

The Fixation of Incineration Ash:  
Physical and Leachate Properties

Interim Report - February 1986

Prepared by

Waste Management Institute  
Marine Sciences Research Center  
State University of New York  
Stony Brook, New York 11794

Principal Investigators

Frank J. Roethel  
Victor Schaeperkoetter  
Ruth Gregg  
Kyeong Park

Prepared for

New York State Legislative Commission on the  
Water Resource Needs of Long Island

85P0981

# 32434041

5/14/85-RL

Waste Management Institute  
Marine Sciences Research Center  
State University of New York  
Stony Brook, New York 11794-5000

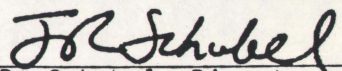
THE FIXATION OF INCINERATION ASH:  
PHYSICAL AND LEACHATE PROPERTIES.

Frank J. Roethel  
Victor Schaeperkoetter  
Ruth Gregg  
Kyeong Park

Working Paper #24

Reference 86-2

Approved for Distribution

  
J. R. Schubel, Director

## Table of Contents

ABSTRACT .....	vii
----------------	-----

### Section 1

INTRODUCTION/OVERVIEW .....	1
PROJECT DESIGN .....	1
PROJECT OBJECTIVES .....	1

### Section 2

INCINERATION WASTE CHARACTERISTICS .....	3
BULK PROPERTIES .....	3
Particle-size Analysis .....	3
Moisture Content and pH .....	12
Loss on Ignition .....	16
Mineralogy .....	16

### Section 3

PROCTOR FABRICATION .....	28
INTRODUCTION .....	28
ADDITIVES .....	29
FABRICATION TECHNIQUES .....	29
DETERMINATION OF THE OPTIMUM MIX .....	31
FULL SCALE PRODUCTION OF TEST PROCTORS .....	51
REFERENCES .....	59
APPENDIX A .....	A-1
New York City Ash Proctor Fabrication Data	
APPENDIX B .....	B-1
Huntington Ash Proctor Fabrication Data	
APPENDIX C .....	C-1
Westchester Ash Proctor Fabrication Data	

## List of Tables

<u>Table</u>		<u>Page</u>
2.1	Size Fraction of Residues .....	10
2.2	Moisture content of Huntington incineration ashes .....	13
2.3	Moisture content of New York City incineration ashes ....	14
2.4	Moisture content of Westchester incineration ashes .....	15
2.5	New York City fly ash, loss on ignition 500°C, 900°C ....	18
2.6	New York City fly ash, loss on ignition 500°C, 900°C ....	19
2.7	Town of Huntington composite ash, loss on ignition 500°C, 900°C .....	20
2.8	Town of Huntington composite ash, loss on ignition 500°C, 900°C .....	21
2.9	Westchester composite ash, loss on ignition 500°C, 900°C.	22
2.10	Mineralogical composition of incineration residues .....	27
3.1	Results of proctor fabrication using 6% lime, 3% cement, 0.5% sodium carbonate.....	33
3.2	Results of proctor fabrication using 9% lime, 3% cement, 0.5% sodium carbonate .....	37
3.3	Results of proctor fabrication using 6% lime, 3% cement..	41
3.4	Results of proctor fabrication using 15% cement .....	45
3.5	Results of proctor fabrication using 4% lime, 15% cement.	49
3.6	Results of proctor fabrication using 6% lime, 3% cement 6% gypsum .....	52
3.7	Formulation of the optimum mixes .....	56

## List of Figures

<u>Figure</u>		<u>Page</u>
2.1	Particle size fractions, New York City incineration ash.	5
2.2	Particle size fractions, Huntington incineration residue.	7
2.3	Particle size fractions, Westchester incineration residue .....	9
2.4	Grain size distribution curves of the various incineration residues .....	11
2.5	Loss on ignition .....	17
2.6	X-ray diffractogram of New York City incineration ash .....	23
2.7	X-ray diffractogram of Westchester incineration residue .....	24
2.8	X-ray diffractogram of Huntington incineration residue .....	25
3.1	Proctor fabrication using 6% lime, 3% cement, 0.5% sodium carbonate (New York City Ash) .....	32
3.2	Proctor fabricatin using 6% lime, 3% cement, 0.5 sodium carbonate (Westchester Ash) .....	34
3.3	Proctor fabrication using 9% lime, 3% cement, 0.5% sodium carbonate (Huntington Ash) .....	35
3.4	Proctor fabrication using 9% lime, 3% cement, 0.5% sodium carbonate (New York City Ash) .....	38
3.5	Proctor fabrication using 9% lime, 3% cement, 0.5% sodium carbonate (Westchester Ash) .....	39
3.6	Proctor fabrication using 9% lime, 3% cement, 0.5% sodium carbonate (Huntington Ash) .....	40
3.7	Proctor fabrication using 6% lime, 3% cement (New York City Ash) .....	42
3.8	Proctor fabrication using 6% lime, 3% cement (Westchester Ash) .....	43
3.9	Proctor fabrication using 6% lime, 3% cement (Huntington Ash) .....	44

List of Figures (continued)

<u>Figure</u>		<u>Page</u>
3.10	Proctor fabrication using 15% cement (New York City Ash) .....	46
3.11	Proctor fabrication using 15% cement (Huntington Ash) .....	47
3.12	Proctor fabrication using 15% cement (Westchester Ash) .....	48
3.13	Proctor fabrication using 4% lime, 15% cement (New York City Ash) .....	50
3.14	Proctor fabrication using 6% lime, 3% cement, 6% gypsum (New York City Ash) .....	53
3.15	Proctor fabrication using 6% lime, 3% cement, 6% gypsum (Huntington Ash) .....	54
3.16	Proctor fabrication using 6% lime, 3% cement, 6% gypsum (Westchester Ash) .....	55
3.17	Solidified proctors of the three optimum mixes .....	58

## ABSTRACT

Incineration ash from three operational facilities within the New York Metropolitan area were stabilized with various portions of additives (lime, gypsum, portland cement and sodium carbonate) to produce a concrete-like material suitable for both marine disposal and use in the construction industry. Curing parameters were adjusted to maximize the structural integrity of the experimental mixes. Certain mix and curing designs produced proctor sized samples exhibiting a compressive strength of approximately 1,600 psi.

The results of this investigation indicate that incineration ash possesses significant pozzolanic activity and may be a suitable substitute for aggregate in the manufacture of cement blocks for use by the construction industry in this region. In addition, blocks having excellent structural properties relative to marine disposal have been fabricated.

## Section 1

### INTRODUCTION/OVERVIEW

#### PROJECT DESIGN

This project, entitled "The Fixation of Incineration Ash: Physical and Leachate Properties", is a one year laboratory study which began in May 1985. This work is sponsored by the New York State Legislature with the New York State Legislative Commission on the Water Resource Needs of Long Island as the lead agency. Investigators at the Waste Management Institute of the Marine Sciences Research Center of the State University of New York at Stony Brook are conducting the investigation. Motivation for the project stemmed from a desire to examine the feasibility of fixating incineration ash and demonstrate the use of the stabilized material in a constructive manner as an alternative to landfilling.

#### PROJECT OBJECTIVES

This project focussed on two main objectives:

Objective 1 - To investigate incineration ash fixation by means of chemical additives and controlled curing environments.

Objective 2 - To determine the permeability and leachate characteristics of several "optimum" mixtures of incineration ash and fixation additives.

This Interim Report presents data collected while addressing Objective 1 of the project. The incineration ash utilized in this study was secured from three operational incinerators. New York City's Southwest Brooklyn facility twice provided a source of fly ash. On two



separate occasions the Town of Huntington incinerator located in East Northport, Long Island was visited to remove composite samples of both bottom and fly ash. Composite ash samples were also acquired from the Westchester Resource Recovery facility in Peekskill, New York.

The incineration wastes were initially characterized by determining the moisture content of the samples, particle size distribution and pH. The concentration of organic constituents was determined by measuring the loss on ignition and X-ray diffraction provided information as to the major mineral phase found within the incineration wastes.

Calcium hydroxide (lime), portland cement (Type 1), gypsum and sodium carbonate served as fixation additives during the fabrication of ASTM proctor sized cylinders of incineration ash. The proctors were cured in various controlled temperature-humidity environments for varying periods of time.

At the end of the curing period, proctors were subjected to compressive strength testing (ASTM C39). Relative compressive strengths were used as a criterion for comparing various mixes of incineration wastes and fixation additives in order to determine an optimum formulation. Mixes containing 15% portland cement were selected as optimum.

## Section 2

### INCINERATION WASTE CHARACTERISTICS

#### BULK PROPERTIES

##### Particle-size Analysis

The distribution of particle size in the incineration wastes was determined by sieving a sample of approximately 6 kg of Huntington ash, 1 kg of Westchester ash and 0.5 kg of New York City ash. The analysis followed ASTM D 422-63 using a series of U.S. Standard Sieves 3 in, 1.5 in, 0.75 in, Numbers 4, 10, 18, 40, 60, 100 and 200. For the three larger size sieves the residues were sieved dry and shaken by hand. The smaller sieves were placed into a Ro-Tap sieve shaker.

The results of the particle-size analysis are illustrated in Figures 2.1 - 2.3 which shows the composition of the different size fractions. The composite ash from Westchester and Huntington was more heterogeneous than the New York City fly ash, as expected. In the larger size groups glass was predominant. In the Huntington samples fragments of rags, paper and wood shaving were observed.

The quantitative contributions of the different size fractions to the samples are given in Table 2.1. From the grain size distribution curve (Figure 2.4) it can be concluded that the second New York City fly ash sample obtained is predominantly of silt size having a mean grain size of 0.09 mm. This is significantly finer than the first sample that was collected which has a mean grain size of 0.25 mm. Sand sized particles are dominant in the Westchester ash; the mean particle size is 0.6 mm. The largest particle size is represented by the two Huntington samples which compare very well. Huntington ash has the highest fraction of gravel sized particles and a mean particle size of slightly less than 2.0 mm.

Figure 2.1. Particle size fractions, New York City incineration ash.

Illustration	Sample Retained by Sieve Number
A	18 (1.00 mm)
B	40 (425 $\mu\text{m}$ )
C	60 (250 $\mu\text{m}$ )
D	150 (100 $\mu\text{m}$ )
E	200 (75 $\mu\text{m}$ )
F	Pan (<75 $\mu\text{m}$ )

Figure 2.1

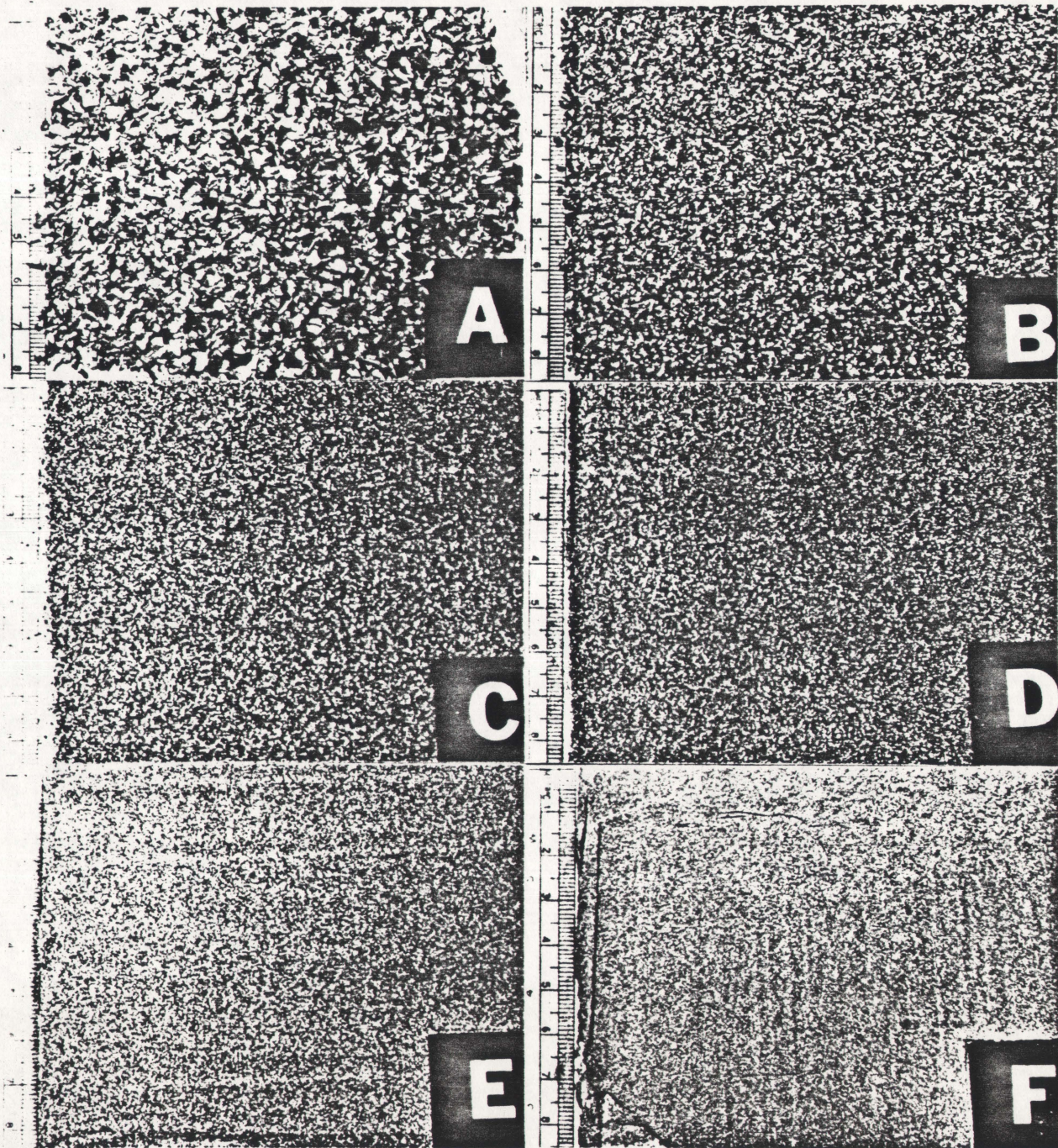


Figure 2.2. Particle size fractions, Huntington incineration residue.

Illustration	Sample Retained by Sieve Number
A	(3/4")
B	(1/2")
C	4 (4.75 mm)
D	18 (1.00 mm)
E	60 (250 $\mu\text{m}$ )
F	Pan (<75 $\mu\text{m}$ )

Figure 2.2

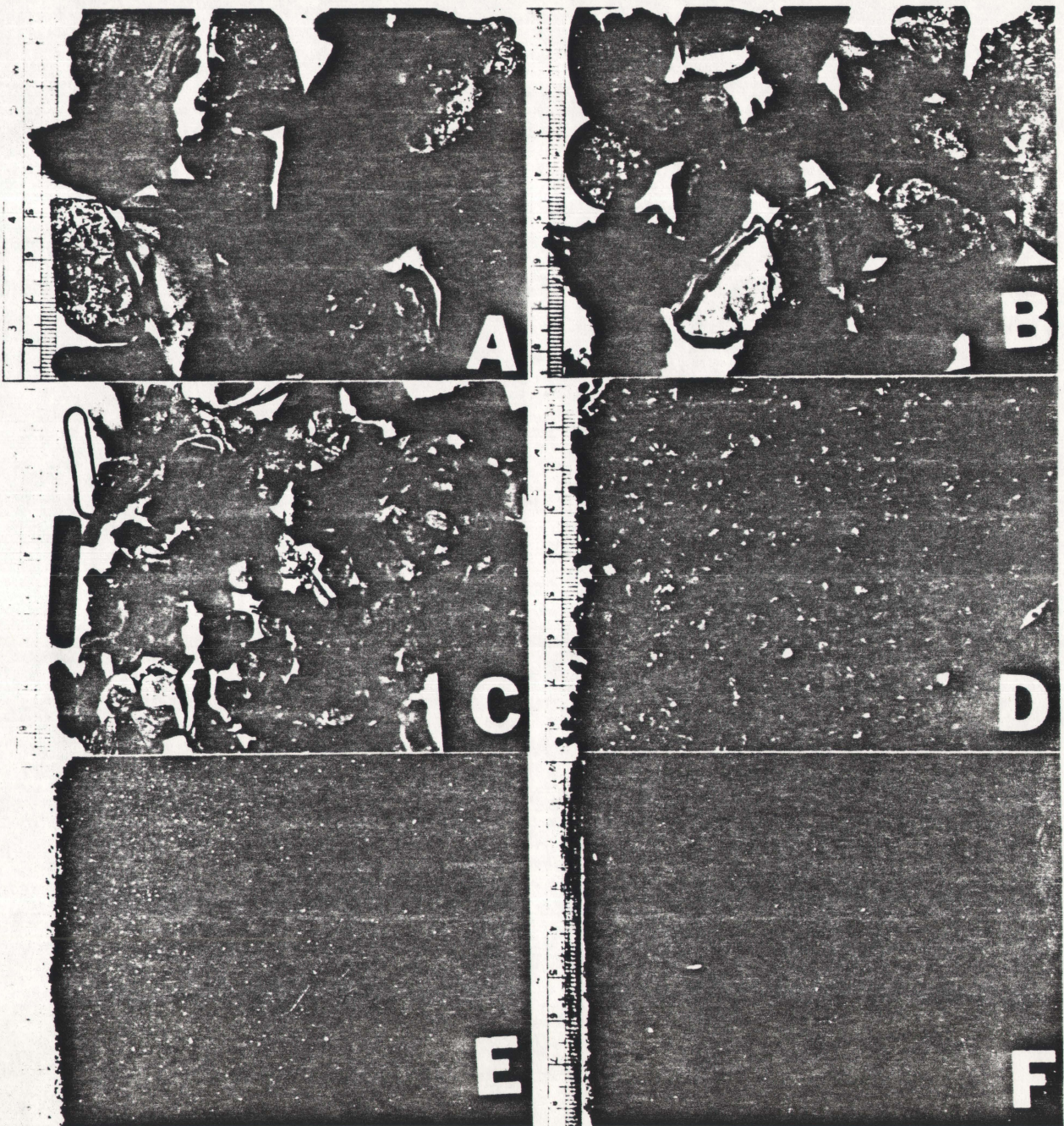


Figure 2.3. Particle size fractions, Westchester incineration residue.

Illustration	Sample Retained by Sieve Number
A	4 (4.75 mm)
B	10 (2.00 mm)
C	18 (1.00 mm)
D	60 (250 $\mu\text{m}$ )
E	200 (75 $\mu\text{m}$ )
F	Pan (<75 $\mu\text{m}$ )

Figure 2.3

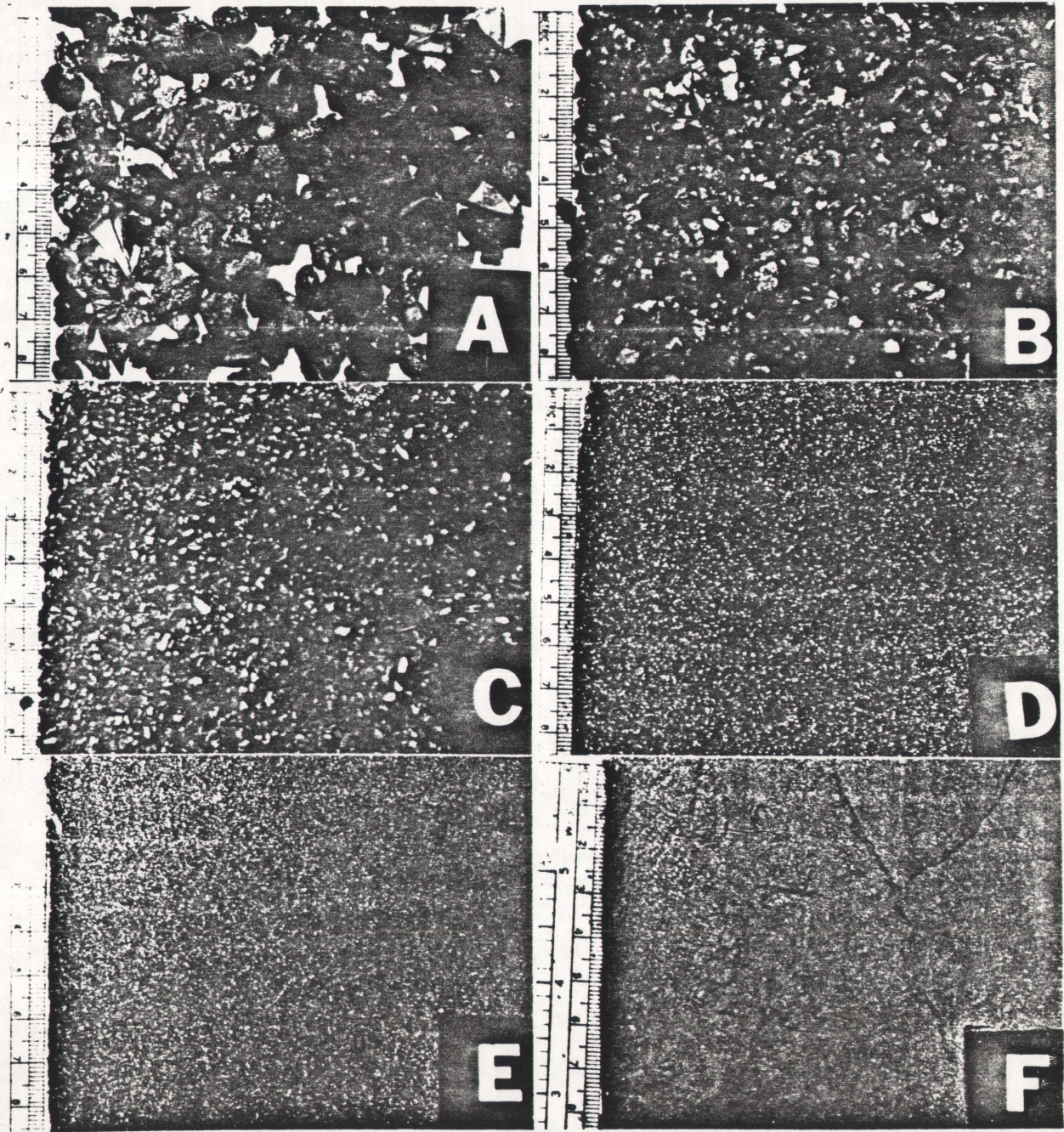




Table 2.1

## SIZE FRACTION OF RESIDUES

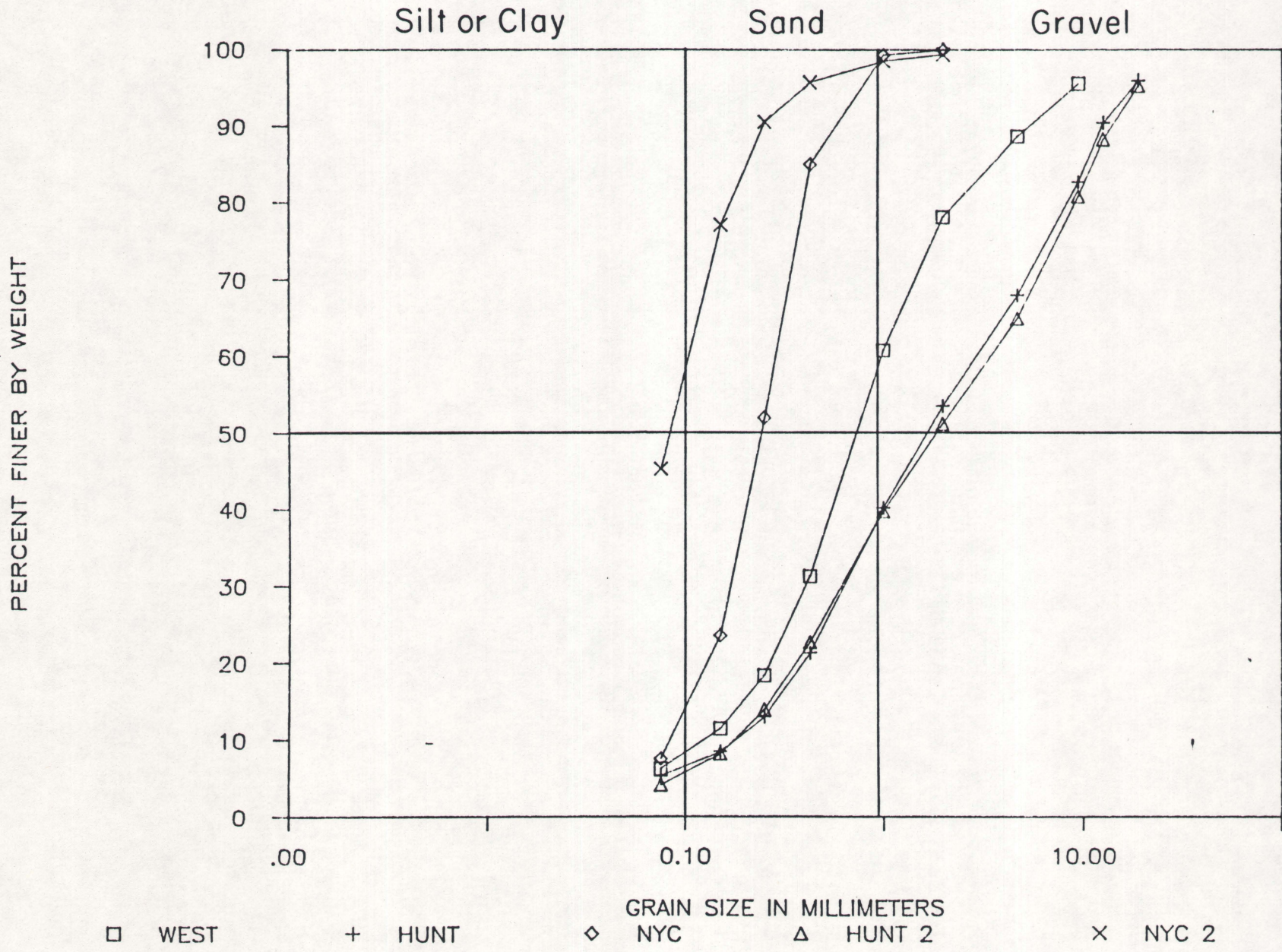
## PARTICLE SIZE ANALYSIS

SIEVE NUMBER	OPENING SIZE	HUNTINGTON COMPOSITE ASH		NEW YORK CITY FLY ASH		WESTCHESTER FLY ASH		NEW YORK CITY FLY ASH*		HUNTINGTON FLY ASH*	
		GRAMS RETAINED	% RETAINED	GRAMS RETAINED	% RETAINED	GRAMS RETAINED	% RETAINED	GRAMS RETAINED	% RETAINED	GRAMS RETAINED	% RETAINED
	.75"	239.1	4.08	0.0	0.00	0.0	0.00	0.0	0.00	88.3	4.76
	.50"	324.5	5.54	0.0	0.00	0.0	0.00	0.0	0.00	128.98	6.96
	.375"	451.5	7.70	0.0	0.00	47.2	4.47	0.0	0.00	139.08	7.50
4	4.75 mm	866.2	14.78	0.0	0.00	72.5	6.87	0.0	0.00	294.32	15.87
10	2.00 mm	844.6	14.41	0.6	0.11	111.4	10.56	4.0	0.69	254.77	13.74
18	1.00 mm	779.9	13.30	3.7	0.70	183.1	17.36	5.0	0.86	212.48	11.46
40	425 $\mu$ m	1108.8	18.91	74.2	14.12	310.8	29.46	16.3	2.80	315.01	16.99
60	250 $\mu$ m	487.6	8.32	174.0	33.13	136.3	12.92	29.8	5.10	162.73	8.78
100	150 $\mu$ m	262.8	4.48	149.0	28.37	73.0	6.92	78.4	13.45	106.46	5.74
200	75 $\mu$ m	186.9	3.19	84.3	16.04	54.6	5.18	185.6	31.84	75.04	4.05
	<75 $\mu$ m	310.3	5.29	39.5	7.52	66.1	6.27	263.8	45.25	77.13	4.16
	TOTAL WEIGHT:	5862.1		525.3		1055.0		582.9		1854.3	

\* Represents ash collected on a second visit to the facility.

Figure 2.4

### GRAIN SIZE DISTRIBUTION CURVES



## Moisture Content and pH

Moisture Content was determined in replicate (n=10) on 30 - 40 g samples of fresh residue ash which were dried to constant weight in an oven at about 90°C, Tables 2.2 - 2.4. Moisture contents were fairly uniform, despite the heterogeneity of the materials and the large solid inclusions. New York City fly ash and Westchester residue were significantly dryer than the Huntington ash which has a moisture content of approximately 24%.

The pH of the various residues was determined using an Orion Research Model 701A pH meter attached to a standard glass electrode. The table below presents the data obtained:

---

### pH Values for the Various Residues

Residue	pH
New York City Fly Ash	10.89
New York City Fly Ash (a)	6.59
Huntington Composite Ash	7.72
Huntington Composite Ash (a)	7.71
Westchester Composite Ash	12.74

(a) Represents ash collected on a second visit to the facility

---

Once again the two New York City samples differed considerably, the first sample was alkaline while the second sample collected was slightly acidic. The two Huntington samples were virtually identical and the most alkaline residue was obtained from the Westchester facility.

Table 2.2

## MOISTURE CONTENT OF HUNTINGTON INCINERATION ASHES

WEIGHT	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
BEAKER	27.74	27.28	27.93	27.21	27.50	28.89	28.05	27.39	48.81	49.48
BEAKER + ASH	59.56	58.13	61.31	60.65	62.78	60.31	64.99	62.33	87.28	89.27
WET ASH	31.83	30.85	33.38	33.43	35.29	31.43	36.94	34.94	38.46	39.79
BEAKER + ASH (DRY)	51.62	50.15	52.41	52.15	54.11	52.70	56.37	53.49	77.63	79.17
DRY ASH	23.89	22.87	24.48	24.94	26.61	23.81	28.31	26.10	28.81	29.69
MOISTURE CONTENT	7.94	7.98	8.90	8.50	8.67	7.62	8.62	8.84	9.65	10.10
% MOISTURE	24.94	25.87	26.66	25.41	24.58	24.24	23.34	25.30	25.09	25.39
AVE. MOISTURE	25.08									
VARIANCE	0.74									
STD. DEV.	0.86									
WEIGHT	H1*	H2*	H3*	H4*	H5*	H6*	H7*	H8*	H9*	H10*
BEAKER	49.92	50.31	50.13	49.96	49.96	48.74	50.56	49.59	49.96	51.50
BEAKER + ASH	90.19	91.14	81.01	77.71	76.40	72.70	83.49	87.55	79.62	83.48
WET ASH	40.27	40.83	30.88	27.75	26.44	23.95	32.93	37.96	29.66	31.98
BEAKER + ASH (DRY)	81.08	80.98	74.42	71.34	69.84	67.23	75.63	79.77	72.61	77.02
DRY ASH	31.16	30.68	24.29	21.38	19.88	18.49	25.07	30.18	22.65	25.52
MOISTURE CONTENT	9.11	10.16	6.60	6.37	6.56	5.46	7.86	7.78	7.01	6.46
% MOISTURE	22.63	24.88	21.36	22.96	24.80	22.81	23.87	20.49	23.62	20.21
AVE. MOISTURE	22.76									
VARIANCE	2.43									
STD. DEV.	1.56									

\* Represents ash collected on a second visit to the facility.

