

# A COMBUSTION HANDBOOK

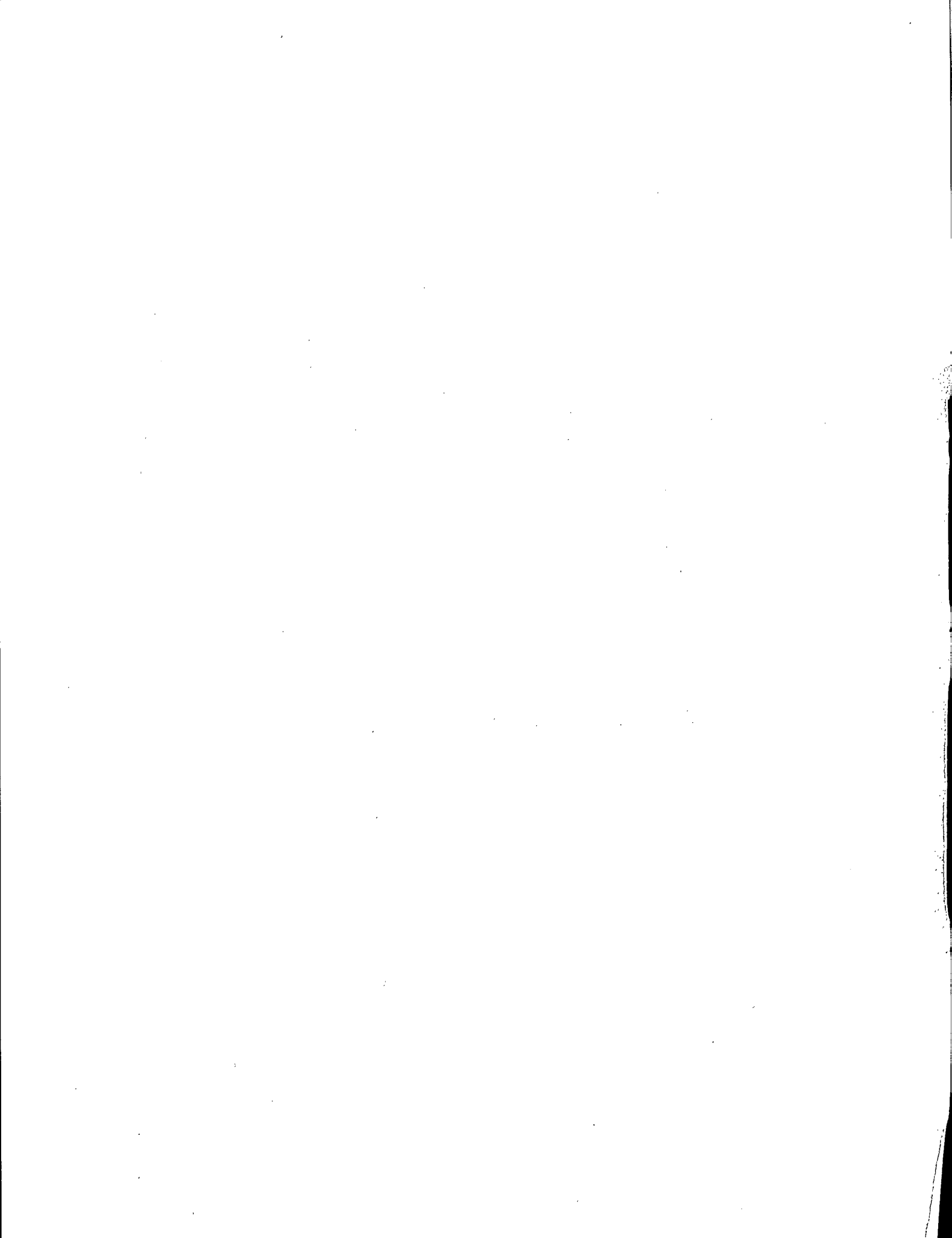
FOR  
CANADIAN  
FUELS

VOLUME 3. COAL. PART 2

F. D. FRIEDRICH AND A. C. S. HAYDEN

CANADIAN COMBUSTION  
RESEARCH LABORATORY

MINES BRANCH MONOGRAPH 882



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Ottawa, 1975

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#### Combustion and Heat Loss Data

##### *Set. No. Name and Description*

##### Nova Scotia Coals

NS 1-1	Acadia, Pictou County, 3/4 in. x 3/16 in.	30
NS 1-2	Acadia, Pictou County, 3/16 in. x 0	38
NS 1-3	Acadia, Pictou County, 1 1/2 in. x 0	46
NS 1-4	Acadia, Pictou County, 3/4 in. x 0	54
NS 2-1	Bras d'Or Coal Company, Cape Breton, 3/4 in. x 0	62
NS 3-1	Dominion – St. Lawrence Mix, Devco, Cape Breton, 1 1/4 in. x 0	70
NS 3-2	Dominion No. 12, Devco, Cape Breton, 1 1/4 in. x 0	78
NS 3-3	Dominion No. 18, Devco, Cape Breton, 1 3/4 in. x 0	86
NS 3-4	Dominion No. 20, Devco, Cape Breton, 1 1/2 in. x 0	94
NS 3-5	Dominion No. 26, Devco, Cape Breton, 1 1/4 in. x 0	102
NS 3-6	Dominion Slack, Devco, Cape Breton 3/4 in. x 0	110
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NS 1-3	Avon, N.B. Coal Ltd., Minto, 1/4 in. x 0	238
NS 2-1	D.W. and R.A. Mills, N.B. Coal Ltd., Minto, 2 in. x 0	246
NS 2-2	D.W. and R.A. Mills, N.B. Coal Ltd., Minto, 3/4 in. x 0	254
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Psychrometric Chart . . . . . (appears at the end of the book — Part 1)

### COAL US K-1, ELKHORN No. 3

Typical Moisture Range: 0–6%

#### *Proximate Analysis (lb/lb dry coal)*

Ash	0.040
Volatile Matter	0.413
Fixed Carbon	0.547
Total	<u>1.000</u>

#### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.817
Hydrogen (H)	0.052
Sulphur (S)	0.013
Nitrogen (N)	0.016
Oxygen (O)	0.062
Ash	0.040
Total	<u>1.000</u>

#### *Gross Calorific Value*

Btu/lb:	14580
Btu/short ton:	$29.16 \times 10^6$
Btu/long ton:	$32.66 \times 10^6$
MJ/kg:	33.91

#### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 68.59 lb	
$10^6$ Btu	= 0.03429 short tons	
$10^6$ Btu	= 0.03062 long tons	



