 -33. 52.74 \* 52.87 52.87 100,875 =39 = 1445# 16-27-71 72.2 \* --108 -34. -29#. -333. -333. 1446# # -1:007 # -1:021 10-27-71 -328. Ö• é 0. 0-27-71 73.2 99,962 -334. -301. \* -.0045 \* -.0053 0. \* 0. \* -1.029 <del>-338.</del> 455# 10-27-71 -336. -R. 72.6 -4. \* -.0028 19-27-71 52.77 \* 1530# 99.941 # -1.042 -343. -306. # #12. # -. 0080 72.6 # -340. -18. \* -.0115 -21. \* -.0136 -9. \* -.0062 52.77 \* 52.76 \* 99,925 # =1.058 99,914 # =1.059 10-27-71 1735\* 72.6 \* -348. -345. -312. 2120\* 72.5 -352· -13, \* - 0084 10-27-71 -20. \* -.0133 -24. \* -.0159 1445# 52.76 \* 99.891 # -1.092 -32£. # 10-28-71 72.5 # -360-**~356**, -29, # -.0185 10-29-71 52.75 \* # -1-105 1445# 72.4 99,878 -360a -326. -32. é -.0211 \* -26. # -.0171 52.75 \* 72.4 # 10-30-71 1575+ 99.872 \* -1.111 ~366. +362° -326. -34. \* -.0224 \* 11 -1-71 1350# 52.75 \* 72.4 99,856 \* -1.127 -372. **-367**° -33<del>4</del>. -40. a -. 0258 \* ~31. \* ~.0206 11 -4-71 1350# 57.78 # 72.7 # 99.838 # -1-145 -376. -374. -34**∂**∘ .450 # -.0302 # -38. \* -.0250 -41. \* -.0267 99,830 \* -1.153 \* 11 -6-71 1330# 52.78 \* 72.7 # -378 a -376 · -343. -49. \* -. n320 \* 1400# 11-11-71 52.74 \* 72.2 # 99.811 \* -1.172 -387. -382. -348. ~54° \* -.0353 -46. \* -.0300 99,797 \* -1:216 99,773 \* -1:216 52.76 \* 52.74 \* \*51. \* -.0334 11-18-71 1640# 72.5 # -390. -387. -353. -59. \$ -.0386 -5A. \* -.038I 1550# -399. ∞36∂. -66. # -.0434 12 -1-71 72.2 # -394. 52.75 -.0497 -68. \* -.0444 1 -3-72 # 1450\* 99.740 -1 -243 -413. -370. -74. 5 71.8 \* -414-2 -4-72 + **\*379**\* -.0557 **"77**. 1 ል4 ፍ 4 50.68 71.5 99.716 -1.273 -4744 -6190 -85. -.0504

FIGURES

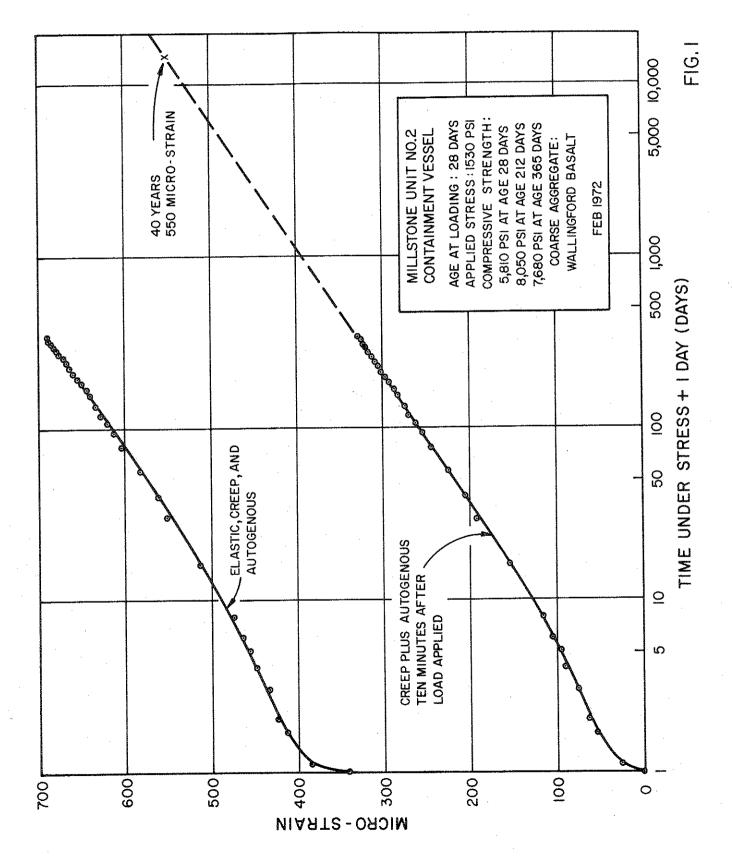


FIG. I

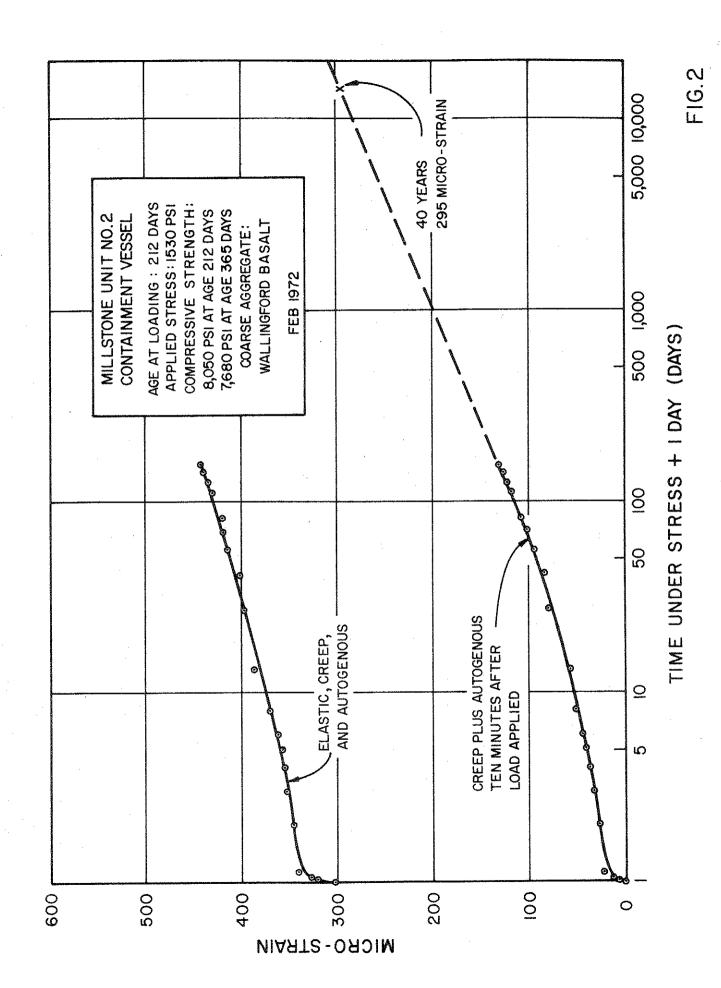


FIG 2