Table 2.3

## MOISTURE CONTENT OF NEW YORK CITY INCINERATION ASHES

WEIGHT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
BEAKER	30.08	27.10	27.32	28.01	29.48	30.00	28.05	29.00	51.50	49.56
BEAKER + ASH	46.82	46.40	47.00	45.52	48.43	50.37	45.92	48.45	76.11	76.56
WET ASH	16.74	19.30	19.68	17.51	18.94	20.37	17.87	19.45	24.61	27.00
BEAKER + ASH (DRY)	45.94	45.23	45.83	44.53	47.26	49.12	44.71	47.19	74.48	74.77
DRY ASH	15.86	18.13	18.51	16.52	17.78	19.12	16.66	18.19	22.98	25.20
MOISTURE CONTENT	0.88	1.17	1.17	0.99	1.16	1.25	1.21	1.26	1.63	1.79
% MOISTURE	5.25	6.07	5.96	5.64	6.13	6.14	6.75	6.49	6.63	6.64
AVE. MOISTURE	6.17									
VARIANCE	0.21									
STD. DEV.	0.45									
WEIGHT	C1*	C2*	C3*	C4*	C5*	C6*	C7*	C8*	C9*	C10*
BEAKER	50.04	51.60	48.29	49.57	48.82	51.30	49.46	50.85	48.75	48.99
BEAKER + ASH	67.67	67.17	68.31	66.70	70.21	69.54	66.88	69.60	66.90	66.36
WET ASH	17.63	15.57	20.02	17.14	21.39	18.23	17.41	18.75	18.15	17.37
BEAKER + ASH (DRY)	67.37	66.90	67.96	66.40	69.81	69.22	66.58	69.28	66.58	66.05
DRY ASH	17.33	15.30	19.66	16.83	20.99	17.91	17.12	18.43	17.83	17.06
MOISTURE CONTENT	0.30	0.27	0.35	0.30	0.40	0.32	0.30	0.32	0.32	0.31
% MOISTURE	1.70	1.76	1.77	1.78	1.87	1.75	1.72	1.70	1.75	1.79
AVE. MOISTURE	1.76									
VARIANCE	0.002									
STD. DEV.	0.048									

\* Represents ash collected on a second visit to the facility.

Table 2.4

## MOISTURE CONTENT OF WESTCHESTER INCINERATION ASHES

---

WEIGHT	W1	W2	W3	W4	W5
BEAKER	51.60	48.29	49.57	48.83	50.63
BEAKER + ASH	89.17	82.98	82.53	84.27	86.33
WET ASH	37.57	34.69	32.96	35.44	35.70
BEAKER + ASH (DRY)	88.38	82.18	81.82	83.43	85.47
DRY ASH	36.78	33.89	32.26	34.60	34.84
MOISTURE CONTENT	0.78	0.79	0.70	0.83	0.86
% MOISTURE	2.08	2.29	2.14	2.35	2.40
AVE. MOISTURE	2.25				
VARIANCE	0.01				
STD. DEV.	0.12				

---

## Loss on Ignition

The dried samples of residue used for determination of moisture content were used to measure loss on ignition (LOI). In this method the samples were ignited in a covered crucible in a muffle furnace at controlled temperature. Separate determinations were made for LOI at two temperatures,  $500 \pm 50^\circ\text{C}$  and  $900 \pm 50^\circ\text{C}$ . LOI is frequently determined at temperatures of 900 to  $1,000^\circ\text{C}$  but biogenic organics are burned off at  $500^\circ\text{C}$  and this was a materials group.

Figure 2.5 and Tables 2.5 - 2.9 clearly illustrate that Huntington ash possessed the highest amount of uncombusted material, approximately 14% at  $900^\circ\text{C}$ . The second sample of New York City ash was significantly higher in organics when compared to the first sample and Westchester composite ash lost only 1.8% of its dry weight after being heated to  $500^\circ\text{C}$ .

## Mineralogy

The mineralogical composition of the incineration wastes was determined by X-ray diffraction (XRD) analysis of unoriented mounts of powdered samples. The powdered samples were prepared by grinding a freeze dried sample and passing it through a No. 200 sieve (mesh size  $75 \mu\text{m}$ ). A portion of the sample was spread in a thin layer on a glass slide and analyzed on a Picker (New Hyde Park, New York) x-ray diffractometer using  $\text{Cu-K}\alpha$  radiation at 40 kv and 17 mA and a 5 to 70  $2\theta$  scan.

The diffractograms Figures 2.6 - 2.8 were examined for the presence of minerals using for peak identification the alphabetical index for inorganic materials compiled by the Joint Committee on Powder Diffraction Standards.

It should be noted that the intensity of x-ray diffraction by a given mineral phase is a function of the degree of mineral crystallinity as well as crystal size. An authigenically precipitated phase may yield

Figure 2.5

### LOSS ON IGNITION

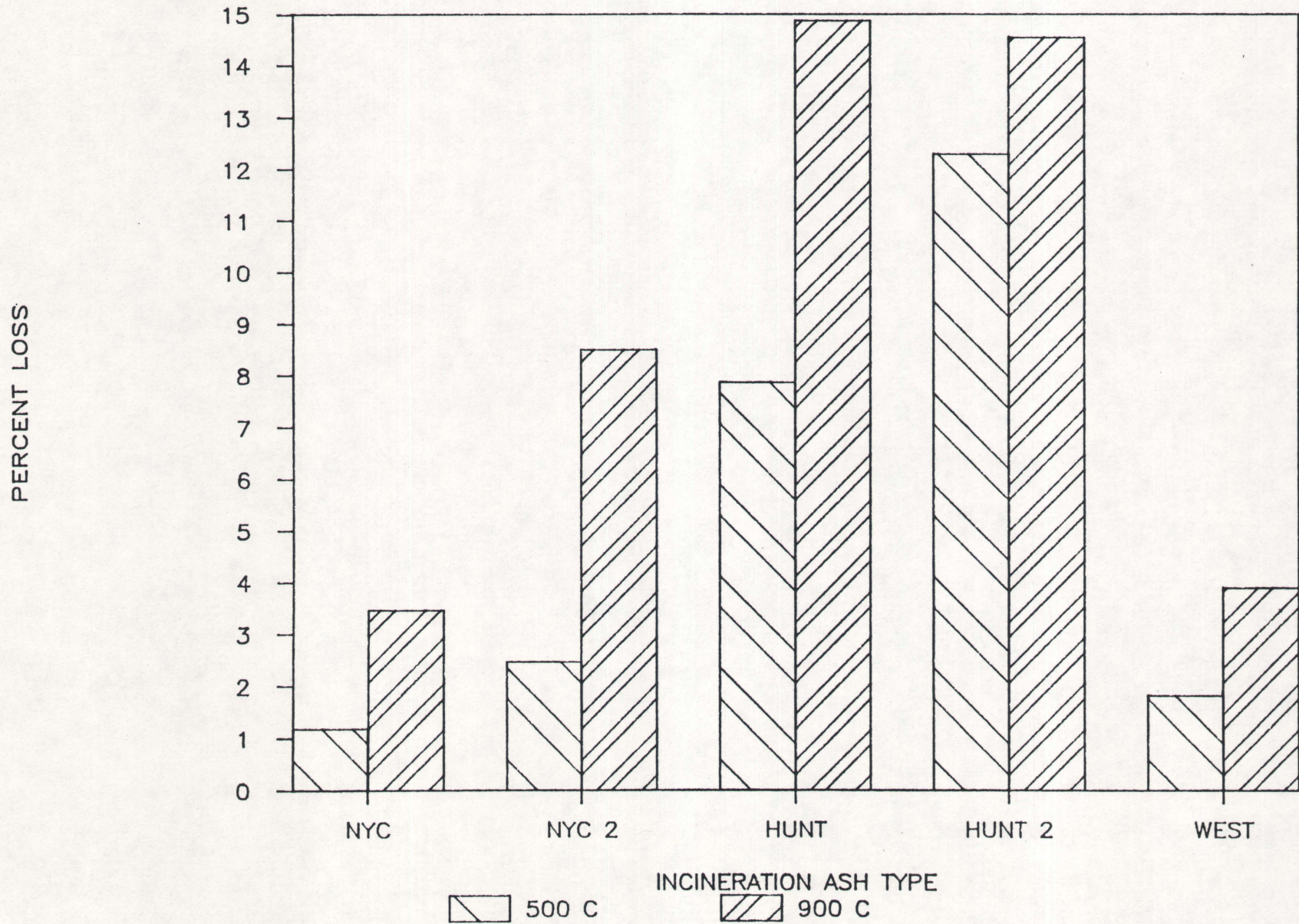




Table 2.6

NEW YORK CITY FLY ASH  
LOSS ON IGNITION 500°C, 900°C

WEIGHT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
CRUCIBLE + COVER	13.86	14.13	13.60	13.76	13.86	13.96	14.03	13.76	14.01	50.83
CRUCIBLE + ASH	20.38	19.49	19.30	18.67	18.52	18.04	19.06	19.03	19.22	68.57
ASH (PREIGN.)	6.52	5.36	5.70	4.91	4.67	4.08	5.03	5.27	5.20	17.74
CRUCIBLE + ASH (POST)	20.31	19.44	19.24	18.63	18.49	17.99	18.98	18.94	19.14	68.40
ASH (POSTIGN)	6.46	5.30	5.63	4.87	4.63	4.03	4.95	5.18	5.13	17.57
LOI (@500)	0.07	0.06	0.06	0.05	0.03	0.05	0.08	0.09	0.08	0.17
% LOI (@500)	1.01	1.09	1.09	0.94	0.75	1.28	1.62	1.78	1.48	0.96
AVG. % LOI (@500)	1.20									
VARIANCE	0.10									
STD. DEV	0.31									
CRUCIBLE + ASH (POST)	20.17	19.31	19.10	18.51	18.37	17.89	18.88	18.84	19.03	67.95
ASH (POSTIGN)	6.31	5.18	5.50	4.75	4.51	3.93	4.85	5.09	5.02	17.13
LOI (@900)	0.21	0.18	0.20	0.16	0.15	0.16	0.18	0.19	0.18	0.62
% LOI (@900)	3.23	3.42	3.42	3.35	3.32	3.83	3.64	3.55	3.56	3.47
AVG. % LOI (@900)	3.48									
VARIANCE	0.03									
STD. DEV.	0.17									

Table 2.6

NEW YORK CITY FLY ASH  
LOSS ON IGNITION 500°C, 900°C

WEIGHT	C1*	C2*	C3*	C4*	C5*	C6*	C7*	C8*	C9*	C10*
CRUCIBLE + COVER	13.6097	14.2302	13.8725	13.9815	13.759	13.89	13.9099	13.7816	14.0237	50.3976
CRUCIBLE + ASH	15.1298	15.5602	15.4956	15.7813	15.3532	15.2704	15.7026	15.2201	15.8605	55.4538
ASH (PREIGN.)	1.52	1.33	1.62	1.80	1.59	1.38	1.79	1.44	1.84	5.06
CRUCIBLE + ASH (POST)	15.09	15.5271	15.455	15.7343	15.3141	15.2342	15.6586	15.183	15.8207	55.3301
ASH (POSTIGN)	1.48	1.30	1.58	1.75	1.56	1.34	1.75	1.40	1.80	4.93
LOI (@500)	0.04	0.03	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.12
% LOI (@500)	2.62	2.49	2.50	2.61	2.45	2.62	2.45	2.58	2.17	2.45
AVG. % LOI (@500)	2.49									
VARIANCE	0.02									
STD. DEV	0.13									
CRUCIBLE + ASH (POST)	14.9945	15.4446	15.3506	15.6178	15.2695	15.1392	15.4961	15.0866	15.7357	55.0947
ASH (POSTIGN)	1.38	1.21	1.48	1.64	1.51	1.25	1.59	1.31	1.71	4.70
LOI (@900)	0.14	0.12	0.14	0.16	0.08	0.13	0.21	0.13	0.12	0.36
% LOI (@900)	8.90	8.69	8.93	9.08	5.25	9.50	11.52	9.28	6.79	7.10
AVG. % LOI (@900)	8.51									
VARIANCE	2.69									
STD. DEV.	1.64									

\* Represents ash collected on a second visit to the facility.

Table 2.7

TOWN OF HUNTINGTON COMPOSITE ASH  
LOSS ON IGNITION 500°C, 900°C

WEIGHT	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
CRUCIBLE + COVER	50.23	23.76	24.47	87.27	88.82	49.34	24.65	23.64	24.47	85.57
CRUCIBLE + ASH	71.30	45.83	44.78	127.90	136.55	65.02	40.14	40.38	42.50	127.40
ASH (PREIGN.)	21.07	22.07	20.31	40.63	47.73	15.68	15.49	16.75	18.03	41.83
CRUCIBLE + ASH (POST)	70.05	44.40	43.43	125.18	133.66	63.75	38.47	38.68	40.45	124.65
ASH (POSTIGN)	19.82	20.64	18.97	37.91	44.84	14.41	13.82	15.04	15.98	39.07
LOI (@500)	1.25	1.43	1.35	2.72	2.89	1.27	1.67	1.71	2.05	2.75
% LOI (@500)	5.93	6.48	6.62	6.69	6.06	8.09	10.76	10.19	11.37	6.59
AVG. % LOI (@500)	7.88									
VARIANCE	3.96									
STD. DEV	1.99									
CRUCIBLE + ASH (POST)	68.41		42.08	121.92	130.16	62.68	37.58	37.76	39.60	120.89
ASH (POSTIGN)	18.18		17.61	34.65	41.34	13.34	12.94	14.12	15.13	35.32
LOI (@900)	2.89		2.70	5.98	6.39	2.34	2.56	2.63	2.90	6.51
% LOI (@900)	13.74		13.29	14.72	13.39	14.91	16.50	15.68	16.09	15.57
AVG. % LOI (@900)	14.88									
VARIANCE	1.25									
STD. DEV.	1.12									

Table 2.8

TOWN OF HUNTINGTON COMPOSITE ASH  
LOSS ON IGNITION 500°C, 900°C

WEIGHT	H1*	H2*	H3*	H4*	H5*	H6*	H7*	H8*	H9*	H10*
CRUCIBLE + COVER	6.9482	7.0982	24.6426	23.6228	24.3341	23.7857	23.6358	24.47	23.8519	6.82
CRUCIBLE + ASH	12.2523	11.5105	40.3781	36.3578	40.803	43.304	43.0079	40.3944	37.7056	9.0541
ASH (PREIGN.)	5.30	4.41	15.74	12.73	16.47	19.52	19.37	15.92	13.85	2.23
CRUCIBLE + ASH (POST)	11.6332	11.1526	38.3832	34.7655	38.1904	41.3771	40.6259	38.1368	36.1448	8.7287
ASH (POSTIGN)	4.69	4.05	13.74	11.14	13.86	17.59	16.99	13.67	12.29	1.91
LOI (@500)	0.62	0.36	1.99	1.59	2.61	1.93	2.38	2.26	1.56	0.33
% LOI (@500)	11.67	8.11	12.68	12.50	15.86	9.87	12.30	14.18	11.27	14.57
AVG. % LOI (@500)	12.30									
VARIANCE	4.64									
STD. DEV	2.15									
CRUCIBLE + ASH (POST)	11.4773	11.0448	37.988	34.34	37.8947	40.9061	40.6232	37.8298	35.8675	8.6594
ASH (POSTIGN)	4.53	3.95	13.35	10.72	13.56	17.12	16.99	13.36	12.02	1.84
LOI (@900)	0.78	0.47	2.39	2.02	2.91	2.40	2.38	2.56	1.84	0.39
% LOI (@900)	14.61	10.55	15.19	15.84	17.66	12.29	12.31	16.10	13.27	17.67
AVG. % LOI (@900)	14.55									
VARIANCE	5.16									
STD. DEV.	2.27									

\* Represents ash collected on a second visit to the facility.

Table 2.9

WESTCHESTER COMPOSITE ASH  
LOSS ON IGNITION AT 500°C, 900°C

WEIGHT	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
CRUCIBLE + COVER	14.1611	13.9618	13.7895	13.9748	13.6363	13.88	13.7186	13.882	14.0202	50.2386
CRUCIBLE + ASH	19.5761	18.5713	17.7568	18.481	18.7635	19.6731	18.8331	19.211	18.5563	64.32
ASH (PREIGN.)	5.42	4.61	3.97	4.51	5.13	5.79	5.11	5.33	4.54	14.08
CRUCIBLE + ASH (POST)	19.4894	18.4794	17.6902	18.3855	18.6658	19.5552	18.7476	19.1046	18.4778	64.0927
ASH (POSTIGN)	5.33	4.52	3.90	4.41	5.03	5.68	5.03	5.22	4.46	13.85
LOI (@500)	0.09	0.09	0.07	0.10	0.10	0.12	0.09	0.11	0.08	0.23
% LOI (@500)	1.60	1.99	1.68	2.12	1.91	2.04	1.67	2.00	1.73	1.61
AVG. % LOI (@500)	1.83									
VARIANCE	0.03									
STD. DEV	0.19									
CRUCIBLE + ASH (POST)	19.3654	18.3944	17.6114	18.2983	18.5707	19.4201	18.6532	19.01	18.3612	63.766
ASH (POSTIGN)	5.20	4.43	3.82	4.32	4.93	5.54	4.93	5.13	4.34	13.53
LOI (@900)	0.21	0.18	0.15	0.18	0.19	0.25	0.18	0.20	0.20	0.55
% LOI (@900)	3.89	3.84	3.66	4.05	3.76	4.37	3.52	3.77	4.30	3.93
AVG. % LOI (@900)	3.91									
VARIANCE	0.06									
STD. DEV.	0.25									

Figure 2.6. X-ray diffractogram of New York City incineration ash.

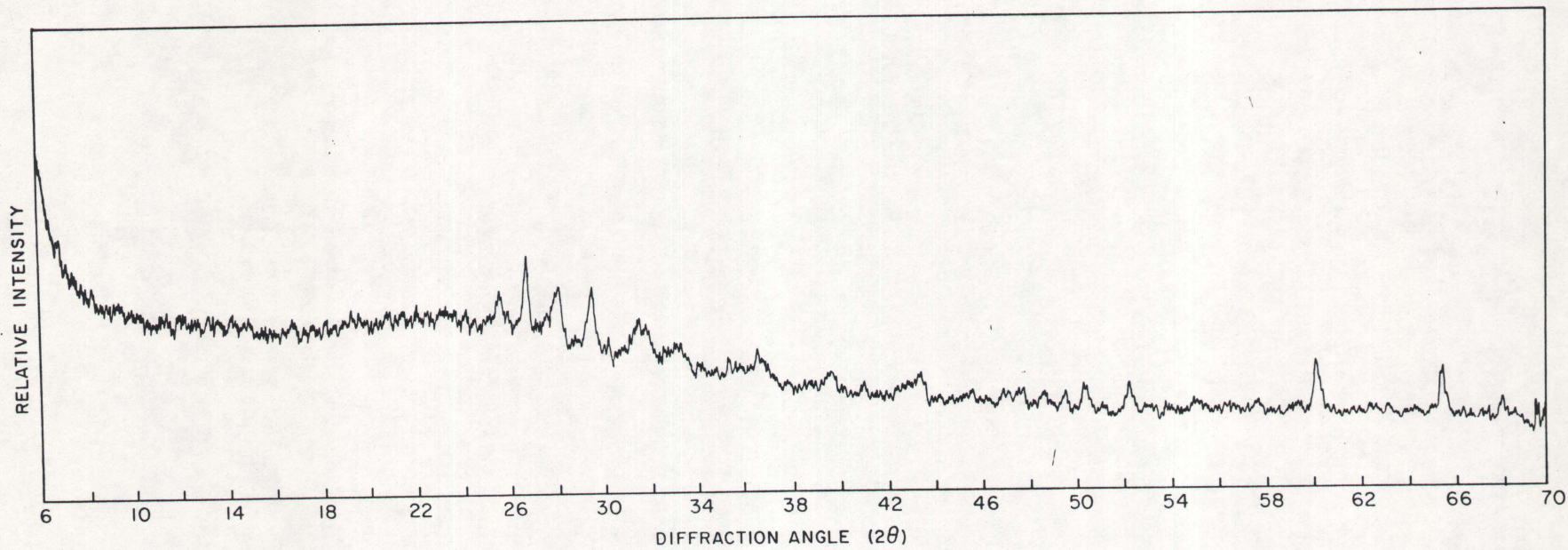


Figure 2.7. X-ray diffractogram of Westchester incineration residue.

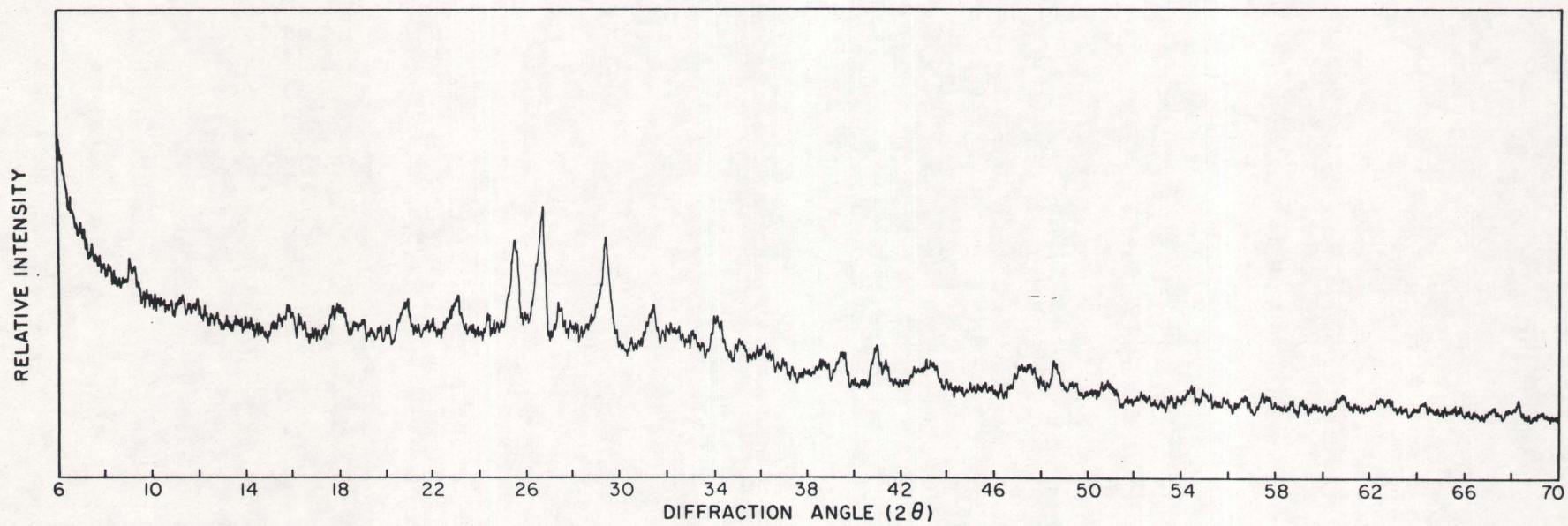
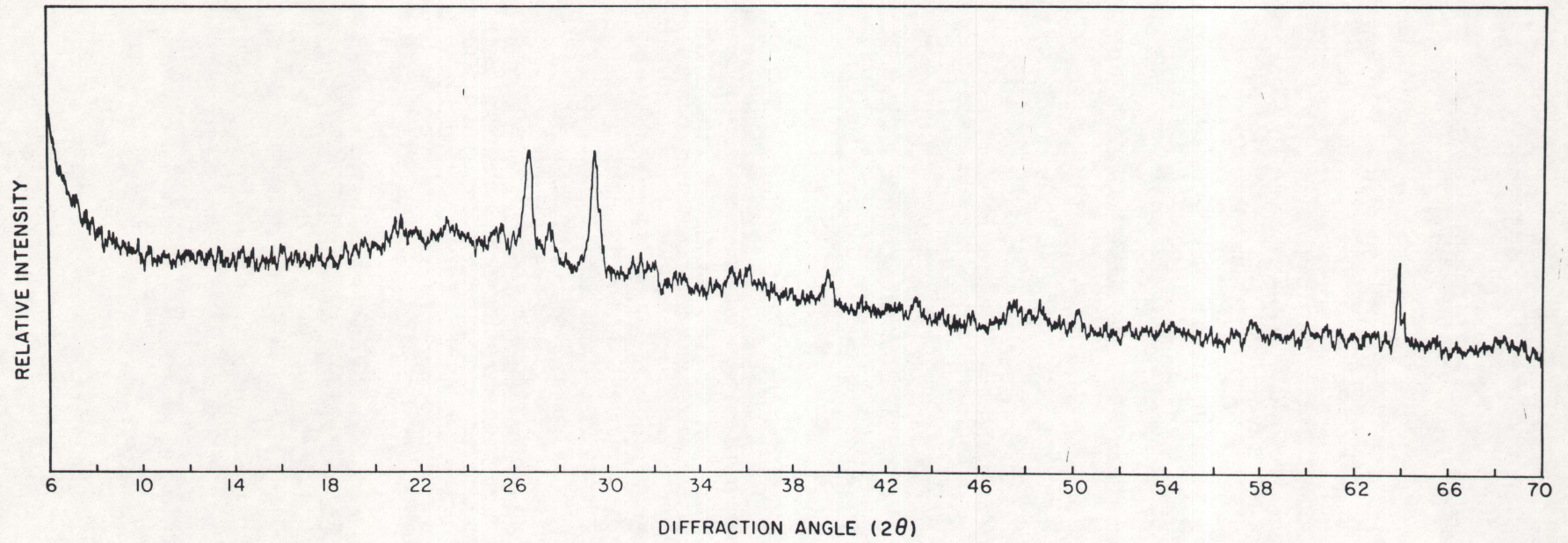


Figure 2.8. X-ray diffractogram of Huntington incineration residue.





a weak diffraction pattern even though present in large quantity since it will be poorly crystallized in incineration waste material.

The interpretation of the diffractograms Table 2.10 indicate that the mineralogical composition of the incineration wastes are relatively similar for all three ashes. Quartz ( $\text{SiO}_2$ ), Calcite ( $\text{CaCO}_3$ ), and Anhydrite ( $\text{CaSO}_4$ ) are common minerals. Additionally, Westchester ash includes Ettringite [ $\text{Ca}_6\text{Al}_2(\text{SO}_4)_3(\text{OH})_{12} \cdot 31\text{H}_2\text{O}$ ] a hydrated calcium sulfoaluminate which is observed to be present in concrete and responsible in part for the initial strengths developed during the curing process. Calcium hydroxide [ $\text{Ca}(\text{OH})_2$ ] was observed in only the Westchester ash. A number of peaks still remain to be identified and during the second phase of this investigation we hope to determine whether these peaks represent mineral or are secondary reflections. All of the diffractograms examined exhibit a low signal to noise ratio and that is attributed to the presence of large amounts of amorphous material.

Table 2.10 MINERALOGICAL COMPOSITION OF INCINERATION RESIDUES

New York City		Westchester		Huntington		Mineral
<u>2 Theta</u>	<u>D</u>	<u>2 Theta</u>	<u>D</u>	<u>2 Theta</u>	<u>D</u>	
		68.3	1.37			Unidentified
67.9	1.38					Unidentified
65.4	1.43					Unidentified
				63.9	1.46	Unidentified
60.1	1.54					Quartz
52.2	1.75					Anhydrite
50.3	1.81			50.3	1.81	Quartz
49.5	1.84					Unidentified
		48.6	1.87	48.6	1.87	Anhydrite
43.4	2.08	43.4	2.08	43.4	2.08	Calcite
41.0	2.20	41.0	2.20			Anhydrite
39.6	2.28	39.6	2.28	39.6	2.28	Quartz
36.5	2.46					Quartz
		34.2	2.62			Ca(OH) <sub>2</sub>
31.5	2.84	31.5	2.84			Anhydrite
29.5	3.03	29.5	3.03	29.5	3.03	Calcite
28.1	3.17					Unidentified
		27.5	3.24	27.5	3.24	Unidentified
26.7	3.34	26.7	3.34	26.7	3.34	Quartz
25.6	3.48	25.6	3.48	25.6	3.48	Anhydrite
		23.1	3.85	23.1	3.85	Ettringite
		20.9	4.25	20.9	4.25	Quartz
		18.0	4.93			Ca(OH) <sub>2</sub>
		15.9	5.57			Ettringite
		9.1	9.72			Ettringite

### Section 3 PROCTOR FABRICATION

#### INTRODUCTION

The proctor fabrication stage of this project dealt with four major tasks:

- Initial research and development of proctor fabrication techniques.
- Determination of optimum water content for making proctors.
- Production of test proctors for all of the mix types studied.
- Comparison of proctor compressive strengths in order to select optimum mixes.

In order to accomplish these tasks the following types of equipment were used. Proctor compaction was done with a Soil Test, Inc. model CN-4230 Mechanical Compactor equipped with a 4 inch replacement mold, Soil Test model CN-4230-100. Mold dimensions were 4.6 inches height by 4.0 inches diameter for a volume of 1/30 cubic foot. The mechanical compactor permitted operator selection of either a 5.5 or 10 pound, 2 inch diameter circular face rammer as well as a 12 or 18 inch drop height. Hot Pack Corporation model 435300 Bench Top Steady-State Humidity Chambers were used for accelerated cures at different temperature and 98-100 % relative humidity. Compressive strength testing was performed using a Model FS 160 Riehle Universal Testing Machine which conformed with ANSI/ASTM C39-72 standards.

## ADDITIVES

Additives such as sodium carbonate ( $\text{Na}_2\text{CO}_3$ ), lime ( $\text{Ca}(\text{OH})_2$ ), calcium sulfate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) and Portland cement (type 1) were used in this study. These additives were obtained from Fisher Scientific, Inc. except Portland cement which was supplied from local supplier.

According to Fisher Scientific, Inc. 1983,  $\text{Na}_2\text{CO}_3$  (Fisher CERTIFIED) used in this study contains only 0.01% insoluble matters and 0.005% silica ( $\text{SiO}_2$ ), 0.003% sulfur compounds ( $\text{SO}_4$ ), 0.01% calcium and magnesium ppt, and 0.5 ppm heavy metals (as Pb). For  $\text{Ca}(\text{OH})_2$  (Fisher CERTIFIED), it shows 0.03% insoluble in hydrochloric acid and contains 0.1% sulfur compounds ( $\text{SO}_4$ ), 1.0% magnesium and alkali salts, and 0.003% heavy metals (as Pb). Fisher CERTIFIED gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) was used in this study. Portland cement (designated as type 1 by the ASTM) is the most important of the inorganic cementing materials by far. There are three predominant compounds in common portland cement, i.e., dicalcium silicate ( $2\text{CaO} \cdot \text{SiO}_2$ ), tricalcium silicate ( $3\text{CaO} \cdot \text{SiO}_2$ ), and Tricalcium aluminate ( $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ ).

## FABRICATION TECHNIQUES

ASTM D698-78 provided guidelines for proctor fabrication techniques. These conditions in general require the compaction of the sample using:

- a 5.5 pound rammer falling a distance of 12 inches,
- 3 compactions of material per proctor,
- a total of 75 compactions per proctor.

The appropriate components of a test mixture were mixed on a weight basis and in the sequence: incineration wastes (first), calcium

hydroxide (lime), additives (cement, gypsum, sodium carbonate) and water (last). Hand mixing was used to distribute the materials as they were added. After thoroughly mixing the dry components, water was added to the mix and vigorously stirred to achieve a uniform distribution. In some cases additional water was added to the mix prior to final hand mixing. Subsamples of the wet mix were taken in order to determine the total moisture content prior to compaction and curing. Prior to mixing particles larger than 0.75 in were screened out.