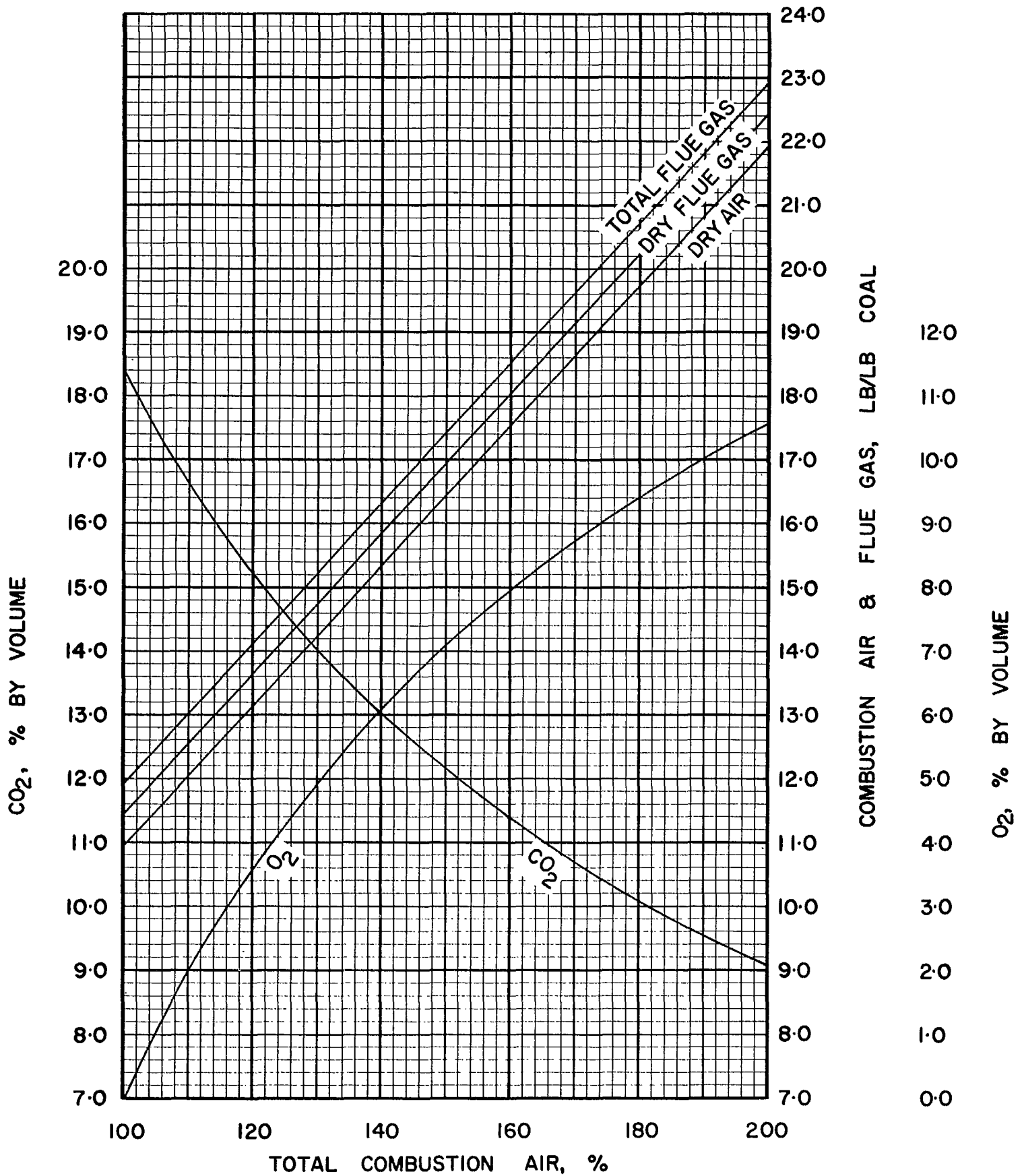


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-K-1

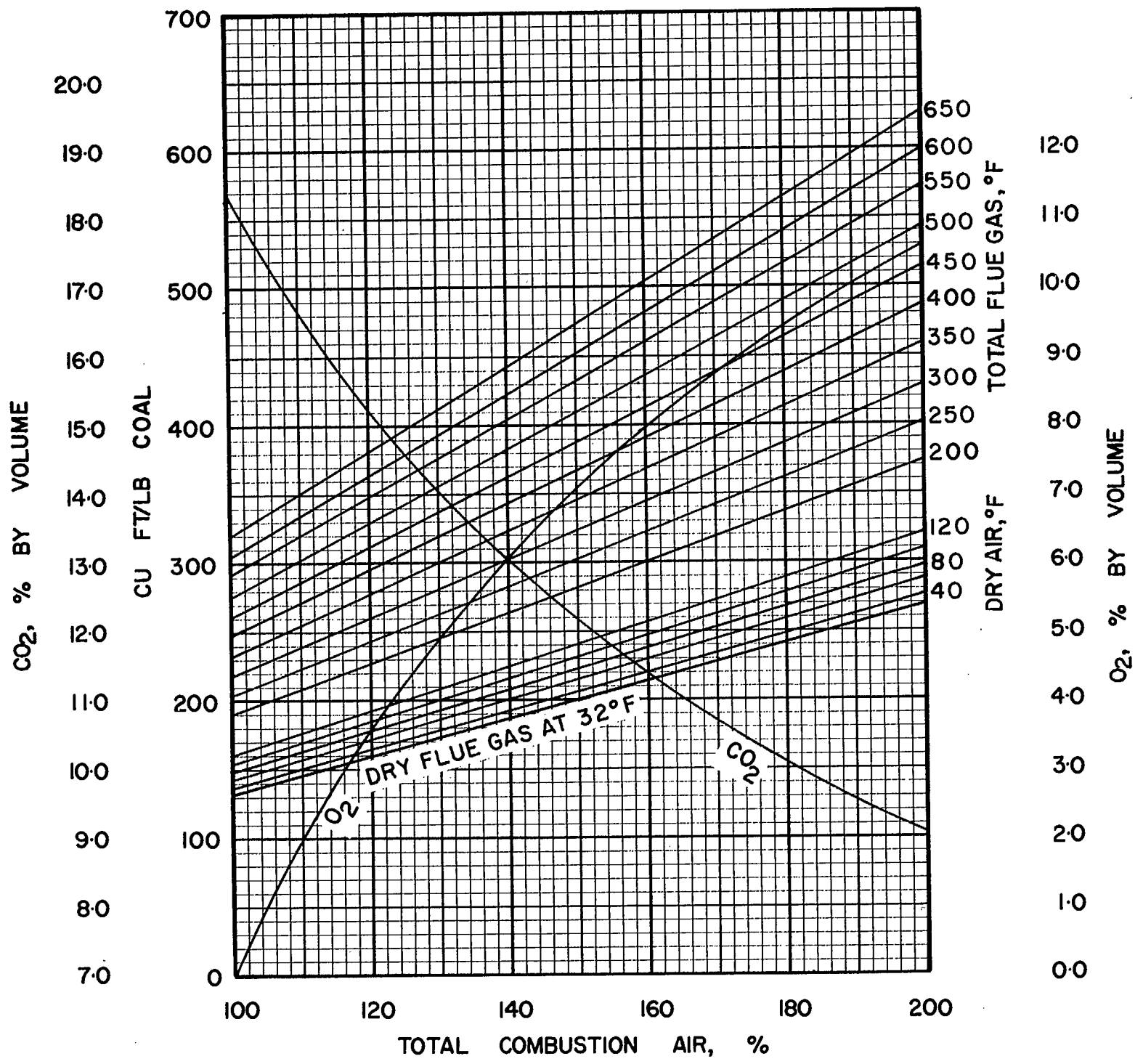


FIGURE 2. COMBUSTION DATA, VOLUME BASIS

US·K·1

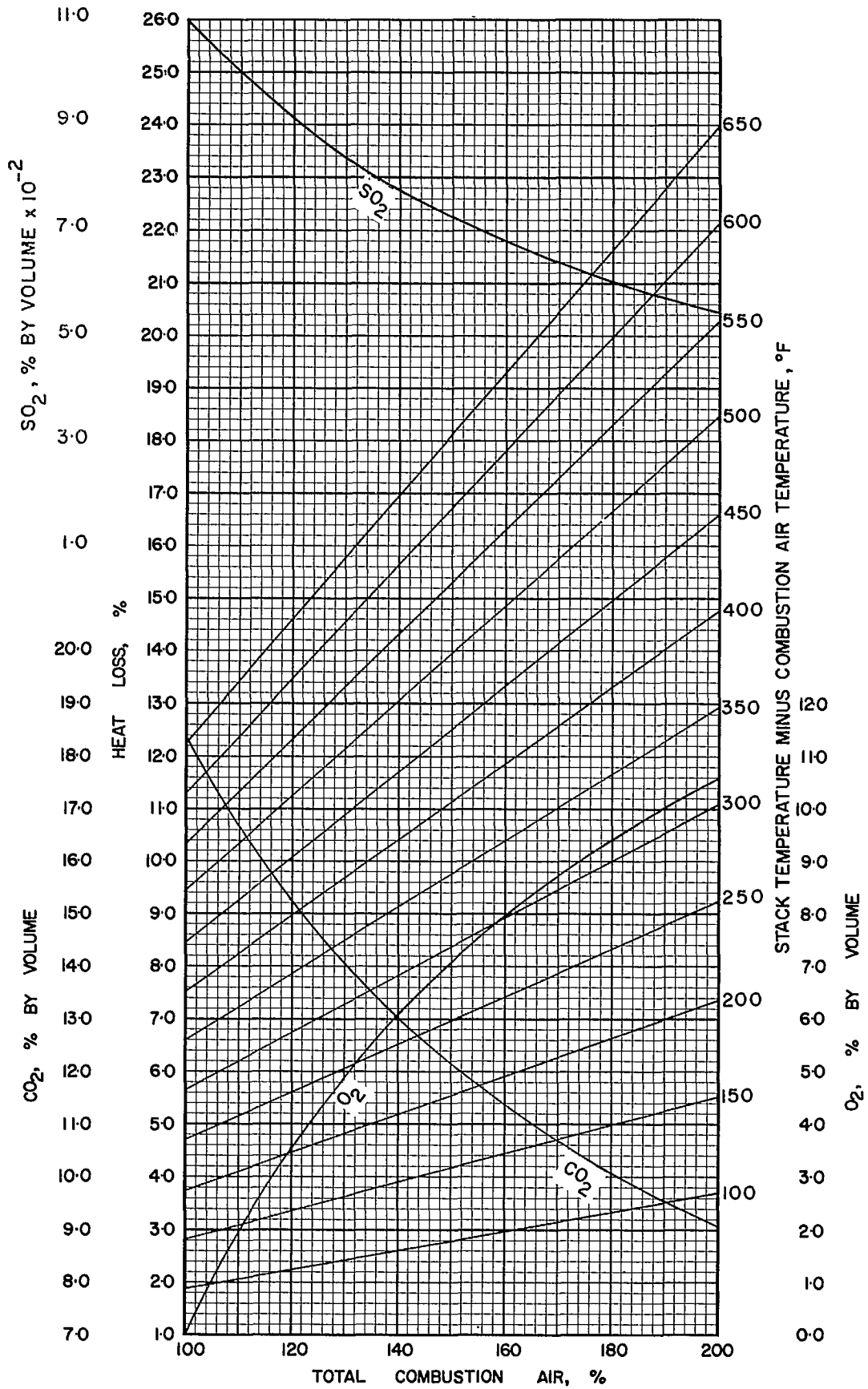


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·K·1

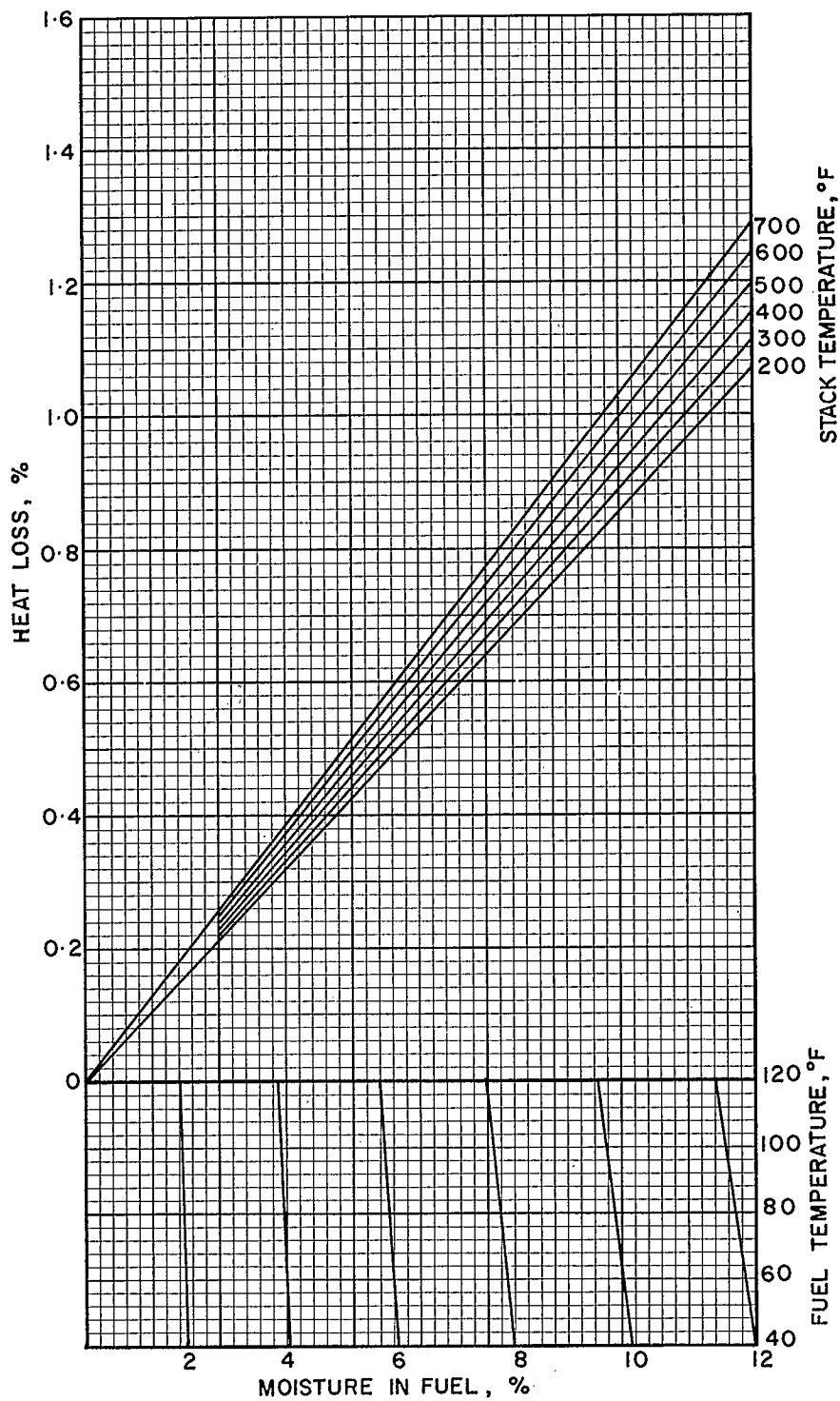


FIGURE 4 HEAT LOSS DUE TO MOISTURE IN COAL

US·K·I

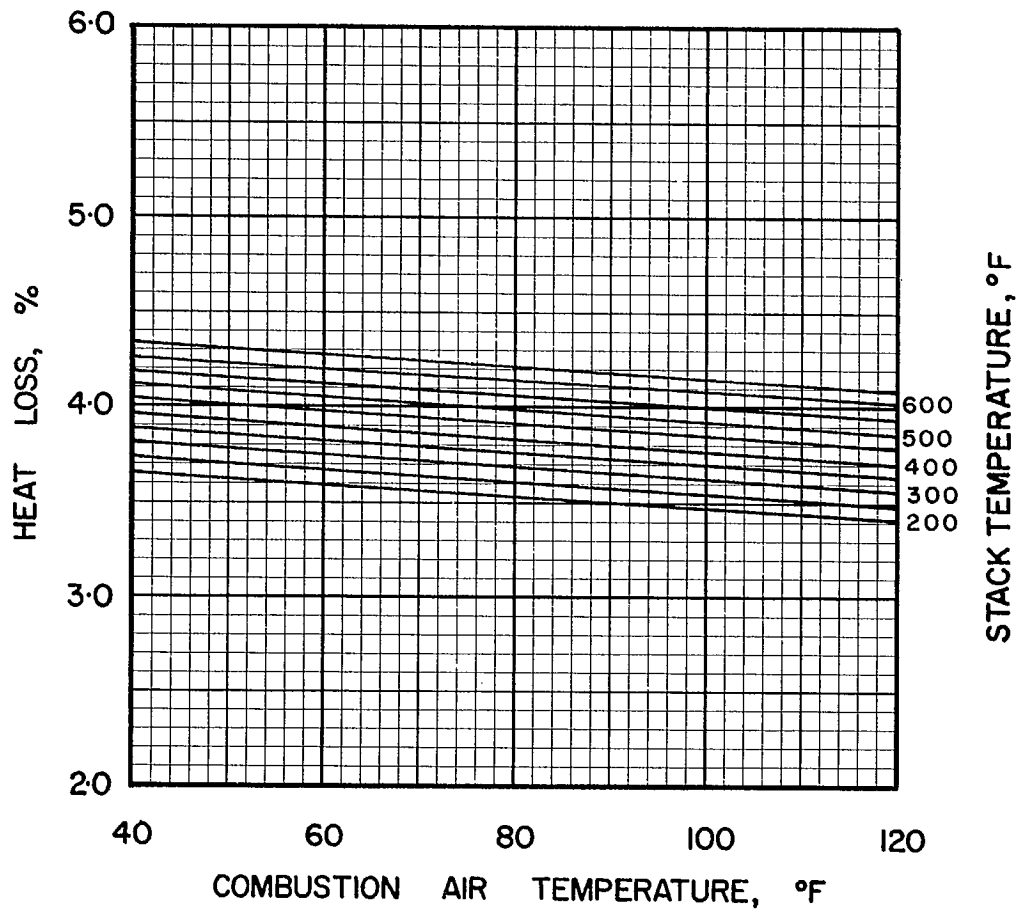


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·K·1

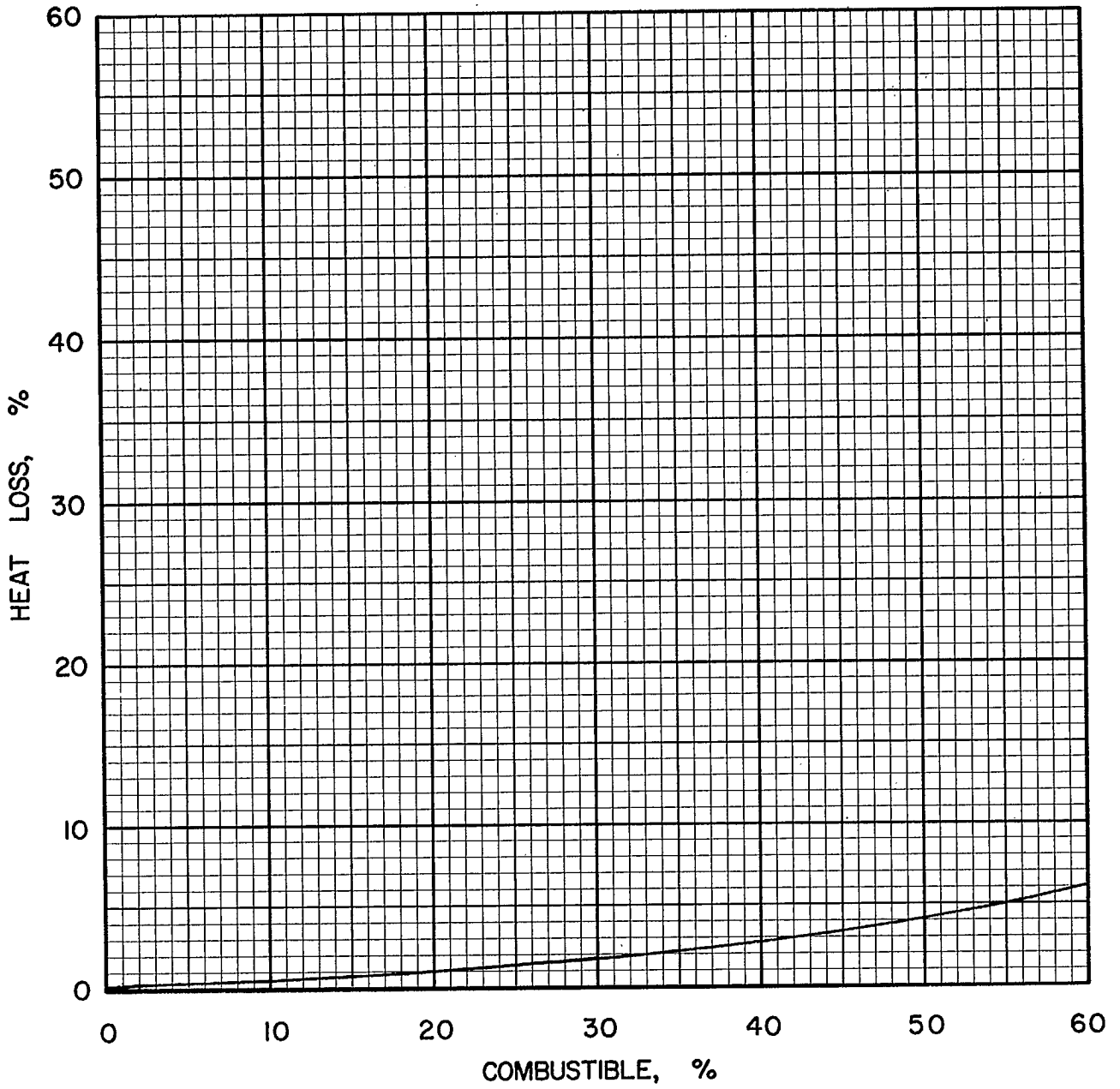


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·K·I

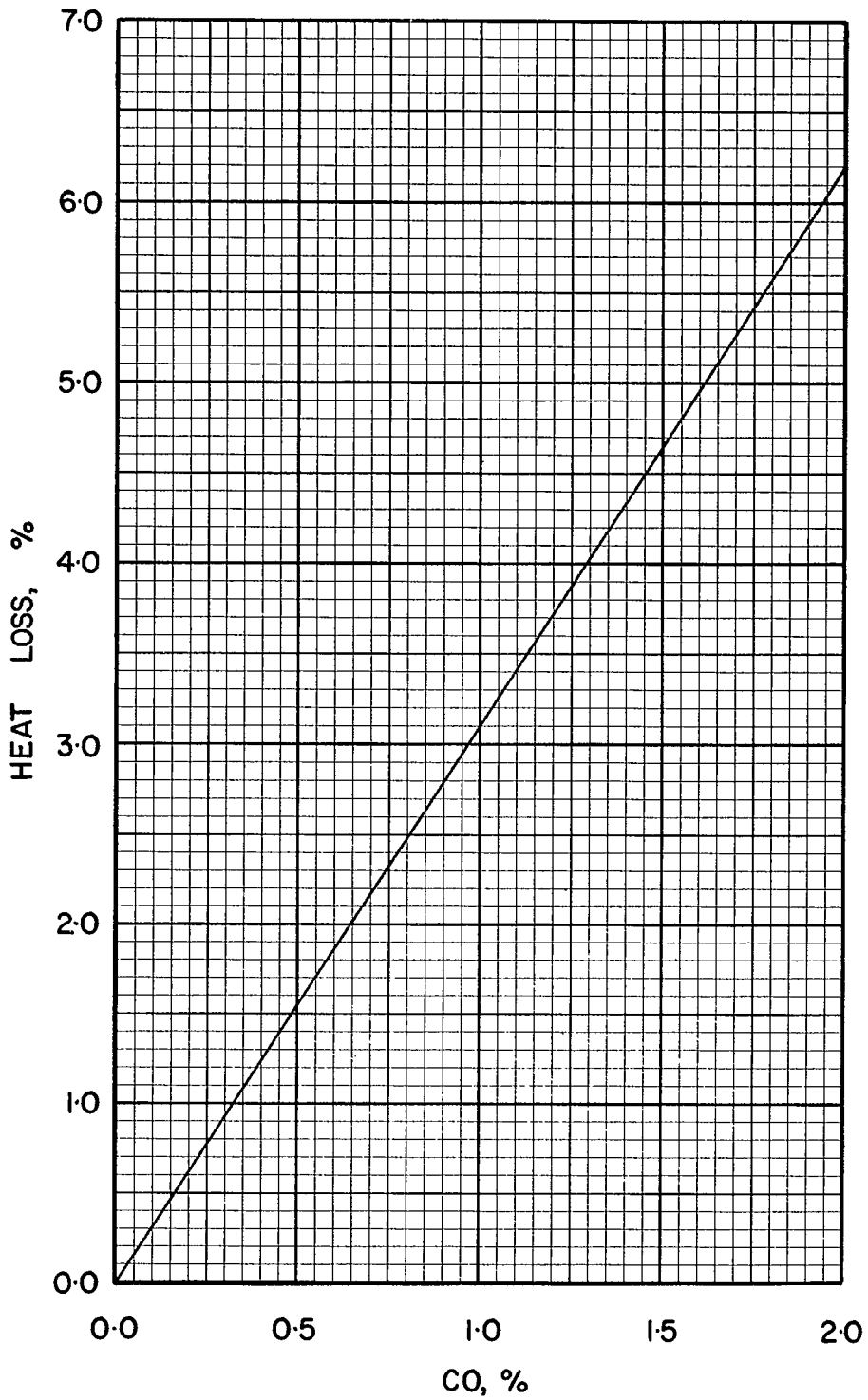


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·K·I

COAL US K-2, GREER-ELLISON, FLOYD COUNTY

Typical Moisture Range: 0–8%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.091
Volatile Matter	0.357
Fixed Carbon	0.552
Total	<u>1.000</u>

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.759
Hydrogen (H)	0.051
Sulphur (S)	0.012
Nitrogen (N)	0.017
Oxygen (O)	0.070
Ash	0.091
Total	<u>1.000</u>

*Gross Calorific Value*

Btu/lb:	13430
Btu/short ton:	$26.86 \times 10^6$
Btu/long ton:	$30.08 \times 10^6$
MJ/kg:	31.23

*Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
$10^6$ Btu = 74.46	lb
$10^6$ Btu = 0.03723	short tons
$10^6$ Btu = 0.03324	long tons



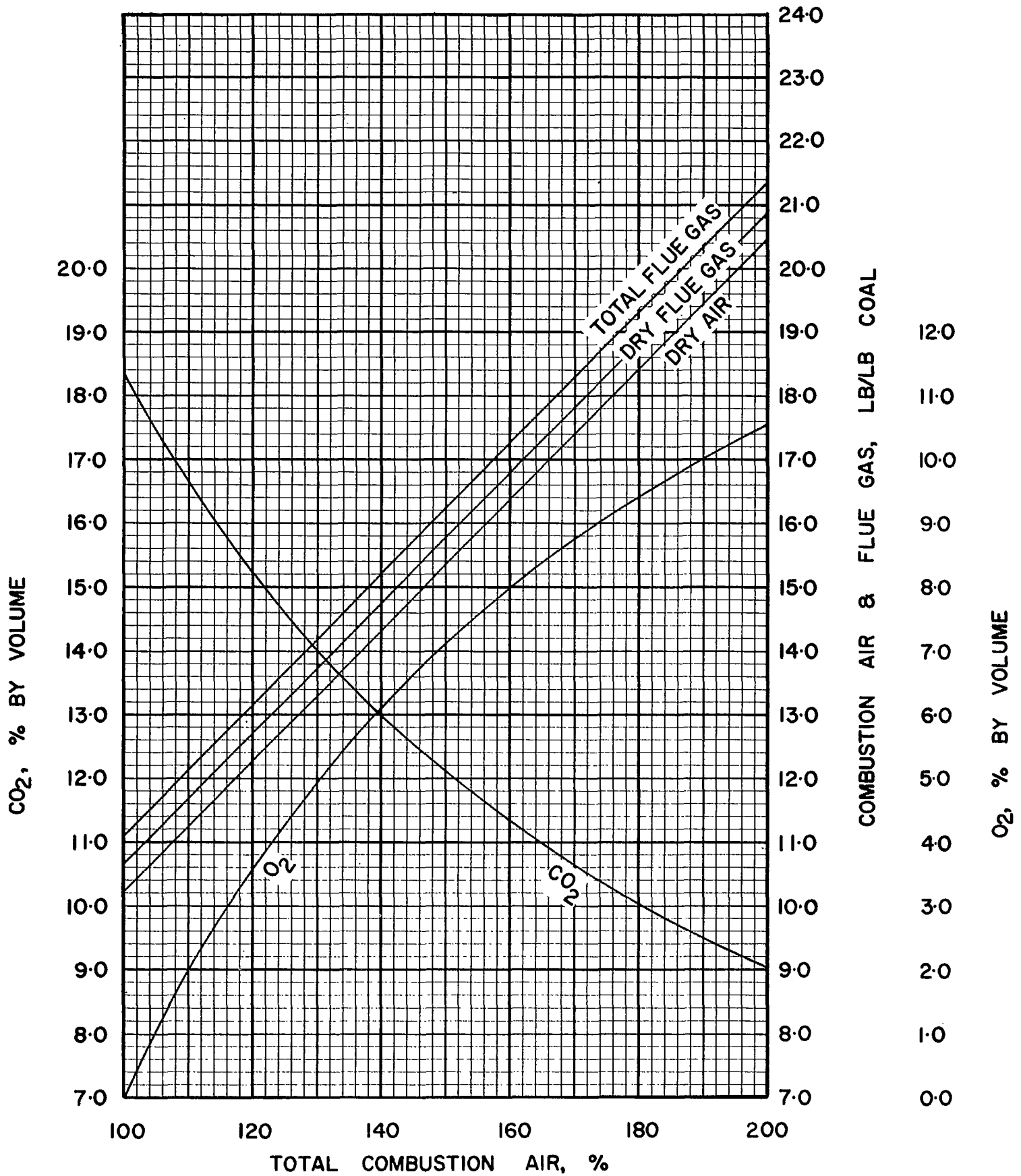


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

U.S.K-2

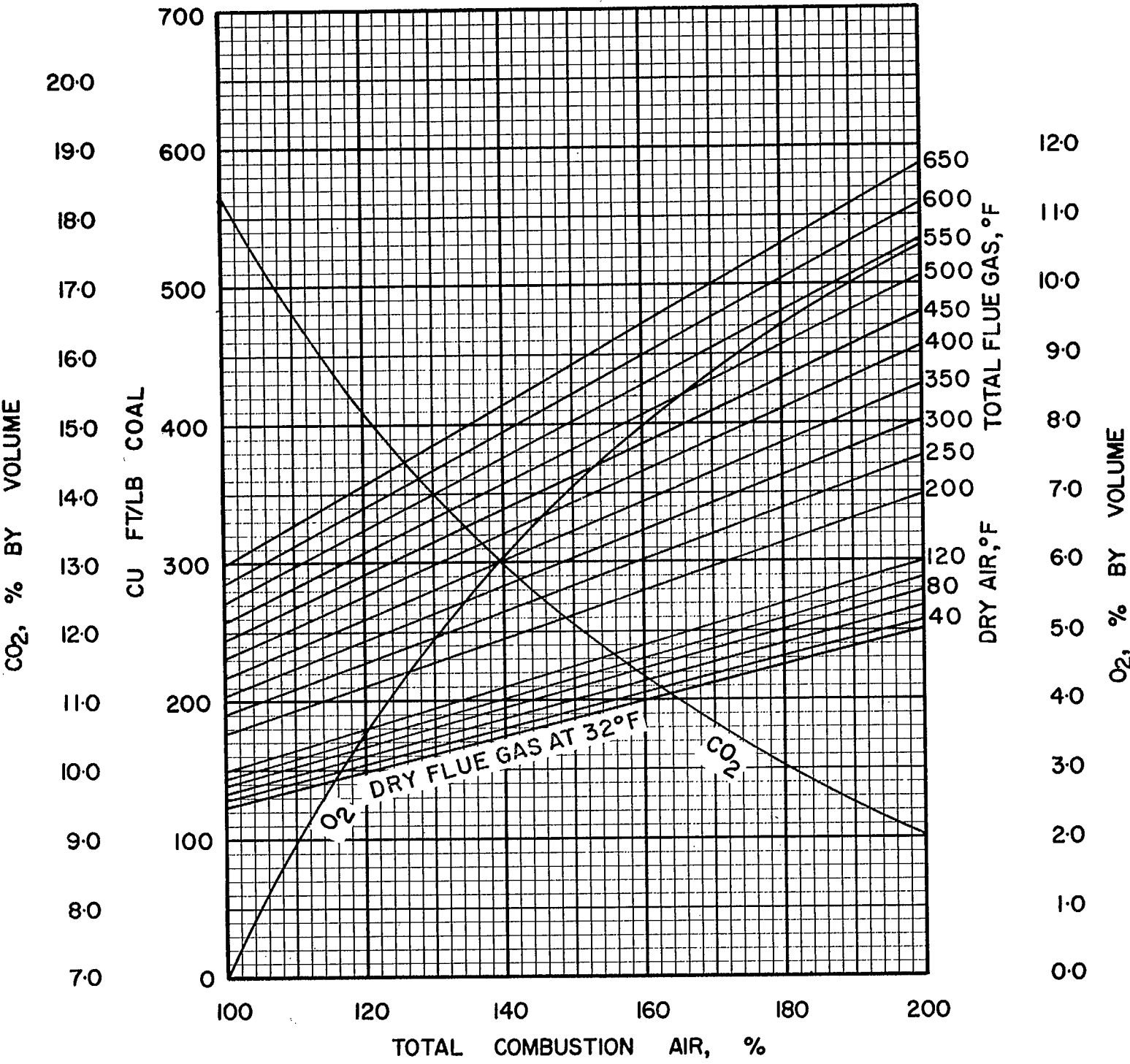


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·K·2

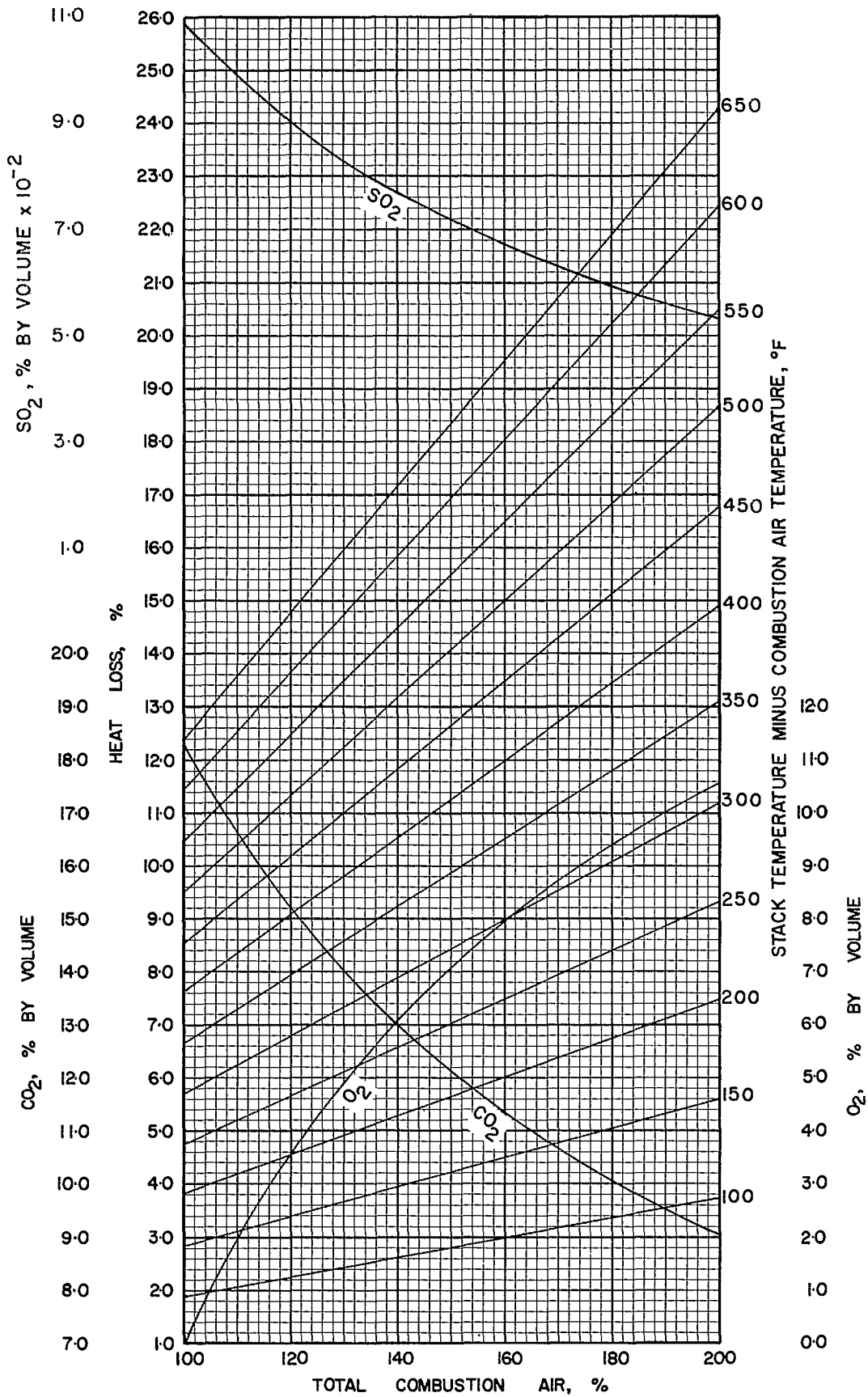


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US · K · 2

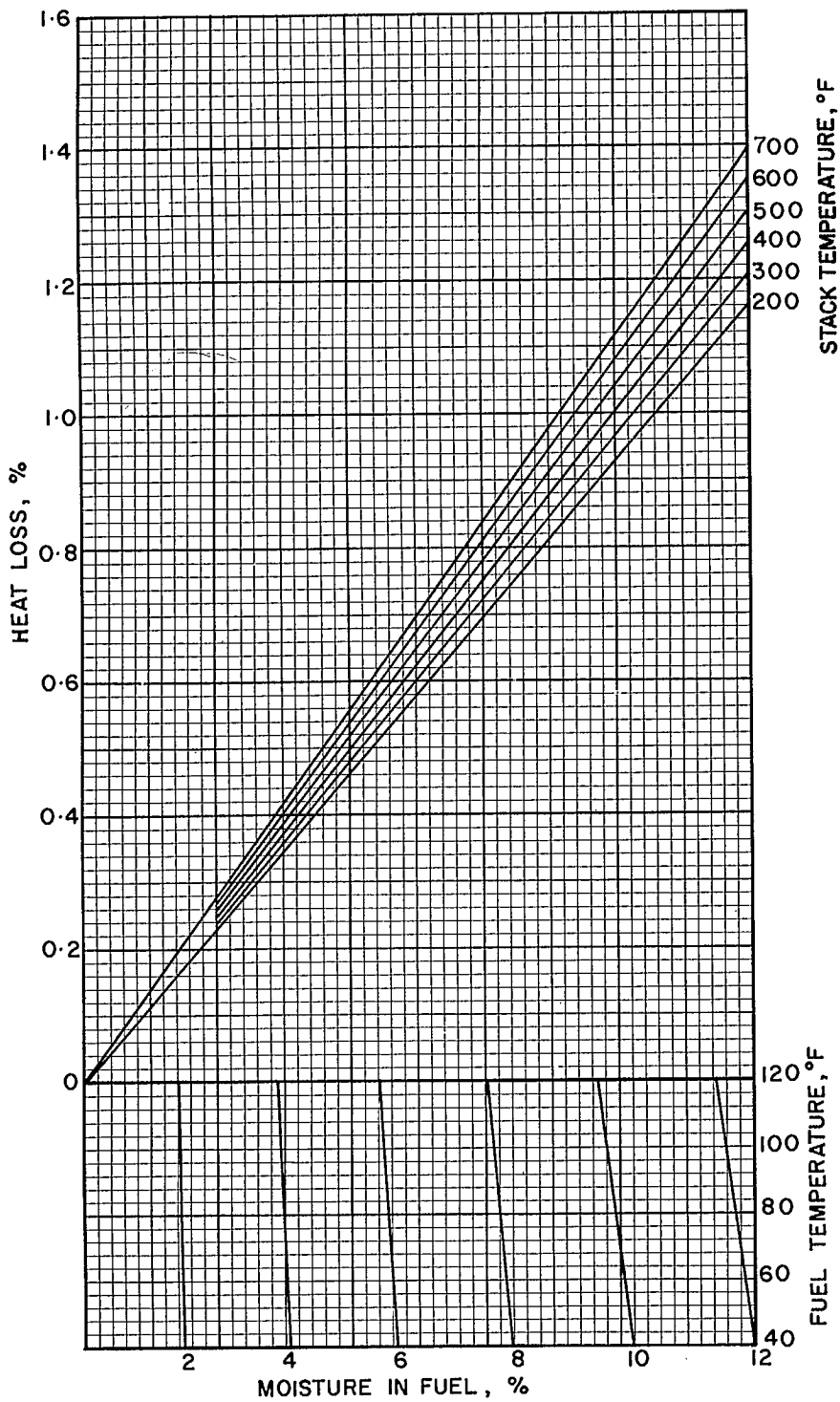


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US-K-2

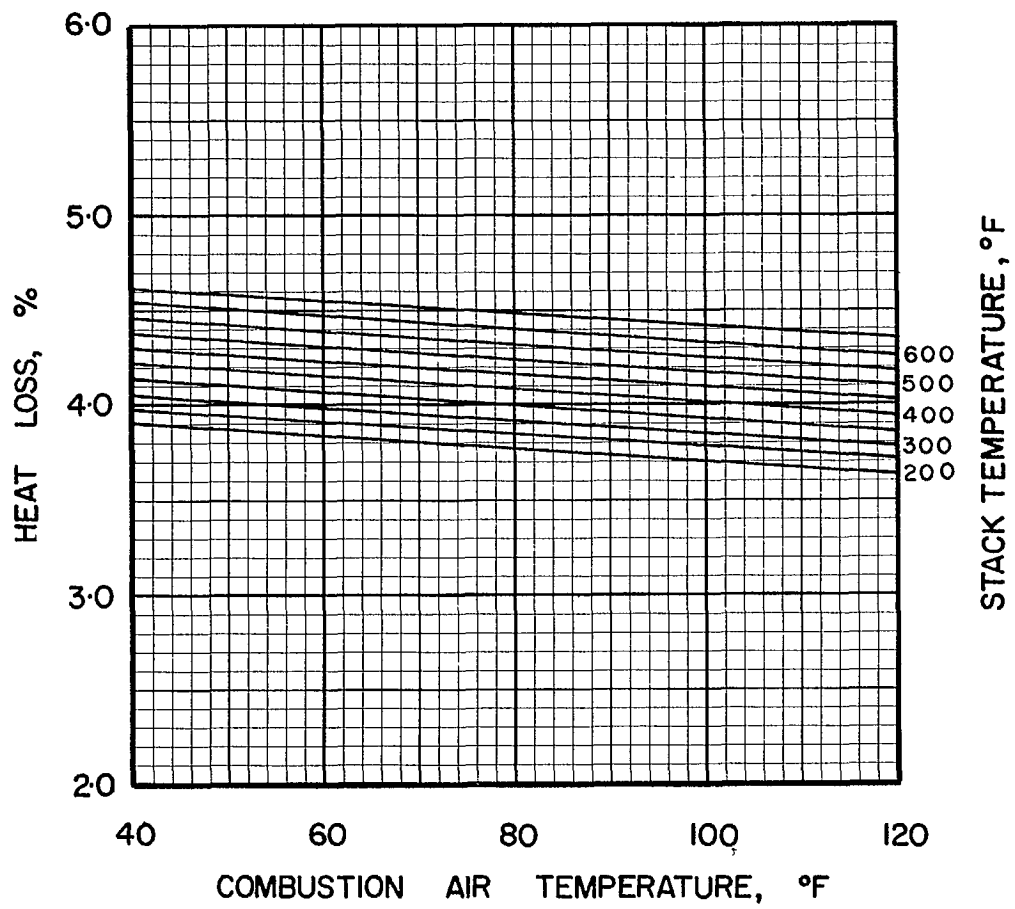


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·K·2

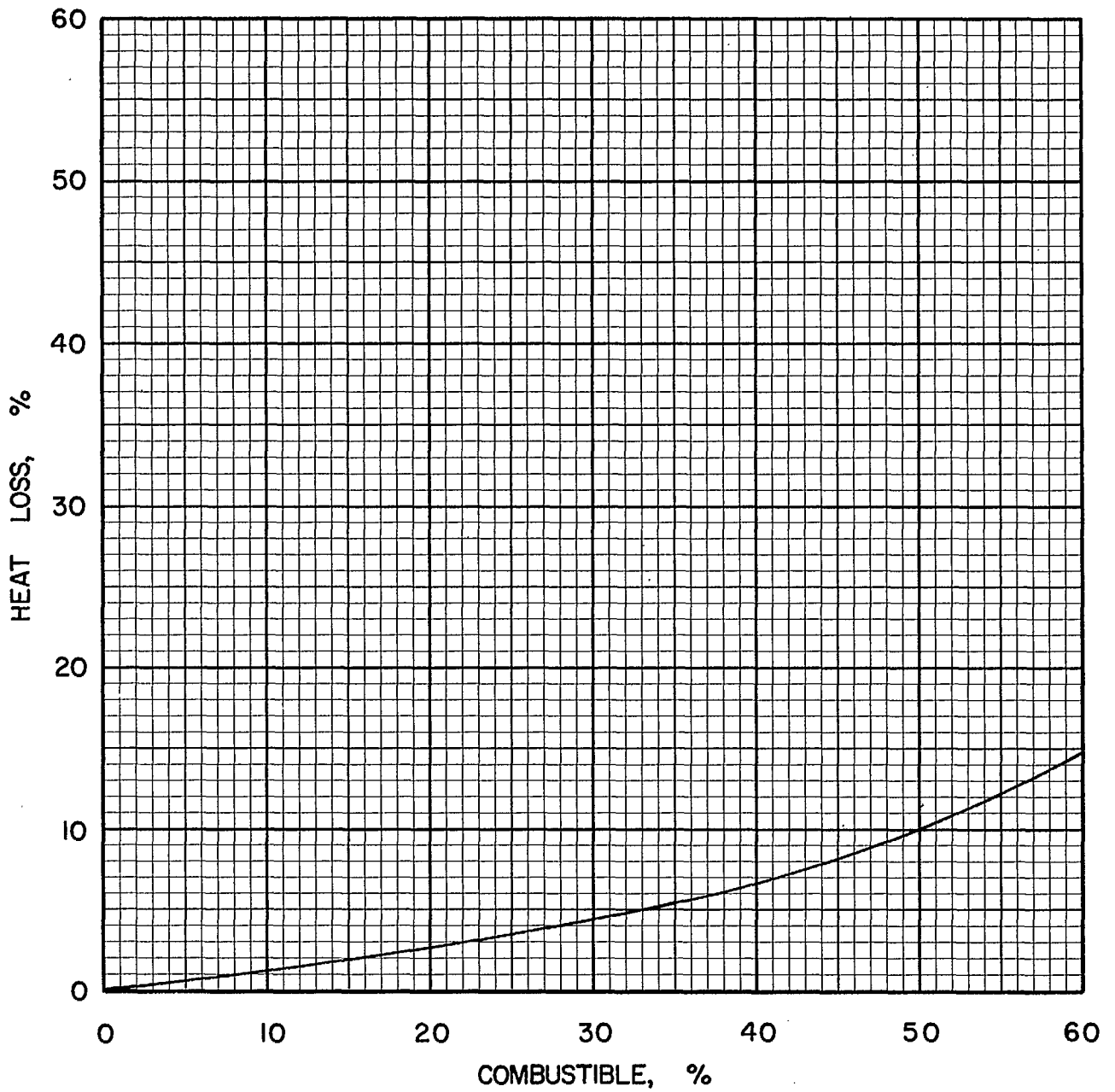


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·K·2

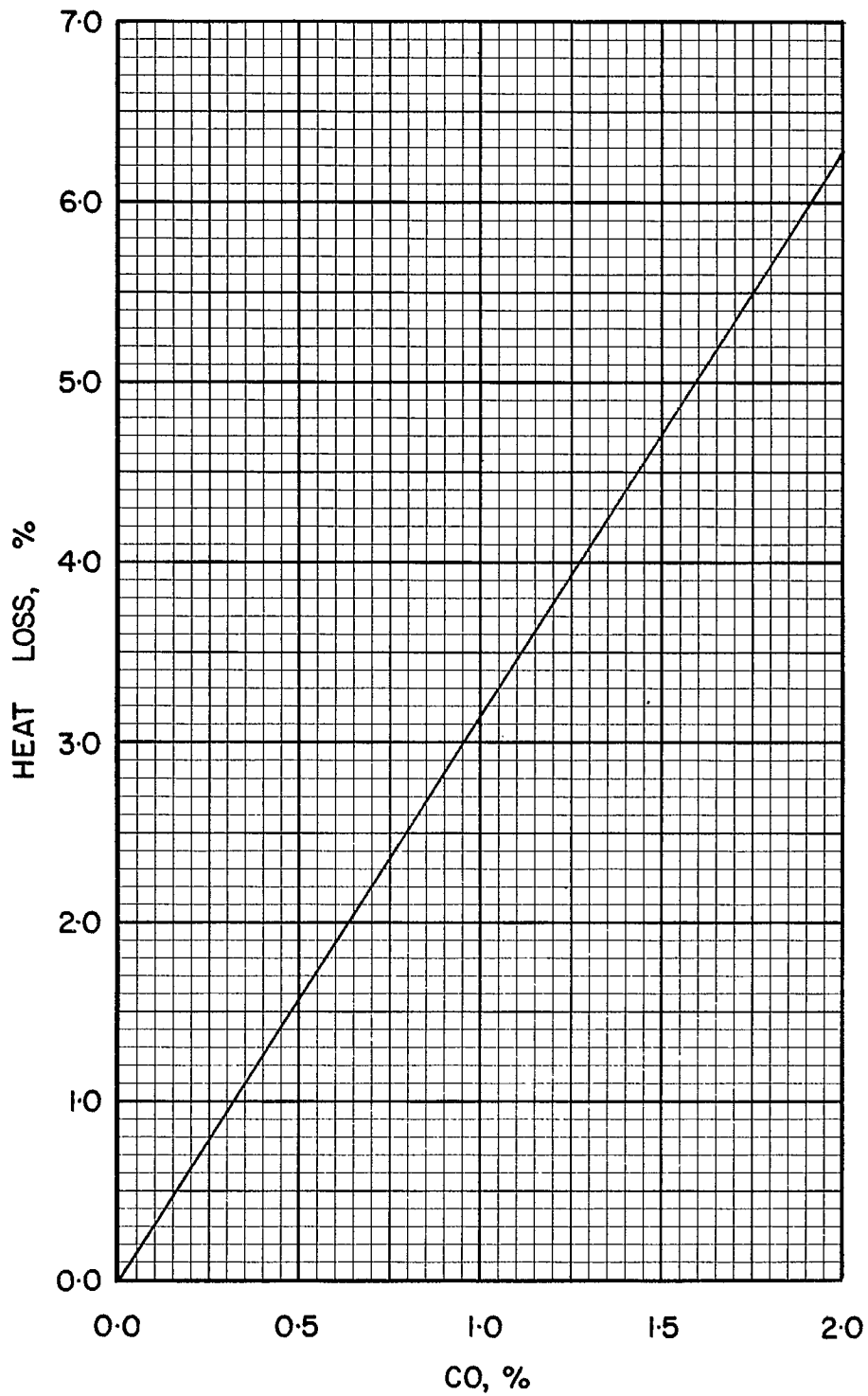


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLIGIBLE EXCESS AIR

US·K·2

COAL US 0-1, BROKEN ARO, OHIO No. 6

Typical Moisture Range: 0-8%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.072
Volatile Matter	0.441
Fixed Carbon	<u>0.487</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.759
Hydrogen (H)	0.050
Sulphur (S)	0.025
Nitrogen (N)	0.018
Oxygen (O)	0.076
Ash	<u>0.072</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	13580
Btu/short ton:	$27.16 \times 10^6$
Btu/long ton:	$30.42 \times 10^6$
MJ/kg:	31.58

*Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
$10^6$ Btu = 73.64	lb
$10^6$ Btu = 0.03682	short tons
$10^6$ Btu = 0.03287	long tons