The ASTM D698 method was used for proctor fabrication. Approximately 600 grams of mix were placed in a mold and a 5.5 pound rammer was dropped twenty five times from a height of 12 inches. Between each drop the mold was automatically rotated 36° in order to assure uniform compaction of the proctor surface. A second 600 gram portion of mix was added to the mold and the process repeated. After addition and compaction of a third 600 gram sample, the extension collar of the mold was removed. The proctor's surface was trimmed and leveled prior to weighting. After extrusion from the mold, the proctor was ready for curing.

Three curing temperatures were studied. Ambient (approximately 23°C), 49°C and 71°C. Proctors cured at 23°C in air were wrapped in 1 mil thick plastic bags to prevent premature dehydration. These samples were air cured for intervals of 7, 14 and 21 days. The accelerated cures at 49°C and 71°C were performed in controlled humidity chambers for two time intervals, 24 and 72 hr.

After curing, proctors were permitted to cool to room temperature or were removed from the double wrapped plastic bags. Their weight, height, diameter and physical appearance were recorded prior to unconfined compressive strength testing.

Cured proctors were tested for unconfined compressive strength on a Model FS160 Riehle Universal Testing Machine. The FS160 was equipped with a 7 inch diameter self-aligning compressive head and spherical seat which conforms to the requirements of ANSI/ASTM C39-72, "Standard

Methods for Compressive Strength Testing of Cylindrical Concrete Specimens". The rate of loading was 3200 pounds per second. The total load withstood during testing was divided by the cross sectional area of the proctor to calculate unconfined compressive strength in pounds per square inch.

#### DETERMINATION OF THE OPTIMUM MIX

The first formulation of proctors were fabricated using lime portland cement and sodium carbonate, three additives that were shown in prior investigations to enhance stabilization. While holding relatively constant the concentrations of incinerator residue and additives, moisture content was altered between 13 and 25% for the three different residues. Following compaction, the proctors were subdivided into three groups and each group cured at different temperatures [49°C, 71°C, and air (23°C)]. The duration of the cure was also altered for each of the groups. For the proctors being cured at elevated temperatures, curing time was either 24 or 72 hours. For the air cured samples, the curing time was either 168, 336 or 504 hours (7, 14 or 21 days). The data in Figure 3.1 in concert with the detailed fabrication information found in Appendixes A, B and C reveals the following information:

- a) Huntington residue produced proctor samples having the lowest compressive strength,
- b) in order to achieve a maximum compressive strength, as the particle size of the residue increased, moisture content also increased
- c) increased curing time resulted in improved structural integrity,
- d) proctors fabricated using Westchester residue yield the highest density, while New York City samples exhibited the best compressive strength.

The effects of increasing the lime concentration was examined by fabricating a series of proctor samples having a 9% lime content.

Table 3.1

 RESULTS OF PROCTOR FABRICATION USING  
 6% LIME, 3% CEMENT, 0.5% Na<sub>2</sub>CO<sub>3</sub>.

---

 NEW YORK CITY INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
CA	17	18.6	438 - 875
CB	19	19.4	458 - 1134
CC	21	22.1	601 - 903
CD	23	22.2	430 - 688
CE	24	23.6	386 - 637

## WESTCHESTER INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
WA	17	17	251 - 446
WB	15	14.8	394 - 533
WC	13	13	161 - 521
WD	11	11.5	84 - 414
WE	19	19.5	139 - 398

## HUNTINGTON INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
HA	18	21.5	115 - 254
HB	22	23.7	96 - 217
HC	24	25.1	62 - 183
HL	20	21.6	203 - 386
HM	18	19.2	219 - 314
HN	16	18.8	219 - 330
HO	14.6	16.3	171 - 235

---

Figure 3.1

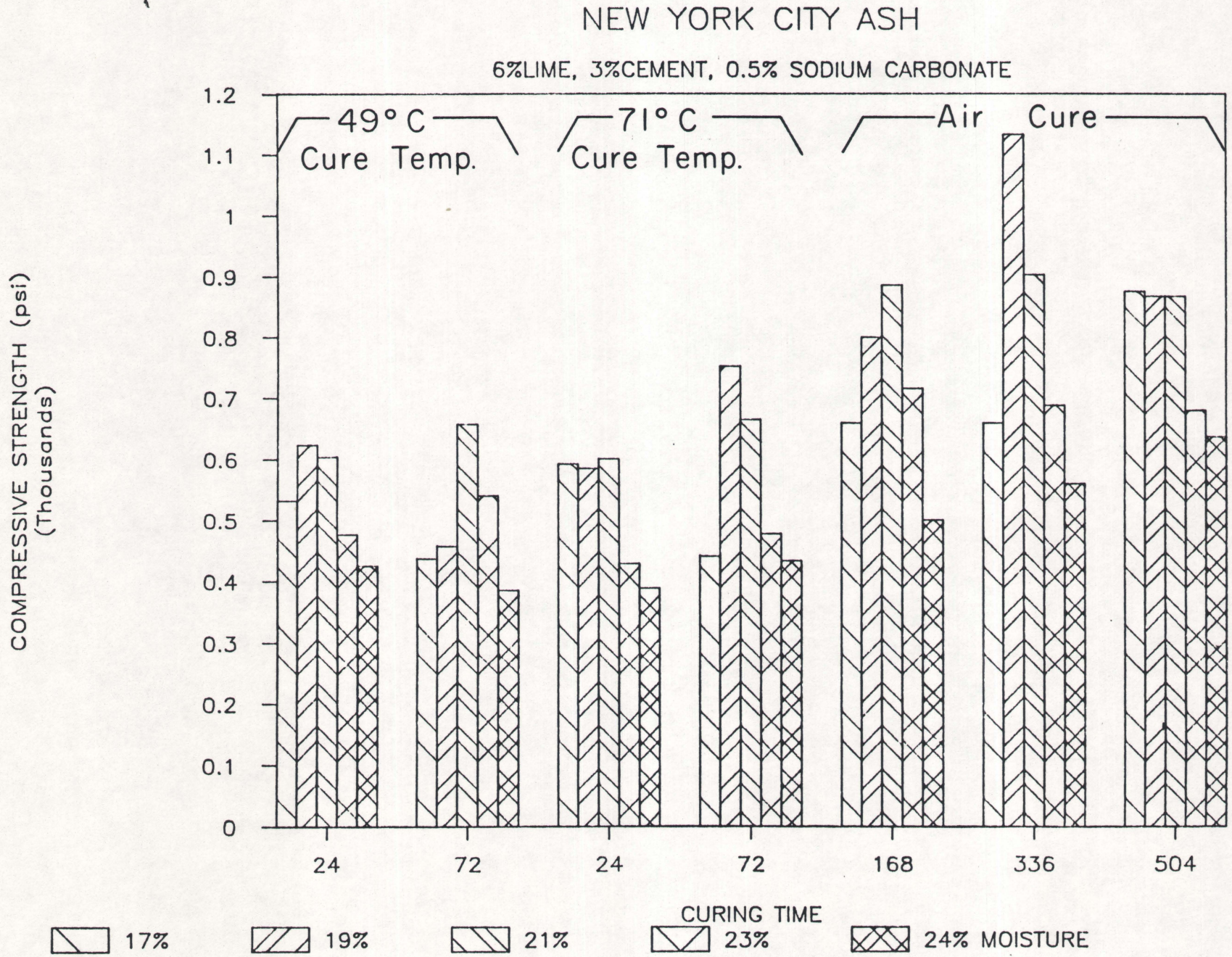




Figure 3.2

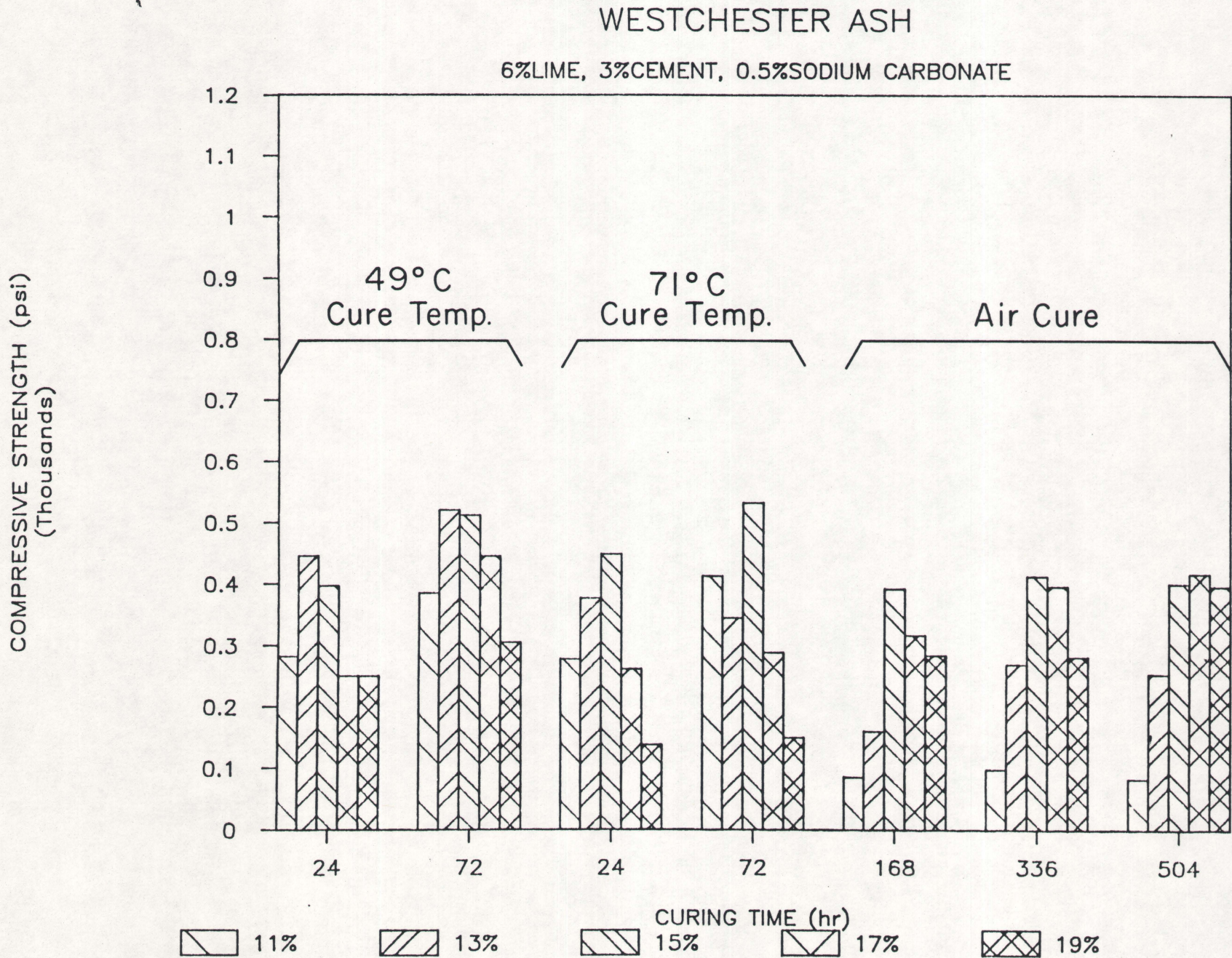


Figure 3.3

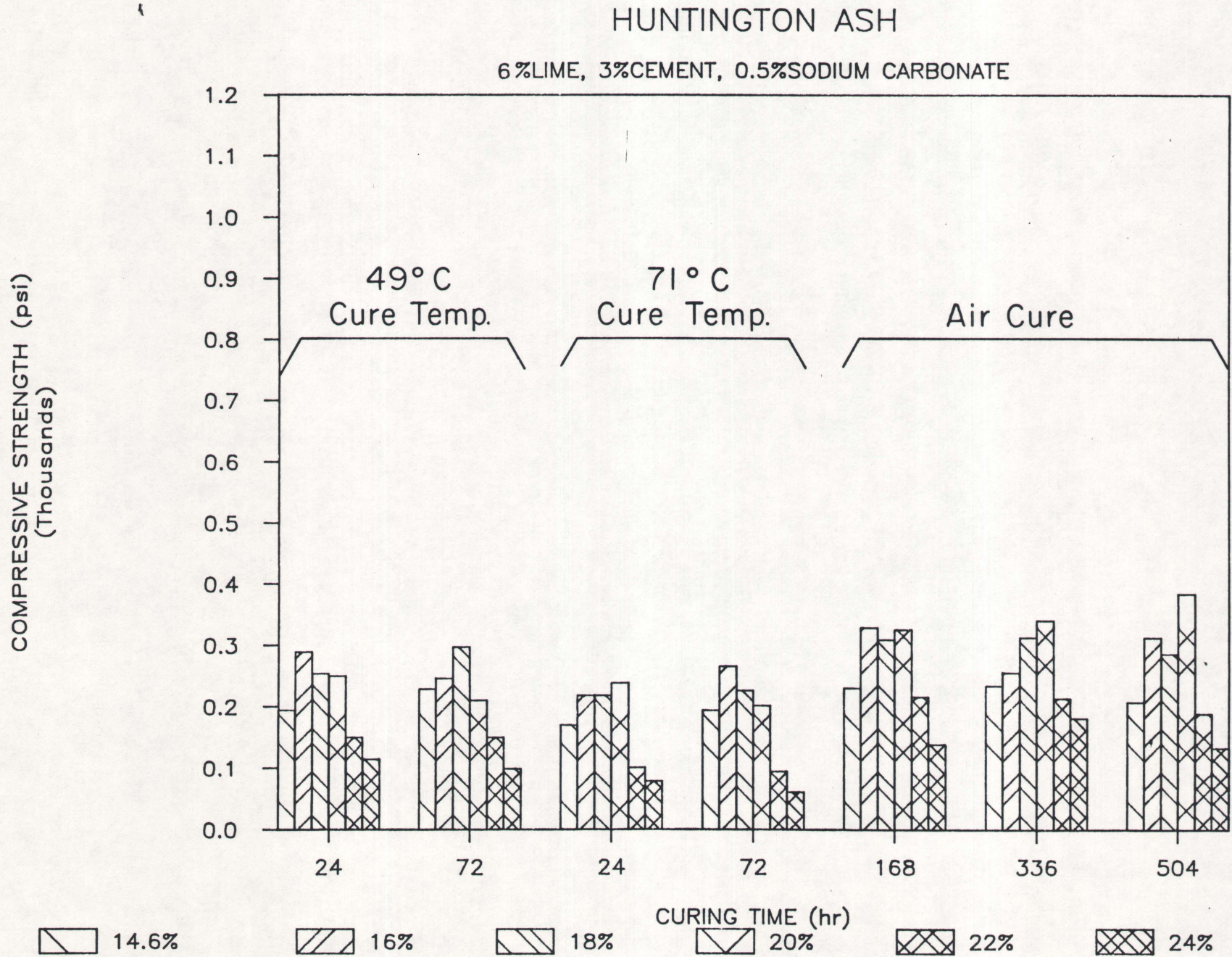


Table 3.2 and Figures 3.4 - 3.6 illustrates that little benefit with respect to the structural integrity is realized by increasing lime concentration. New York City and Huntington proctor samples exhibited a decline in compressive strength and only a slight increase in strength was noted for the Westchester samples. In all cases increasing the lime content did not alter the pH of the mix. It can be concluded that lime content in excess of 6% offers no significant structural improvement.

Sodium carbonate ( $\text{Na}_2\text{CO}_3$ ), was used in this research for prior investigations by Harder et al., 1981, Vincent et al., 1961 and Roethel et al., 1985 has shown that this additive accelerates the strength gain of various coal ash mix designs. This investigation reveals that sodium carbonate has no effect on the compressive strength of stabilized incineration ash samples. Table 3.3 and Figures 3.7 - 3.9 indicates that New York City samples without sodium carbonate exhibit a slight increase in strength.

Portland cement (type 1) was added to the mix design and yielded proctor samples having the highest compressive strength. Samples fabricated using Westchester residue and 15% cement achieved a compressive strength of 1592 psi. Unfortunately by this time we were using the second batch of New York City fly ash which possessed properties that significantly reduced the structural integrity of the samples. Strengths measured for the New York City samples reached 400 psi, significantly lower than earlier samples though still acceptable for marine disposal. Data pertaining to this mix design is presented in Table 3.4 along with Figures 3.10 - 3.12.

One of the possible reasons the proctors fabricated using second batch of New York City fly ash failed to achieve a higher compressive strength was the significantly lower pH of the ash. In an attempt to improve the compressive strength a series of proctors were fabricated with 15% cement and 4% lime. While the lime did elevate the pH of these samples, no significant improvement in compressive strength was obtained. Table 3.5 and Figure 3.13 presents the data obtained from this investigation.

Table 3.2 RESULTS OF PROCTOR FABRICATION USING  
9% LIME, 3% CEMENT, 0.5%  $\text{Na}_2\text{CO}_3$ .

NEW YORK CITY INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
CF	17	15.9	386 - 625
CG	19	18.0	489 - 780
CH	21	20.3	637 - 949
CI	23	21.9	450 - 844

WESTCHESTER INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
WF	17	17.9	183 - 454
WG	15	16.2	517 - 688
WH	13	14.7	269 - 645

HUNTINGTON INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
HD	20	23.4	68 - 255
HE	22	27.4	80 - 147
HH	22	25.0	76 - 247
HJ	18	21.9	167 - 318
HK	16	20.2	171 - 285
HI	20	24.2	119 - 318

Figure 3.4

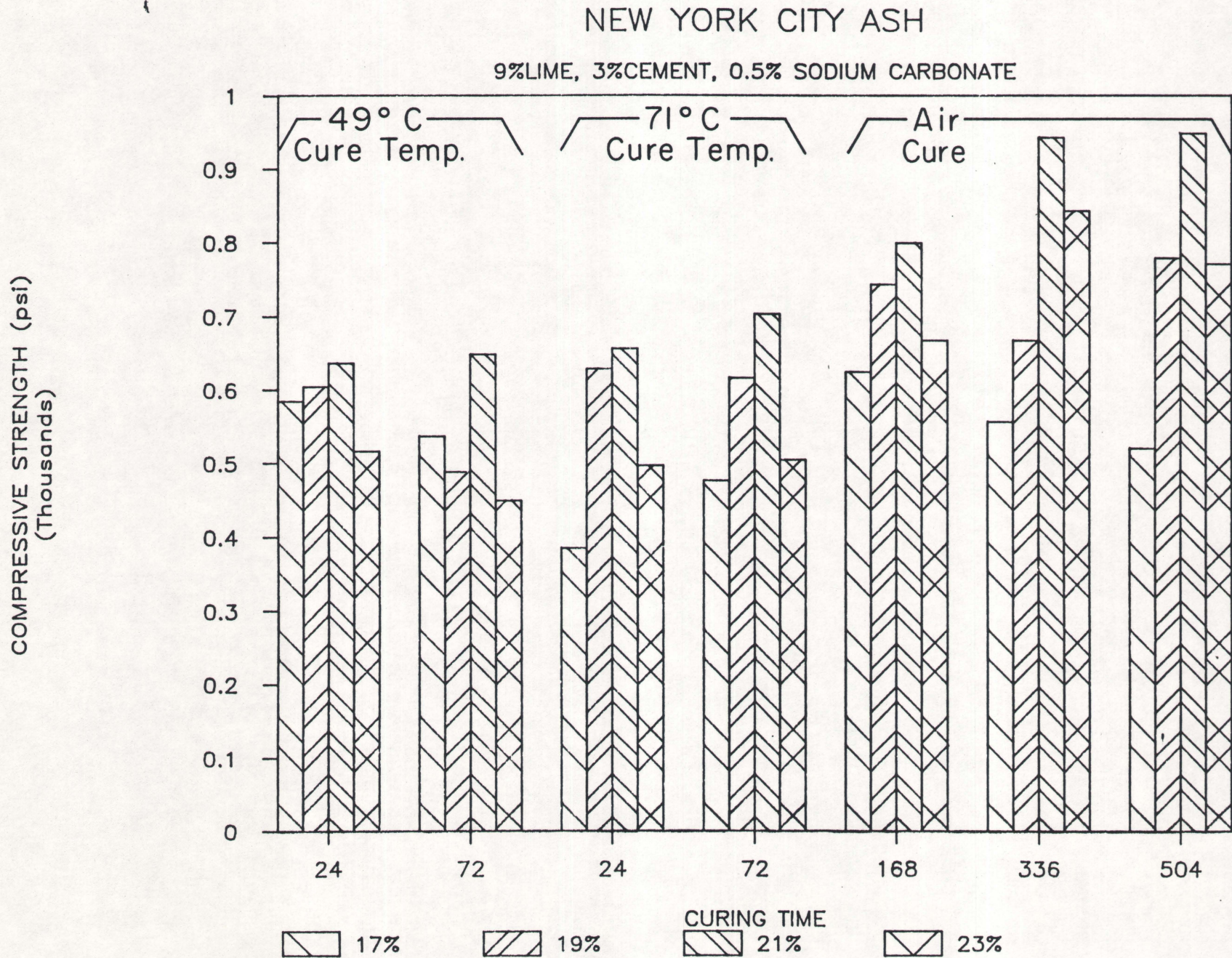


Figure 3.5

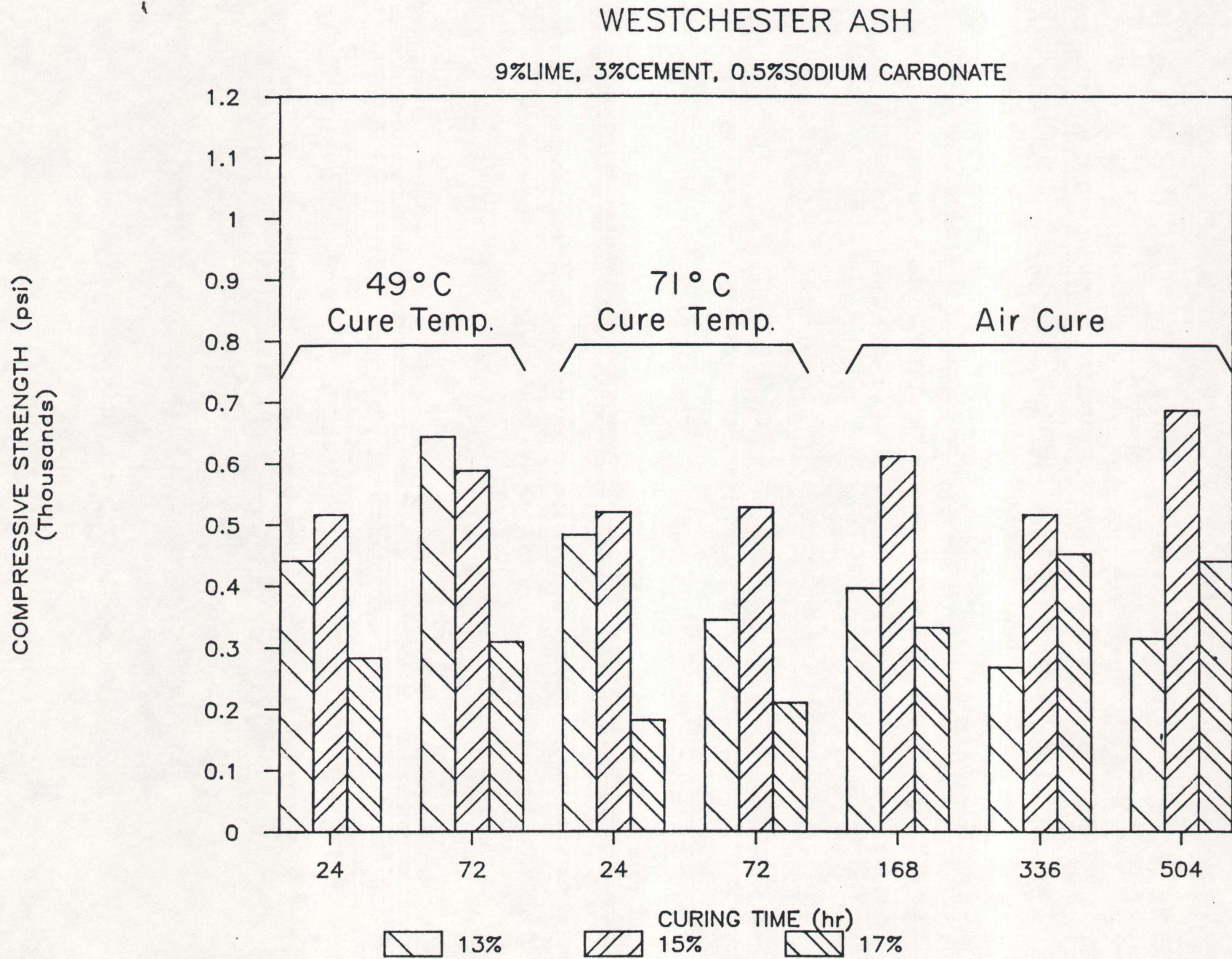


Figure 3.6

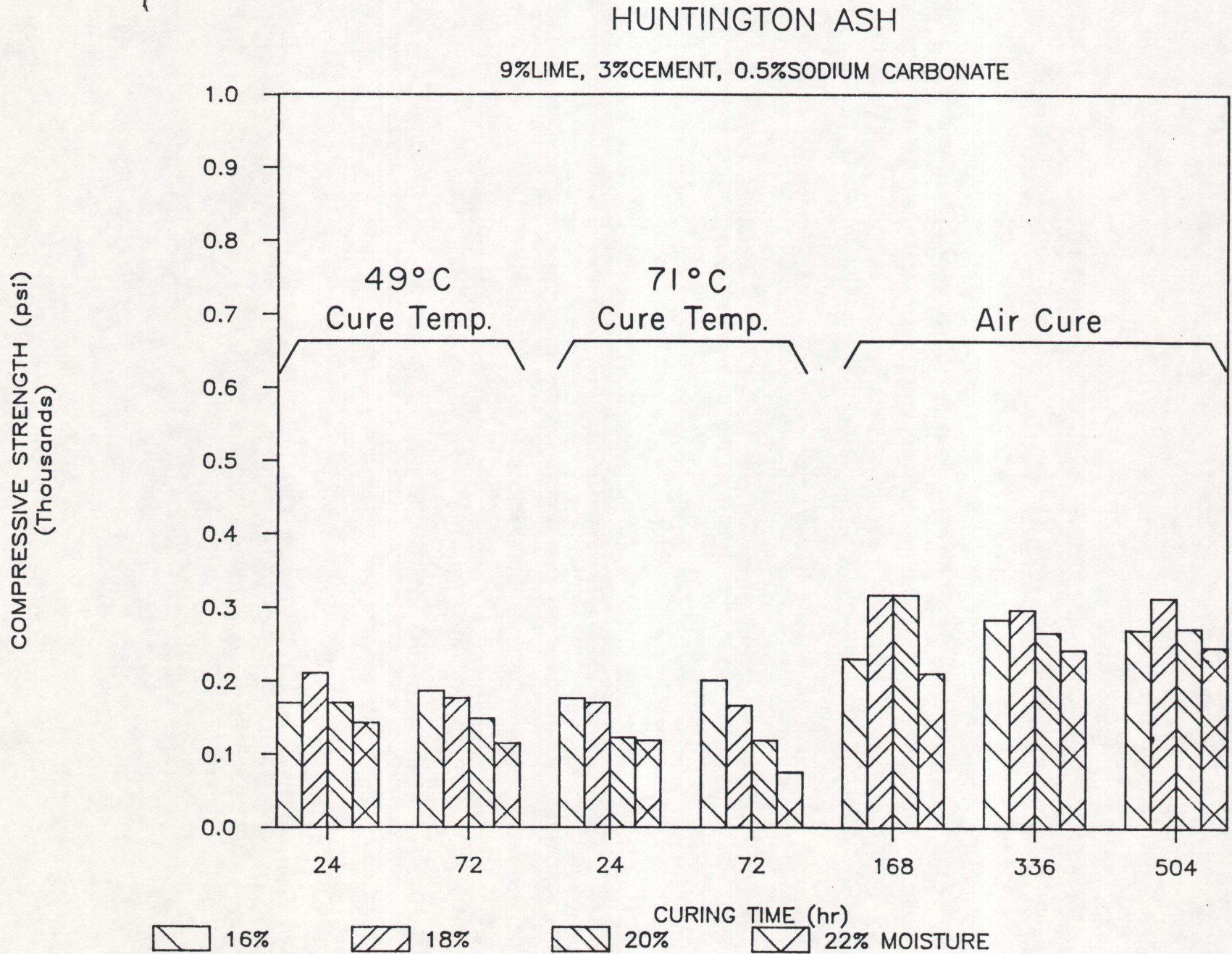


Table 3.3

RESULTS OF PROCTOR FABRICATION USING  
6% LIME, 3% CEMENT

---

NEW YORK CITY INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
CJ	15	15.4	537 - 1122
CK	17	17.4	557 - 1194
CL	19	18.4	454 - 955
CM	21	20.5	312 - 891
CN	23	22.9	157 - 660

WESTCHESTER INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
WI	17	16.3	199 - 450
WJ	15	14.9	217 - 410
WK	13	14.5	287 - 454
WR	11	10.5	101 - 398

HUNTINGTON INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
HP	16	17.2	175 - 231
HQ	18	21.7	219 - 306
HR	20	22.0	163 - 314
HS	22	24.2	92 - 231