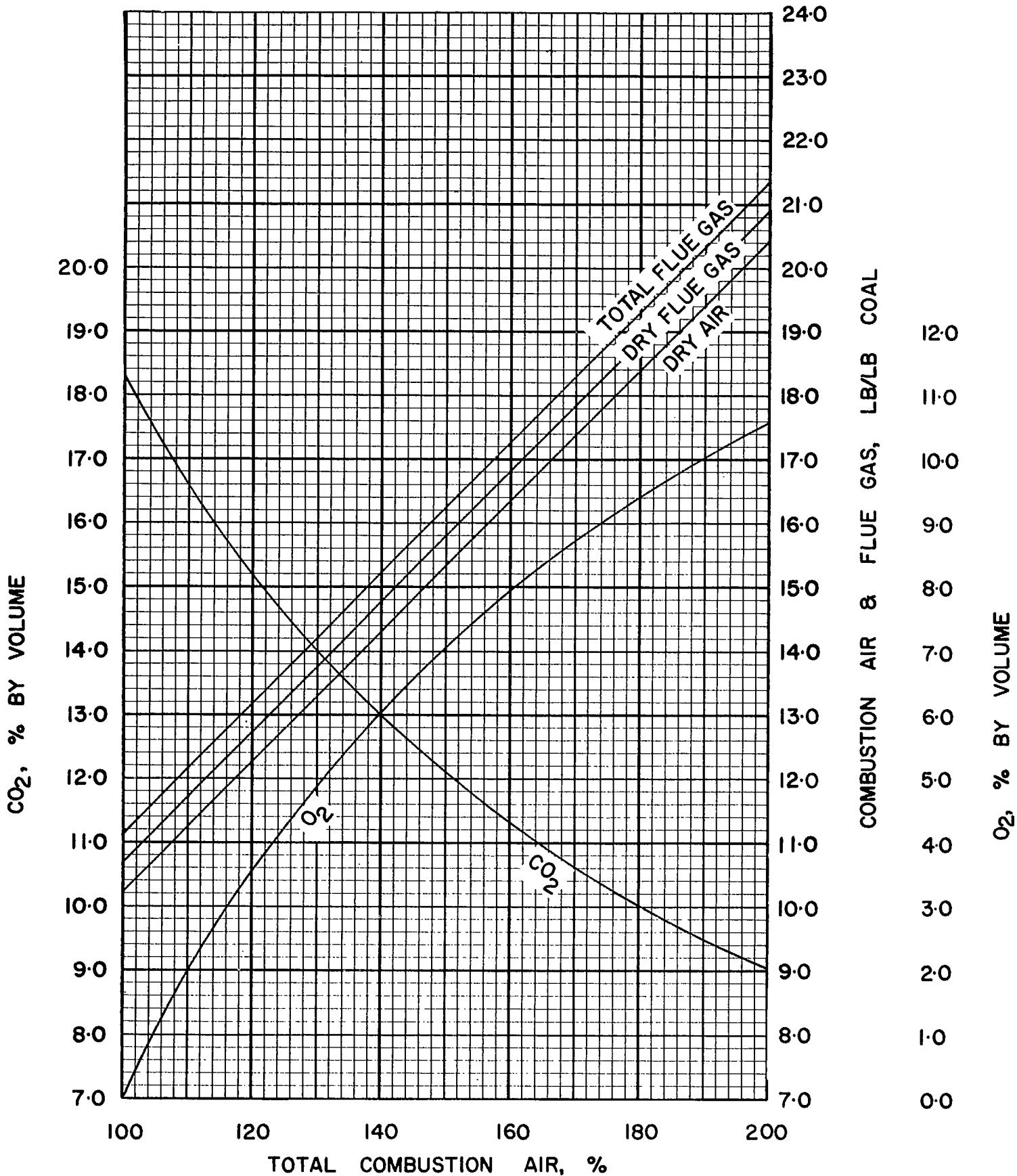


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·O·I

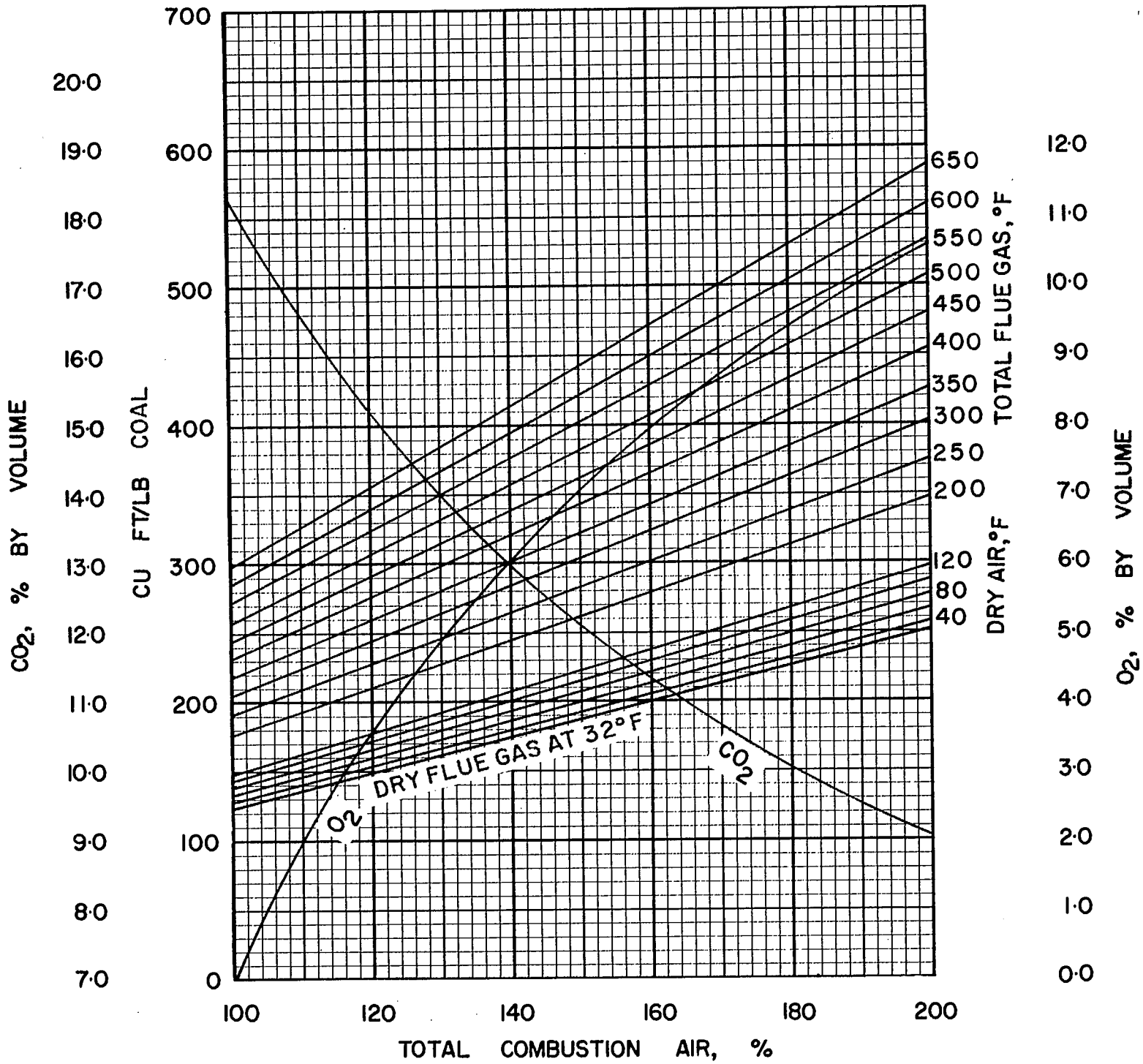


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·O·I

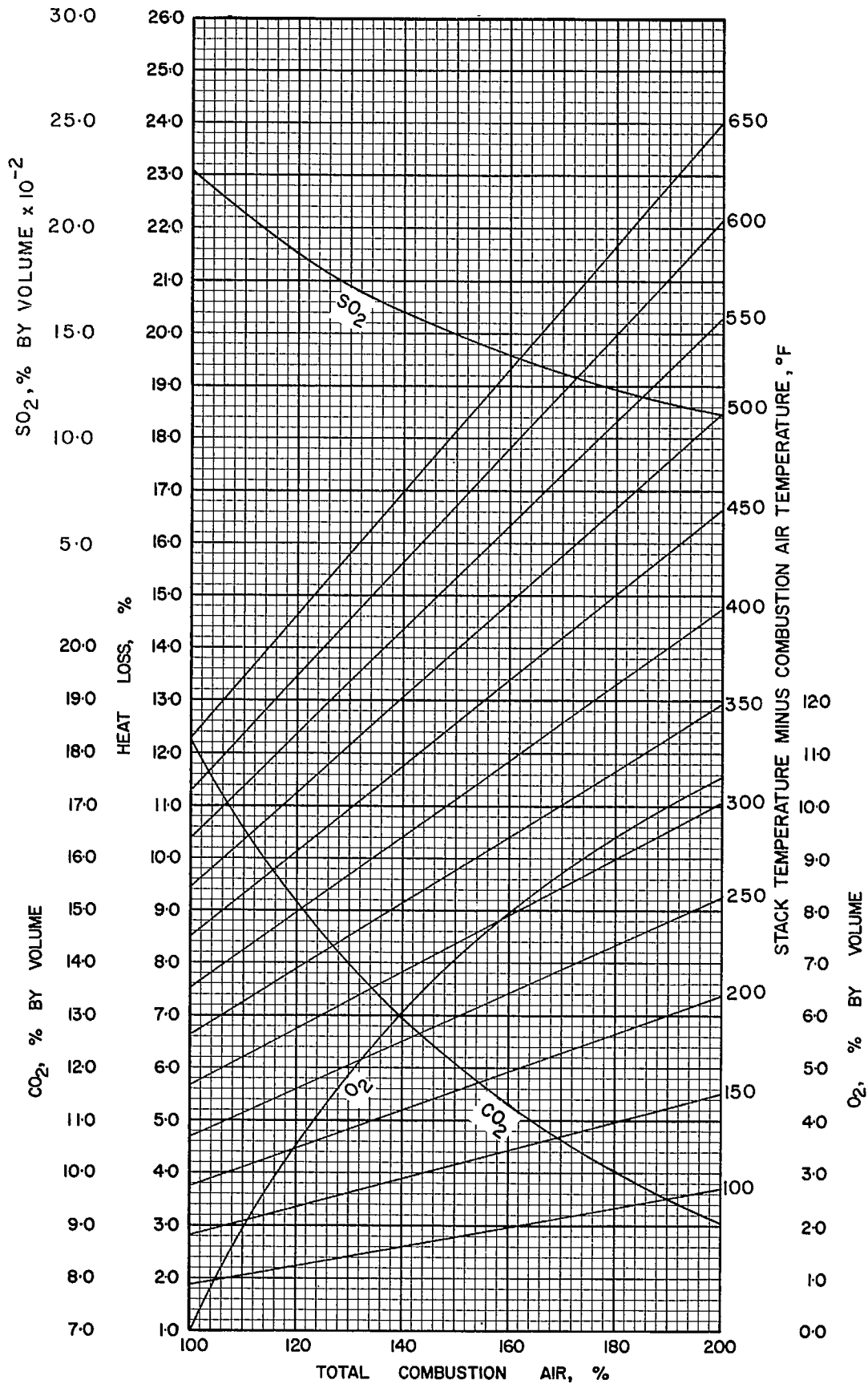


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·O·I

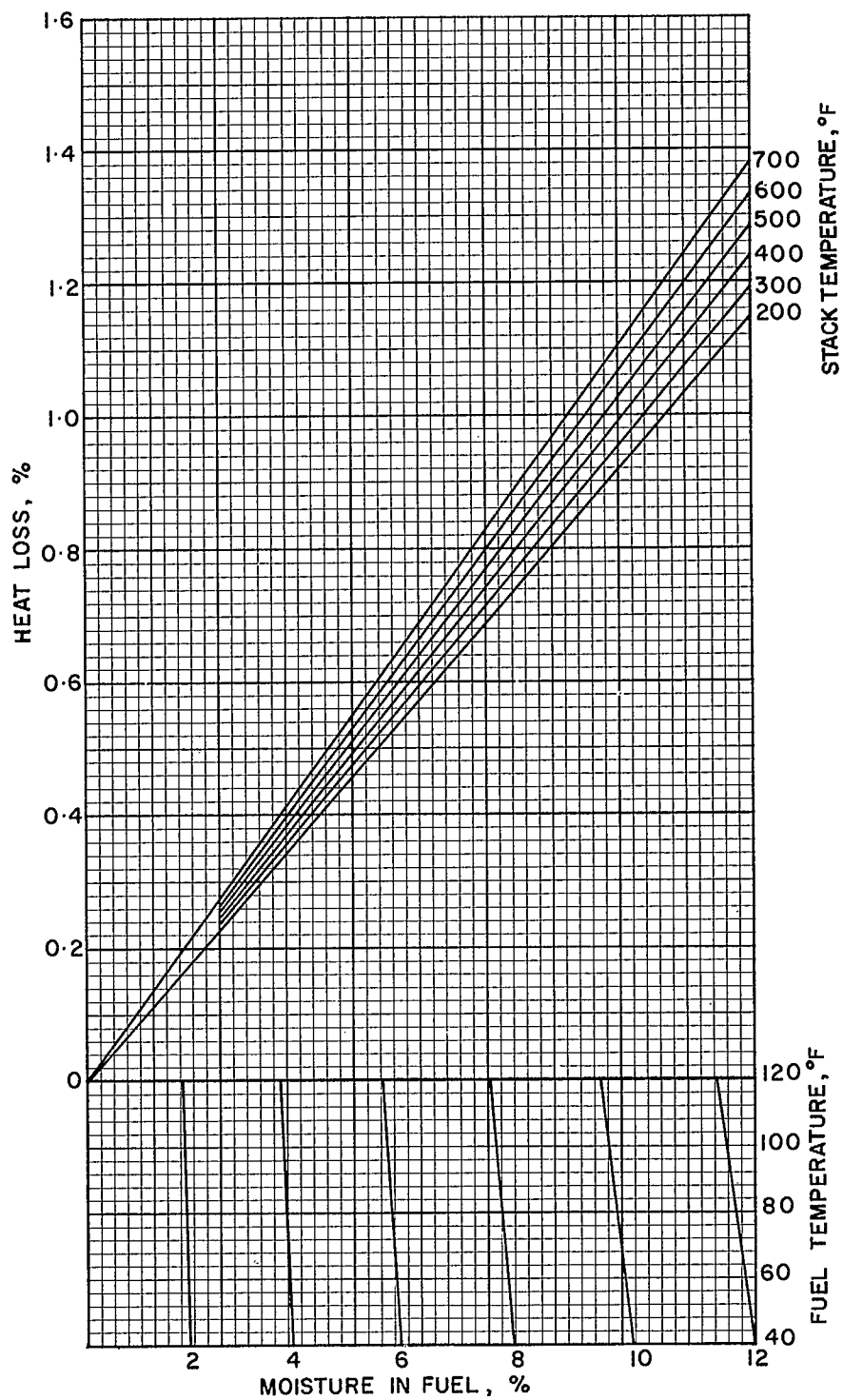


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US-0-1

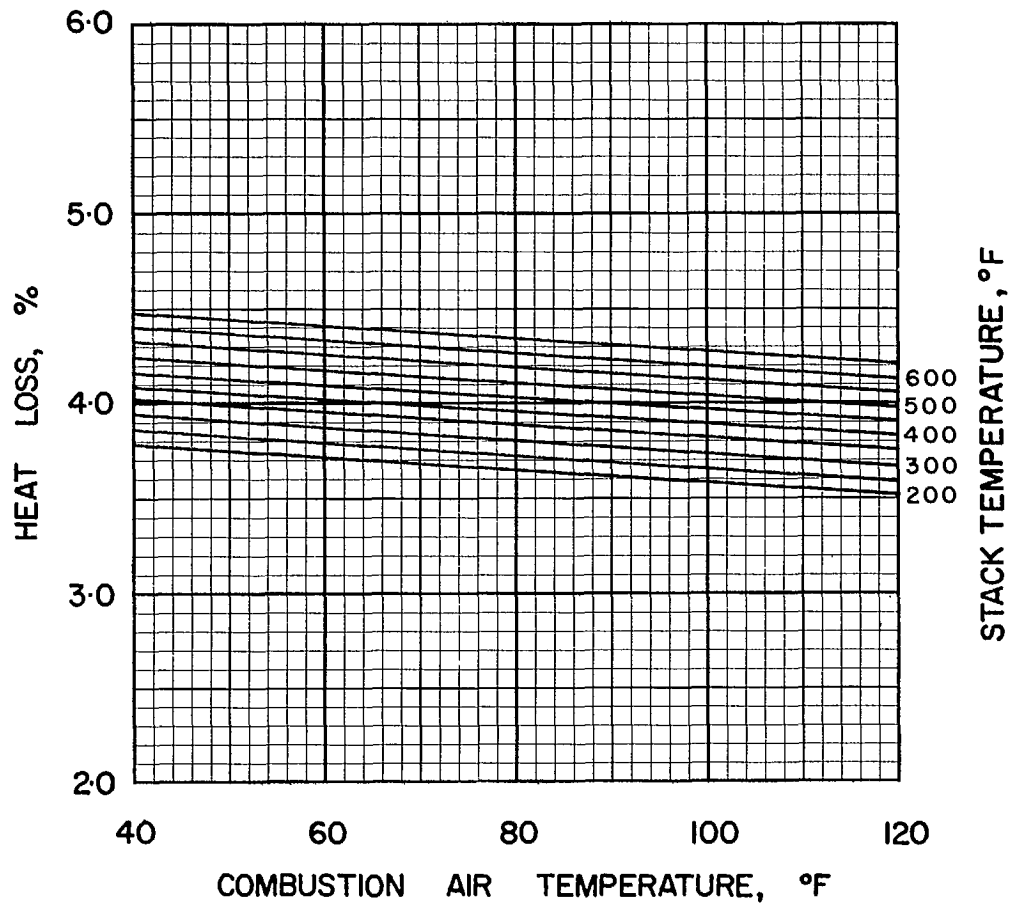


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·0·1

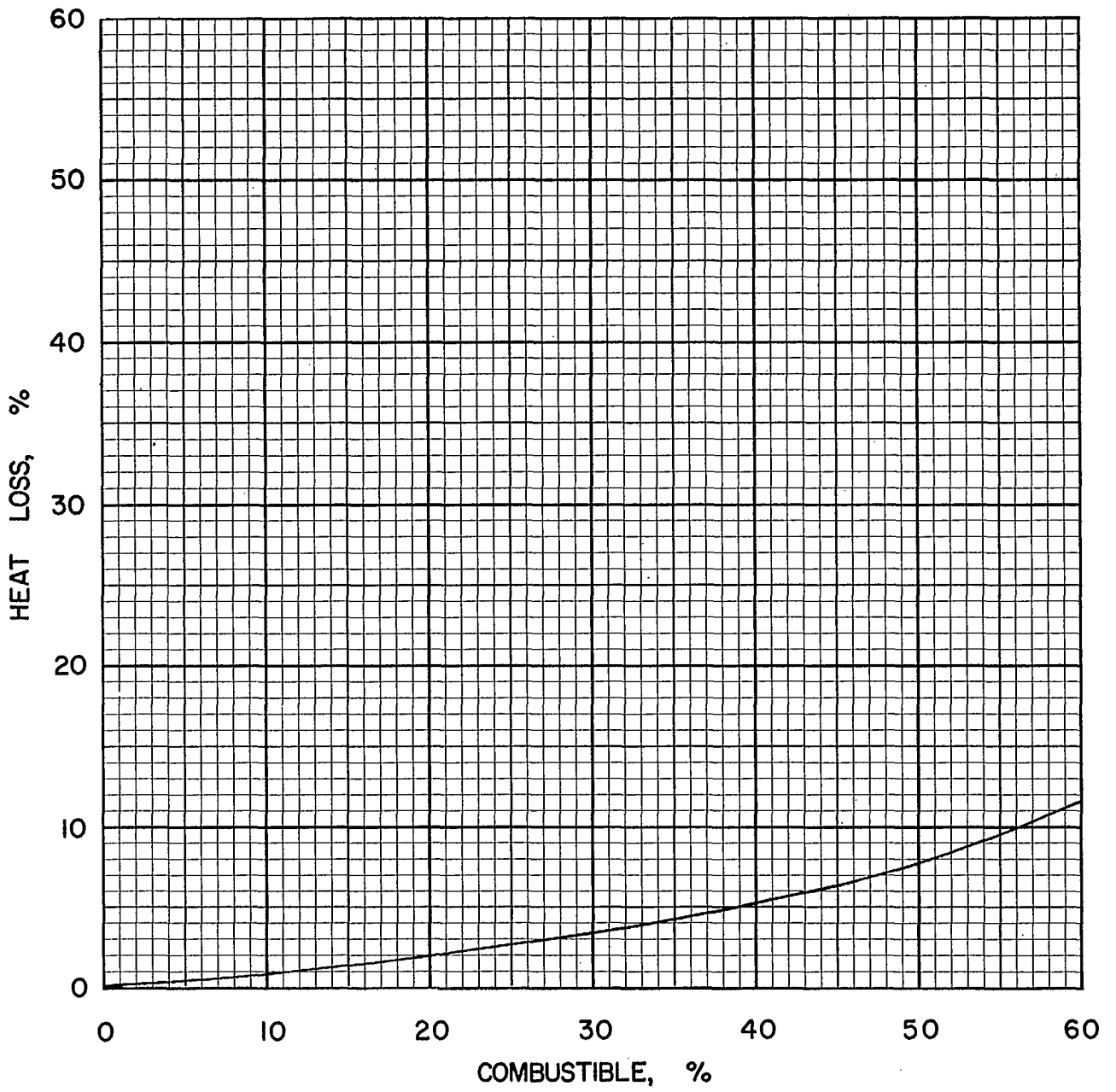


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·0·1

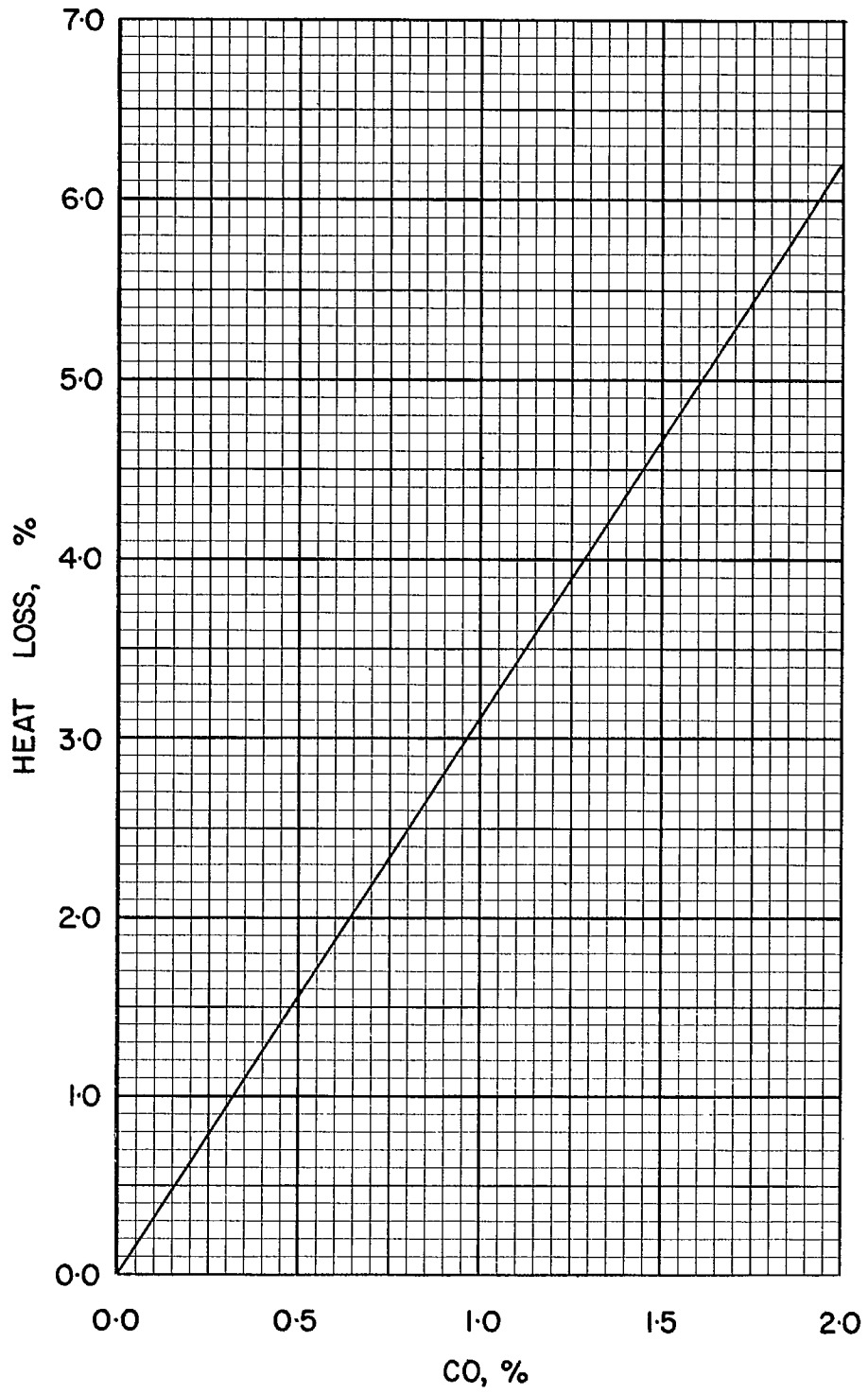


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·0·1

### COAL US 0-2, JENSIE, JEFFERSON COUNTY

Typical Moisture Range: 0--8%

#### *Proximate Analysis (lb/lb dry coal)*

Ash	0.049
Volatile Matter	0.460
Fixed Carbon	0.491
Total	1.000

#### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.781
Hydrogen (H)	0.052
Sulphur (S)	0.031
Nitrogen (N)	0.015
Oxygen (O)	0.072
Ash	0.049
Total	1.000

#### *Gross Calorific Value*

Btu/lb:	13650
Btu/short ton:	$27.30 \times 10^6$
Btu/long ton:	$30.58 \times 10^6$
MJ/kg:	31.74

#### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 73.26 lb	
$10^6$ Btu	= 0.03663 short tons	
$10^6$ Btu	= 0.03271 long tons	



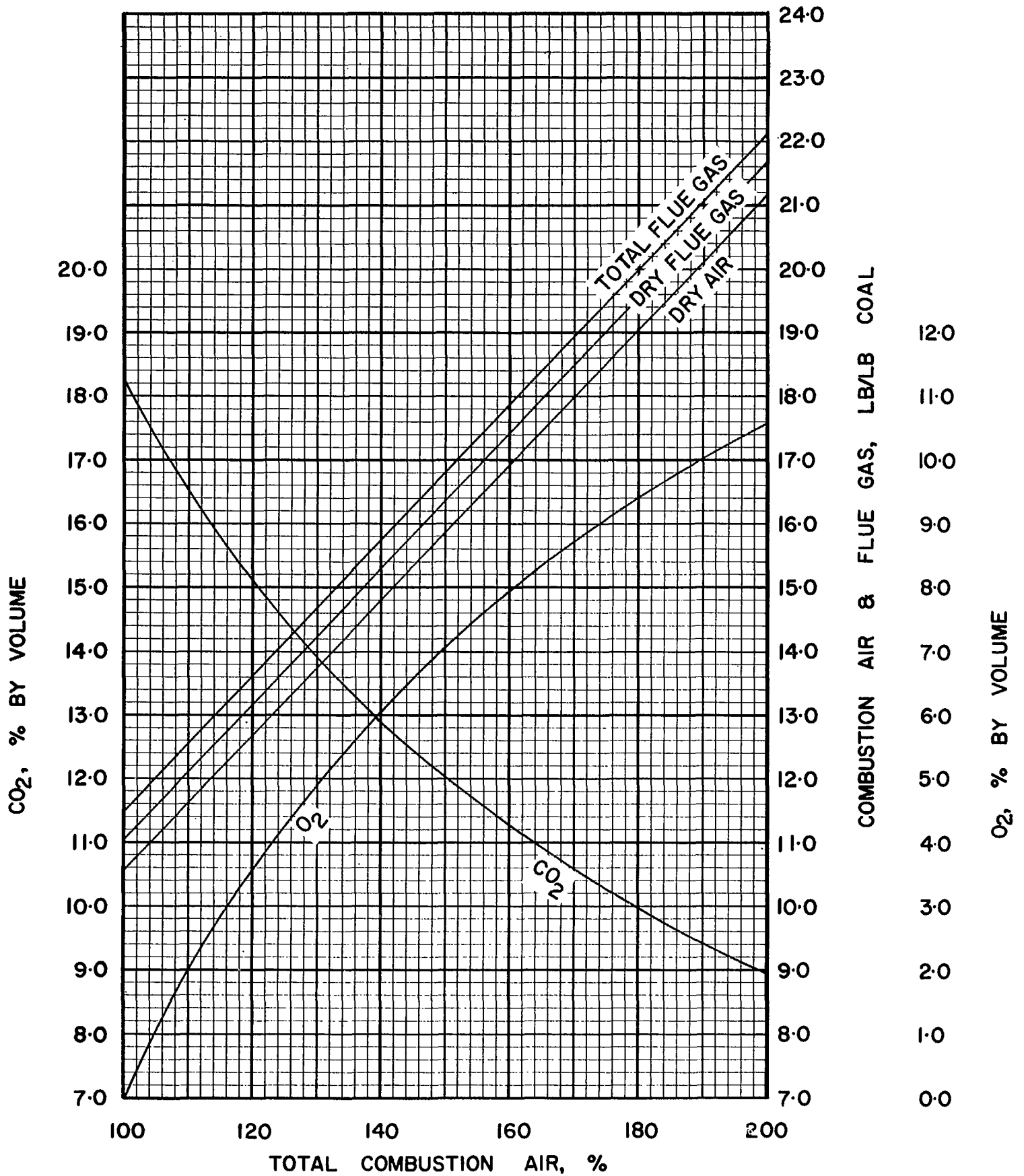


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-0-2

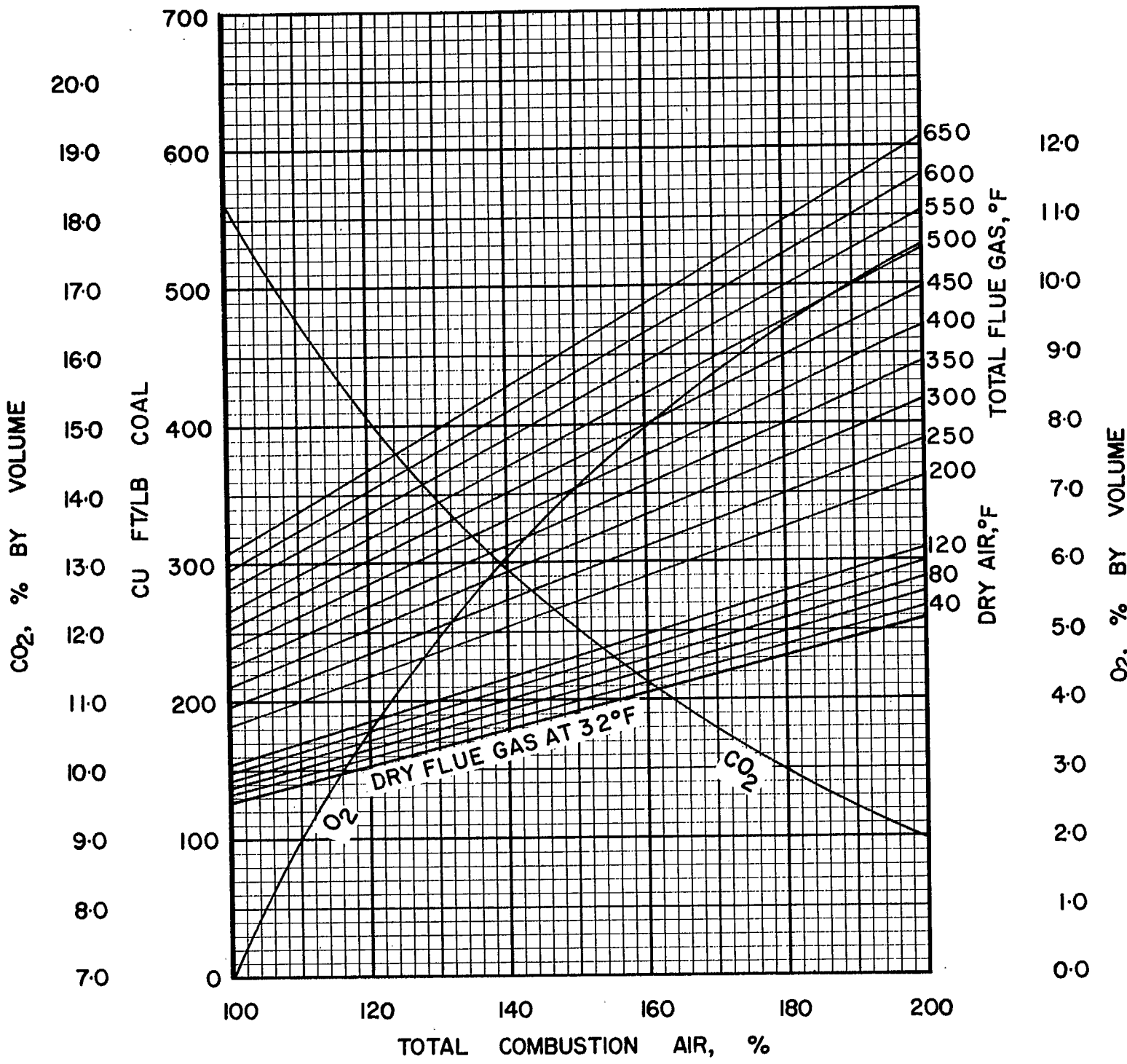


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·O·2

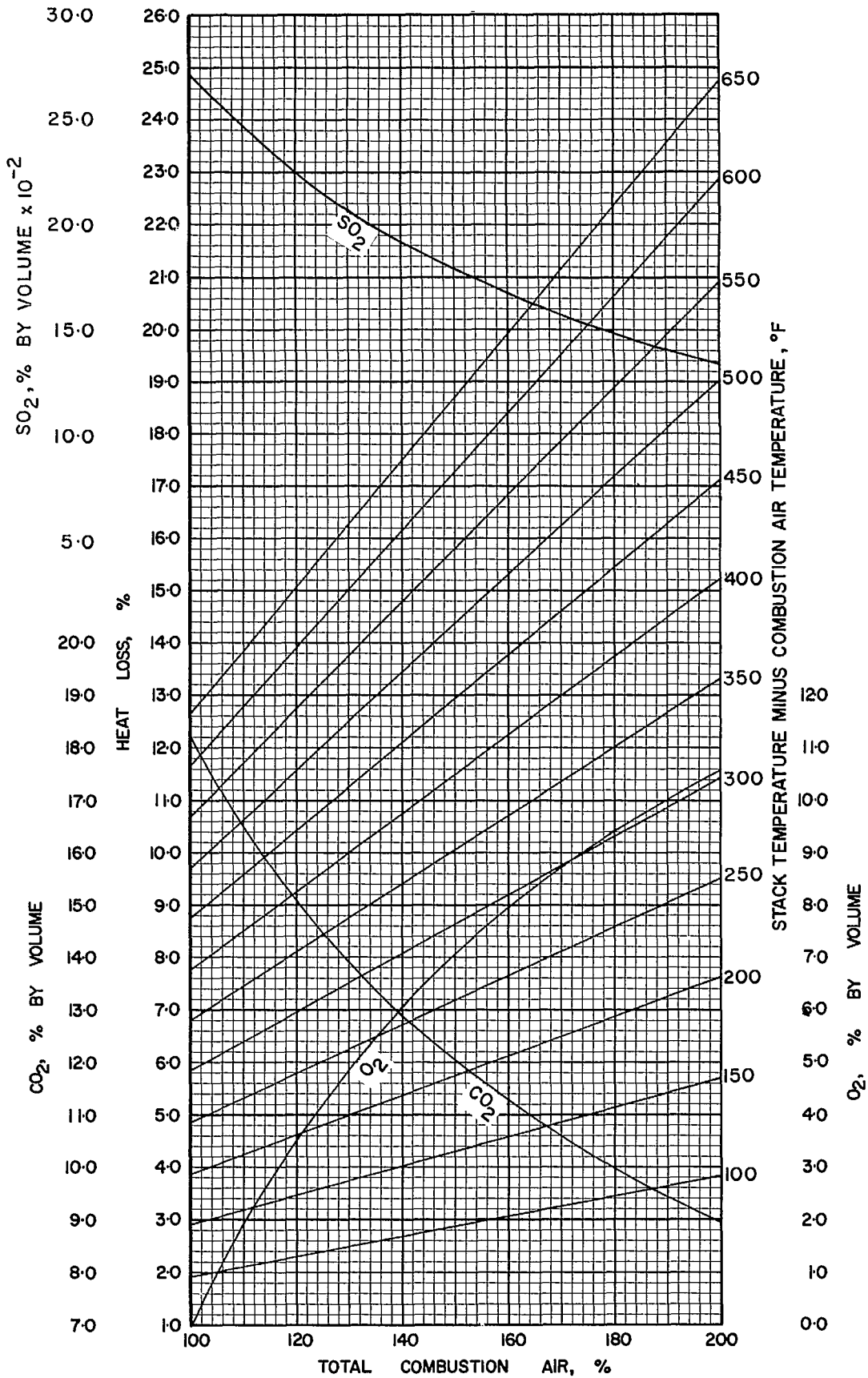


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·O·2

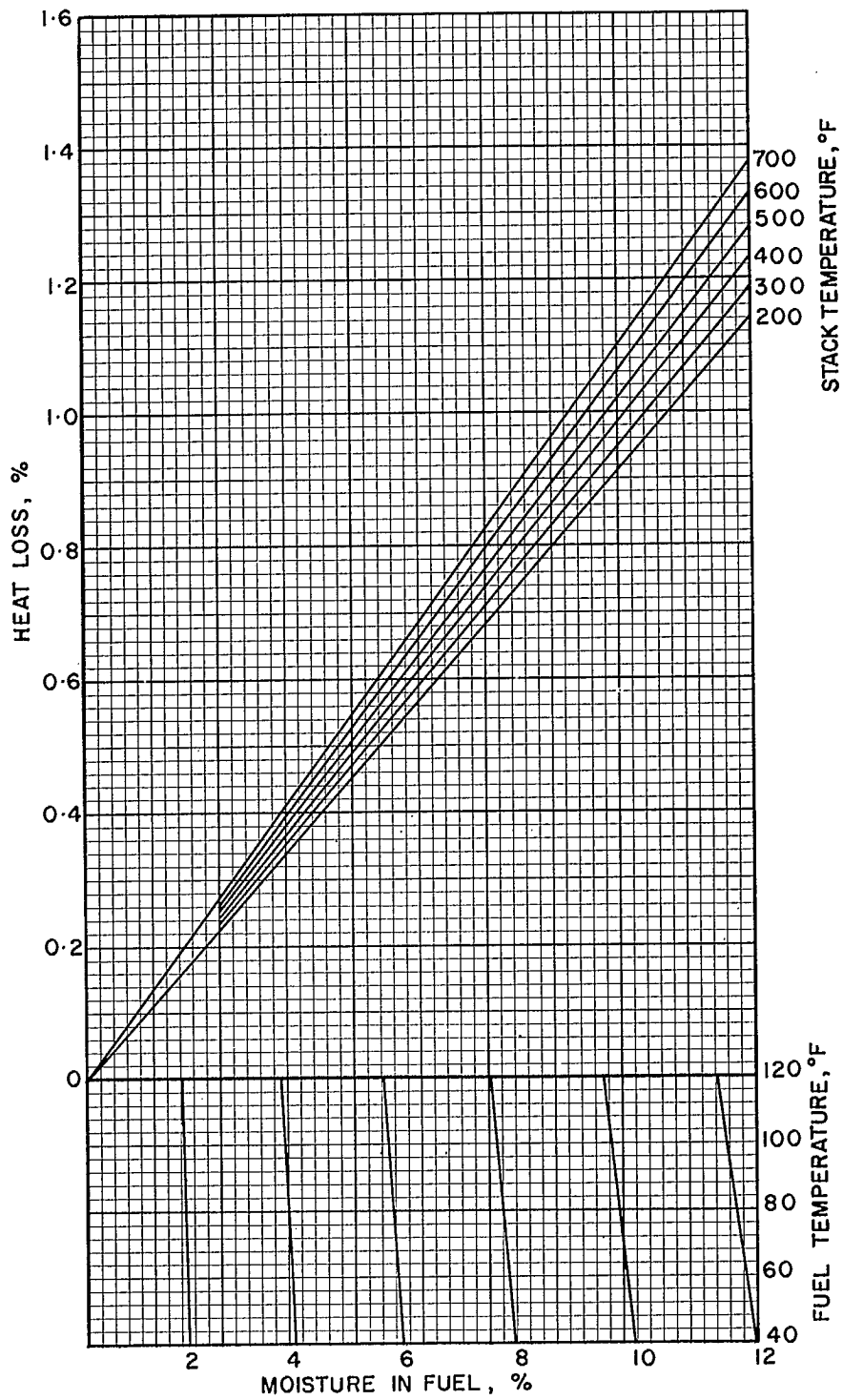


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US-0-2

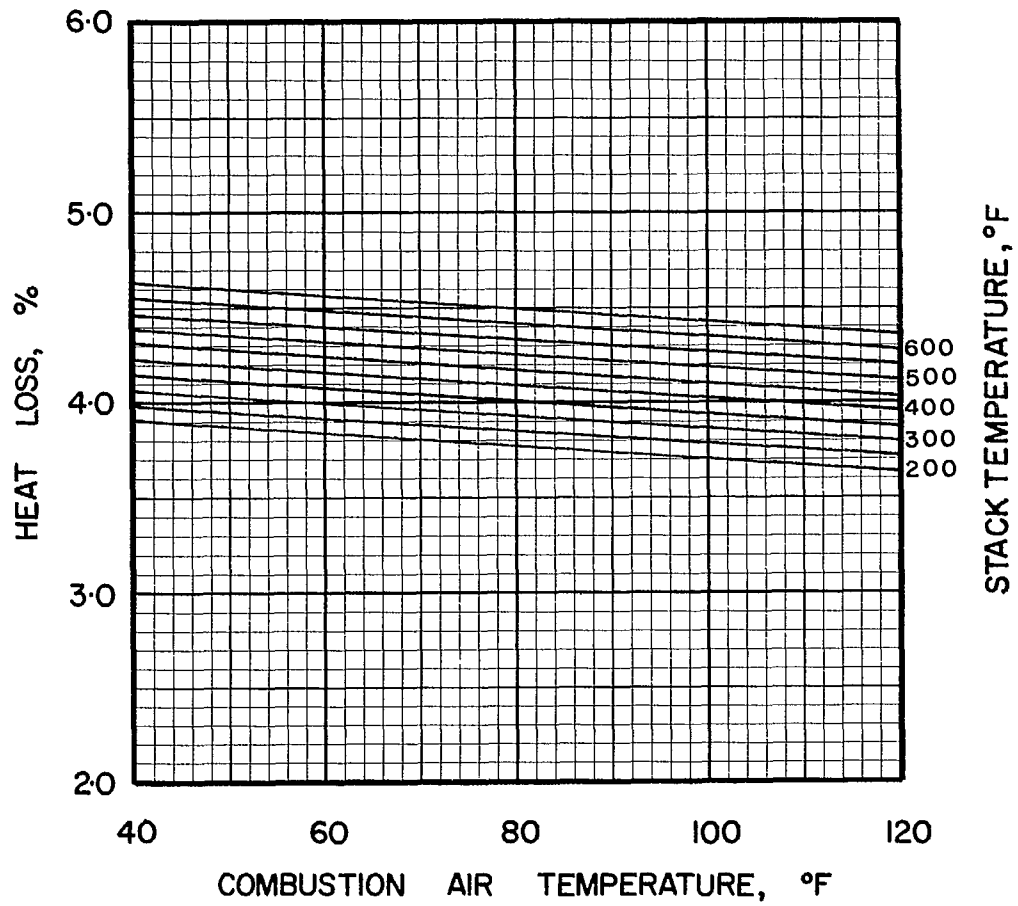


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·O·2

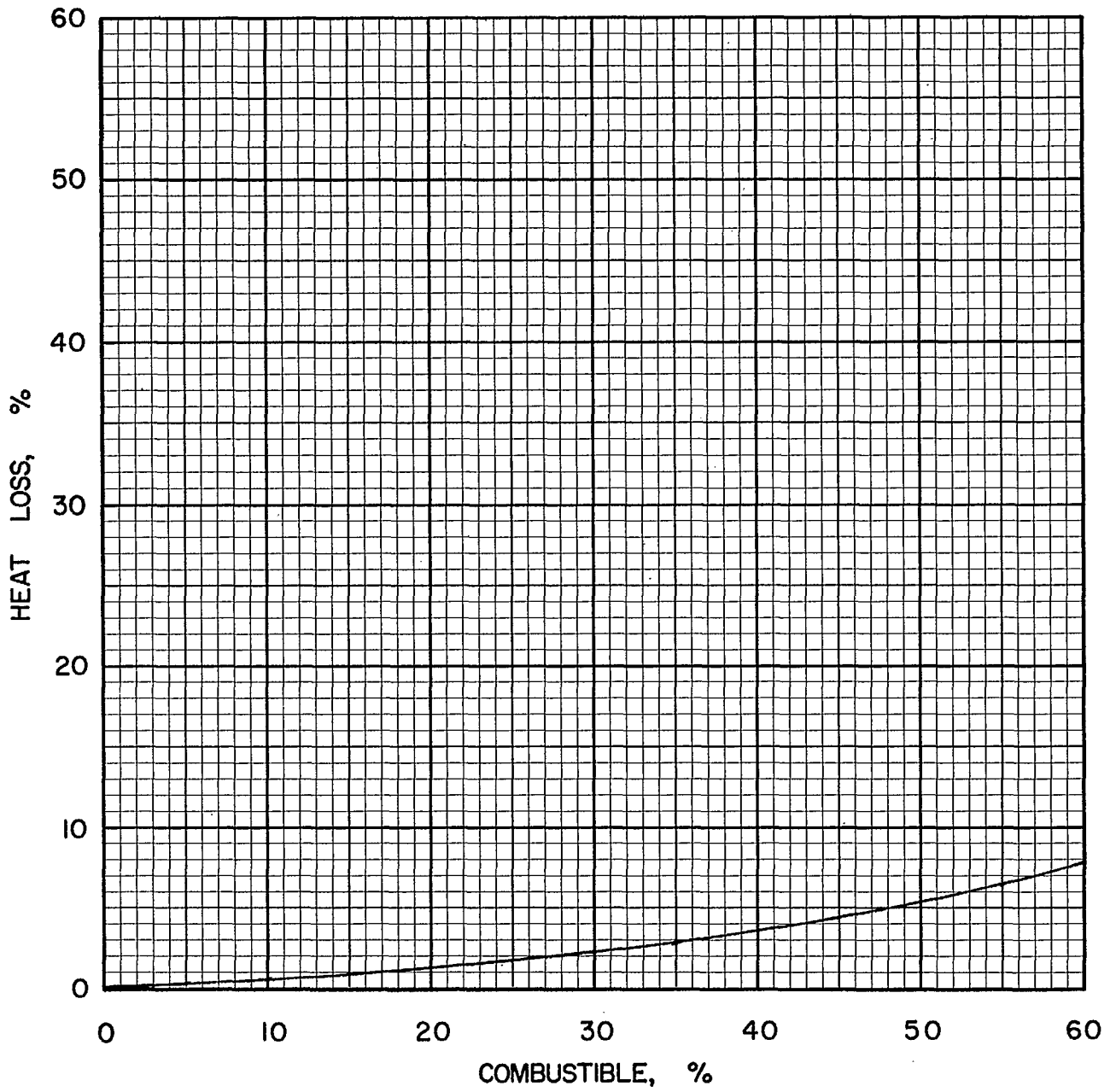


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US-0-2

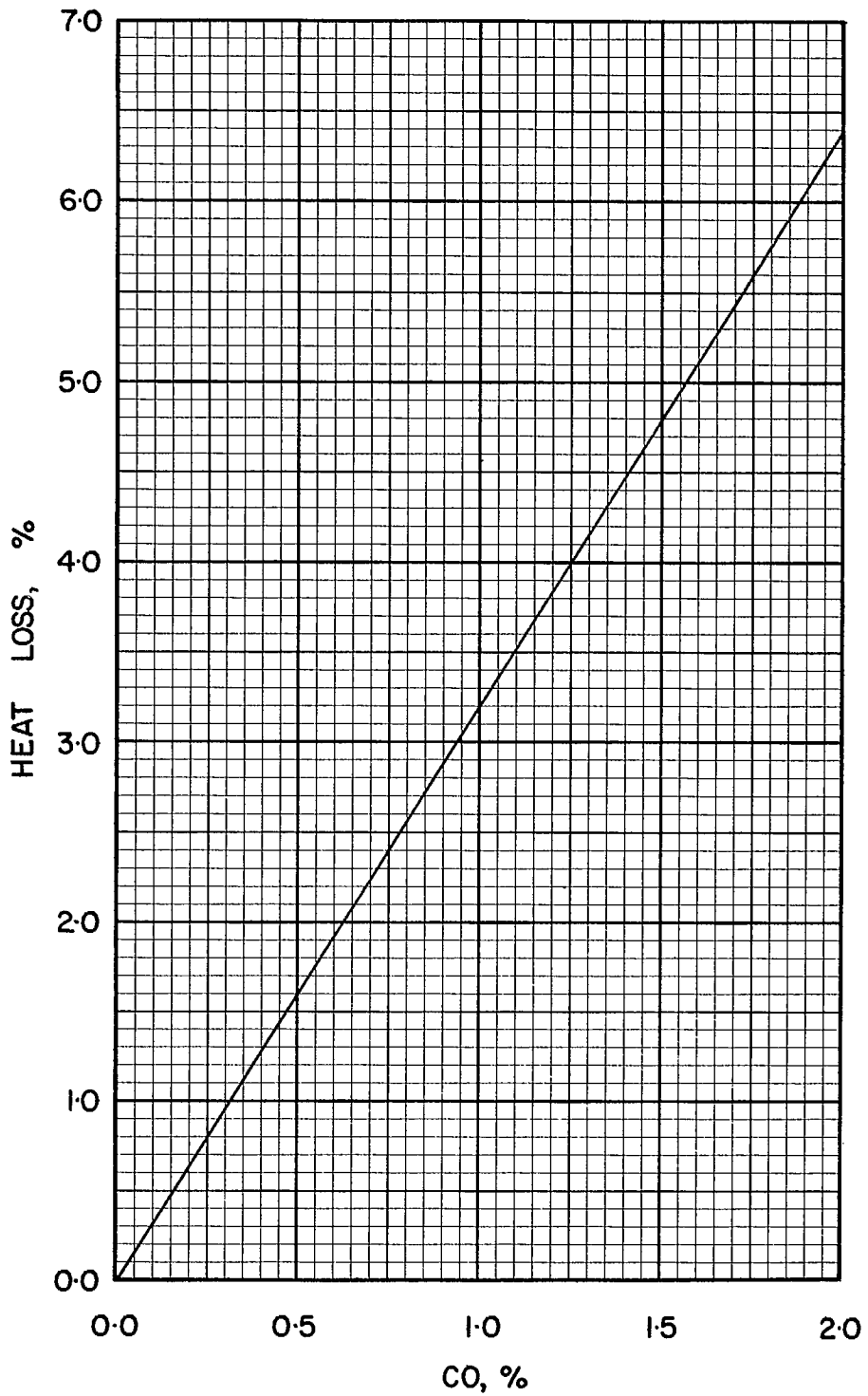


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLIGIBLE EXCESS AIR

US·O·2

**COAL US 0-3, SUNNYHILL, MIDDLE KITTANNING No. 6**

Typical Moisture Range: 4–10%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.137
Volatile Matter	0.390
Fixed Carbon	<u>0.473</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.703
Hydrogen (H)	0.050
Sulphur (S)	0.029
Nitrogen (N)	0.015
Oxygen (O)	0.066
Ash	<u>0.137</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	12324
Btu/short ton:	$24.65 \times 10^6$
Btu/long ton:	$27.61 \times 10^6$
MJ/kg:	28.66