---



Figure 3.7

### NEW YORK CITY ASH

6% LIME, 3% CEMENT,

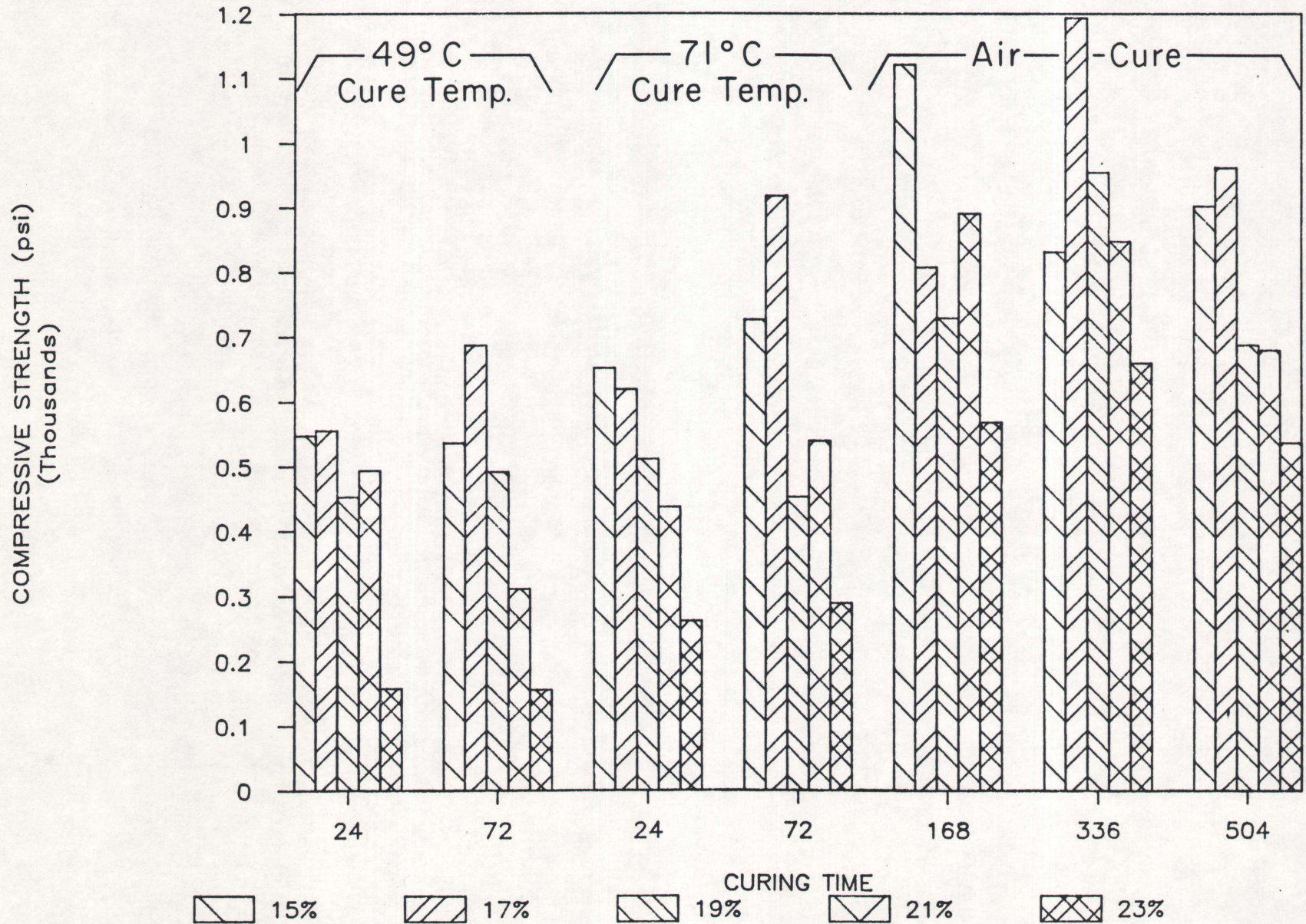


Figure 3.8

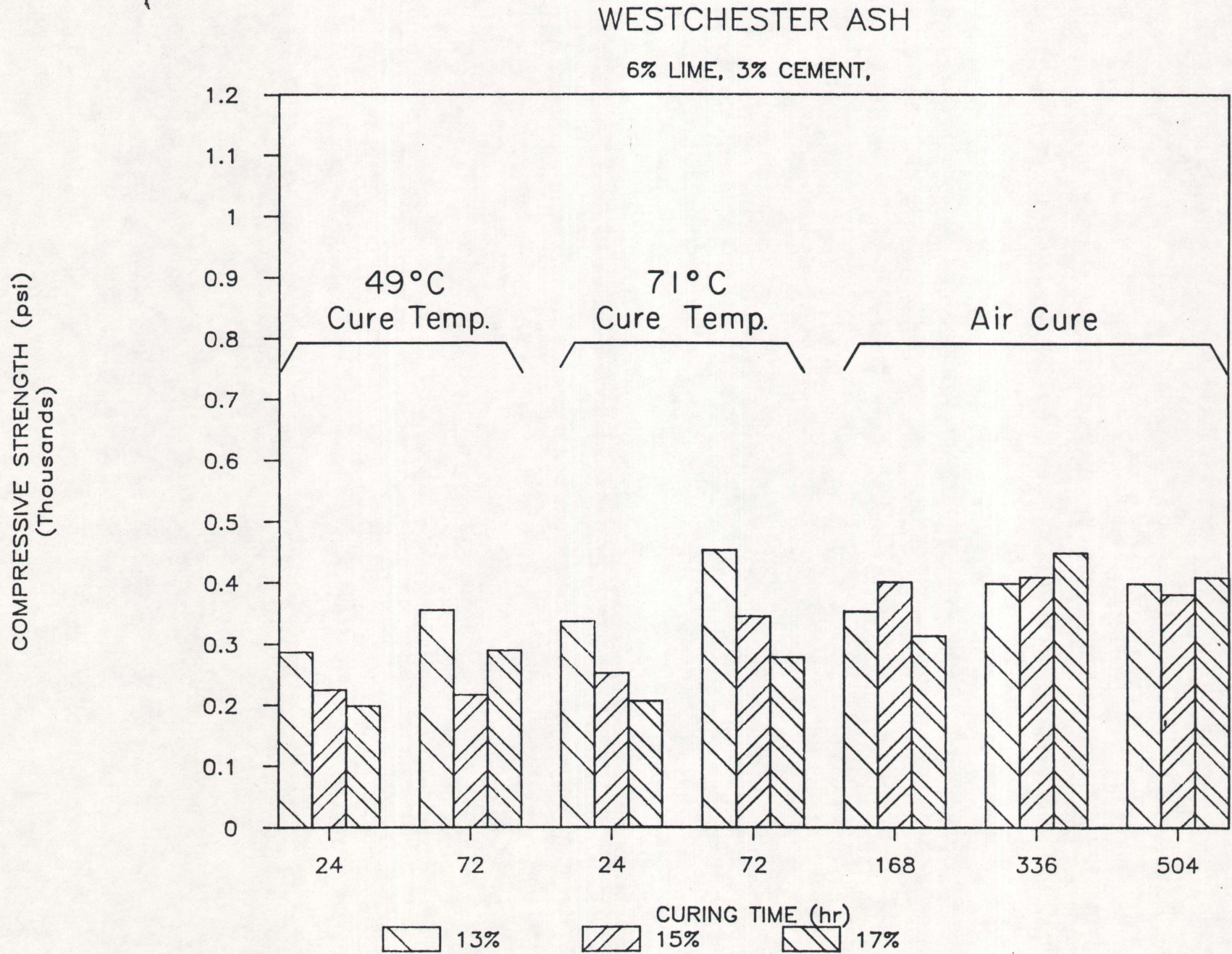


Figure 3.9

### HUNTINGTON ASH

6% LIME, 3% CEMENT

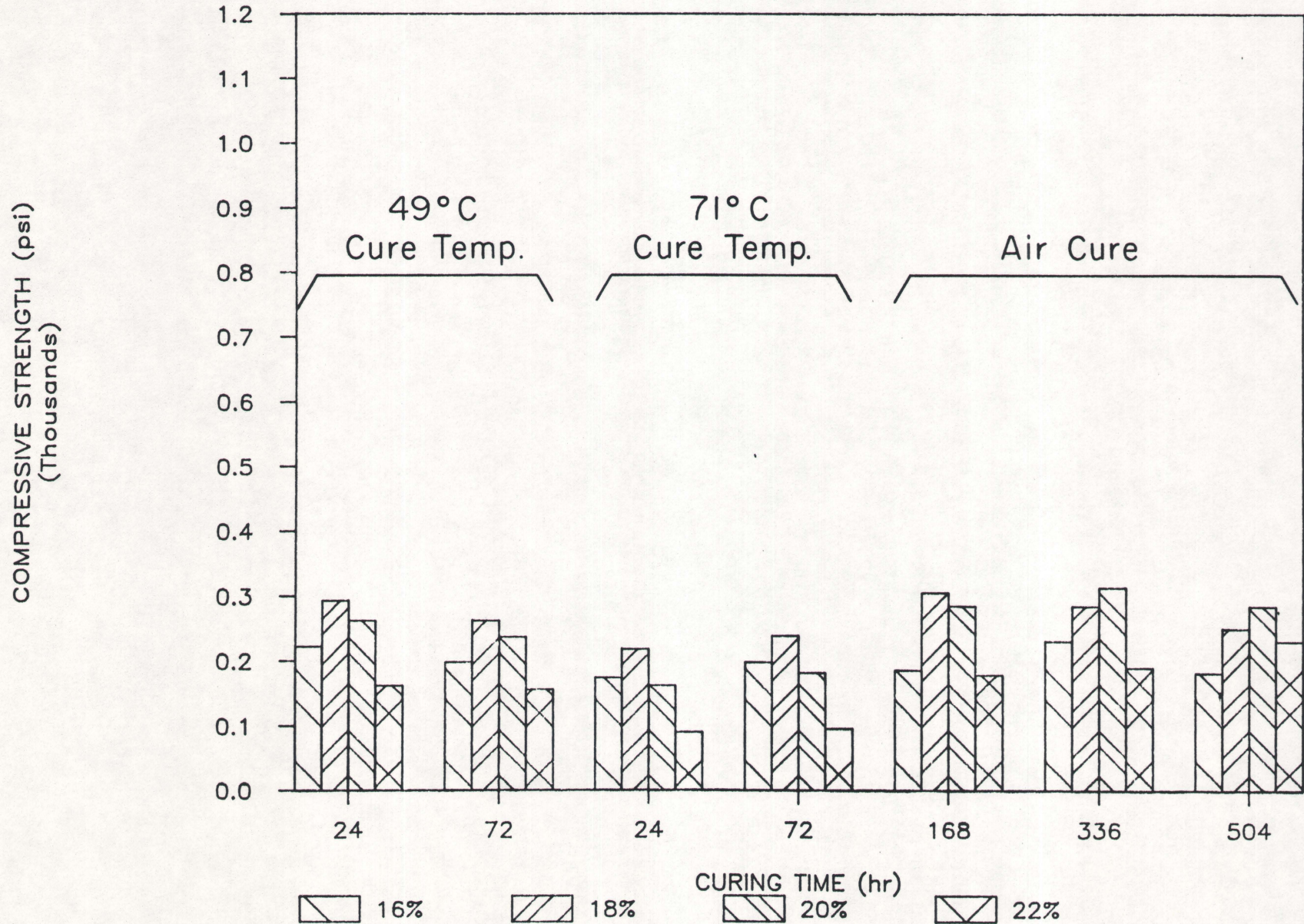


Table 3.4 RESULTS OF PROCTOR FABRICATION USING  
15% CEMENT

---

NEW YORK CITY INCINERATION ASH\*

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
CQ	15	14.4	251 - 398
CR	17	16.0	197 - 292
CS	19	18.2	119 - 247
CT	21	20.4	119 - 211
CY	23	22.4	88 - 390

HUNTINGTON INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
HX	20	23.8	235 - 611
HY	18	22.1	330 - 569
HZ	16	19.1	322 - 466

WESTCHESTER INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
WO	13	12.3	462 - 816
WP	15	14.1	513 - 1241
WQ	17	16.2	736 - 1377
WT	19	18.0	593 - 1592

---

\* Represents ash collected on a second visit to the facility.

Figure 3.10

### NEW YORK CITY ASH (2)

15% CEMENT

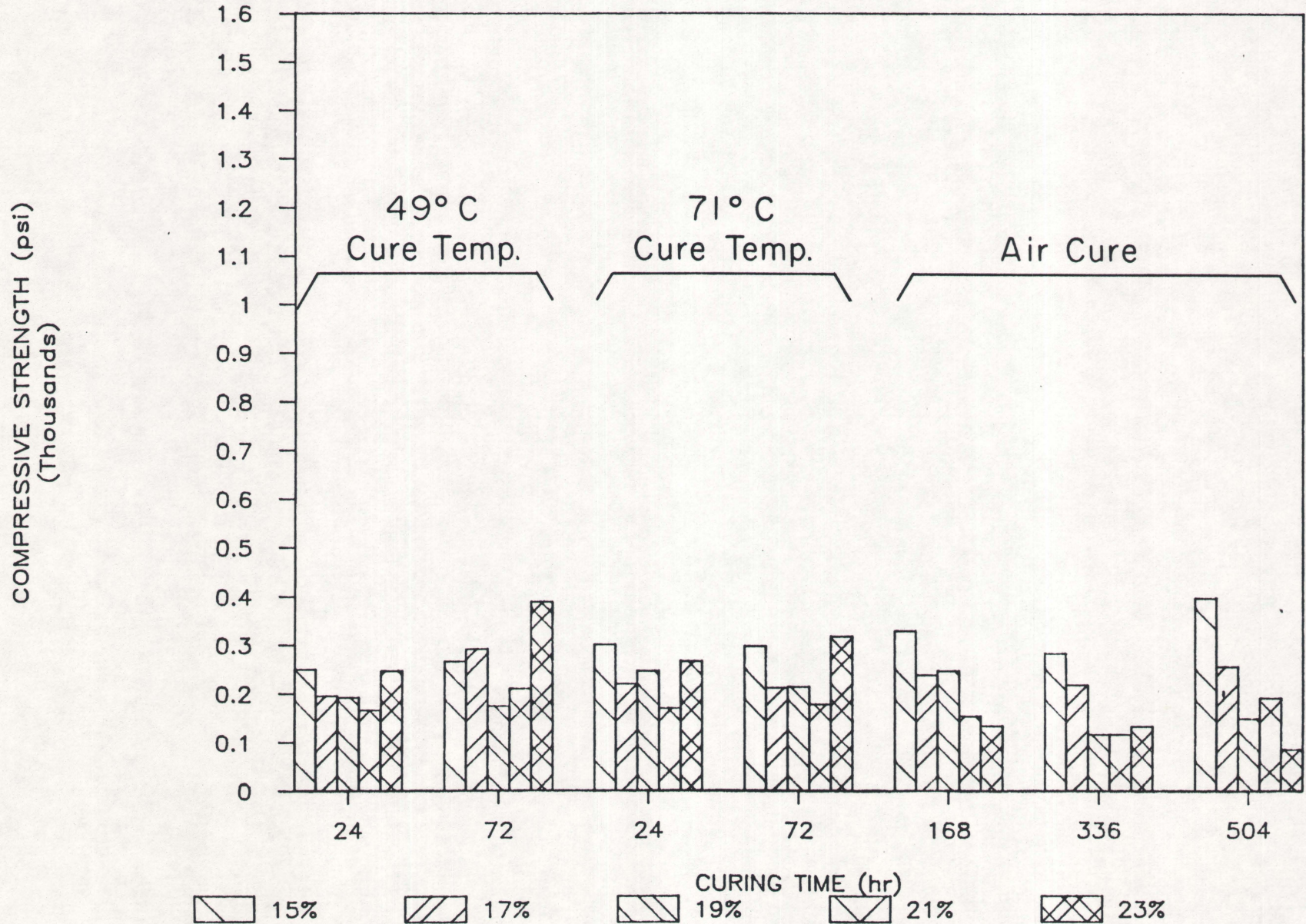


Figure 3.11

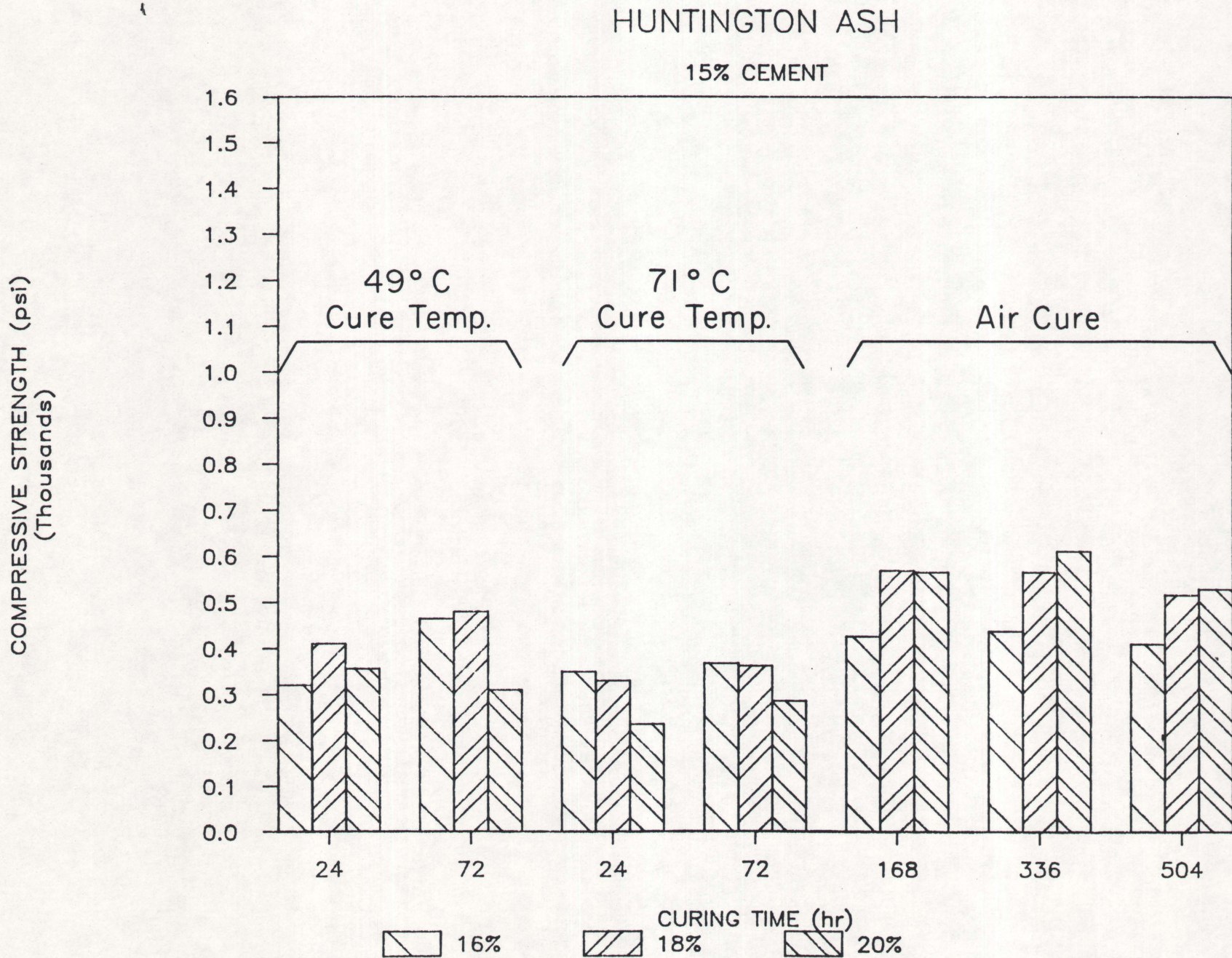


Figure 3.12

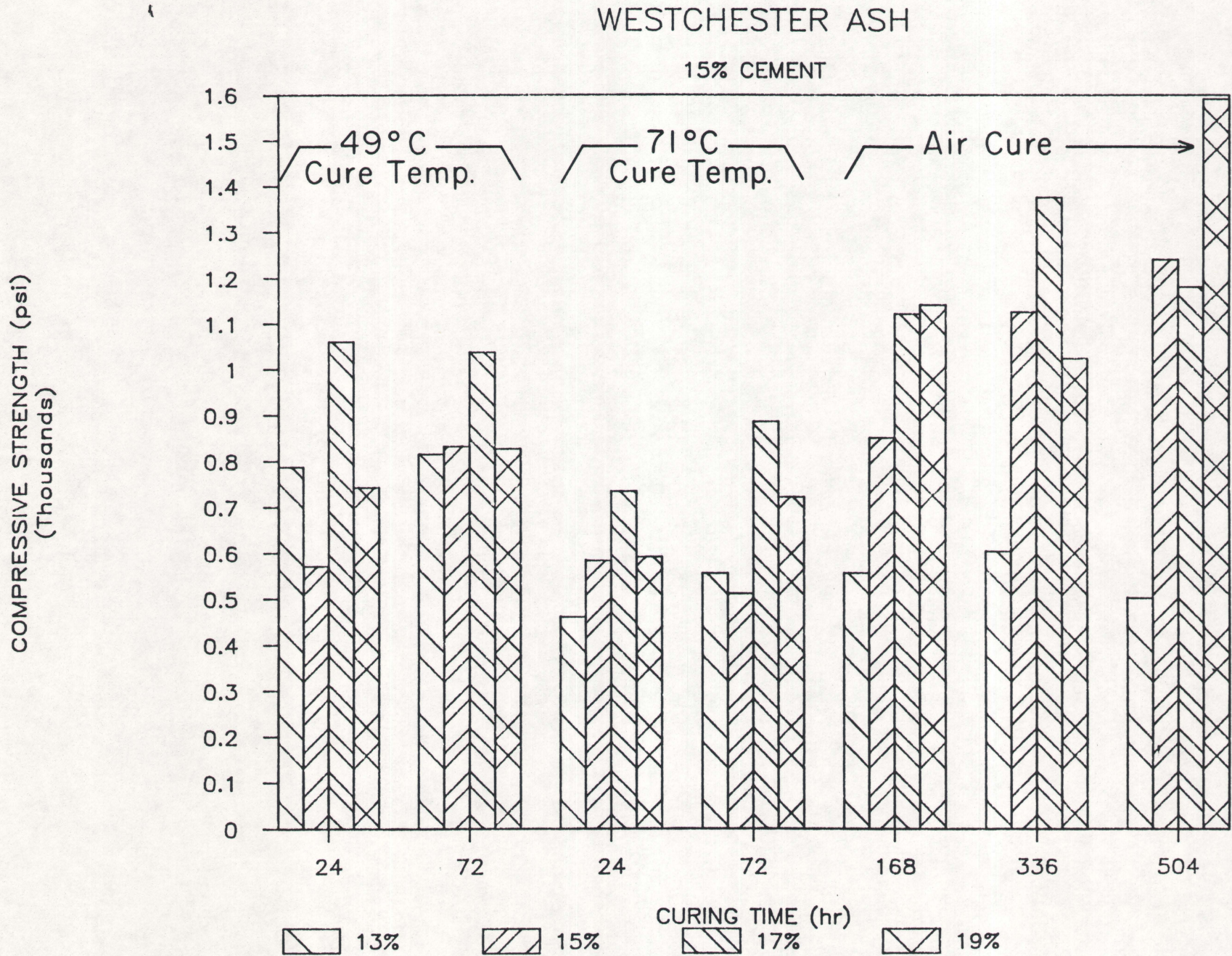


Table 3.5 RESULTS OF PROCTOR FABRICATION USING  
4% LIME, 15% CEMENT

---

NEW YORK CITY INCINERATION ASH\*

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
CZ	19	17.9	211 - 382
CAA	21	19.1	171 - 267
CAB	23	21.3	167 - 263
CAC	25	23.5	111 - 249
CAD	29	27.2	80 - 207
CAE	31	29.8	24 - 195

---

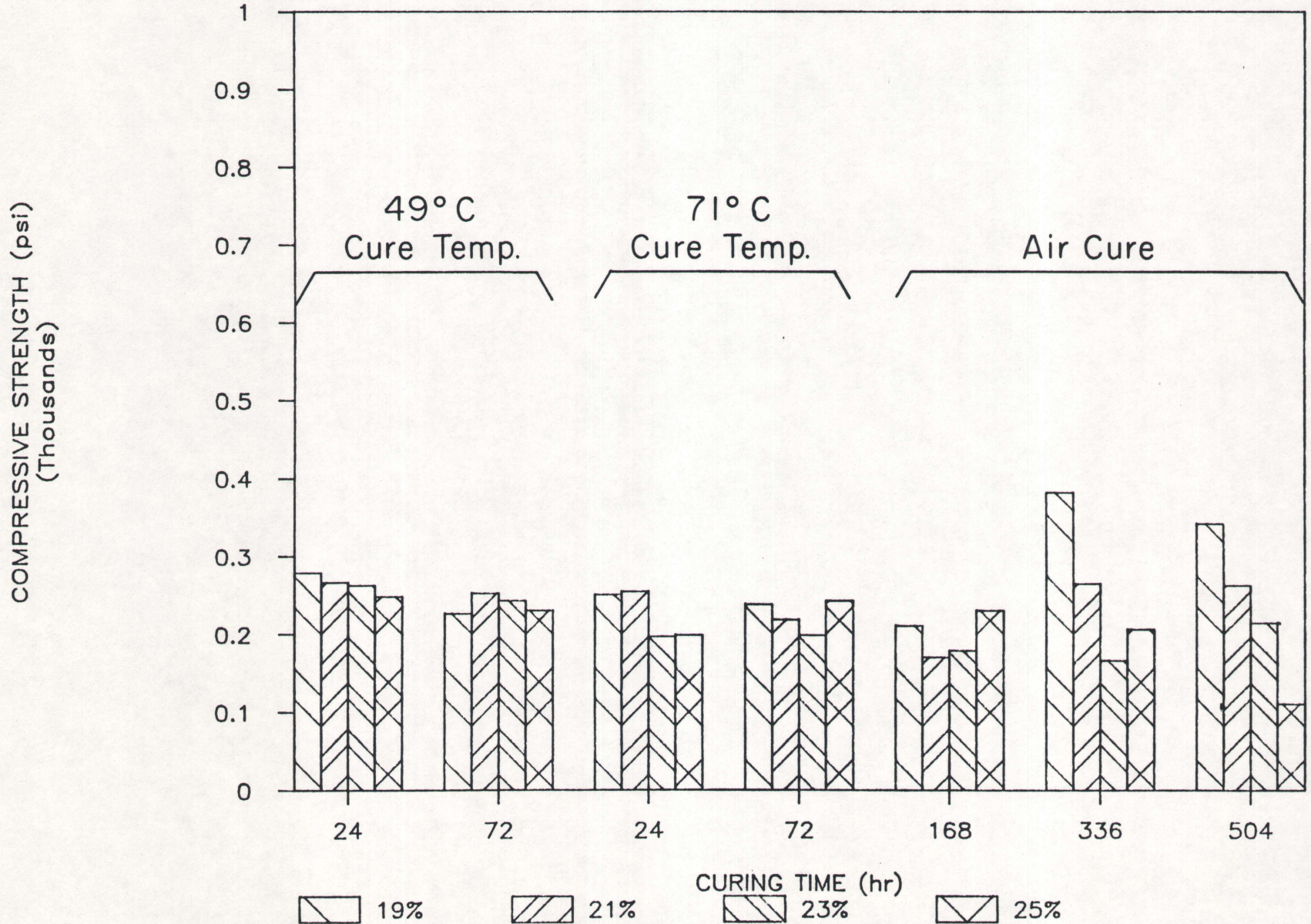
\* Represents ash collected on a second visit to the facility.



Figure 3.13

### NEW YORK CITY ASH (2)

4% LIME, 15% CEMENT



Prior investigations with coal ash has shown that small amounts of gypsum ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) can significantly improve compressive strength. A series of proctor samples were fabricated using all three ashes and 6% lime, 6% gypsum and 3% cement. Significant deterioration in the structural integrity of the samples was observed. Table 3.6 and Figures 3.14 - 3.16 indicates that none of the samples achieved a strength of 300 psi, the minimum strength we accept for marine disposal.

#### FULL SCALE PRODUCTION OF TEST PROCTORS

Having developed methods for fabricating proctors of acceptable quality, the next task was to begin full scale production of test proctors to be used in the second phase of this investigation. Thirty proctor sized cylinders of each residue were fixated with 15% Portland cement. Table 3.7 describes the mix design and proctor curing conditions for each residue examined and the resulting compressive strength measured for three randomly selected samples. All three solidified samples are presented in Figure 3.17.

These mixes will be subjected to additional physical and chemical tests including permeability, porosity, ASTM and EPA leachate tests, bulk chemical composition and x-ray diffraction.