*Conversion Factors*

1 short ton	= 0.8929	long tons	= 2000 lb
$10^6$ Btu	= 81.14	lb	
$10^6$ Btu	= 0.04057	short tons	
$10^6$ Btu	= 0.03622	long tons	



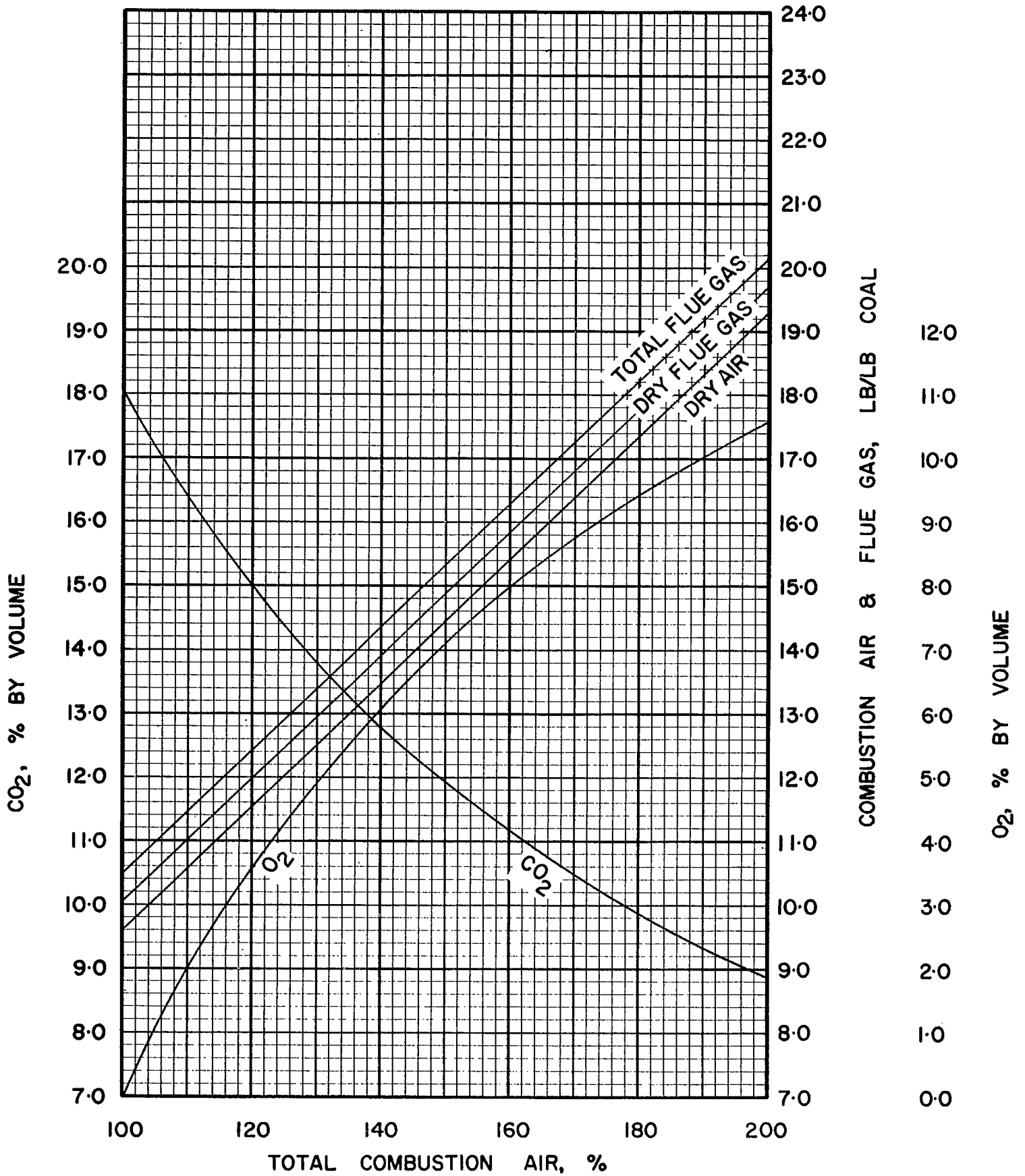


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-0-3

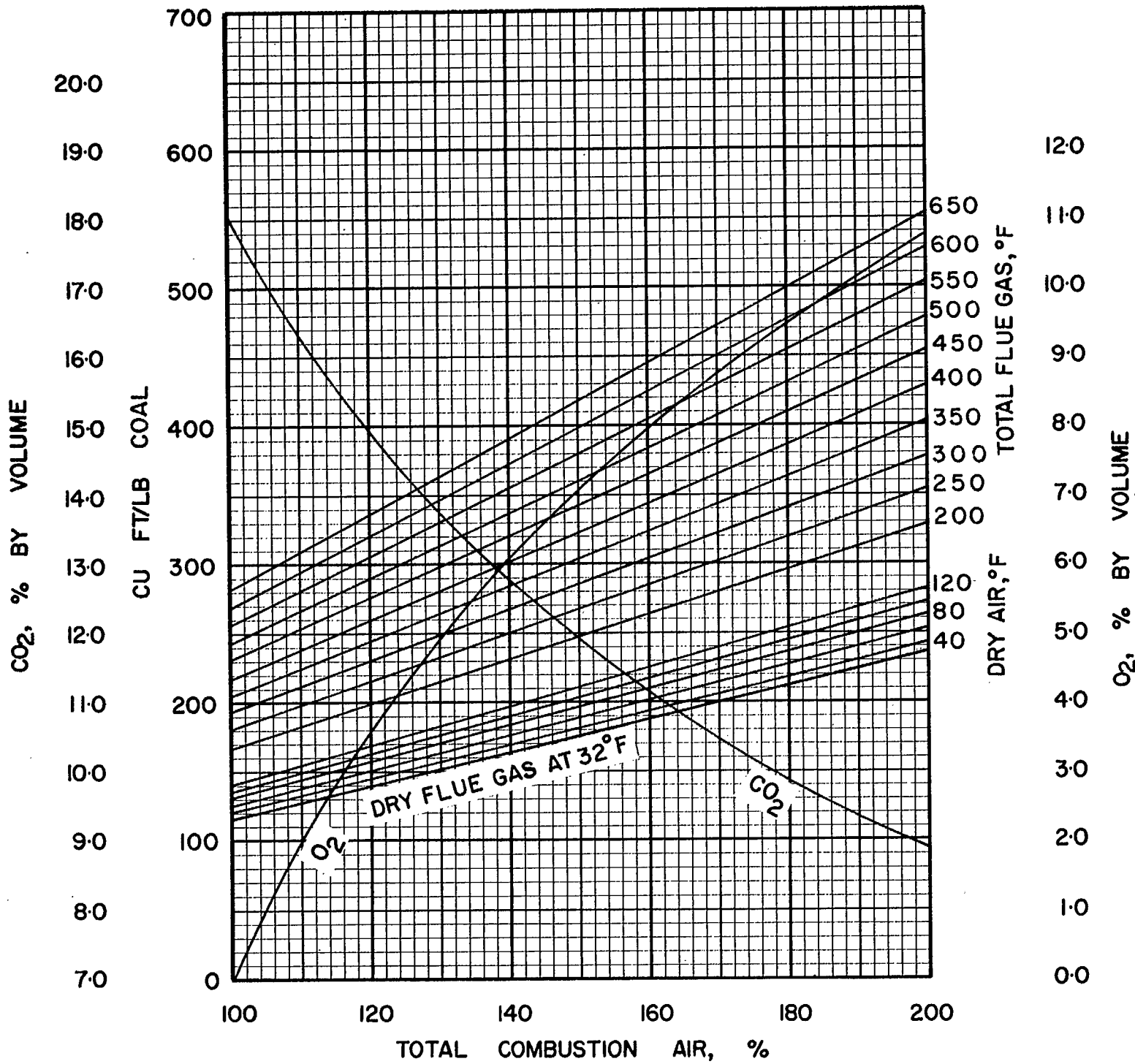


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·0·3

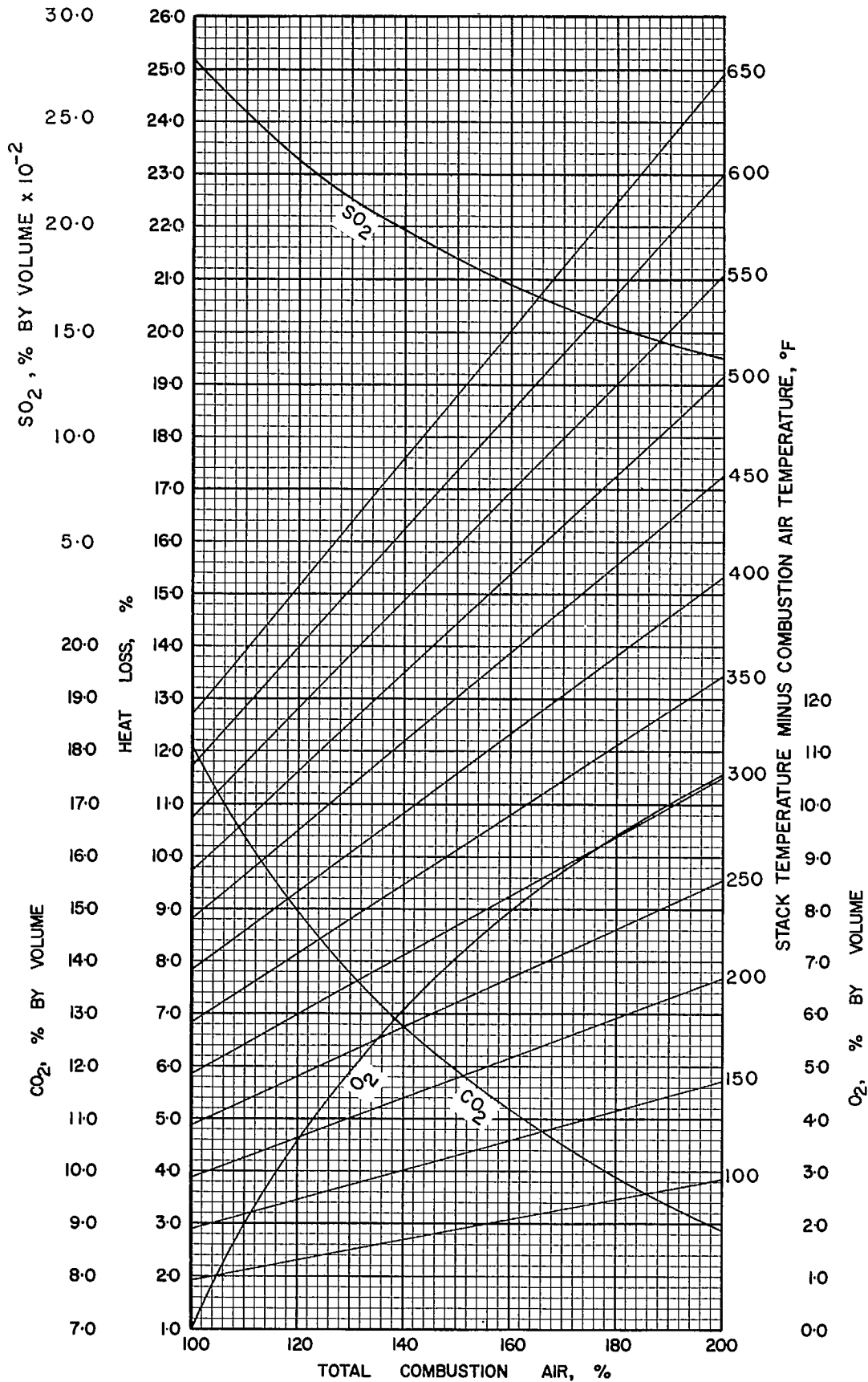


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·0·3

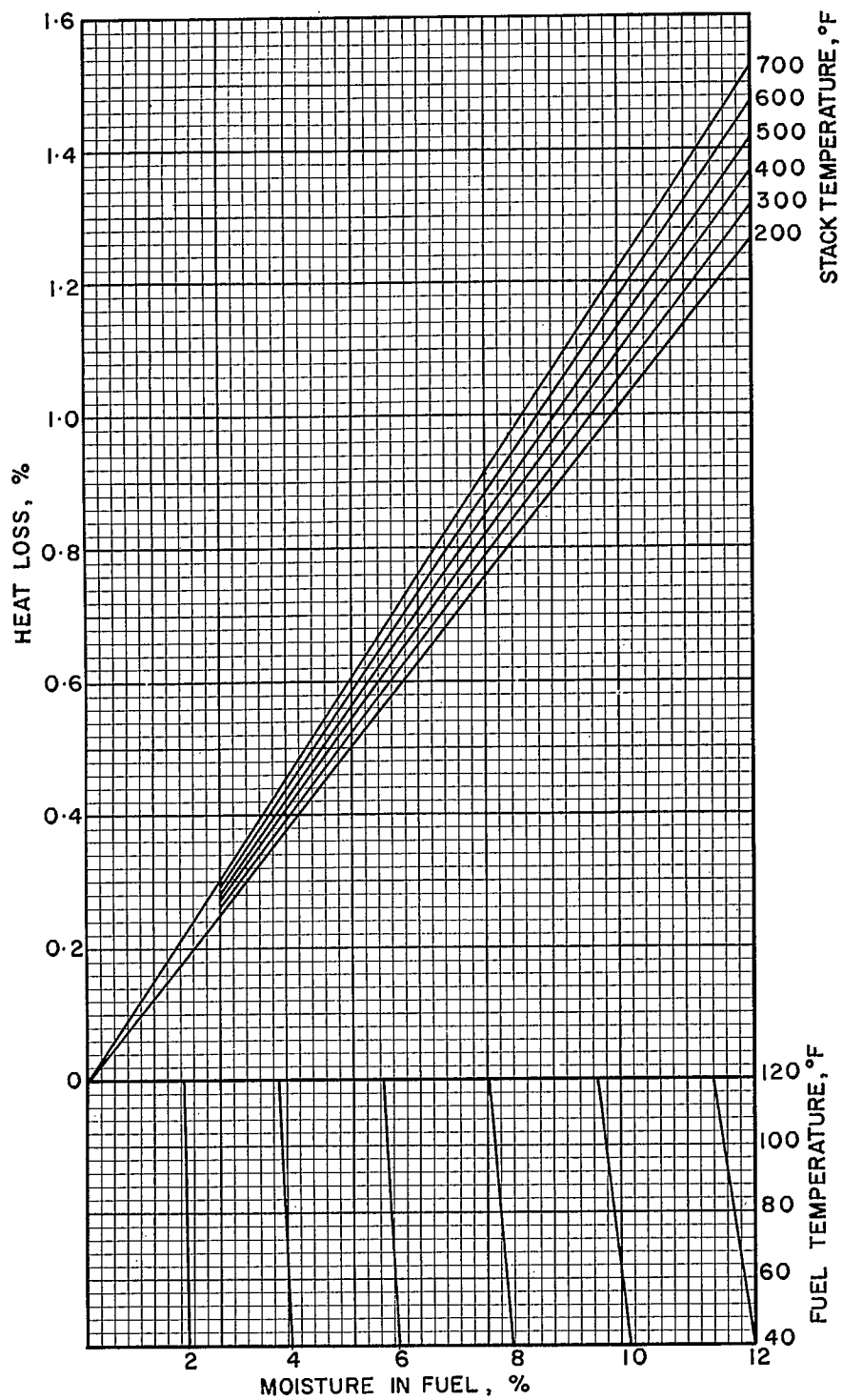


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·0·3

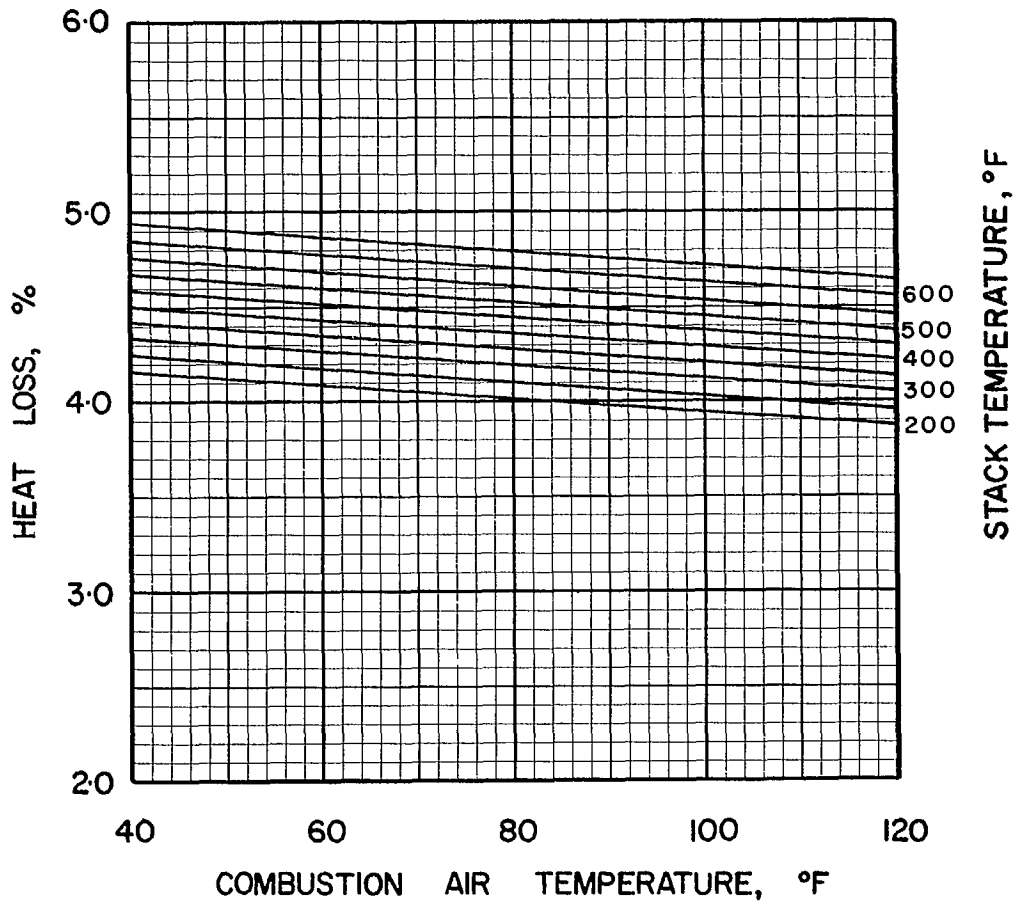


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·O·3

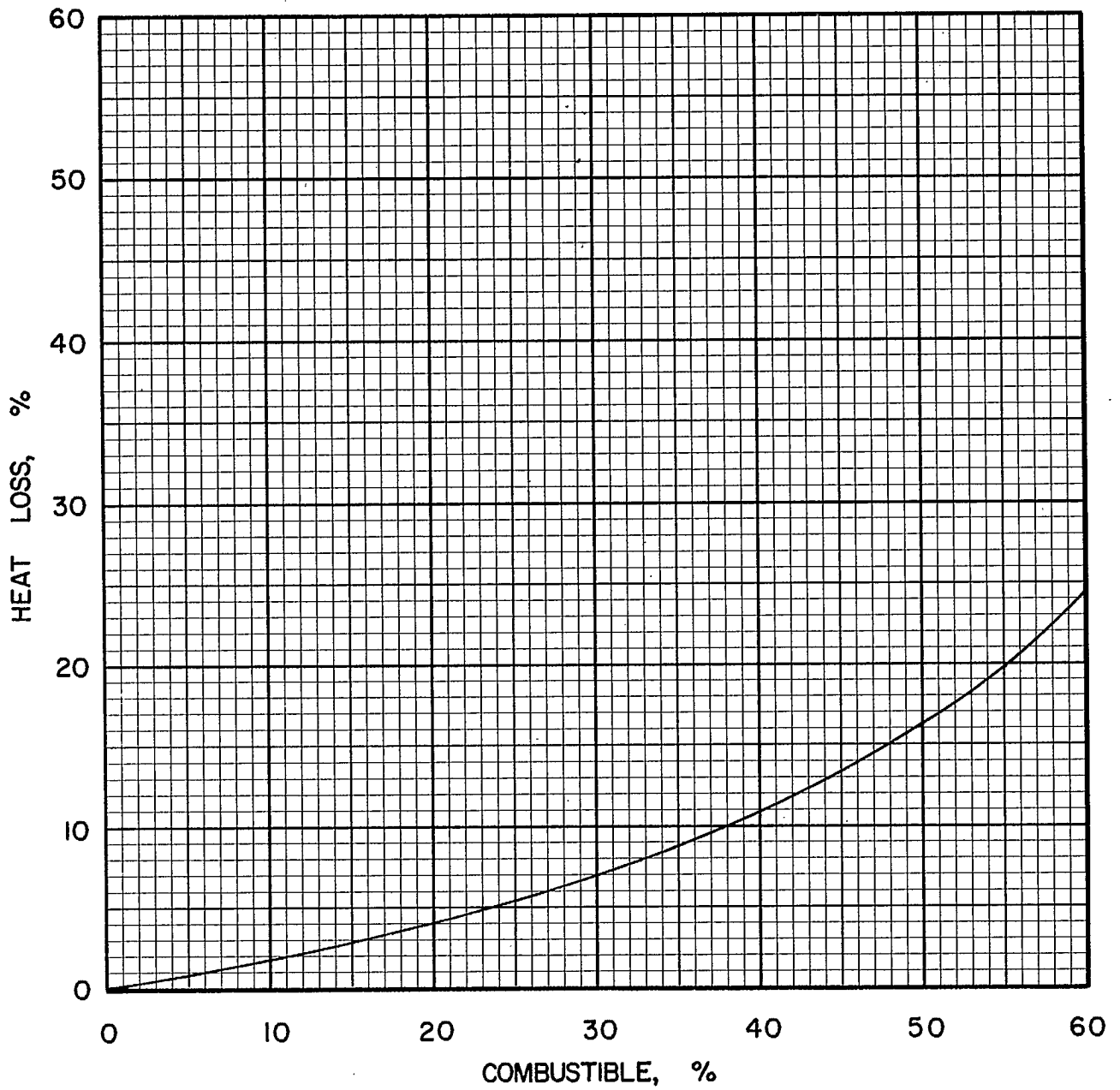


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·O·3

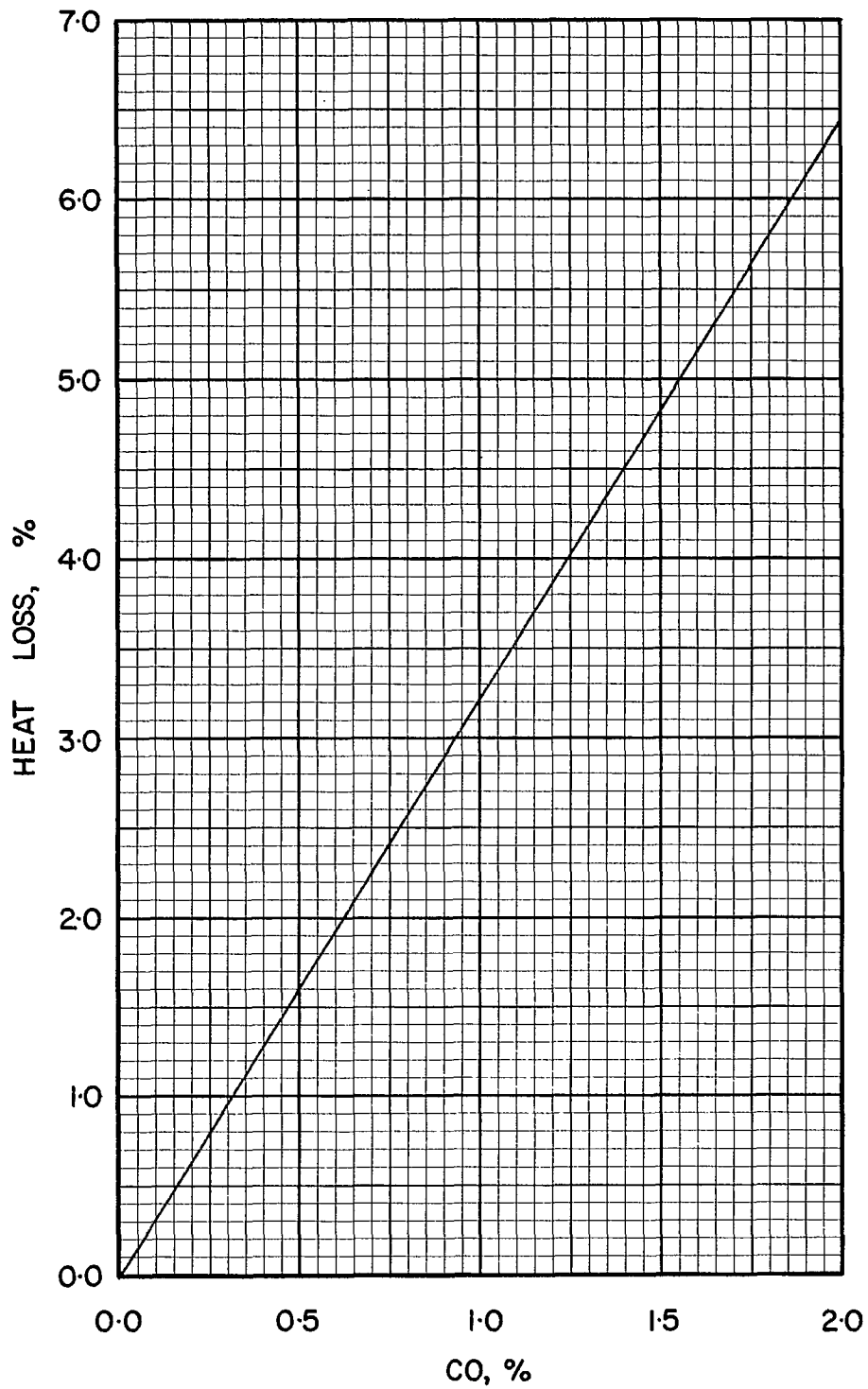


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US·O·3