Table 3.6

 RESULTS OF PROCTOR FABRICATION USING  
 6% LIME, 3% CEMENT, 6%  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ 


---

 NEW YORK CITY INCINERATION ASH
 

---

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
CU	17	16.5	115 - 199
CV	19	18.5	143 - 251
CW	21	20.9	135 - 219
CX	23	22.8	183 - 243

## HUNTINGTON INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
HT	20	21.0	199 - 294
HU	22	21.0	179 - 239
HV	24	25.6	147 - 199
HW	17	19.9	191 - 286
HAA	16	16.2	203 - 277
HAB	18	20.4	235 - 348
HAC	20	21.3	183 - 286

## WESTCHESTER INCINERATION ASH

PROCTOR I.D.	CALC. MOISTURE	MEAS. MOISTURE	COMPRESSIVE STRENGTH
WL	13	12.8	0 - 231
WM	15	14.5	0 - 217
WN	17	16.1	0 - 255

---

Figure 3.14

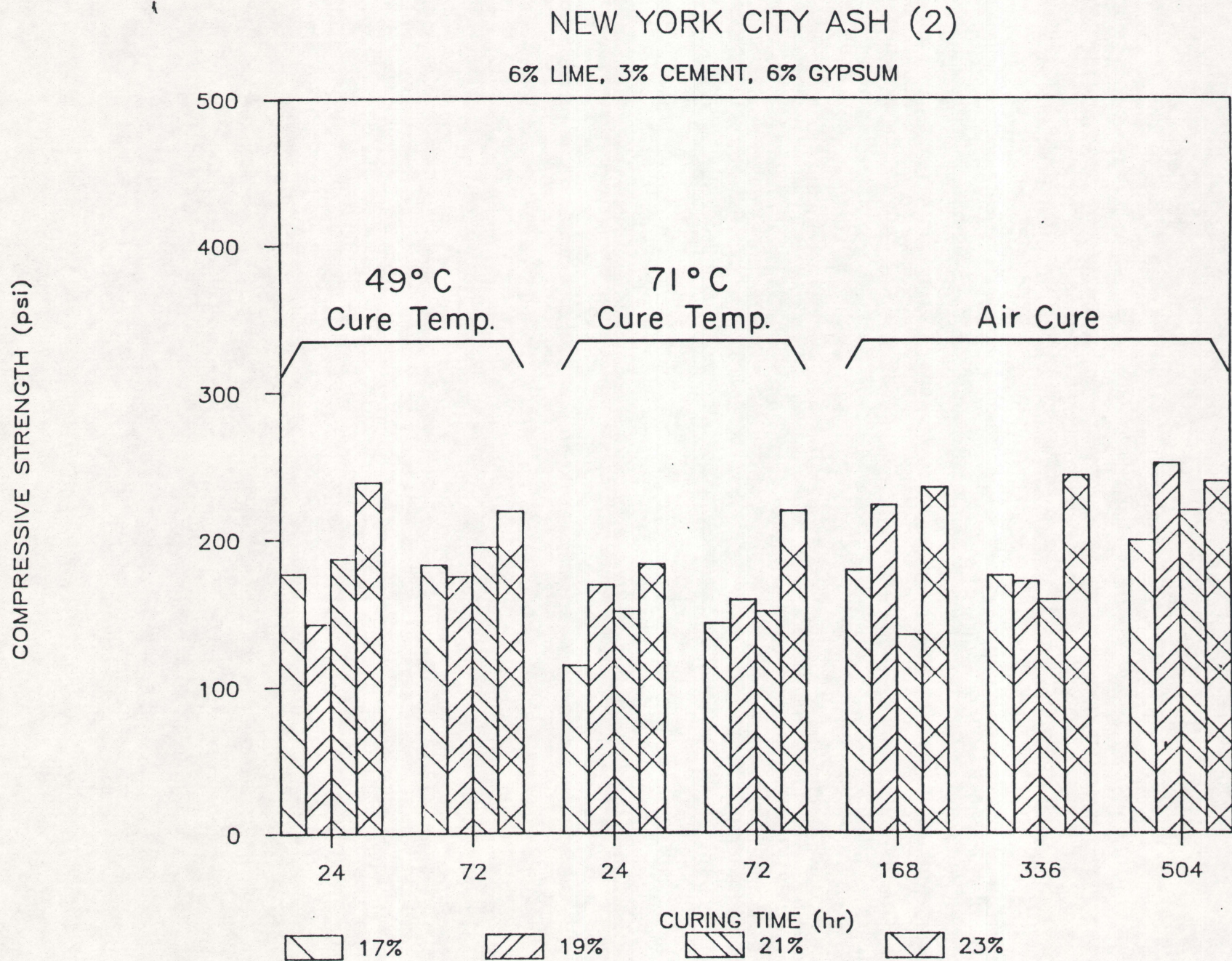


Figure 3.15

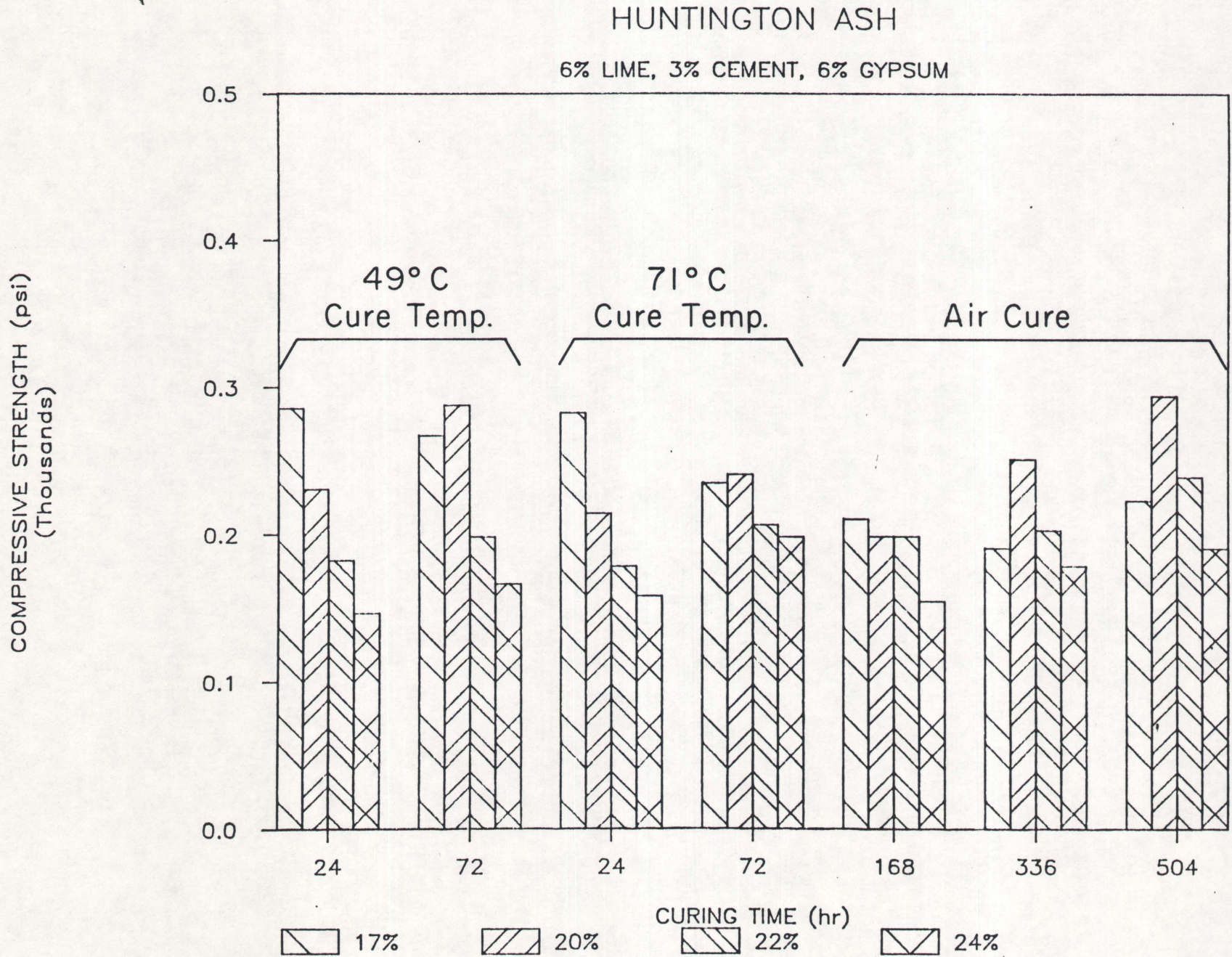


Figure 3.16

### WESTCHESTER ASH

6%LIME, 3%CEMENT, 6% GYPSUM

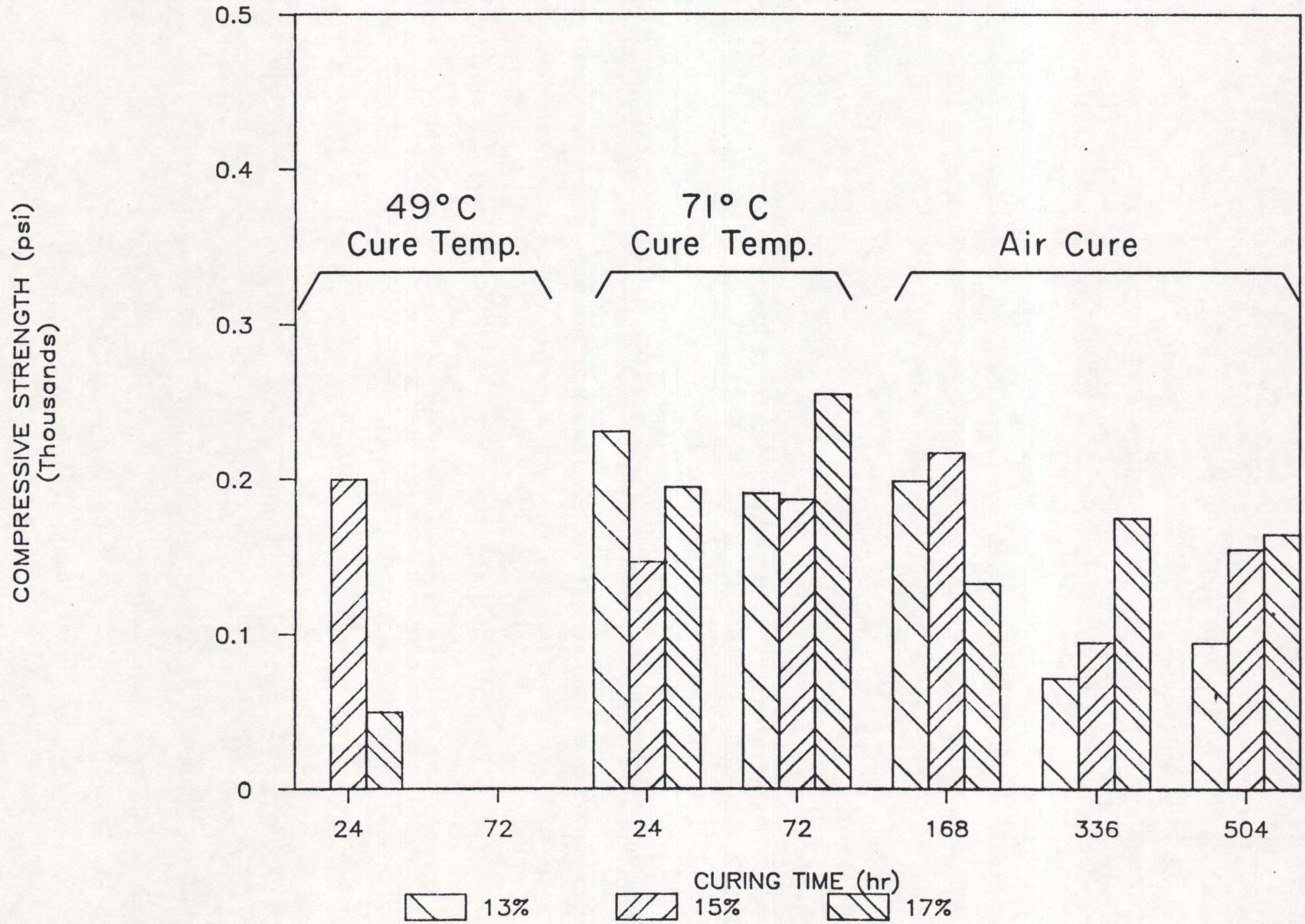


Table 3.7

## FORMULATION OF THE OPTIMUM MIXES

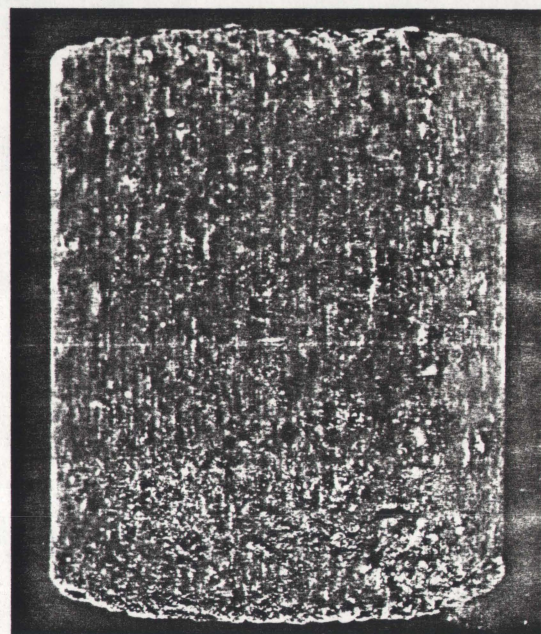
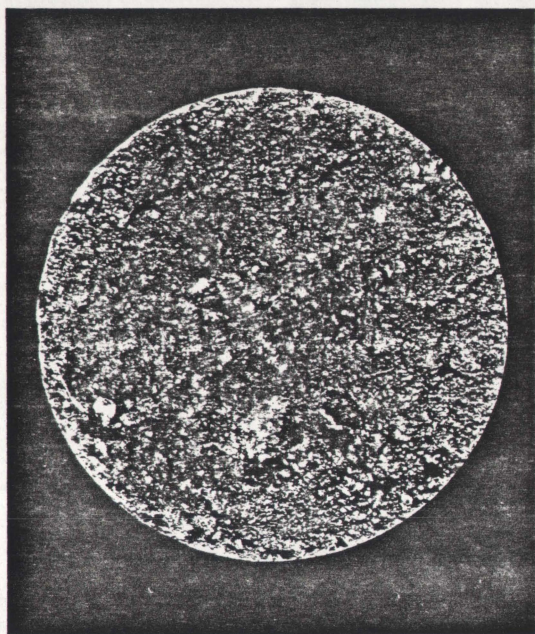
RESIDUE	NEW YORK CITY*	HUNTINGTON	WESTCHESTER
INCINERATION RESIDUE (%)	XX	XX	XX
CEMENT (%)	15	15	15
MOISTURE (%)	23	18	17
CURING TEMPERATURE (°C)	49	AIR (23)	49
CURING TIME (h)	72	168	24
COMPRESSIVE STRENGTH (psi)	228(±43)	455(±51)	1230(±59)

Figure 3.17. Solidified proctors of the three optimum mixes.

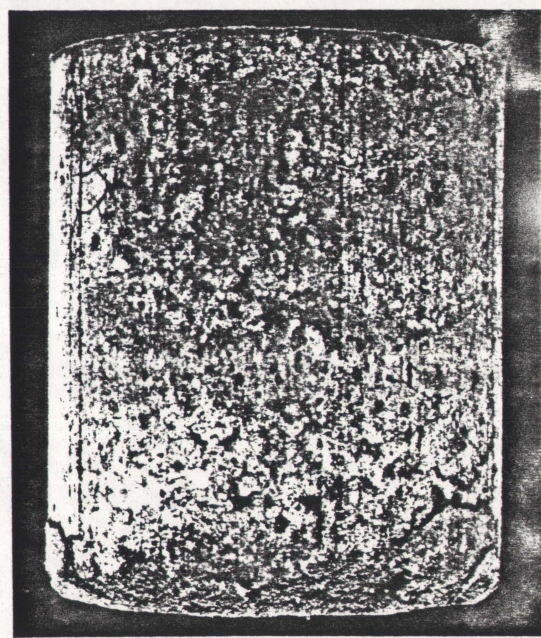
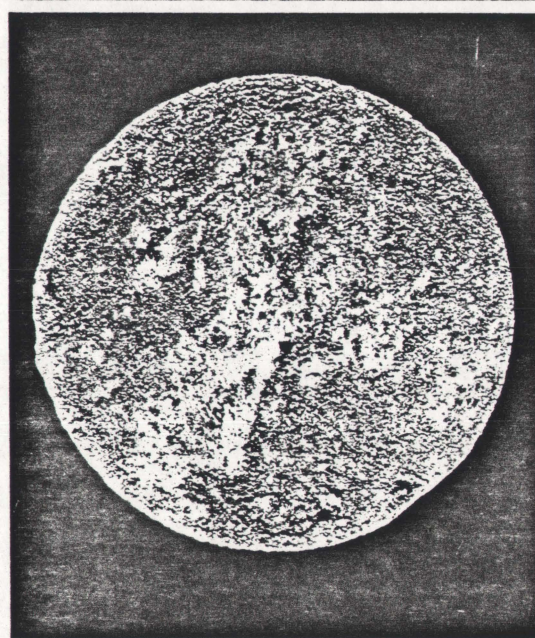
- a) Stabilized Huntington Incineration Residue
- b) Stabilized New York City Incineration Ash
- c) Stabilized Westchester Incineration Residue



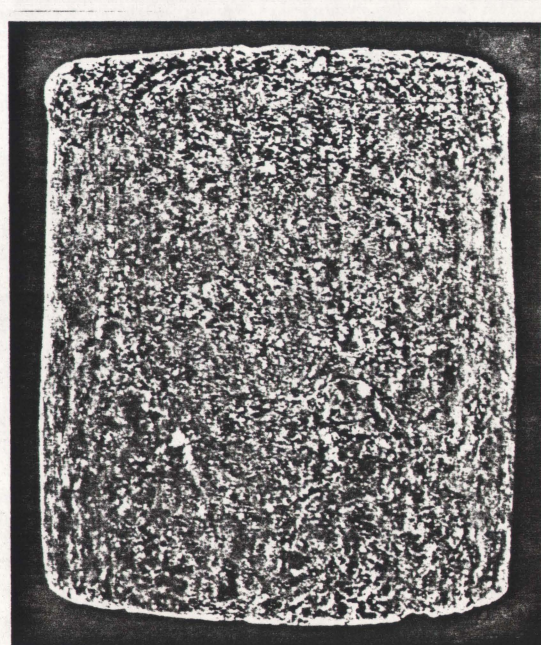
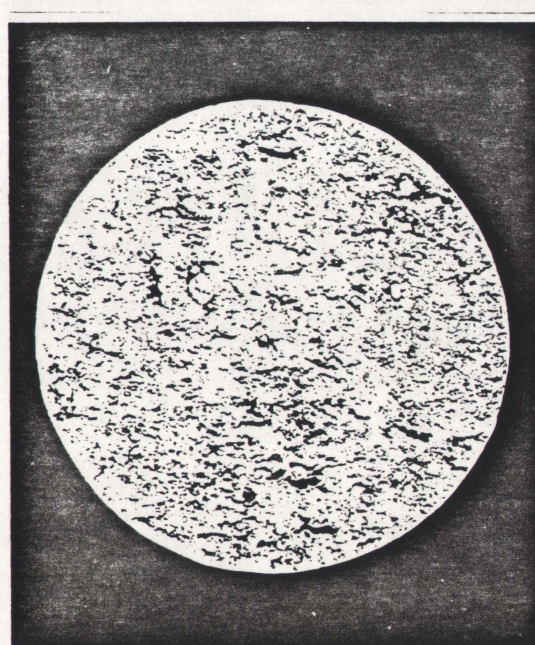
a)



b)



c)



## REFERENCES

- Harder, P. J., M. J. Marcinak, N. J. Schlotter, A. I. Labotka, and I. W. Duedall. 1981. The fixation of fly ash: Physical and leachate properties. Final Report to the Consolidated Edison Company of New York, Inc., New York, N.Y. 10003, pp. 264.
- Roethel, F. J., P. M. J. Woodhead, C. Shieh and S. L. Puleo. 1985. Fixation of Sewage Sludge and Fly Ash. In: Proceedings of the Second Conference on Municipal, Hazardous and Coal Waste Management. S. Sengupta (ed.) NTIS No. DOE/METC/84-34.
- Vincent, R. D., Mateos, M., and D. T. Davidson. 1961. Variations in Pozzolanic Behavior of Fly Ashes. ASTM Proceedings.

APPENDIX A

NEW YORK CITY INCINERATION ASH

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CA1		CA2		CA3		CA4		CA5		CA6		CA7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	73.5	1396.5	73.5	1396.5	73.5	1396.5	73.5	1396.5	73.5	1396.5	73.5	1396.5	73.5	1396.5
INCINERATION ASH(RAW)	81.8	1556	81.9	1556	81.9	1556	81.9	1556	81.9	1556	81.8	1556	81.9	1556
LIME	6	114	6	114	6	114	6	114	6	114	6	114	6	114
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
WATER ADDED	8.6	163.5	8.6	163.5	8.6	163.5	8.6	163.5	8.6	163.5	8.6	163.5	8.6	163.5
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	19.1				18.1				18.4				18.9	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH			12.9				12.8				12.8			
DATE FABRICATED		8/27/85		8/27/85		8/28/85		8/28/85		8/28/85		8/28/85		8/28/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1440	1425	1445	1420	1430	1435	1410
WET DENSITY G/CC	1.5	1.5	1.5	1.5	1.5	1.5	1.5
LB/CU FT	95.2	94.1	95.5	93.8	94.5	94.8	93.2
DRY WEIGHT	1300	1300	1300	1295	1345		1320
DRY DENSITY	1.4	1.4	1.4	1.4	1.4		1.4
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	533.2	437.7	592.9	441.7	660	660	875
DATE TESTED	9/3/85	9/3/85	9/3/85	9/3/85	9/9/85	9/16/85	9/23/85
AIR CURE TIME (d)	6	4	5	3	5	5	5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CB1		CB2		CB3		CB4		CB5		CB6		CB7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5
INCINERATION ASH(RAW)	80.5	1531	80.6	1531	80.6	1531	80.6	1531	80.6	1531	80.6	1531	80.6	1531
LIME	6	114	6	114	6	114	6	114	6	114	6	114	6	114
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
WATER ADDED	9.9	188.5	9.9	188.5	9.9	188.5	9.9	188.5	9.9	188.5	9.9	188.5	9.9	188.5
TOTAL MOISTURE (CALC)	19		19		19		19		19		19		19	
TOTAL MOISTURE (MEAS)	19.3				19.2				18.7				20.3	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH			12.8				12.85				12.9			
DATE FABRICATED		8/29/85		8/29/85		8/29/85		8/29/85		8/29/85		8/29/85		8/29/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1460		1460		1465		1455		1445		1460		1450
WET DENSITY G/CC		1.5		1.6		1.6		1.5		1.5		1.6		1.5
LB/CU FT		96.5		96.5		96.8		96.2		95.5		96.5		95.8
DRY WEIGHT		1310		1300		1300		1290		1335				1341
DRY DENSITY		1.4		1.4		1.4		1.4		1.4				1.4
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		624.6		458		584.9		752		800		1134		867
DATE TESTED		9/3/85		9/6/85		9/3/85		9/6/85		9/9/85		9/16/85		9/23/85
AIR CURE TIME (d)		4		5		4		5		4		4		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CC1		CC2		CC3		CC4		CC5		CC6		CC7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5
INCINERATION ASH(RAW)	78.3	1488	78.3	1488	78.3	1488	78.3	1488	78.3	1488	78.3	1488	78.3	1488
LIME	6	114	6	114	6	114	6	114	6	114	6	114	6	114
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
WATER ADDED	12.1	231.5	12.2	231.5	12.2	231.5	12.2	231.5	12.2	231.5	12.2	231.5	12.2	231.5
TOTAL MOISTURE (CALC)	21		21		21		21		21		21		21	
TOTAL MOISTURE (MEAS)	21.9				21.9				22.1				22.4	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH			12.9				12.9				12.9			
DATE FABRICATED		8/29/85		8/29/85		8/29/85		8/29/85		8/29/85		8/29/85		8/29/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1515	1510	1505	1510	1510	1500	1505
WET DENSITY G/CC	1.6	1.6	1.6	1.6	1.6	1.6	1.6
LB/CU FT	100.1	99.8	99.5	99.8	99.8	99.1	99.5
DRY WEIGHT	1345	1330	1360	1310	1385		1492
DRY DENSITY	1.4	1.4	1.4	1.4	1.5		1.6
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	604.8	657	600.8	665	885	903	867
DATE TESTED	9/3/85	9/6/85	9/3/85	9/6/85	9/9/85	9/16/85	9/23/85
AIR CURE TIME (d)	4	5	4	5	4	4	4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CD1		CD2		CD3		CD4		CD5		CD6		CD7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	67.5	1215	67.5	1215	67.5	1215	67.5	1215	67.5	1215	67.5	1215	67.5	1215
INCINERATION ASH(RAW)	75.3	1356	75.3	1356	75.3	1356	75.3	1356	75.3	1356	75.3	1356	75.3	1356
LIME	6	108	6	108	6	108	6	108	6	108	6	108	6	108
SODIUM CARBONATE	0.5	9	0.5	9	0.5	9	0.5	9	0.5	9	0.5	9	0.5	9
CEMENT	3	54	3	54	3	54	3	54	3	54	3	54	3	54
WATER ADDED	15.1	273	15.2	273	15.2	273	15.2	273	15.2	273	15.1	273	15.2	273
TOTAL MOISTURE (CALC)	23		23		23		23		23		23		23	
TOTAL MOISTURE (MEAS)	22.2				22.3				22.2				22.2	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH			12.9				12.9				12.9			
DATE FABRICATED		8/30/85		8/30/85		8/30/85		8/30/85		8/30/85		8/30/85		8/30/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1550	1550	1565	1560	1565	1570	1565
WET DENSITY G/CC	1.6	1.6	1.7	1.7	1.7	1.7	1.7
LB/CU FT	102.4	102.4	103.4	103.1	103.4	103.7	103.4
DRY WEIGHT	1385	1375	1375	1340	1465		1445
DRY DENSITY	1.5	1.5	1.5	1.4	1.6		1.5
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	477.5	541	429.7	478	716	688	680
DATE TESTED	9/3/85	9/6/85	9/3/85	9/6/85	9/9/85	9/16/85	9/23/85
AIR CURE TIME (d)	3	4	3	4	3	3	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CE1		CE2		CE3		CE4		CE5		CE6		CE7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	66.5	1197	66.5	1197	66.5	1197	66.5	1197	66.5	1197	66.5	1197	66.5	1197
INCINERATION ASH(RAW)	72.4	1304	72.4	1304	72.4	1304	72.4	1304	72.4	1304	72.4	1304	72.4	1304
LIME	6	108	6	108	6	108	6	108	6	108	6	108	6	108
SODIUM CARBONATE	0.5	9	0.5	9	0.5	9	0.5	9	0.5	9	0.5	9	0.5	9
CEMENT	3	54	3	54	3	54	3	54	3	54	3	54	3	54
WATER ADDED	18.0	325	18.1	325	18.1	325	18.1	325	18.1	325	18.1	325	18.1	325
TOTAL MOISTURE (CALC)	24		24		24		24		24		24		24	
TOTAL MOISTURE (MEAS)	23.8				23.9				23.4				23.2	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH			12.8				12.8				12.8			
DATE FABRICATED		9/3/85		9/3/85		9/3/85		9/3/85		9/3/85		9/3/85		9/3/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1560	1560	1565	1560	1560	1560	1550
WET DENSITY G/CC	1.7	1.7	1.7	1.7	1.7	1.7	1.6
LB/CU FT	103.1	103.1	103.4	103.1	103.1	103.1	102.4
DRY WEIGHT	1365	1380	1355	1370	1440	1400	1360
DRY DENSITY	1.5	1.5	1.4	1.5	1.5	1.5	1.4
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	426	386	390	434	501	561	637
DATE TESTED	9/9/85	9/9/85	9/9/85	9/9/85	9/13/85	9/20/85	9/20/85
AIR CURE TIME (d)	5	3	5	3	3	3	6



## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CF1		CF2		CF3		CF4		CF5		CF6		CF7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	70.5	1269.0	70.5	1269.0	70.5	1269.0	70.5	1269.0	70.5	1269.0	70.5	1269.0	70.5	1269.0
INCINERATION ASH(RAW)	74.9	1349.0	74.9	1349.0	74.9	1349.0	74.9	1349.0	74.9	1349.0	74.9	1349.0	74.9	1349.0
LIME	9	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0
SODIUM CARBONATE	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0
CEMENT	3	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0
WATER ADDED	12.5	226.0	12.6	226.0	12.6	226.0	12.6	226.0	12.6	226.0	12.6	226.0	12.6	226.0
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	16.1				16				15.6				16	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH			13				13				13			
DATE FABRICATED		9/23/85		9/23/85		9/23/85		9/23/85		9/23/85		9/23/85		9/23/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1410		1401		1374		1391		1408		1339		1402
WET DENSITY G/CC		1.50		1.49		1.46		1.48		1.49		1.42		1.49
LB/CU FT		93.17		92.58		90.79		91.92		93.04		88.48		92.64
DRY WEIGHT		1305		1321		1290		1300		1375		1300		1357
DRY DENSITY		1.38		1.40		1.37		1.38		1.46		1.38		
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		585		537		386		477		625		557		521
DATE TESTED		9/30/85		9/30/85		9/30/85		9/30/85		10/3/85		10/10/85		10/18/85
AIR CURE TIME (d)		6		4		6		4		3		3		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CG1		CG2		CG3		CG4		CG5		CG6		CG7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68.5	1233.0	68.5	1233.0	68.5	1233.0	68.5	1233.0	68.5	1233.0	68.5	1233.0	68.5	1233.0
INCINERATION ASH(RAW)	72.5	1306.0	72.6	1306.0	72.6	1306.0	72.6	1306.0	72.6	1306.0	72.6	1306.0	72.6	1306.0
LIME	9	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0
SODIUM CARBONATE	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0
CEMENT	3	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0
WATER ADDED	14.9	269.0	14.9	269.0	14.9	269.0	14.9	269.0	14.9	269.0	14.9	269.0	14.9	269.0
TOTAL MOISTURE (CALC)	19		19		19		19		19		19		19	
TOTAL MOISTURE (MEAS)	18.3				17.9				18.3				17.8	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH			13				13				13			
DATE FABRICATED		9/23/85		9/23/85		9/23/85		9/23/85		9/23/85		9/23/85		9/23/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1465		1453		1455		1476		1487		1375		1375
WET DENSITY G/CC		1.55		1.54		1.54		1.57		1.58		1.46		1.46
LB/CU FT		96.81		96.01		96.15		97.53		98.26		90.86		90.86
DRY WEIGHT		1340		1350		1342		1371		1460		1435		1422
DRY DENSITY		1.42		1.43		1.42		1.45		1.55		1.52		1.51
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		605		489		629		617		744		668		780
DATE TESTED		9/30/85		9/30/85		9/30/85		9/30/85		10/3/85		10/10/85		10/18/85
AIR CURE TIME (d)		6		4		6		4		3		3		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CH1		CH2		CH3		CH4		CH5		CH6		CH7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	66.5	1197.0	66.5	1197.0	66.5	1197.0	66.5	1197.0	66.5	1197.0	66.5	1197.0	66.5	1197.0
INCINERATION ASH(RAW)	70.1	1263.0	70.2	1263.0	70.2	1263.0	70.2	1263.0	70.2	1263.0	70.2	1263.0	70.2	1263.0
LIME	9	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0
SODIUM CARBONATE	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0
CEMENT	3	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0
WATER ADDED	17.3	312.0	17.3	312.0	17.3	312.0	17.3	312.0	17.3	312.0	17.3	312.0	17.3	312.0
TOTAL MOISTURE (CALC)	21		21		21		21		21		21		21	
TOTAL MOISTURE (MEAS)	20.3				19.6				20.7				20.6	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH			13.1				13.1				13.1			
DATE FABRICATED		9/24/85		9/24/85		9/24/85		9/24/85		9/24/85		9/24/85		9/24/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1550	1545	1555	1540	1530	1530	1555
WET DENSITY G/CC	1.64	1.64	1.65	1.63	1.62	1.62	1.65
LB/CU FT	102.42	102.09	102.75	101.76	101.10	101.10	102.75
DRY WEIGHT	1412	1427	1400	1399	1495	1460	1481
DRY DENSITY	1.50	1.51	1.48	1.48	1.59	1.55	1.57
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	637	649	657	704	800	943	949
DATE TESTED	9/30/85	9/30/85	9/30/85	9/30/85	10/4/85	10/11/85	10/18/85
AIR CURE TIME (d)	5	3	5	3	3	3	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CI1		CI2		CI3		CI4		CI5		CI6		CI7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	64.5	1161.0	64.5	1161.0	64.5	1161.0	64.5	1161.0	64.5	1161.0	64.5	1161.0	64.5	1161.0
INCINERATION ASH(RAW)	68.3	1231.0	68.4	1231.0	68.4	1231.0	68.4	1231.0	68.4	1231.0	68.4	1231.0	68.4	1231.0
LIME	9	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0	9.0	162.0
SODIUM CARBONATE	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0	0.5	9.0
CEMENT	3	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0	3.0	54.0
WATER ADDED	19.1	344.0	19.1	344.0	19.1	344.0	19.1	344.0	19.1	344.0	19.1	344.0	19.1	344.0
TOTAL MOISTURE (CALC)	23		23		23		23		23		23		23	
TOTAL MOISTURE (MEAS)	21.4				22.7				22.1				21.5	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH			13.1				13.1				13.1			
DATE FABRICATED		9/24/85		9/24/85		9/24/85		9/24/85		9/24/85		9/24/85		9/24/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1570	1575	1565	1565	1560	1565	1565
WET DENSITY G/CC	1.67	1.67	1.66	1.66	1.65	1.66	1.66
LB/CU FT	103.74	104.07	103.41	103.41	103.08	103.41	103.41
DRY WEIGHT	1418	1439	1406	1403	1505	1500	1491
DRY DENSITY	1.50	1.53	1.49	1.49	1.60	1.59	1.58
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	517	450	497	505	668	844	772
DATE TESTED	9/30/85	9/30/85	9/30/85	9/30/85	10/4/85	10/11/85	10/18/85
AIR CURE TIME (d)	5	3	5	3	3	3	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CJ1		CJ2		CJ3		CJ4		CJ5		CJ6		CJ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	76.0	1368	76.0	1368	76.0	1368	76.0	1368	76.0	1368	76.0	1368	76.0	1368
INCINERATION ASH(RAW)	78.4	1412	78.4	1412	78.4	1412	78.4	1412	78.4	1412	78.4	1412	78.4	1412
LIME	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54
WATER ADDED	12.6	226	12.6	226	12.6	226	12.6	226	12.6	226	12.6	226	12.6	226
TOTAL MOISTURE (CALC)	15		15		15		15		15		15		15	
TOTAL MOISTURE (MEAS)	15.3				15.28				15.31				15.61	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.49				12.48				12.49		
DATE FABRICATED		10/5/85		10/5/85		10/5/85		10/5/85		10/5/85		10/5/85		10/5/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1437		1448		1430		1440		1415		1407		1421
WET DENSITY G/CC		1.52		1.54		1.52		1.53		1.50		1.49		1.51
LB/CU FT		94.96		95.68		94.49		95.15		93.50		92.97		93.90
DRY WEIGHT		1325		1360		1340		1360		1345		1335		1348
DRY DENSITY		1.41		1.44		1.42		1.44		1.43		1.42		1.43
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		549		537		653		728		1122		832		903
DATE TESTED		10/10/85		10/11/85		10/10/85		10/11/85		10/17/85		10/24/85		11/1/85
AIR CURE TIME (d)		4		3		4		3		5		5		5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CK1		CK2		CK3		CK4		CK5		CK6		CK7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	74.0	1332	74.0	1332	74.0	1332	74.0	1332	74.0	1332	74.0	1332	74.0	1332
INCINERATION ASH(RAW)	76.3	1374	76.3	1374	76.3	1374	76.3	1374	76.3	1374	76.3	1374	76.3	1374
LIME	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54
WATER ADDED	14.7	264	14.7	264	14.7	264	14.7	264	14.7	264	14.7	264	14.7	264
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	17.3				17.3				17.38				17.38	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.44				12.44				12.43		
DATE FABRICATED		10/5/85		10/5/85		10/5/85		10/5/85		10/5/85		10/5/85		10/5/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1461		1478		1477		1464		1489		1494		1490
WET DENSITY G/CC		1.55		1.57		1.57		1.55		1.58		1.58		1.58
LB/CU FT		96.54		97.67		97.60		96.74		98.39		98.72		98.46
DRY WEIGHT		1355		1380		1380		1380		1400		1405		1400
DRY DENSITY		1.44		1.47		1.46		1.47		1.48		1.49		1.48
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		557		688		621		919		808		1194		963
DATE TESTED		10/10/85		10/11/85		10/10/85		10/11/85		10/17/85		10/24/85		11/1/85
AIR CURE TIME (d)		4		3		4		3		5		5		5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CL1		CL2		CL3		CL4		CL5		CL6		CL7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	72.0	1296	72.0	1296	72.0	1296	72.0	1296	72.0	1296	72.0	1296	72.0	1296
INCINERATION ASH(RAW)	74.2	1336	74.2	1336	74.2	1336	74.2	1336	74.2	1336	74.2	1336	74.2	1336
LIME	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54
WATER ADDED	16.8	302	16.8	302	16.8	302	16.8	302	16.8	302	16.8	302	16.8	302
TOTAL MOISTURE (CALC)	19		19		19		19		19		19		19	
TOTAL MOISTURE (MEAS)	19.0				18.1				18.33				18.09	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.55				12.54				12.51		
DATE FABRICATED		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1513		1507		1521		1519		1527		1492		1512
WET DENSITY G/CC		1.60		1.60		1.61		1.61		1.62		1.58		1.60
LB/CU FT		99.98		99.58		100.51		100.37		100.90		98.59		99.91
DRY WEIGHT		1400		1405		1400		1398		1435		1445		1410
DRY DENSITY		1.48		1.49		1.48		1.48		1.52		1.53		1.50
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		454		493		513		454		730		955		688
DATE TESTED		10/10/85		10/14/85		10/10/85		10/14/85		10/17/85		10/24/85		11/1/85
AIR CURE TIME (d)		3		5		3		5		4		4		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CM1		CM2		CM3		CM4		CM5		CM6		CM7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	70.0	1260	70.0	1260	70.0	1260	70.0	1260	70.0	1260	70.0	1260	70.0	1260
INCINERATION ASH(RAW)	72.9	1313	72.9	1313	72.9	1313	72.9	1313	72.9	1313	72.9	1313	72.9	1313
LIME	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108	6.0	108
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54	3.0	54
WATER ADDED	18.1	325	18.1	325	18.1	325	18.1	325	18.1	325	18.1	325	18.1	325
TOTAL MOISTURE (CALC)	21		21		21		21		21		21		21	
TOTAL MOISTURE (MEAS)	19.9				20.76				20.58				20.58	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.51				12.51				12.51		
DATE FABRICATED		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1552	1614	1611	1562	1608	1528	1555
WET DENSITY G/CC	1.65	1.71	1.71	1.66	1.71	1.62	1.65
LB/CU FT	102.56	106.65	106.45	103.22	106.26	100.97	102.75
DRY WEIGHT	1418	1475	1470	1435	1500	1490	1430
DRY DENSITY	1.50	1.56	1.56	1.52	1.59	1.58	1.52
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	495	312	438	541	891	848	680
DATE TESTED	10/10/85	10/14/85	10/10/85	10/14/85	10/17/85	10/24/85	11/1/85
AIR CURE TIME (d)	3	5	3	5	4	4	4



## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	CN1		CN2		CN3		CN4		CN5		CN6		CN7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68.0	1292	68.0	1292	68.0	1292	68.0	1292	68.0	1292	68.0	1292	68.0	1292
INCINERATION ASH(RAW)	70.8	1346	70.8	1346	70.8	1346	70.8	1346	70.8	1346	70.8	1346	70.8	1346
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
WATER ADDED	20.2	383	20.2	383	20.2	383	20.2	383	20.2	383	20.2	383	20.2	383
TOTAL MOISTURE (CALC)	23		23		23		23		23		23		23	
TOTAL MOISTURE (MEAS)	22.4				23.01				22.91				23.17	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.52				12.46				12.45		
DATE FABRICATED		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1598		1586		1613		1610		1572		1595		1598
WET DENSITY G/CC		1.69		1.68		1.71		1.71		1.67		1.69		1.69
LB/CU FT		105.59		104.80		106.59		106.39		103.88		105.40		105.59
DRY WEIGHT		1435		1445		1460		1440		1440		1540		1441
DRY DENSITY		1.52		1.53		1.55		1.53		1.53		1.63		1.53
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		159		157		263		290		569		660		537
DATE TESTED		10/10/85		10/14/85		10/10/85		10/14/85		10/17/85		10/24/85		11/1/85
AIR CURE TIME (d)		3		5		3		5		4		4		4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	C01		C02		C03		C04	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	76.0	1520	76.0	1520	76.0	1520	76.0	1520
INCINERATION ASH(RAW)	77.4	1547	77.4	1547	77.4	1547	77.4	1547
LIME	6.0	120	6.0	120	6.0	120	6.0	120
SODIUM CARBONATE	0.0		0.0		0.0		0.0	
CEMENT	3.0	60	3.0	60	3.0	60	3.0	60
WATER ADDED	13.7	273	13.7	273	13.7	273	13.7	273
TOTAL MOISTURE (CALC)	15.0		15.0		15.0		15.0	
TOTAL MOISTURE (MEAS)	14.4				14.58			
TOTAL MIX WEIGHT		2000		2000		2000		2000
MIX pH				12.46				12.43
DATE FABRICATED		11/6/85		11/6/85		11/6/85		11/6/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1202		1197		1195		1213
WET DENSITY G/CC		1.27		1.27		1.27		1.29
LB/CU FT		79.43		79.10		78.96		80.15
DRY WEIGHT		1178		1205		1168		1205
DRY DENSITY		1.25		1.28		1.24		1.28
CURE TEMPERATURE		49		49		71		71
CURE TIME (h)		24		72		24		72
COMPRESSIVE STRENGTH (psi)		173		163		163		179
DATE TESTED		11/12/85		11/14/85		11/12/85		11/14/85
AIR CURE TIME (d)		5		5		5		5

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CP1		CP2		CP3		CP4	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	72.0	1440	72.0	1440	72.0	1440	72.0	1440
INCINERATION ASH(RAW)	73.3	1465	73.3	1465	73.3	1465	73.3	1465
LIME	6.0	120	6.0	120	6.0	120	6.0	120
SODIUM CARBONATE	0.0		0.0		0.0		0.0	
CEMENT	3.0	60	3.0	60	3.0	60	3.0	60
WATER ADDED	17.8	355	17.8	355	17.8	355	17.8	355
TOTAL MOISTURE (CALC)	19.0		19.0		19.0		19.0	
TOTAL MOISTURE (MEAS)	18.7				18.9			
TOTAL MIX WEIGHT		2000		2000		2000		2000
MIX pH				12.45				12.38
DATE FABRICATED		11/6/85		11/6/85		11/6/85		11/6/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1264	1267	1250	1257
WET DENSITY G/CC	1.34	1.34	1.33	1.33
LB/CU FT	83.52	83.72	82.60	83.06
DRY WEIGHT	1202	1235	1187	1215
DRY DENSITY	1.27	1.31	1.26	1.29
CURE TEMPERATURE	49	49	71	71
CURE TIME (h)	24	72	24	72
COMPRESSIVE STRENGTH (psi)	161	159	191	185
DATE TESTED	11/12/85	11/14/85	11/12/85	11/14/85
AIR CURE TIME (d)	5	5	5	5

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CQ1		CQ2		CQ3		CQ4		CQ5		CQ6		CQ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	70.0	1120	70.0	1120	70.0	1120	70.0	1120	70.0	1120	70.0	1120	70.0	1120
INCINERATION ASH(RAW)	71.2	1139	71.2	1139	71.2	1139	71.2	1139	71.2	1139	71.2	1139	71.2	1139
LIME	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240
WATER ADDED	13.8	221	13.8	221	13.8	221	13.8	221	13.8	221	13.8	221	13.8	221
TOTAL MOISTURE (CALC)	15.0		15.0		15.0		15.0		15.0		15.0		15.0	
TOTAL MOISTURE (MEAS)	13.9				13.74				14.91				15.07	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				11.48				11.52				11.43		
DATE FABRICATED		11/08/85		11/08/85		11/08/85		11/08/85		11/08/85		11/08/85		11/08/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1333		1367		1343		1337		1335		1334		1363
WET DENSITY G/CC		1.41		1.45		1.42		1.42		1.42		1.41		1.45
LB/CU FT		88.08		90.33		88.74		88.35		88.22		88.15		90.07
DRY WEIGHT		1325		1378		1284		1252		1266		1275		1293
DRY DENSITY		1.41		1.46		1.36		1.33		1.34		1.35		1.37
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		251		267		302		298		330		284		398
DATE TESTED		11/14/85		11/15/85		11/14/85		11/15/85		11/21/85		11/27/85		12/05/85
AIR CURE TIME (d)		5		4		5		4		6		5		6

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CR1		CR2		CR3		CR4		CR5		CR6		CR7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68.0	1088	68.0	1088	68.0	1088	68.0	1088	68.0	1088	68.0	1088	68.0	1088
INCINERATION ASH(RAW)	69.2	1107	69.2	1107	69.2	1107	69.2	1107	69.2	1107	69.2	1107	69.2	1107
LIME	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240
WATER ADDED	15.8	253	15.8	253	15.8	253	15.8	253	15.8	253	15.8	253	15.8	253
TOTAL MOISTURE (CALC)	17.0		17.0		17.0		17.0		17.0		17.0		17.0	
TOTAL MOISTURE (MEAS)	15.4				16.5				16.06				16	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				11.58				11.57				11.54		
DATE FABRICATED		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1374		1372		1300		1299		1307		1365		1334
WET DENSITY G/CC		1.46		1.46		1.38		1.38		1.39		1.45		1.41
LB/CU FT		90.79		90.66		85.90		85.84		86.37		90.20		88.15
DRY WEIGHT		1332		1360		1205		1186		1238		1302		1269
DRY DENSITY		1.41		1.44		1.28		1.26		1.31				
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		197		292		221		213		239		219		257
DATE TESTED		11/14/85		11/15/85		11/14/85		11/15/85		11/21/85		11/27/85		12/05/85
AIR CURE TIME (d)		4		3		4		3		5		4		3

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CS1		CS2		CS3		CS4		CS5		CS6		CS7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	66.0	1056	66.0	1056	66.0	1056	66.0	1056	66.0	1056	66.0	1056	66.0	1056
INCINERATION ASH(RAW)	67.1	1074	67.1	1074	67.1	1074	67.1	1074	67.1	1074	67.1	1074	67.1	1074
LIME	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240
WATER ADDED	17.9	286	17.9	286	17.9	286	17.9	286	17.9	286	17.9	286	17.9	286
TOTAL MOISTURE (CALC)	19.0		19.0		19.0		19.0		19.0		19.0		19.0	
TOTAL MOISTURE (MEAS)	19.2				17.58				18.1				17.92	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				11.49				11.45				11.52		
DATE FABRICATED		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1432		1414		1392		1396		1477		1372		1372
WET DENSITY G/CC		1.52		1.50		1.48		1.48		1.57		1.46		1.46
LB/CU FT		94.63		93.44		91.98		92.25		97.60		90.66		90.66
DRY WEIGHT		1387		1393		1282		1267		1412		1289		1288
DRY DENSITY		1.47		1.48		1.36		1.34		1.50		1.37		1.37
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		193		175		247		215		247		119		151
DATE TESTED		11/14/85		11/15/85		11/14/85		11/15/85		11/21/85		11/27/85		12/05/85
AIR CURE TIME (d)		4		3		4		3		5		4		5

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CT1		CT2		CT3		CT4		CT5		CT6		CT7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	64.0	1024	64.0	1024	64.0	1024	64.0	1024	64.0	1024	64.0	1024	64.0	1024
INCINERATION ASH(RAW)	65.1	1041	65.1	1041	65.1	1041	65.1	1041	65.1	1041	65.1	1041	65.1	1041
LIME	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240
WATER ADDED	19.9	319	19.9	319	19.9	319	19.9	319	19.9	319	19.9	319	19.9	319
TOTAL MOISTURE (CALC)	21.0		21.0		21.0		21.0		21.0		21.0		21.0	
TOTAL MOISTURE (MEAS)	21.2				19.82				19.99				20.45	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				11.42				11.51				11.44		
DATE FABRICATED		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85		11/09/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1438		1439		1483		1462		1459		1449		1452
WET DENSITY G/CC		1.53		1.53		1.57		1.55		1.55		1.54		1.54
LB/CU FT		95.02		95.09		98.00		96.61		96.41		95.75		95.95
DRY WEIGHT		1367		1397		1370		1305		1372		1354		1364
DRY DENSITY		1.45		1.48		1.45		1.38		1.46		1.44		1.45
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		167		211		171		179		155		119		193
DATE TESTED		11/14/85		11/15/85		11/14/85		11/15/85		11/21/85		11/27/85		12/05/85
AIR CURE TIME (d)		4		3		4		3		5		4		5

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CY1		CY2		CY3		CY4		CY5		CY6		CY7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	62.0	992	62.0	992	62.0	992	62.0	992	62.0	992	62.0	992	62.0	992
INCINERATION ASH(RAW)	63.6	1017	63.6	1017	63.6	1017	63.6	1017	63.6	1017	63.6	1017	63.6	1017
LIME	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240	15.0	240
WATER ADDED	21.4	343	21.4	343	21.4	343	21.4	343	21.4	343	21.4	343	21.4	343
TOTAL MOISTURE (CALC)	23		23		23		23		23		23		23	
TOTAL MOISTURE (MEAS)	21.7				22.42				22.21				23.39	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				11.52				11.5				11.54		
DATE FABRICATED		11/14/85		11/14/85		11/14/85		11/14/85		11/14/85		11/14/85		11/14/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1524		1537		1554		1540		1546		1543		1561
WET DENSITY G/CC		1.62		1.63		1.65		1.63		1.64		1.64		1.66
LB/CU FT		100.70		101.56		102.69		101.76		102.16		101.96		103.15
DRY WEIGHT		1486		1454		1457		1463		1431		1443		1425
DRY DENSITY		1.58		1.54		1.55		1.55		1.52		1.53		1.51
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		247		390		267		318		135		135		88
DATE TESTED		11/18/85		11/21/85		11/18/85		11/21/85		11/27/85		12/02/85		12/11/85
AIR CURE TIME (d)		3		4		3		4		6		4		6



## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CU1		CU2		CU3		CU4		CU5		CU6		CU7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68.0	1088	68.0	1088	68.0	1088	68.0	1088	68.0	1088	68.0	1088	68.0	1088
INCINERATION ASH(RAW)	69.5	1112	69.5	1112	69.5	1112	69.5	1112	69.5	1112	69.5	1112	69.5	1112
LIME	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CEMENT	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48
WATER ADDED	15.5	248	15.5	248	15.5	248	15.5	248	15.5	248	15.5	248	15.5	248
TOTAL MOISTURE (CALC)	17.0		17.0		17.0		17.0		17.0		17.0		17.0	
TOTAL MOISTURE (MEAS)	16.2				16.37				16.59				16.48	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				12.54				12.53				12.52		
DATE FABRICATED		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1234	1266	1177	1228	1273	1260	1232
WET DENSITY G/CC	1.31	1.34	1.25	1.30	1.35	1.34	1.31
LB/CU FT	81.54	83.66	77.78	81.15	84.12	83.26	81.41
DRY WEIGHT	1191	1240	1072	1134	1209	1191	1155
DRY DENSITY	1.26	1.32	1.14	1.20	1.28	1.26	1.22
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	177	183	115	143	179	175	199
DATE TESTED	11/15/85	11/18/85	11/15/85	11/18/85	11/21/85	11/27/85	12/05/85
AIR CURE TIME (d)	4	5	4	5	4	3	4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CV1		CV2		CV3		CV4		CV5		CV6		CV7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	66.0	1056	66.0	1056	66.0	1056	66.0	1056	66.0	1056	66.0	1056	66.0	1056
INCINERATION ASH(RAW)	67.4	1079	67.4	1079	67.4	1079	67.4	1079	67.4	1079	67.4	1079	67.4	1079
LIME	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CEMENT	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48
WATER ADDED	17.6	281	17.6	281	17.6	281	17.6	281	17.6	281	17.6	281	17.6	281
TOTAL MOISTURE (CALC)	19		19		19		19		19		19		19	
TOTAL MOISTURE (MEAS)	18.8				18.59				18.27				18.36	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				12.51				12.5				12.49		
DATE FABRICATED		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1249		1323		1277		1251		1299		1287		1321
WET DENSITY G/CC		1.32		1.40		1.35		1.33		1.38		1.36		1.40
LB/CU FT		82.53		87.42		84.38		82.67		85.84		85.04		87.29
DRY WEIGHT		1192		1283		1161		1136		1218		1210		1249
DRY DENSITY		1.26		1.36		1.23		1.20		1.29		1.28		1.32
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		143		175		169		159		223		171		251
DATE TESTED		11/15/85		11/18/85		11/15/85		11/18/85		11/21/85		11/27/85		12/05/85
AIR CURE TIME (d)		4		5		4		5		4		3		4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CW1		CW2		CW3		CW4		CW5		CW6		CW7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	64.0	1024	64.0	1024	64.0	1024	64.0	1024	64.0	1024	64.0	1024	64.0	1024
INCINERATION ASH(RAW)	65.4	1046	65.4	1046	65.4	1046	65.4	1046	65.4	1046	65.4	1046	65.4	1046
LIME	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CEMENT	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48
WATER ADDED	19.6	314	19.6	314	19.6	314	19.6	314	19.6	314	19.6	314	19.6	314
TOTAL MOISTURE (CALC)	21		21		21		21		21		21		21	
TOTAL MOISTURE (MEAS)	20.5				21.83				20.43				20.61	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				12.48				12.48				12.48		
DATE FABRICATED		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1348	1333	1352	1296	1347	1316	1369
WET DENSITY G/CC	1.43	1.41	1.43	1.37	1.43	1.40	1.45
LB/CU FT	89.07	88.08	89.34	85.64	89.01	86.96	90.46
DRY WEIGHT	1265	1280	1233	1182	1275	1252	1303
DRY DENSITY	1.34	1.36	1.31	1.25	1.35	1.33	1.38
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	187	195	151	151	135	159	219
DATE TESTED	11/15/85	11/18/85	11/15/85	11/18/85	11/21/85	11/27/85	12/05/85
AIR CURE TIME (d)	4	5	4	5	4	3	4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CX1		CX2		CX3		CX4		CX5		CX6		CX7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	62.0	992	62.0	992	62.0	992	62.0	992	62.0	992	62.0	992	62.0	992
INCINERATION ASH(RAW)	63.4	1014	63.4	1014	63.4	1014	63.4	1014	63.4	1014	63.4	1014	63.4	1014
LIME	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96	6.0	96
CEMENT	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48	3.0	48
WATER ADDED	21.6	346	21.6	346	21.6	346	21.6	346	21.6	346	21.6	346	21.6	346
TOTAL MOISTURE (CALC)	23		23		23		23		23		23		23	
TOTAL MOISTURE (MEAS)	22.9				22.58				23.03				22.78	
TOTAL MIX WEIGHT		1600		1600		1600		1600		1600		1600		1600
MIX pH				12.46				12.48				12.5		
DATE FABRICATED		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85		11/10/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1431		1431		1372		1421		1385		1449		1402
WET DENSITY G/CC		1.52		1.52		1.46		1.51		1.47		1.54		1.49
LB/CU FT		94.56		94.56		90.66		93.90		91.52		95.75		92.64
DRY WEIGHT		1338		1373		1239		1292		1309		1382		1338
DRY DENSITY		1.42		1.46		1.31		1.37		1.39		1.47		1.42
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		239		219		183		219		235		243		239
DATE TESTED		11/15/85		11/18/85		11/15/85		11/18/85		11/21/85		11/27/85		12/05/85
AIR CURE TIME (d)		4		5		4		5		4		3		4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CZ1		CZ2		CZ3		CZ4		CZ5		CZ6		CZ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	62.0	1116	62.0	1116	62.0	1116	62.0	1116	62.0	1116	62.0	1116	62.0	1116
INCINERATION ASH(RAW)	63.6	1145	63.6	1145	63.6	1145	63.6	1145	63.6	1145	63.6	1145	63.6	1145
LIME	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270
WATER ADDED	17.4	313	17.4	313	17.4	313	17.4	313	17.4	313	17.4	313	17.4	313
TOTAL MOISTURE (CALC)	19		19		19		19		19		19		19	
TOTAL MOISTURE (MEAS)	18.1				17.33				17.92				18.24	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.52				12.53				12.57		
DATE FABRICATED		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1379		1376		1352		1365		1350		1376		1407
WET DENSITY G/CC		1.46		1.46		1.43		1.45		1.43		1.46		1.49
LB/CU FT		91.12		90.93		89.34		90.20		89.21		90.93		92.97
DRY WEIGHT		1320		1353		1273		1308		1283		1305		1342
DRY DENSITY		1.40		1.43		1.35		1.39		1.36		1.38		1.42
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		279		227		251		239		211		382		342
DATE TESTED		11/21/85		11/22/85		11/21/85		11/22/85		11/27/85		12/05/85		12/11/85
AIR CURE TIME (d)		4		3		4		3		4		5		4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CAA1		CAA2		CAA3		CAA4		CAA5		CAA6		CAA7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	60.0	1080	60.0	1080	60.0	1080	60.0	1080	60.0	1080	60.0	1080	60.0	1080
INCINERATION ASH(RAW)	61.6	1108	61.6	1108	61.6	1108	61.6	1108	61.6	1108	61.6	1108	61.6	1108
LIME	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270
WATER ADDED	19.4	350	19.4	350	19.4	350	19.4	350	19.4	350	19.4	350	19.4	350
TOTAL MOISTURE (CALC)	21		21		21		21		21		21		21	
TOTAL MOISTURE (MEAS)	20.4				19.35				18.6				18.04	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.53				12.52				12.54		
DATE FABRICATED		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1420		1378		1396		1405		1389		1390		1377
WET DENSITY G/CC		1.51		1.46		1.48		1.49		1.47		1.47		1.46
LB/CU FT		93.83		91.06		92.25		92.84		91.78		91.85		90.99
DRY WEIGHT		1353		1330		1318		1329		1327		1320		1313
DRY DENSITY		1.43		1.41		1.40		1.41		1.41		1.40		1.39
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		267		253		255		219		171		265		263
DATE TESTED		11/21/85		11/22/85		11/21/85		11/22/85		11/27/85		12/05/85		12/11/85
AIR CURE TIME (d)		4		3		4		3		4		5		4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CAB1		CAB2		CAB3		CAB4		CAB5		CAB6		CAB7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	58.0	1044	58.0	1044	58.0	1044	58.0	1044	58.0	1044	58.0	1044	58.0	1044
INCINERATION ASH(RAW)	59.5	1071	59.5	1071	59.5	1071	59.5	1071	59.5	1071	59.5	1071	59.5	1071
LIME	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270
WATER ADDED	21.5	387	21.5	387	21.5	387	21.5	387	21.5	387	21.5	387	21.5	387
TOTAL MOISTURE (CALC)	23		23		23		23		23		23		23	
TOTAL MOISTURE (MEAS)	21.1				21.1				21.36				21.5	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.52				12.52				12.52		
DATE FABRICATED		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1502		1467		1442		1445		1427		1350		1392
WET DENSITY G/CC		1.59		1.56		1.53		1.53		1.51		1.43		1.48
LB/CU FT		99.25		96.94		95.29		95.48		94.30		89.21		91.98
DRY WEIGHT		1410		1407		1335		1340		1355		1270		1322
DRY DENSITY		1.50		1.49		1.42		1.42		1.44		1.35		1.40
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		263		243		197		199		179		167		215
DATE TESTED		11/21/85		11/22/85		11/21/85		11/22/85		11/27/85		12/05/85		12/11/85
AIR CURE TIME (d)		4		3		4		3		5		5		4

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	CAC1		CAC2		CAC3		CAC4		CAC5		CAC6		CAC7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	56.0	1008	56.0	1008	56.0	1008	56.0	1008	56.0	1008	56.0	1008	56.0	1008
INCINERATION ASH(RAW)	57.4	1034	57.4	1034	57.4	1034	57.4	1034	57.4	1034	57.4	1034	57.4	1034
LIME	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72	4.0	72
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270	15.0	270
WATER ADDED	23.6	424	23.6	424	23.6	424	23.6	424	23.6	424	23.6	424	23.6	424
TOTAL MOISTURE (CALC)	25		25		25		25		25		25		25	
TOTAL MOISTURE (MEAS)	23.1				23.99				23.52				23.17	
TOTAL MIX WEIGHT		1800		1800		1800		1800		1800		1800		1800
MIX pH				12.53				12.52				12.51		
DATE FABRICATED		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85		11/16/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1506	1489	1515	1492	1537	1506	1494
WET DENSITY G/CC	1.60	1.58	1.61	1.58	1.63	1.60	1.58
LB/CU FT	99.52	98.39	100.11	98.59	101.56	99.52	98.72
DRY WEIGHT	1405	1419	1399	1379	1442	1404	1427
DRY DENSITY	1.49	1.50	1.48	1.46	1.53	1.49	1.51
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	249	231	199	243	231	207	111
DATE TESTED	11/21/85	11/22/85	11/21/85	11/27/85	11/27/85	12/05/85	12/11/85
AIR CURE TIME (d)	4	3	4	3	4	5	4



APPENDIX B

HUNTINGTON INCINERATION RESIDUE

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HA1		HA2		HA3		HA4		HA5		HA6		HA7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	72.5	1450	72.5	1450	72.5	1450	72.5	1450	72.5	1450	72.5	1450	72.5	1450
INCINERATION ASH(RAW)	80.7	1615	80.8	1615	80.8	1615	80.8	1615	80.8	1615	80.75	1615	80.8	1615
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	9.8	195	9.8	195	9.8	195	9.8	195	9.8	195	9.8	195	9.8	195
TOTAL MOISTURE (CALC)	18		18		18		18		18		18		18	
TOTAL MOISTURE (MEAS)	20.8				19.8				22.6				22.8	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH		12.6				12.5				12.3		12.3		
DATE FABRICATED		8/13/85		8/13/85		8/13/85		8/13/85		8/13/85		8/13/85		8/13/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1665	1675	1665	1670	1660	1665	1640
WET DENSITY G/CC	1.8	1.8	1.8	1.8	1.8	1.8	1.7
LB/CU FT	110.0	110.7	110.0	110.4	109.7	110.1	108.4
DRY WEIGHT	1445	1455	1445	1460	1485	1415	1495
DRY DENSITY	1.5	1.5	1.5	1.6	1.6	1.5	1.6
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	159.2	163.1	131.3	115.4	175	254	239
DATE TESTED	8/20/85	8/20/85	8/20/85	8/20/85	8/22/85	9/3/85	9/6/85
AIR CURE TIME (d)	6	4	6	4	2	7	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HB1		HB2		HB3		HB4		HB5		HB6		HB7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68.5	1301.5	68.5	1301.5	68.5	1301.5	68.5	1301.5	68.5	1301.5	68.5	1301.5	68.5	1301.5
INCINERATION ASH(RAW)	83.1	1580.0	83.2	1580.0	83.2	1580.0	83.2	1580.0	83.2	1580.0	83.2	1580.0	83.2	1580.0
LIME	6	114.0	6.0	114.0	6.0	114.0	6.0	114.0	6.0	114.0	6.0	114.0	6.0	114.0
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0
WATER ADDED	7.3	139.5	7.3	139.5	7.3	139.5	7.3	139.5	7.3	139.5	7.3	139.5	7.3	139.5
TOTAL MOISTURE (CALC)	22		22.0		22.0		22.0		22.0		22.0		22.0	
TOTAL MOISTURE (MEAS)	23.3				23.2				24.3				23.9	
TOTAL MIX WEIGHT		1900.0		1900.0		1900.0		1900.0		1900.0		1900.0		1900.0
MIX pH		12.6				12.6				12.6				12.6
DATE FABRICATED		8/14/85		8/14/85		8/14/85		8/14/85		8/14/85		8/14/85		8/14/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1730		1720		1695		1730		1735		1715		1725
WET DENSITY G/CC		1.8		1.8		1.8		1.8		1.8		1.8		1.8
LB/CU FT		114.3		113.7		112.0		114.3		114.7		113.3		114.0
DRY WEIGHT		1450		1485		1415		1495		1475		1465		1500
DRY DENSITY		1.5		1.6		1.5		1.6		1.6		1.6		1.6
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		151.2		151.2		101.5		95.5		216.8		214.9		191
DATE TESTED		8/20/85		8/20/85		8/20/85		8/20/85		8/28/85		9/3/85		9/9/85
AIR CURE TIME (d)		5		3		5		3		7		6		5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HC1		HC2		HC3		HC4		HC5		HC6		HC7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	66.5	1263.5	66.5	1263.5	66.5	1263.5	66.5	1263.5	66.5	1263.5	66.5	1263.5	66.5	1263.5
INCINERATION ASH(RAW)	80.7	1534.0	80.7	1534.0	80.7	1534.0	80.7	1534.0	80.7	1534.0	80.7	1534.0	80.7	1534.0
LIME	6	114.0	6.0	114.0	6.0	114.0	6.0	114.0	6.0	114.0	6.0	114.0	6.0	114.0
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0
WATER ADDED	9.8	185.5	9.8	185.5	9.8	185.5	9.8	185.5	9.8	185.5	9.8	185.5	9.8	185.5
TOTAL MOISTURE (CALC)	24		24.0		24.0		24.0		24.0		24.0		24.0	
TOTAL MOISTURE (MEAS)	26.3				26.2				24.4		24.4		24.4	
TOTAL MIX WEIGHT		1900.0		1900.0		1900.0		1900.0		1900.0		1900.0		1900.0
MIX pH		12.8				12.8				12.8				12.8
DATE FABRICATED		8/15/85		8/15/85		8/15/85		8/15/85		8/15/85		8/15/85		8/15/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1670.0		1650.0		1670.0		1675.0		1660.0		1675.0		1655.0
WET DENSITY G/CC		1.8		1.8		1.8		1.8		1.8		1.8		1.8
LB/CU FT		110.4		109.0		110.4		110.7		109.7		110.7		109.4
DRY WEIGHT		1420.0		1430.0		1425.0		1425.0		1385.0		1400.0		1435
DRY DENSITY		1.5		1.5		1.5		1.5		1.5		1.5		1.5
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		115.4		99.5		79.6		61.7		139.3		183.0		135
DATE TESTED		8/20/85		8/20/85		8/20/85		8/20/85		8/28/85		9/6/85		9/9/85
AIR CURE TIME (d)		4		2		4		2		6		8		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HL1		HL2		HL3		HL4		HL5		HL6		HL7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5
INCINERATION ASH(RAW)	80.3	1526	80.3	1526	80.3	1526	80.3	1526	80.3	1526	80.3	1526	80.3	1526
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	7.6	143.5	7.6	143.5	7.6	143.5	7.6	143.5	7.6	143.5	7.6	143.5	7.6	143.5
TOTAL MOISTURE (CALC)	20		20		20		20		20		20		20	
TOTAL MOISTURE (MEAS)	22.0				21.2				22.3				21.0	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.7				12.6				12.7		
DATE FABRICATED		10/3/85		10/3/85		10/3/85		10/3/85		10/3/85		10/3/85		10/3/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1645	1650	1650	1650	1645	1650	1650
WET DENSITY G/CC	1.74	1.75	1.75	1.75	1.74	1.75	1.75
LB/CU FT	108.70	109.03	109.03	109.03	108.70	109.03	109.03
DRY WEIGHT	1441	1420	1422	1410	1476	1434	1440
DRY DENSITY	1.53	1.51	1.51	1.50	1.57	1.52	1.53
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	251	211	239	203	326	342	386
DATE TESTED	10/8/85	10/10/85	10/8/85	10/10/85	10/14/85	10/22/85	10/28/85
AIR CURE TIME (d)	4	4	4	4	4	5	4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HM1		HM2		HM3		HM4		HM5		HM6		HM7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5
INCINERATION ASH(RAW)	82.6	1569	82.6	1569	82.6	1569	82.6	1569	82.6	1569	82.6	1569	82.6	1569
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	7.9	150.5	7.9	150.5	7.9	150.5	7.9	150.5	7.9	150.5	7.9	150.5	7.9	150.5
TOTAL MOISTURE (CALC)	18		18		18		18		18		18		18	
TOTAL MOISTURE (MEAS)	18.4				20.9				17.4				20.1	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.6				12.6				12.6		
DATE FABRICATED		10/3/85		10/3/85		10/3/85		10/3/85		10/3/85		10/3/85		10/3/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1615	1620	1605	1620	1610	1610	1595
WET DENSITY G/CC	1.71	1.72	1.70	1.72	1.71	1.71	1.69
LB/CU FT	106.72	107.05	106.06	107.05	106.39	106.39	105.40
DRY WEIGHT	1439	1440	1408	1397	1433	1417	1395
DRY DENSITY	1.53	1.53	1.49	1.48	1.52	1.50	1.48
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	255	298	219	227	310	314	288
DATE TESTED	10/8/85	10/10/85	10/8/85	10/10/85	10/14/85	10/22/85	10/28/85
AIR CURE TIME (d)	4	5	4	5	4	5	4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HN1		HN2		HN3		HN4		HN5		HN6		HN7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5
INCINERATION ASH(RAW)	84.8	1612	84.8	1612	84.8	1612	84.8	1612	84.8	1612	84.8	1612	84.8	1612
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	5.7	107.5	5.7	107.5	5.7	107.5	5.7	107.5	5.7	107.5	5.7	107.5	5.7	107.5
TOTAL MOISTURE (CALC)	16		16		16		16		16		16		16	
TOTAL MOISTURE (MEAS)	18.5				19.18				18.44				18.94	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.68				12.61				12.63		
DATE FABRICATED		10/4/85		10/4/85		10/4/85		10/4/85		10/4/85		10/4/85		10/4/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1590		1590		1580		1570		1585		1565		1560
WET DENSITY G/CC		1.69		1.69		1.68		1.67		1.68		1.66		1.65
LB/CU FT		105.07		105.07		104.41		103.74		104.74		103.41		103.08
DRY WEIGHT		1398		1400		1350		1360		1437		1420		1393
DRY DENSITY		1.48		1.48		1.43		1.44		1.52		1.51		1.48
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		290		247		219		267		330		257		314
DATE TESTED		10/10/85		10/11/85		10/10/85		10/11/85		10/14/85		10/22/85		10/28/85
AIR CURE TIME (d)		5		4		5		4		3		4		3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	H01		H02		H03		H04		H05		H06		H07	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	75.9	1442.1	75.9	1442.1	75.9	1442.1	75.9	1442.1	75.9	1442.1	75.9	1442.1	75.9	1442.1
INCINERATION ASH(RAW)	90.5	1718.6	90.5	1718.6	90.5	1718.6	90.5	1718.6	90.5	1718.6	90.5	1718.6	90.5	1718.6
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	.0	0.9	.0	0.9	.0	0.9	.0	0.9	.0	0.9	.0	0.9	.0	0.9
TOTAL MOISTURE (CALC)	14.6		14.6		14.6		14.6		14.6		14.6		14.6	
TOTAL MOISTURE (MEAS)	17.8				17.15				15.77				14.43	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.77				12.75				12.76		
DATE FABRICATED		10/9/85		10/9/85		10/9/85		10/9/85		10/9/85		10/9/85		10/9/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1530	1524	1531	1526	1499	1538	1505
WET DENSITY G/CC	1.62	1.62	1.62	1.62	1.59	1.63	1.60
LB/CU FT	101.10	100.70	101.17	100.84	99.05	101.63	99.45
DRY WEIGHT	1398	1358	1393	1345	1345	1395	1375
DRY DENSITY	1.48	1.44	1.48	1.43	1.43	1.48	1.46
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	195	229	171	195	231	235	209
DATE TESTED	10/14/85	10/17/85	10/14/85	10/17/85	10/22/85	10/28/85	11/4/85
AIR CURE TIME (d)	4	5	4	5	6	5	5



## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HD1		HD2		HD3		HD4		HD5		HD6		HD7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5
INCINERATION ASH(RAW)	84.9	1614	84.9	1614	84.9	1614	84.9	1614	84.9	1614	84.9	1614	84.9	1614
LIME	9	171	9	171	9	171	9	171	9	171	9	171	9	171
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
WATER ADDED	5.1	97	5.1	97	5.1	97	5.1	97	5.1	97	5.1	97	5.1	97
TOTAL MOISTURE (CALC)	20.0		20.0		20.0		20.0		20.0		20.0		20.0	
TOTAL MOISTURE (MEAS)	24.7				20.0				25.1				23.7	
TOTAL MIX WEIGHT		1948.5		1948.5		1948.5		1948.5		1948.5		1948.5		1948.5
MIX pH		12.8				12.7				12.8				12.8
DATE FABRICATED		8/16/85		8/16/85		8/16/85		8/16/85		8/16/85		8/16/85		8/16/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1660		1685		1670		1680		1675		1680		1670
WET DENSITY G/CC		1.8		1.8		1.8		1.8		1.8		1.8		1.8
LB/CU FT		109.7		111.3		110.4		111.0		110.7		111.0		110.4
DRY WEIGHT		1460		1505		1460		1460		1460		1475		1500
DRY DENSITY		1.5		1.6		1.6		1.6		1.5		1.6		1.6
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		195		127.3		115.4		67.6		254.6		224.6		207
DATE TESTED		8/20/85		8/20/85		8/20/85		8/20/85		8/28/85		9/3/85		9/9/85
AIR CURE TIME (d)		3		1		3		1		5		4		3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HE1		HE2		HE3		HE4		HE5		HE6		HE7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5
INCINERATION ASH(RAW)	79.5	1511	79.5	1511.0	79.5	1511.0	79.5	1511.0	79.5	1511.0	79.5	1511.0	79.5	1511.0
LIME	9	171	9.0	171.0	9.0	171.0	9.0	171.0	9.0	171.0	9.0	171.0	9.0	171.0
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0
WATER ADDED	8.0	151.5	8.0	151.5	8.0	151.5	8.0	151.5	8.0	151.5	8.0	151.5	8.0	151.5
TOTAL MOISTURE (CALC)	22		22.0		22.0		22.0		22.0		22.0		22.0	
TOTAL MOISTURE (MEAS)	26.3				28.5				28.0				26.5	
TOTAL MIX WEIGHT		1900.0		1900.0		1900.0		1900.0		1900.0		1900.0		1900.0
MIX pH		13.1				13				13.0				13.0
DATE FABRICATED		8/19/85		8/19/85		8/19/85		8/19/85		8/19/85		8/19/85		8/19/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1670		1665		1670		1650		1650		1645		1640
WET DENSITY G/CC		1.8		1.8		1.8		1.8		1.8		1.7		1.7
LB/CU FT		110.4		110.0		110.4		109.0		109.0		108.7		108.4
DRY WEIGHT		1470		1370		1400		1340		1450		1395		1400
DRY DENSITY		1.6		1.5		1.5		1.4		1.5		1.5		1.48
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		79.6		97.5		119.4		103.5		123.3		159		147
DATE TESTED		8/22/85		8/28/85		8/22/85		8/28/85		9/3/85		9/6/85		9/13/85
AIR CURE TIME (d)		2		6		2		6		8		4		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HH1		HH2		HH3		HH4		HH5		HH6		HH7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5	65.5	1244.5
INCINERATION ASH(RAW)	79.8	1518	79.9	1518	79.9	1518	79.9	1518	79.9	1518	79.9	1518	79.9	1518
LIME	9	171	9	171	9	171	9	171	9	171	9	171	9	171
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WATER ADDED	7.6	144.5	7.6	144.5	7.6	144.5	7.6	144.5	7.6	144.5	7.6	144.5	7.6	144.5
TOTAL MOISTURE (CALC)	22		22		22		22		22		22		22	
TOTAL MOISTURE (MEAS)	22.6				24.71				25.98				26.5	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				13.05				13.01				13.04		
DATE FABRICATED		9/25/85		9/25/85		9/25/85		9/25/85		9/25/85		9/25/85		9/25/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1658	1663	1679	1669	1667	1660	1658
WET DENSITY G/CC	1.76	1.76	1.78	1.77	1.77	1.76	1.76
LB/CU FT	109.56	109.89	110.95	110.29	110.15	109.69	109.56
DRY WEIGHT	1400	1420	1405	1380	1431	1420	1392
DRY DENSITY	1.48	1.51	1.49	1.46	1.51	1.51	1.48
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	143	115	119	76	211	243	247
DATE TESTED	9/30/85	10/3/85	9/30/85	10/3/85	10/8/85	10/14/85	10/18/85
AIR CURE TIME (d)	4	5	4	5	6	5	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HJ1		HJ2		HJ3		HJ4		HJ5		HJ6		HJ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5	69.5	1320.5
INCINERATION ASH(RAW)	84.8	1611	84.8	1611	84.8	1611	84.8	1611	84.8	1611	84.8	1611	84.8	1611
LIME	9.0	171	9.0	171	9.0	171	9.0	171	9.0	171	9.0	171	9.0	171
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	2.7	51.5	2.7	51.5	2.7	51.5	2.7	51.5	2.7	51.5	2.7	51.5	2.7	51.5
TOTAL MOISTURE (CALC)	18		18		18		18		18		18		18	
TOTAL MOISTURE (MEAS)														
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.8				12.7				12.7		
DATE FABRICATED		9/28/85		9/28/85		9/28/85		9/28/85		9/28/85		9/28/85		9/28/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1649		1652		1642		1633		1641		1637		1622
WET DENSITY G/CC		1.75		1.75		1.74		1.73		1.74		1.74		1.72
LB/CU FT		108.96		109.16		108.50		107.91		108.44		108.17		107.18
DRY WEIGHT		1430		1470		1390		1395		1407		1420		1385
DRY DENSITY		1.52		1.56		1.47		1.48		1.49		1.51		1.47
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		211		177		171		167		318		298		314
DATE TESTED		10/3/85		10/4/85		10/3/85		10/4/85		10/10/85		10/17/85		10/24/85
AIR CURE TIME (d)		4		3		4		3		5		5		5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HK1		HK2		HK3		HK4		HK5		HK6		HK7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5	71.5	1358.5
INCINERATION ASH(RAW)	87.2	1657	87.2	1657	87.2	1657	87.2	1657	87.2	1657	87.2	1657	87.2	1657
LIME	9.0	171	9.0	171	9.0	171	9.0	171	9.0	171	9.0	171	9.0	171
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	0.3	5.5	0.3	5.5	0.3	5.5	0.3	5.5	0.3	5.5	0.3	5.5	0.3	5.5
TOTAL MOISTURE (CALC)	16		16		16		16		16		16		16	
TOTAL MOISTURE (MEAS)	18.6				20.0				19.8				22.2	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.9				12.8				12.8		
DATE FABRICATED		9/30/85		9/30/85		9/30/85		9/30/85		9/30/85		9/30/85		9/30/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1601	1591	1595	1592	1596	1595	1579
WET DENSITY G/CC	1.70	1.69	1.69	1.69	1.69	1.69	1.67
LB/CU FT	105.79	105.13	105.40	105.20	105.46	105.40	104.34
DRY WEIGHT	1450	1382	1410	1365	1415	1427	1410
DRY DENSITY	1.54	1.47	1.50	1.45	1.50	1.51	1.50
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	171	187	177	201	231	285	271
DATE TESTED	10/4/85	10/8/85	10/4/85	10/8/85	10/11/85	10/18/85	10/24/85
AIR CURE TIME (d)	3	5	3	5	4	4	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HI1		HI2		HI3		HI4		HI5		HI6		HI7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	67.5	1282.5	67.5	1282.5	67.5	1282.5	67.5	1282.5	67.5	1282.5	67.5	1282.5	67.5	1282.5
INCINERATION ASH(RAW)	82.3	1565	82.4	1565	82.4	1565	82.4	1565	82.4	1565	82.4	1565	82.4	1565
LIME	9	171	9	171	9	171	9	171	9	171	9	171	9	171
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WATER ADDED	5.1	97.5	5.1	97.5	5.1	97.5	5.1	97.5	5.1	97.5	5.1	97.5	5.1	97.5
TOTAL MOISTURE (CALC)	20		20		20		20		20		20		20	
TOTAL MOISTURE (MEAS)	26.0				23.6				24.5				22.7	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				13.0				13.0				13.0		
DATE FABRICATED		9/25/85		9/25/85		9/25/85		9/25/85		9/25/85		9/25/85		9/25/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1648		1656		1651		1654		1634		1633		1618
WET DENSITY G/CC		1.75		1.76		1.75		1.75		1.73		1.73		1.72
LB/CU FT		108.90		109.43		109.10		109.30		107.97		107.91		106.92
DRY WEIGHT		1417		1410		1399		1395		1421		1411		1373
DRY DENSITY		1.50		1.50		1.48		1.48		1.51		1.50		1.46
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		171		149		123		119		318		267		273
DATE TESTED		9/30/85		10/3/85		9/30/85		10/3/85		10/8/85		10/14/85		10/18/85
AIR CURE TIME (d)		4		5		4		5		6		5		3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HP1		HP2		HP3		HP4		HP5		HP6		HP7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	75.0	1425	75.0	1425	75.0	1425	75.0	1425	75.0	1425	75.0	1425	75.0	1425
INCINERATION ASH(RAW)	90.3	1715	90.3	1715	90.3	1715	90.3	1715	90.3	1715	90.3	1715	90.3	1715
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
WATER ADDED	0.7	14	0.7	14	0.7	14	0.7	14	0.7	14	0.7	14	0.7	14
TOTAL MOISTURE (CALC)	16.0		16.0		16.0		16.0		16.0		16.0		16.0	
TOTAL MOISTURE (MEAS)	16.4				19.18				16.64				16.52	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.57				12.59				12.58		
DATE FABRICATED		10/12/85		10/12/85		10/12/85		10/12/85		10/12/85		10/12/85		10/12/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1621		1604		1620		1612		1623		1607		1592
WET DENSITY G/CC		1.72		1.70		1.72		1.71		1.72		1.70		1.69
LB/CU FT		107.11		105.99		107.05		106.52		107.25		106.19		105.20
DRY WEIGHT		1385		1370		1385		1386		1365		1378		1372
DRY DENSITY		1.47		1.45		1.47		1.47		1.45		1.46		1.46
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		223		199		175		199		187		231		183
DATE TESTED		10/17/85		10/18/85		10/17/85		10/18/85		10/24/85		11/1/85		11/8/85
AIR CURE TIME (d)		4		3		4		3		5		4		6

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HQ1		HQ2		HQ3		HQ4		HQ5		HQ6		HQ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	73.0	1387	73.0	1387	73.0	1387	73.0	1387	73.0	1387	73.0	1387	73.0	1387
INCINERATION ASH(RAW)	87.8	1669	87.8	1669	87.8	1669	87.8	1669	87.8	1669	87.8	1669	87.8	1669
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
WATER ADDED	3.2	60	3.2	60	3.2	60	3.2	60	3.2	60	3.2	60	3.2	60
TOTAL MOISTURE (CALC)	18.0		18.0		18.0		18.0		18.0		18.0		18.0	
TOTAL MOISTURE (MEAS)	21.0				22.55				21.15				22.24	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.37				12.41				12.4		
DATE FABRICATED		10/13/85		10/13/85		10/13/85		10/13/85		10/13/85		10/13/85		10/13/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1644	1651	1634	1653	1661	1667	1646
WET DENSITY G/CC	1.74	1.75	1.73	1.75	1.76	1.77	1.75
LB/CU FT	108.63	109.10	107.97	109.23	109.76	110.15	108.77
DRY WEIGHT	1377	1367	1365	1351	1410	1413	1449
DRY DENSITY	1.46	1.45	1.45	1.43	1.50	1.50	1.54
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	294	263	219	239	306	286	251
DATE TESTED	10/18/85	10/22/85	10/18/85	10/22/85	10/24/85	11/1/85	11/7/85
AIR CURE TIME (d)	3	6	3	6	4	4	4



## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HR1		HR2		HR3		HR4		HR5		HR6		HR7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	73.4	1394	73.4	1394	73.4	1394	73.4	1394	73.4	1394	73.4	1394	73.4	1394
INCINERATION ASH(RAW)	85.5	1624	85.5	1624	85.5	1624	85.5	1624	85.5	1624	85.5	1624	85.5	1624
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	5.5	105	5.5	105	5.5	105	5.5	105	5.5	105	5.5	105	5.5	105
TOTAL MOISTURE (CALC)	20.0		20.0		20.0		20.0		20.0		20.0		20.0	
TOTAL MOISTURE (MEAS)	22.3				21.64				19.64				24.21	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.58				12.58				12.58		
DATE FABRICATED		10/14/85		10/14/85		10/14/85		10/14/85		10/14/85		10/14/85		10/14/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1675		1671		1692		1678		1693		1699		1697
WET DENSITY G/CC		1.78		1.77		1.79		1.78		1.80		1.80		1.80
LB/CU FT		110.68		110.42		111.81		110.88		111.87		112.27		112.14
DRY WEIGHT		1426		1374		1420		1367		1433		1410		1461
DRY DENSITY		1.51		1.46		1.51		1.45		1.52		1.49		1.55
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		263		237		163		183		286		314		286
DATE TESTED		10/18/85		10/22/85		10/18/85		10/22/85		10/24/85		11/4/85		11/8/85
AIR CURE TIME (d)		3		5		3		5		3		7		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HS1		HS2		HS3		HS4		HS5		HS6		HS7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	69.0	1311	69.0	1311	69.0	1311	69.0	1311	69.0	1311	69.0	1311	69.0	1311
INCINERATION ASH(RAW)	83.1	1578	83.1	1578	83.1	1578	83.1	1578	83.1	1578	83.1	1578	83.1	1578
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WATER ADDED	7.9	151	7.9	151	7.9	151	7.9	151	7.9	151	7.9	151	7.9	151
TOTAL MOISTURE (CALC)	22.0		22.0		22.0		22.0		22.0		22.0		22.0	
TOTAL MOISTURE (MEAS)	25.3				26.29				24.11				20.88	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.6				12.58				12.56		
DATE FABRICATED		10/14/85		10/14/85		10/14/85		10/14/85		10/14/85		10/14/85		10/14/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1693		1655		1680		1680		1675		1685		1685
WET DENSITY G/CC		1.80		1.76		1.78		1.78		1.78		1.79		1.79
LB/CU FT		111.87		109.36		111.01		111.01		110.68		111.34		111.34
DRY WEIGHT		1411		1337		1387		1342		1395		1385		1433
DRY DENSITY		1.50		1.42		1.47		1.42		1.48		1.47		1.52
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		163		157		92		97		179		191		231
DATE TESTED		10/18/85		10/22/85		10/18/85		10/22/85		10/24/85		11/1/85		11/8/85
AIR CURE TIME (d)		3		5		3		5		3		4		4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HT1		HT2		HT3		HT4		HT5		HT6		HT7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235
INCINERATION ASH(RAW)	83.1	1578	83.1	1578	83.1	1578	83.1	1578	83.1	1578	83.1	1578	83.1	1578
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
WATER ADDED	1.9	37	1.9	37	1.9	37	1.9	37	1.9	37	1.9	37	1.9	37
TOTAL MOISTURE (CALC)	20		20		20		20		20		20		20	
TOTAL MOISTURE (MEAS)	22.7				21.62				20.23				19.3	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.54				12.44				12.37		
DATE FABRICATED		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1656		1663		1597		1654		1640		1658		1670
WET DENSITY G/CC		1.76		1.76		1.69		1.75		1.74		1.76		1.77
LB/CU FT		109.43		109.89		105.53		109.30		108.37		109.56		110.35
DRY WEIGHT		1400		1443		1345		1410		1385		1433		1460
DRY DENSITY		1.48		1.53		1.43		1.50		1.47		1.52		1.55
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		231		288		215		241		199		251		294
DATE TESTED		10/24/85		10/28/85		10/24/85		10/28/85		11/1/85		11/7/85		11/14/85
AIR CURE TIME (d)		4		6		4		6		5		5		5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HU1		HU2		HU3		HU4		HU5		HU6		HU7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	63.0	1197	63.0	1197	63.0	1197	63.0	1197	63.0	1197	63.0	1197	63.0	1197
INCINERATION ASH(RAW)	80.6	1532	80.6	1532	80.6	1532	80.6	1532	80.6	1532	80.6	1532	80.6	1532
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
WATER ADDED	4.4	83	4.4	83	4.4	83	4.4	83	4.4	83	4.4	83	4.4	83
TOTAL MOISTURE (CALC)	22		22		22		22		22		22		22	
TOTAL MOISTURE (MEAS)	22.1				21.57				21.36				18.75	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.4				12.43				12.44		
DATE FABRICATED		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1652.00	1669.00	1659	1664	1645	1656	1661
WET DENSITY G/CC	1.75	1.77	1.76	1.76	1.74	1.76	1.76
LB/CU FT	109.16	110.29	109.63	109.96	108.70	109.43	109.76
DRY WEIGHT	1370	1408	1365	1392	1365	1417	1432
DRY DENSITY	1.45	1.49	1.45	1.48	1.45	1.50	1.52
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	183	199	179	207	199	203	239
DATE TESTED	10/24/85	10/28/85	10/24/85	10/28/85	11/1/85	11/7/85	11/14/85
AIR CURE TIME (d)	4	6	4	6	5	5	5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HV1		HV2		HV3		HV4		HV5		HV6		HV7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	61.0	1159	61.0	1159	61.0	1159	61.0	1159	61.0	1159	61.0	1159	61.0	1159
INCINERATION ASH(RAW)	78.2	1486	78.2	1486	78.2	1486	78.2	1486	78.2	1486	78.2	1486	78.2	1486
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
WATER ADDED	6.8	129	6.8	129	6.8	129	6.8	129	6.8	129	6.8	129	6.8	129
TOTAL MOISTURE (CALC)	24		24		24		24		24		24		24	
TOTAL MOISTURE (MEAS)	24.7				23.51				27.59				26.36	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.51				12.49				12.48		
DATE FABRICATED		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85		10/19/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1664	1640	1672	1671	1671	1627	1638
WET DENSITY G/CC	1.76	1.74	1.77	1.77	1.77	1.73	1.74
LB/CU FT	109.96	108.37	110.48	110.42	110.42	107.51	108.24
DRY WEIGHT	1363	1367	1375	1371	1374	1366	1375
DRY DENSITY	1.45	1.45	1.46	1.45	1.46	1.45	1.46
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	147	167	159	199	155	179	191
DATE TESTED	10/24/85	10/28/85	10/24/85	10/28/85	11/1/85	11/7/85	11/14/85
AIR CURE TIME (d)	4	6	4	6	5	5	5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HW1		HW2		HW3		HW4		HW5		HW6		HW7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68.0	1292	68.0	1292	68.0	1292	68.0	1292	68.0	1292	68.0	1292	68.0	1292
INCINERATION ASH(RAW)	85.0	1615	85.0	1615	85.0	1615	85.0	1615	85.0	1615	85.0	1615	85.0	1615
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
WATER ADDED	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	21.6				19.56				18.75				19.52	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.46				12.43				12.4		
DATE FABRICATED		10/22/85		10/22/85		10/22/85		10/22/85		10/22/85		10/22/85		10/22/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1636		1610		1651		1660		1631		1625		1610
WET DENSITY G/CC		1.74		1.71		1.75		1.76		1.73		1.72		1.71
LB/CU FT		108.11		106.39		109.10		109.69		107.78		107.38		106.39
DRY WEIGHT		1437		1435		1430		1475		1431		1500		1464
DRY DENSITY		1.52		1.52		1.52		1.56		1.52		1.59		1.55
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		286		267		283		235		211		191		223
DATE TESTED		10/28/85		10/28/85		10/28/85		10/28/85		11/1/85		11/8/85		11/15/85
AIR CURE TIME (d)		5		3		5		3		3		3		3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	HF1		HF2		HF3		HF4		HF5		HF6	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	62.2	1244.5	62.2	1244.5	62.2	1244.5	62.2	1244.5	62.2	1244.5	53.2	1244.5
INCINERATION ASH(RAW)	75.5	1511	75.6	1511.0	75.6	1511.0	75.6	1511.0	75.6	1511.0	64.6	1511.0
LIME	8.6	171	8.6	171.0	8.6	171.0	8.6	171.0	8.6	171.0	14.6	342.0
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.8	19.0
CEMENT	2.9	57	2.9	57.0	2.9	57.0	2.9	57.0	2.9	57.0	4.9	114.0
CaSO <sub>4</sub> ·2H <sub>2</sub> O	5	100	5	100.0	5.0	100.0	5.0	100.0	5.0	100.0	8.6	200.0
WATER ADDED	7.6	151.5	7.6	151.5	7.6	151.5	7.6	151.5	7.6	151.5	6.5	151.5
TOTAL MOISTURE (CALC)	20.9		20.9		20.9		20.9		20.9		17.9	
TOTAL MOISTURE (MEAS)	23.7				26.7		26.0		23.3			
TOTAL MIX WEIGHT		2000.0		2000.0		2000.0		2000.0		2000.0		2337.5
MIX pH	12.8				12.8		12.8		12.8			
DATE FABRICATED		8/19/85		8/19/85		8/19/85		8/19/85		8/19/85		8/19/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1685	1675	1670	1660	1675	1610
WET DENSITY G/CC	1.79	1.8	1.8	1.8	1.8	1.7
LB/CU FT	111.3	110.7	110.4	109.7	110.7	106.4
DRY WEIGHT	1500	1430	1435	1475	1420	1380
DRY DENSITY	1.6	1.5	1.5	1.6	1.5	1.5
CURE TEMPERATURE	49	49	71	AIR	71	71
CURE TIME (h)	24	72	24	336	72	72
COMPRESSIVE STRENGTH (psi)	109.4	155.2	187	147	133.3	83.6
DATE TESTED	8/22/85	8/28/85	8/22/85	9/6/85	8/28/85	8/28/85
AIR CURE TIME (d)	2	6	2	4	6	6

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	HX1		HX2		HX3		HX4		HX5		HX6		HX7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235
INCINERATION ASH(RAW)	78.6	1494	78.6	1494	78.6	1494	78.6	1494	78.6	1494	78.6	1494	78.6	1494
LIME	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
WATER ADDED	6.4	121	6.4	121	6.4	121	6.4	121	6.4	121	6.4	121	6.4	121
TOTAL MOISTURE (CALC)	20.0		20.0		20.0		20.0		20.0		20.0		20.0	
TOTAL MOISTURE (MEAS)	23.3				23.71				22.72				25.46	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.11				12.04				12.06		
DATE FABRICATED		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1694	1674	1666	1673	1690	1686	1673
WET DENSITY G/CC	1.80	1.78	1.77	1.77	1.79	1.79	1.77
LB/CU FT	111.94	110.62	110.09	110.55	111.67	111.41	110.55
DRY WEIGHT	1520	1472	1473	1432	1534	1535	1546
DRY DENSITY	1.61	1.56	1.56	1.52	1.63	1.63	1.64
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	358	310	235	286	565	611	529
DATE TESTED	11/8/85	11/12/85	11/8/85	11/12/85	11/14/85	11/21/85	11/27/85
AIR CURE TIME (d)	4	6	4	6	4	4	3



## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	HY1		HY2		HY3		HY4		HY5		HY6		HY7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	67.0	1273	67.0	1273	67.0	1273	67.0	1273	67.0	1273	67.0	1273	67.0	1273
INCINERATION ASH(RAW)	81.1	1540	81.1	1540	81.1	1540	81.1	1540	81.1	1540	81.1	1540	81.1	1540
LIME	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
WATER ADDED	3.9	75	3.9	75	3.9	75	3.9	75	3.9	75	3.9	75	3.9	75
TOTAL MOISTURE (CALC)	18.0		18.0		18.0		18.0		18.0		18.0		18.0	
TOTAL MOISTURE (MEAS)	22.0				21.68				22.71				21.94	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.03				11.93				11.98		
DATE FABRICATED		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1692		1677		1694		1677		1683		1666		1688
WET DENSITY G/CC		1.79		1.78		1.80		1.78		1.78		1.77		1.79
LB/CU FT		111.81		110.81		111.94		110.81		111.21		110.09		111.54
DRY WEIGHT		1530		1502		1532		1478		1556		1528		1542
DRY DENSITY		1.62		1.59		1.62		1.57		1.65		1.62		1.64
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		412		481		330		362		569		565		517
DATE TESTED		11/8/85		11/12/85		11/8/85		11/12/85		11/14/85		11/21/85		11/27/85
AIR CURE TIME (d)		4		6		4		6		4		4		3

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	HZ1		HZ2		HZ3		HZ4		HZ5		HZ6		HZ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	83.8	1592	83.8	1592	83.8	1592	83.8	1592	83.8	1592	83.8	1592	83.8	1592
INCINERATION ASH(RAW)	85.0	1615	85.0	1615	85.0	1615	85.0	1615	85.0	1615	85.0	1615	85.0	1615
LIME	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285	15.0	285
CaSO <sub>4</sub> .2H <sub>2</sub> O	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
WATER ADDED	1.5	29	1.5	29	1.5	29	1.5	29	1.5	29	1.5	29	1.5	29
TOTAL MOISTURE (CALC)	16.0		16.0		16.0		16.0		16.0		16.0		16.0	
TOTAL MOISTURE (MEAS)	19.6				17.24				17.38				22.18	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				11.89				11.99				11.83		
DATE FABRICATED		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85		11/3/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1592		1615		1592		1591		1592		1588		1591
WET DENSITY G/CC		1.69		1.71		1.69		1.69		1.69		1.68		1.69
LB/CU FT		105.20		106.72		105.20		105.13		105.20		104.93		105.13
DRY WEIGHT		1455		1471		1451		1427		1475		1470		1543
DRY DENSITY		1.54		1.56		1.54		1.51		1.56		1.56		1.64
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		322		466		350		368		426		438		410
DATE TESTED		11/8/85		11/12/85		11/8/85		11/12/85		11/14/85		11/21/85		11/27/85
AIR CURE TIME (d)		4		6		4		6		4		4		3

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	HAA1		HAA2		HAA3		HAA4		HAA5		HAA6		HAA7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	69.0	1311	69.0	1311	69.0	1311	69.0	1311	69.0	1311	69.0	1311	69.0	1311
INCINERATION ASH(RAW)	84.8	1612	84.8	1612	84.8	1612	84.8	1612	84.8	1612	84.8	1612	84.8	1612
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
CaSO <sub>4</sub> .2H <sub>2</sub> O	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
WATER ADDED	0.2	3	0.2	3	0.2	3	0.2	3	0.2	3	0.2	3	0.2	3
TOTAL MOISTURE (CALC)	16.0		16.0		16.0		16.0		16.0		16.0		16.0	
TOTAL MOISTURE (MEAS)	15.7				15.77				18.81				14.4	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.53				12.55				12.55		
DATE FABRICATED		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1577	1588	1584	1581	1584	1577	1603
WET DENSITY G/CC	1.67	1.68	1.68	1.68	1.68	1.67	1.70
LB/CU FT	104.21	104.93	104.67	104.47	104.67	104.21	105.93
DRY WEIGHT							
DRY DENSITY	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504

## COMPRESSIVE STRENGTH (psi)

DATE TESTED  
AIR CURE TIME (d)

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	HAB1		HAB2		HAB3		HAB4		HAB5		HAB6		HAB7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	67.0	1273	67.0	1273	67.0	1273	67.0	1273	67.0	1273	67.0	1273	67.0	1273
INCINERATION ASH(RAW)	82.4	1566	82.4	1566	82.4	1566	82.4	1566	82.4	1566	82.4	1566	82.4	1566
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
CaSO <sub>4</sub> ·2H <sub>2</sub> O	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
WATER ADDED	2.6	49	2.6	49	2.6	49	2.6	49	2.6	49	2.6	49	2.6	49
TOTAL MOISTURE (CALC)	18.0		18.0		18.0		18.0		18.0		18.0		18.0	
TOTAL MOISTURE (MEAS)	21.1				19.82				20.97				19.79	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.54				12.54				12.56		
DATE FABRICATED		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1649		1659		1647		1627		1622		1618		1644
WET DENSITY G/CC		1.75		1.76		1.75		1.73		1.72		1.72		1.74
LB/CU FT		108.96		109.63		108.83		107.51		107.18		106.92		108.63
DRY WEIGHT														
DRY DENSITY		0.00		0.00		0.00		0.00		0.00		0.00		0.00
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		296		348		306		308		302		235		283
DATE TESTED		11/22/85		11/25/85		11/22/85		11/25/85		12/02/85		12/05/85		12/16/85
AIR CURE TIME (d)		3		4		3		4		7		3		7

## COMPOSITION

## PROCTOR IDENTIFICATION(\*)

MIX FORMULATION	HAC1		HAC2		HAC3		HAC4		HAC5		HAC6		HAC7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235	65.0	1235
INCINERATION ASH(RAW)	79.9	1519	79.9	1519	79.9	1519	79.9	1519	79.9	1519	79.9	1519	79.9	1519
LIME	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114	6.0	114
CaSO <sub>4</sub> ·2H <sub>2</sub> O	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57	3.0	57
WATER ADDED	5.1	96	5.1	96	5.1	96	5.1	96	5.1	96	5.1	96	5.1	96
TOTAL MOISTURE (CALC)	20.0		20.0		20.0		20.0		20.0		20.0		20.0	
TOTAL MOISTURE (MEAS)	23.6				20.56				22.7				18.13	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH				12.56				12.55				12.54		
DATE FABRICATED		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85		11/18/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1669		1661		1637		1651		1654		1637		1652
WET DENSITY G/CC		1.77		1.76		1.74		1.75		1.75		1.74		1.75
LB/CU FT		110.29		109.76		108.17		109.10		109.30		108.17		109.16
DRY WEIGHT														
DRY DENSITY		1.55		1.53		1.51		1.53		1.53		1.55		1.52
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		215		277		219		235		286		183		243
DATE TESTED		11/22/85		11/25/85		11/22/85		11/25/85		12/02/85		12/05/85		12/16/85
AIR CURE TIME (d)		3		4		3		4		7		3		7

APPENDIX C

WESTCHESTER INCINERATION RESIDUE

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WA1		WA2		WA3		WA4		WA5		WA6		WA7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	73.5	1470	73.5	1470	73.5	1470	73.5	1470	73.5	1470	73.5	1470	73.5	1470
INCINERATION ASH(RAW)	75.2	1505	75.3	1505	75.3	1505	75.3	1505	75.3	1505	75.3	1505	75.3	1505
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	15.2	305	15.3	305	15.3	305	15.3	305	15.3	305	15.3	305	15.3	305
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	17.2				17.4				16.3				17.0	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH			13.1				13.1				13.1			
DATE FABRICATED		9/9/85		9/9/85		9/9/85		9/9/85		9/9/85		9/9/85		9/9/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1835		1830		1805		1830		1820		1830		1820
WET DENSITY G/CC		2.0		1.9		1.9		2.0		1.9		1.9		1.9
LB/CU FT		121.3		120.9		119.3		120.9		120.3		120.9		120.3
DRY WEIGHT		1695				1670				1740		1740		1730
DRY DENSITY		1.8				1.8				1.9		1.9		1.8
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		251		446		263		290		318		398		418
										*				
DATE TESTED		9/13/85		9/16/85		9/13/85		9/16/85		9/19/85		9/16/85		9/26/85
AIR CURE TIME (d)		3		4		3		4		3				3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WB1		WB2		WB3		WB4		WB5		WB6		WB7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	75.5	1510	75.5	1510	75.5	1510	75.5	1510	75.5	1510	75.5	1510	75.5	1510
INCINERATION ASH(RAW)	77.3	1546	77.3	1546	77.3	1546	77.3	1546	77.3	1546	77.3	1546	77.3	1546
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	13.2	264	13.2	264	13.2	264	13.2	264	13.2	264	13.2	264	13.2	264
TOTAL MOISTURE (CALC)	15		15		15		15		15		15		15	
TOTAL MOISTURE (MEAS)	14.7				14.9				15.13				14.6	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH			13.1				13.1				13.0			
DATE FABRICATED		9/10/85		9/10/85		9/10/85		9/10/85		9/10/85		9/10/85		9/10/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1758		1760		1755		1735		1755		1760		1735
WET DENSITY G/CC		1.9		1.9		1.9		1.9		1.9		1.9		1.9
LB/CU FT		116.1		116.3		116.0		114.65		116.0		116.3		114.7
DRY WEIGHT										1680		1654		1700
DRY DENSITY										1.78		1.75		1.8
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		398		513		450		533		394		414		402
DATE TESTED		9/16/85		9/16/85		9/16/85		9/16/85		9/20/85		9/30/85		10/4/85
AIR CURE TIME (d)		5		3		5		3		3		6		3



## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WC1		WC2		WC3		WC4		WC5		WC6		WC7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	77.5	1550	77.5	1550	77.5	1550	77.5	1550	77.5	1550	77.5	1550	77.5	1550
INCINERATION ASH(RAW)	79.4	1589	79.5	1589	79.5	1589	79.5	1589	79.5	1589	79.5	1589	79.5	1589
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	11.0	221	11.0	221	11.0	221	11.0	221	11.0	221	11.0	221	11.0	221
TOTAL MOISTURE (CALC)	13		13		13		13		13		13		13	
TOTAL MOISTURE (MEAS)	12.7				13.3				12.6				13.2	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH			13.0				13.0				13.1			
DATE FABRICATED		9/11/85		9/11/85		9/11/85		9/11/85		9/11/85		9/11/85		9/11/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1665	1680	1660	1660	1660	1665	1660
WET DENSITY G/CC	1.8	1.8	1.8	1.8	1.8	1.8	1.8
LB/CU FT	110.0	111.0	109.6	109.7	109.7	110.0	109.7
DRY WEIGHT		1605	1560	1599	1597	1597	1587
DRY DENSITY		1.7	1.7	1.7	1.7	1.7	1.7
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	446	521	378	346	161	271	255
DATE TESTED	9/16/85	9/19/85	9/16/85	9/19/85	9/23/85	9/30/85	10/8/85
AIR CURE TIME (d)	4	5	4	5	5	5	6

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WD1		WD2		WD3		WD4		WD5		WD6		WD7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	79.5	1590	79.5	1590	79.5	1590	79.5	1590	79.5	1590	79.5	1590	79.5	1590
INCINERATION ASH(RAW)	81.5	1630	81.5	1630	81.5	1630	81.5	1630	81.5	1630	81.5	1630	81.5	1630
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	9	180	9	180	9	180	9	180	9	180	9	180	9	180
TOTAL MOISTURE (CALC)	11		11		11		11		11		11		11	
TOTAL MOISTURE (MEAS)	11.0				12.3				10.2				12.4	
TOTAL MIX WEIGHT		2000												
MIX pH			13.0				13.0				13.1			
DATE FABRICATED		9/12/85		9/12/85		9/12/85		9/12/85		9/12/85		9/12/85		9/12/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1645		1640		1640		1620		1620		1615		1615
WET DENSITY G/CC		1.7		1.7		1.8		1.7		1.7		1.7		1.7
LB/CU FT		108.7		108.4		108.4		107.1		107.1		106.8		106.7
DRY WEIGHT				1560				1530		1530		1515		1556
DRY DENSITY				1.7				1.6		1.6		1.6		1.7
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		283		386		279		414		87		99		84
								*						
DATE TESTED		9/16/85		9/19/85		9/16/85		9/19/85		9/23/85		9/30/85		10/8/85
AIR CURE TIME (d)		4		5		4		5		5		5		6

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WE1		WE2		WE3		WE4		WE5		WE6		WE7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430
INCINERATION ASH(RAW)	73.3	1466	73.3	1466	73.3	1466	73.3	1466	73.3	1466	73.3	1466	73.3	1466
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	10
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	17.2	344	17.2	344	17.2	344	17.2	344	17.2	344	17.2	344	17.2	344
TOTAL MOISTURE (CALC)	19		19		19		19		19		19		19	
TOTAL MOISTURE (MEAS)	19.1				18.8				20.0				19.9	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH			13.2				13.2				13.2			
DATE FABRICATED		9/13/85		9/13/85		9/13/85		9/13/85		9/13/85		9/13/85		9/13/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1770	1755	1780	1796	1752	1774	1770
WET DENSITY G/CC	1.9	1.9	1.89	2.0	1.9	1.9	1.9
LB/CU FT	117.0	116.0	117.6	118.7	115.8	117.2	117.0
DRY WEIGHT	1600	1675	1645	1680	1622	1665	1630
DRY DENSITY	1.70	1.8	1.7	1.8	1.7	1.8	1.7
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	251	306	139	151	286	283	398
DATE TESTED	9/19/85	9/19/85	9/19/85	9/19/85	9/23/85	9/30/85	10/10/85
AIR CURE TIME (d)	5	3	5	3	3	3	6

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WF1		WF2		WF3		WF4		WF5		WF6		WF7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5	70.5	1339.5
INCINERATION ASH(RAW)	72.2	1373	72.3	1373	72.3	1373	72.3	1373	72.263	1373	72.3	1373	72.2	1373
LIME	9	171	9	171	9	171	9	171	9	171	9	171	9	171
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
WATER ADDED	15.2	289.5	15.2	289.5	15.2	289.5	15.2	289.5	15.236	289.5	15.2	289.5	15.2	289.5
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	17.4				18.0				18.35				18.0	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH			13.1				13.2				13.2			
DATE FABRICATED		9/16/85		9/16/85		9/16/85		9/16/85		9/16/85		9/16/85		9/16/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1795	1785	1746	1731	1721	1755	1741
WET DENSITY G/CC	1.9	1.9	1.9	1.8	1.8	1.9	1.9
LB/CU FT	118.6	118.0	115.4	114.4	113.7	116.0	115.0
DRY WEIGHT	1670	1654	1590	1547	1600	1640	1630
DRY DENSITY	1.8	1.8	1.7	1.6	1.7	1.7	1.7
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	284	310	183	211	334	454	442
DATE TESTED	9/20/85	9/23/85	9/20/85	9/23/85	9/26/85	10/3/85	10/10/85
AIR CURE TIME (d)	3	4	3	4	3	3	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WG1		WG2		WG3		WG4		WG5		WG6		WG7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5	72.5	1377.5
INCINERATION ASH(RAW)	74.3	1412	74.3	1412	74.3	1412	74.3	1412	74.3	1412	74.3	1412	74.3	1412
LIME	9	171	9	171	9	171	9	171	9	171	9	171	9	171
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57	3	57	3	57	3	57	3	57	3	57	3	57
WATER ADDED	13.1	250.5	13.2	250.5	13.2	250.5	13.2	250.5	13.2	250.5	13.2	250.5	13.2	250.5
TOTAL MOISTURE (CALC)	15		15		15		15		15		15		15	
TOTAL MOISTURE (MEAS)	16.2				15.8				16.3				16.7	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH			13				13.2				13.2			
DATE FABRICATED		9/17/85		9/17/85		9/17/85		9/17/85		9/17/85		9/17/85		9/17/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1692	1728	1723	1715	1692	1704	1674
WET DENSITY G/CC	1.8	1.8	1.8	1.8	1.8	1.8	1.8
LB/CU FT	111.8	114.2	113.9	113.3	111.8	112.6	110.6
DRY WEIGHT	1555	1625	1537	1579	1570	1630	1605
DRY DENSITY	1.7	1.7	1.6	1.7	1.7	1.7	1.7
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	517	589	521	529	613	517	688
DATE TESTED	9/23/85	9/23/85	9/23/85	9/23/85	9/30/85	10/4/85	10/11/85
AIR CURE TIME (d)	5	3	5	3	6	3	

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WH1		WH2		WH3		WH4		WH5		WH6		WH7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5	74.5	1415.5
INCINERATION ASH(RAW)	76.3	1451.0	76.4	1451.0	76.4	1451.0	76.4	1451.0	76.4	1451.0	76.4	1451.0	76.4	1451.0
LIME	9	171.0	9.0	171.0	9.0	171.0	9.0	171.0	9.0	171.0	9.0	171.0	9.0	171.0
SODIUM CARBONATE	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5	0.5	9.5
CEMENT	3	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0	3.0	57.0
WATER ADDED	11.1	211.5	11.1	211.5	11.1	211.5	11.1	211.5	11.1	211.5	11.1	211.5	11.1	211.5
TOTAL MOISTURE (CALC)	13		13		13		13		13		13		13	
TOTAL MOISTURE (MEAS)	15.7				14.6				15.2				13.5	
TOTAL MIX WEIGHT		1900		1900		1900		1900		1900		1900		1900
MIX pH			13.1				13.1				13.1			
DATE FABRICATED		9/20/85		9/20/85		9/20/85		9/20/85		9/20/85		9/20/85		9/20/85

## PROCTOR CHARACTERISTICS

WET WEIGHT		1690		1690		1700		1690		1690		1665		1680
WET DENSITY G/CC		1.79		1.79		1.80		1.79		1.79		1.77		1.78
LB/CU FT		111.67		111.67		112.33		111.67		111.67		110.02		111.01
DRY WEIGHT		1590		1620		1590		1580		1599		1593		1630
DRY DENSITY		1.69		1.72		1.69		1.68		1.70		1.69		1.73
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		442		645		485		346		398		269		316
DATE TESTED		9/26/85		9/26/85		9/26/85		9/26/85		9/30/85		10/10/85		10/14/85
AIR CURE TIME (d)		5		3		5		3		3		6		3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WI1		WI2		WI3		WI4		WI5		WI6		WI7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	74	1480	74	1480	74	1480	74	1480	74	1480	74	1480	74	1480
INCINERATION ASH(RAW)	77.1	1542	77.1	1542	77.1	1542	77.1	1542	77.1	1542	77.1	1542	77.1	1542
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	13.9	278	13.9	278	13.9	278	13.9	278	13.9	278	13.9	278	13.9	278
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	16.7				16.86				14.43				17.12	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.62				12.62				12.62		
DATE FABRICATED		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85		10/6/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1796	1779	1800	1778	1775	1764	1789
WET DENSITY G/CC	1.90	1.89	1.91	1.89	1.88	1.87	1.90
LB/CU FT	118.68	117.56	118.94	117.49	117.29	116.56	118.22
DRY WEIGHT	1625	1650	1650	1617	1610	1618	1624
DRY DENSITY	1.72	1.75	1.75	1.71	1.71	1.72	1.72
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	199	290	207	279	314	450	410
DATE TESTED	10/10/85	10/14/85	10/10/85	10/14/85	10/17/85	10/24/85	11/1/85
AIR CURE TIME (d)	3	5	3	5	4	4	4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WJ1		WJ2		WJ3		WJ4		WJ5		WJ6		WJ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	76.0	1520	76.0	1520	76.0	1520	76.0	1520	76.0	1520	76.0	1520	76.0	1520
INCINERATION ASH(RAW)	79.2	1584	79.2	1584	79.2	1584	79.2	1584	79.2	1584	79.2	1584	79.2	1584
LIME	6.0	120	6.0	120	6.0	120	6.0	120	6.0	120	6.0	120	6.0	120
SODIUM CARBONATE	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	3.0	60	3.0	60	3.0	60	3.0	60	3.0	60	3.0	60	3.0	60
WATER ADDED	11.8	236	11.8	236	11.8	236	11.8	236	11.8	236	11.8	236	11.8	236
TOTAL MOISTURE (CALC)	15.0		15.0		15.0		15.0		15.0		15.0		15.0	
TOTAL MOISTURE (MEAS)	13.9				15.27				15.33				15.25	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH			12.62				12.6				12.58			
DATE FABRICATED		10/7/85		10/7/85		10/7/85		10/7/85		10/7/85		10/7/85		10/7/85
PROCTOR CHARACTERISTICS														
WET WEIGHT		1693		1660		1639		1663		1684		1695		1657
WET DENSITY G/CC		1.80		1.76		1.74		1.76		1.79		1.80		1.76
LB/CU FT		111.87		109.69		108.30		109.89		111.28		112.00		109.49
DRY WEIGHT		1580		1600		1535		1570		1556		1595		1551
DRY DENSITY		1.68		1.70		1.63		1.67		1.65		1.69		1.64
CURE TEMPERATURE		49		49		71		71		AIR		AIR		AIR
CURE TIME (h)		24		72		24		72		168		336		504
COMPRESSIVE STRENGTH (psi)		225		217		253		346		402		410		382
DATE TESTED		10/11/85		10/14/85		10/11/85		10/14/85		10/18/85		10/24/85		11/1/85
AIR CURE TIME (d)		3		4		3		4		4		3		4



## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WK1		WK2		WK3		WK4		WK5		WK6		WK7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	78	1560	78	1560	78	1560	78	1560	78	1560	78	1560	78	1560
INCINERATION ASH(RAW)	81.2	1625	81.25	1625	81.25	1625	81.25	1625	81.25	1625	81.25	1625	81.25	1625
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
SODIUM CARBONATE	0		0		0		0		0		0		0	
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	9.75	195	9.75	195	9.75	195	9.75	195	9.75	195	9.75	195	9.75	195
TOTAL MOISTURE (CALC)	13		13		13		13		13		13		13	
TOTAL MOISTURE (MEAS)	14.0				14.17				14.77				14.83	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.57				12.56				12.54		
DATE FABRICATED		10/8/85		10/8/85		10/8/85		10/8/85		10/8/85		10/8/85		10/8/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1641	1648	1689	1692	1674	1683	1682
WET DENSITY G/CC	1.74	1.75	1.79	1.79	1.78	1.78	1.78
LB/CU FT	108.44	108.90	111.61	111.81	110.62	111.21	111.15
DRY WEIGHT	1542.00	1555.00	1570.00	1590.00	1554.00	1586	1583
DRY DENSITY	1.64	1.65	1.67	1.69	1.65	1.68	1.68
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	287	356	338	454	354	400	400
DATE TESTED	10/14/85	10/14/85	10/14/85	10/14/85	10/18/85	10/28/85	11/1/85
AIR CURE TIME (d)	5	3	5	3	3	6	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WR1		WR2		WR3		WR4		WR5		WR6		WR7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	80.0	1600	80.0	1600	80.0	1600	80.0	1600	80.0	1600	80.0	1600	80.0	1600
INCINERATION ASH(RAW)	85.9	1718	85.9	1718	85.9	1718	85.9	1718	85.9	1718	85.9	1718	85.9	1718
LIME	6.0	120	6.0	120	6.0	120	6.0	120	6.0	120	6.0	120	6.0	120
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
CEMENT	3.0	60	3.0	60	3.0	60	3.0	60	3.0	60	3.0	60	3.0	60
WATER ADDED	5.1	102	5.1	102	5.1	102	5.1	102	5.1	102	5.1	102	5.1	102
TOTAL MOISTURE (CALC)	17.0		17.0		17.0		17.0		17.0		17.0		17.0	
TOTAL MOISTURE (MEAS)	10.2				10.99				10.51				10.35	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.52				12.51				12.5		
DATE FABRICATED		11/1/85		11/1/85		11/1/85		11/1/85		11/1/85		11/1/85		11/1/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1510	1530	1505	1567	1554	1545	1547
WET DENSITY G/CC	1.60	1.62	1.60	1.66	1.65	1.64	1.64
LB/CU FT	99.78	101.10	99.45	103.55	102.69	102.09	102.22
DRY WEIGHT	1440	1475	1442	1509	1497	1493	1500
DRY DENSITY	1.53	1.56	1.53	1.60	1.59	1.58	1.59
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	271	191	310	398	207	255	300
DATE TESTED	11/7/85	11/8/85	11/7/85	11/8/85	11/12/85	11/18/85	11/25/85
AIR CURE TIME (d)	5	4	5	4	4	3	3

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WL1		WL2		WL3		WL4		WL5		WL6		WL7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	72	1440	72	1440	72	1440	72	1440	72	1440	72	1440	72	1440
INCINERATION ASH(RAW)	75.7	1514	75.7	1514	75.7	1514	75.7	1514	75.7	1514	75.7	1514	75.7	1514
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
CaSO <sub>4</sub> .2H <sub>2</sub> O	6	120	6	120	6	120	6	120	6	120	6	120	6	120
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	9.3	186	9.3	186	9.3	186	9.3	186	9.3	186	9.3	186	9.3	186
TOTAL MOISTURE (CALC)	13		13		13		13		13		13		13	
TOTAL MOISTURE (MEAS)	12.9				12.55				13.07				12.74	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.52				12.51				12.51		
DATE FABRICATED		10/17/85		10/17/85		10/17/85		10/17/85		10/17/85		10/17/85		10/17/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1690	1705	1700	1690	1690	1680	1700
WET DENSITY G/CC	1.79	1.81	1.80	1.79	1.79	1.78	1.80
LB/CU FT	111.67	112.67	112.33	111.67	111.67	111.01	112.33
DRY WEIGHT	DAMAGE	DAMAGE	1595	1570	1550	1545	1578
DRY DENSITY	0.00	0.00	1.69	1.61	1.64	1.64	1.67
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	0		231	191	199	72	95
DATE TESTED			10/22/85	10/24/85	10/28/85	11/4/85	11/12/85
AIR CURE TIME (d)			4	4	4	4	5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WM1		WM2		WM3		WM4		WM5		WM6		WM7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	70	1400	70	1400	70	1400	70	1400	70	1400	70	1400	70	1400
INCINERATION ASH(RAW)	73.6	1472	73.6	1472	73.6	1472	73.6	1472	73.6	1472	73.6	1472	73.6	1472
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
CaSO <sub>4</sub> .2H <sub>2</sub> O	6	120	6	120	6	120	6	120	6	120	6	120	6	120
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	11.4	228	11.4	228	11.4	228	11.4	228	11.4	228	11.4	228	11.4	228
TOTAL MOISTURE (CALC)	15		15		15		15		15		15		15	
TOTAL MOISTURE (MEAS)	13.6				14.62				15.18				14.58	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.51				12.47				12.47		
DATE FABRICATED		10/17/85		10/17/85		10/17/85		10/17/85		10/17/85		10/17/85		10/17/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1755	1765	1735	1765	1765	1760	1765
WET DENSITY G/CC	1.86	1.87	1.84	1.87	1.87	1.87	1.87
LB/CU FT	115.97	116.63	114.65	116.63	116.63	116.30	116.63
DRY WEIGHT	1600		1607	1613	1585	1590	1613
DRY DENSITY	1.70	0.00	1.70	1.71	1.68	1.69	1.71
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	200	too low to test	147	187	217	95	155
DATE TESTED	10/22/85	10/24/85	10/22/85	10/24/85	10/28/85	11/4/85	11/22/85
AIR CURE TIME (d)	4	4	4	4	4	4	5

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WN1		WN2		WN3		WN4		WN5		WN6		WN7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68	1360	68	1360	68	1360	68	1360	68	1360	68	1360	68	1360
INCINERATION ASH(RAW)	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430
LIME	6	120	6	120	6	120	6	120	6	120	6	120	6	120
CaSO <sub>4</sub> ·2H <sub>2</sub> O	6	120	6	120	6	120	6	120	6	120	6	120	6	120
CEMENT	3	60	3	60	3	60	3	60	3	60	3	60	3	60
WATER ADDED	13.5	270	13.5	270	13.5	270	13.5	270	13.5	270	13.5	270	13.5	270
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)														
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.51				12.49				12.47		
DATE FABRICATED		10/18/85		10/18/85		10/18/85		10/18/85		10/18/85		10/18/85		10/18/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1815	1805	1810	1835	1825	1815	1810
WET DENSITY G/CC	1.92	1.91	1.92	1.95	1.94	1.92	1.92
LB/CU FT	119.93	119.27	119.60	121.26	120.59	119.93	119.60
DRY WEIGHT	1615	-	1620	1680	1620	1632	1648
DRY DENSITY	1.71		1.72	1.78	1.72	1.73	1.75
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	50	too low to test	195	255	133	175	165
DATE TESTED	10/24/85	10/24/85	10/24/85	10/24/85	10/28/85	11/7/85	11/12/85
AIR CURE TIME (d)	5	3	5	3	3	6	4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	W01		W02		W03		W04		W05		W06		W07	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	72	1440	72	1440	72	1440	72	1440	72	1440	72	1440	72	1440
INCINERATION ASH(RAW)	75.7	1514	75.7	1514	75.7	1514	75.7	1514	75.7	1514	75.7	1514	75.7	1514
LIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CEMENT	15	300	15	300	15	300	15	300	15	300	15	300	15	300
WATER ADDED	9.3	186	9.3	186	9.3	186	9.3	186	9.3	186	9.3	186	9.3	186
TOTAL MOISTURE (CALC)	13		13		13		13		13		13		13	
TOTAL MOISTURE (MEAS)	11.9				12.63				12.16				12.65	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.48				12.4				12.32		
DATE FABRICATED		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1704	1683	1681	1686	1709	1685	1677
WET DENSITY G/CC	1.81	1.78	1.78	1.79	1.81	1.79	1.78
LB/CU FT	112.60	111.21	111.08	111.41	112.93	111.34	110.81
DRY WEIGHT	1610	1595	1580	1575	1630	1632	1623
DRY DENSITY	1.71	1.69	1.68	1.67	1.73	1.73	1.72
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	788	816	462	557	557	605	503
DATE TESTED	10/24/85	10/28/85	10/24/85	10/28/85	11/1/85	11/7/85	11/14/85
AIR CURE TIME (d)	3	5	3	5	4	4	4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WP1		WP2		WP3		WP4		WP5		WP6		WP7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	70	1400	70	1400	70	1400	70	1400	70	1400	70	1400	70	1400
INCINERATION ASH(RAW)	73.6	1472	73.6	1472	73.6	1472	73.6	1472	73.6	1472	73.6	1472	73.6	1472
LIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CEMENT	15	300	15	300	15	300	15	300	15	300	15	300	15	300
WATER ADDED	11.4	228	11.4	228	11.4	228	11.4	228	11.4	228	11.4	228	11.4	228
TOTAL MOISTURE (CALC)	15		15		15		15		15		15		15	
TOTAL MOISTURE (MEAS)	14.4				13.98				14.02				14.16	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH		12.37				12.38				12.39				
DATE FABRICATED		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1736	1776	1766	1759	1776	1792	1772
WET DENSITY G/CC	1.84	1.88	1.87	1.87	1.88	1.90	1.88
LB/CU FT	114.71	117.36	116.70	116.23	117.36	118.41	117.09
DRY WEIGHT	1635	1678	1658	1633	1690	1743	1723
DRY DENSITY	1.73	1.78	1.76	1.73	1.79	1.85	1.83
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	573	833	585	513	851	1126	1241
DATE TESTED	10/24/85	10/28/85	10/24/85	10/28/85	11/1/85	11/7/85	11/14/85
AIR CURE TIME (d)	3	5	3	5	4	4	4

## COMPOSITION

## PROCTOR IDENTIFICATION

MIX FORMULATION	WQ1		WQ2		WQ3		WQ4		WQ5		WQ6		WQ7	
	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)	%	WEIGHT(g)
INCINERATION ASH(DRY)	68	1360	68	1360	68	1360	68	1360	68	1360	68	1360	68	1360
INCINERATION ASH(RAW)	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430	71.5	1430
LIME	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CaSO <sub>4</sub> ·2H <sub>2</sub> O	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CEMENT	15	300	15	300	15	300	15	300	15	300	15	300	15	300
WATER ADDED	13.5	270	13.5	270	13.5	270	13.5	270	13.5	270	13.5	270	13.5	270
TOTAL MOISTURE (CALC)	17		17		17		17		17		17		17	
TOTAL MOISTURE (MEAS)	15.6				16.09				15.95				16.91	
TOTAL MIX WEIGHT		2000		2000		2000		2000		2000		2000		2000
MIX pH				12.58				12.55				12.49		
DATE FABRICATED		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85		10/20/85

## PROCTOR CHARACTERISTICS

WET WEIGHT	1848	1837	1868	1840	1823	1820	1820
WET DENSITY G/CC	1.96	1.95	1.98	1.95	1.93	1.93	1.93
LB/CU FT	122.11	121.39	123.44	121.59	120.46	120.26	120.26
DRY WEIGHT	1745	1712	1745	1780	1730	1765	1763
DRY DENSITY	1.85	1.82	1.85	1.83	1.83	1.87	1.87
CURE TEMPERATURE	49	49	71	71	AIR	AIR	AIR
CURE TIME (h)	24	72	24	72	168	336	504
COMPRESSIVE STRENGTH (psi)	1062	1038	736	887	1122	1377	1182
DATE TESTED	10/24/85	10/28/85	10/24/85	10/28/85	11/1/85	11/7/85	11/14/85
AIR CURE TIME (d)	3	5	3	5	4	4	4