**COAL US 0-4, ZANESVILLE, MUSKINGUM COUNTY**

Typical Moisture Range: 6–12%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.141
Volatile Matter	0.389
Fixed Carbon	<u>0.470</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.685
Hydrogen (H)	0.045
Sulphur (S)	0.041
Nitrogen (N)	0.014
Oxygen (O)	0.074
Ash	<u>0.141</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	11958
Btu/short ton:	$23.92 \times 10^6$
Btu/long ton:	$26.79 \times 10^6$
MJ/kg:	27.81

*Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
$10^6$ Btu = 83.63	lb
$10^6$ Btu = 0.04181	short tons
$10^6$ Btu = 0.03733	long tons



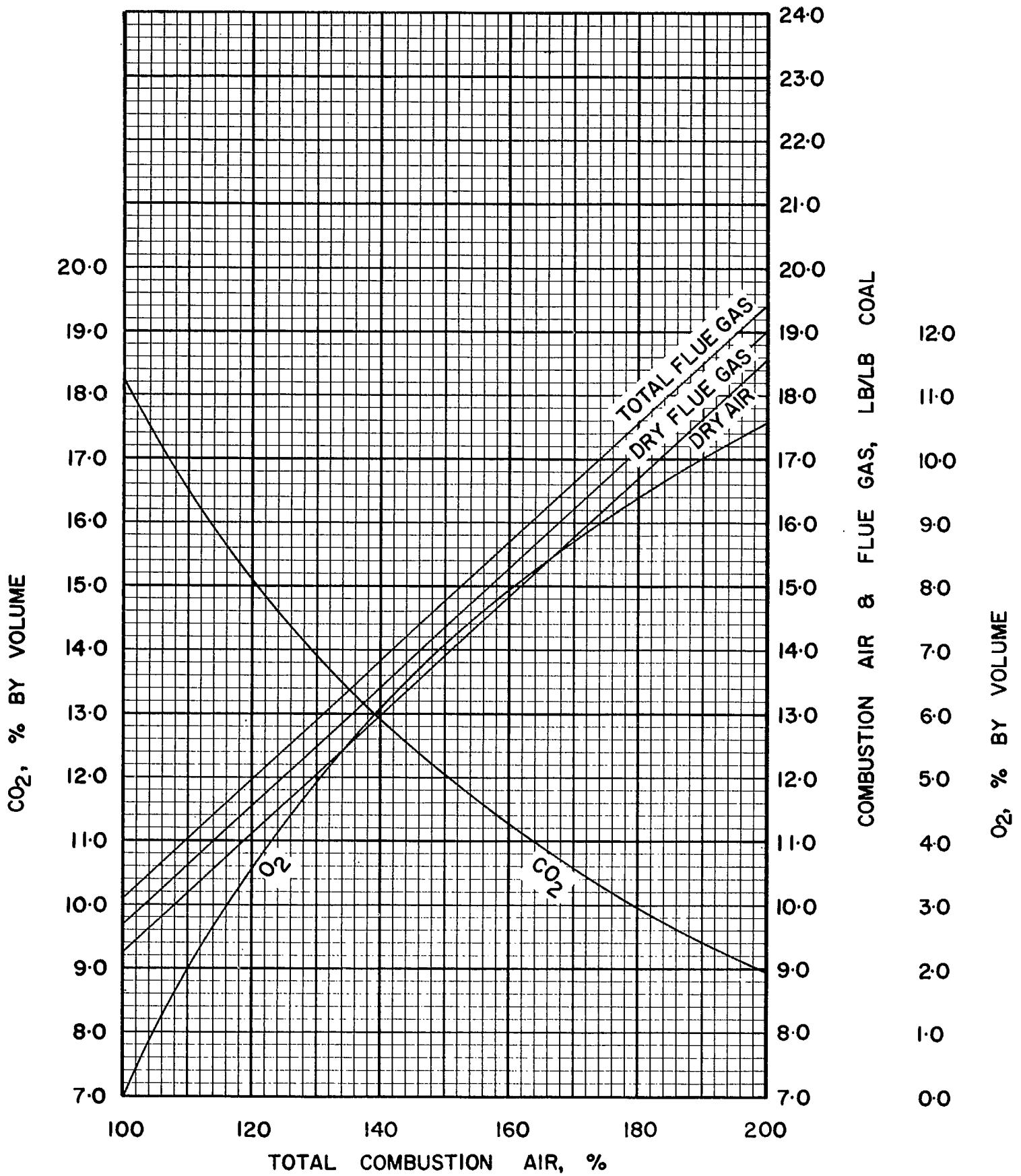


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-0-4

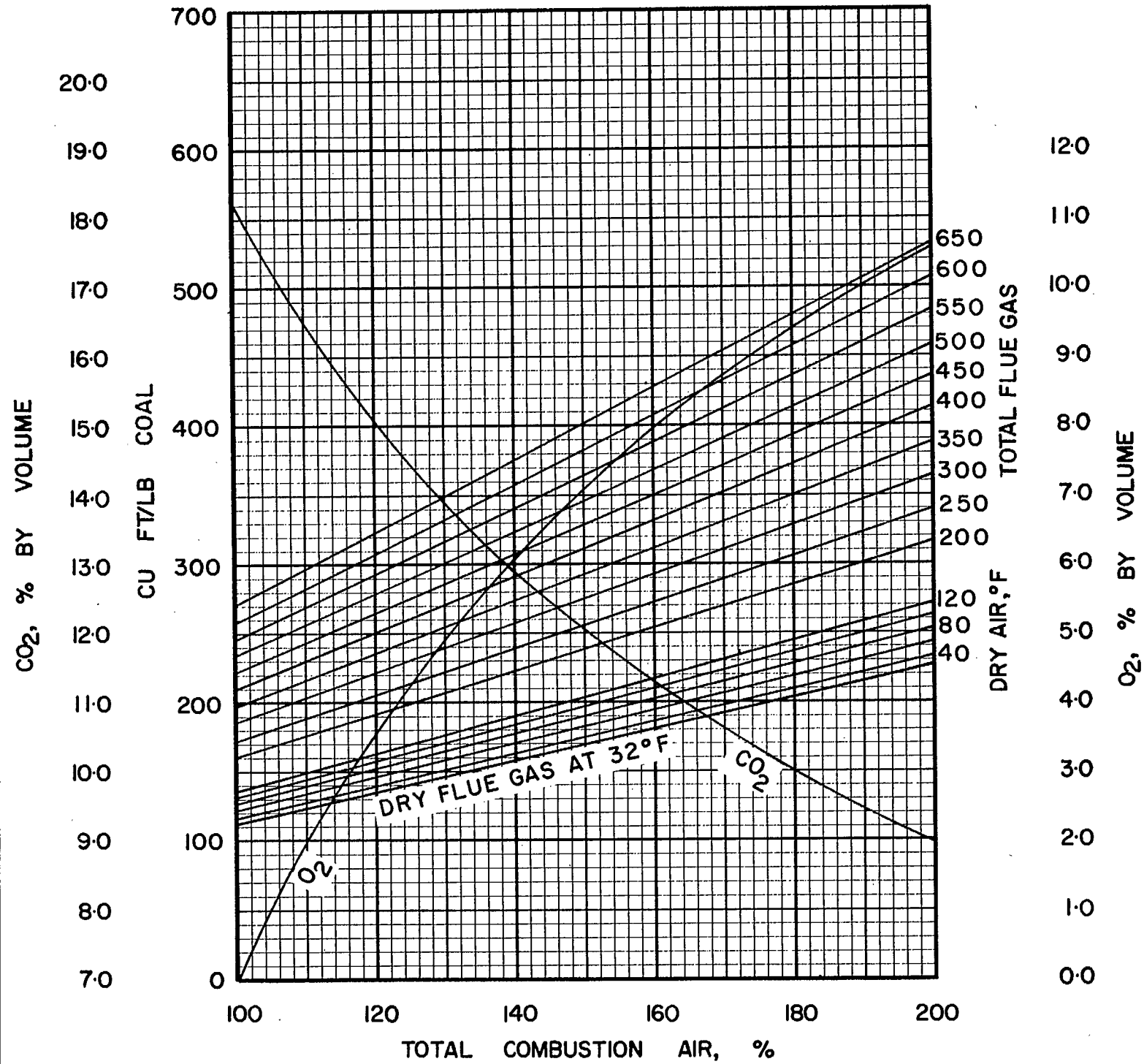


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·0·4

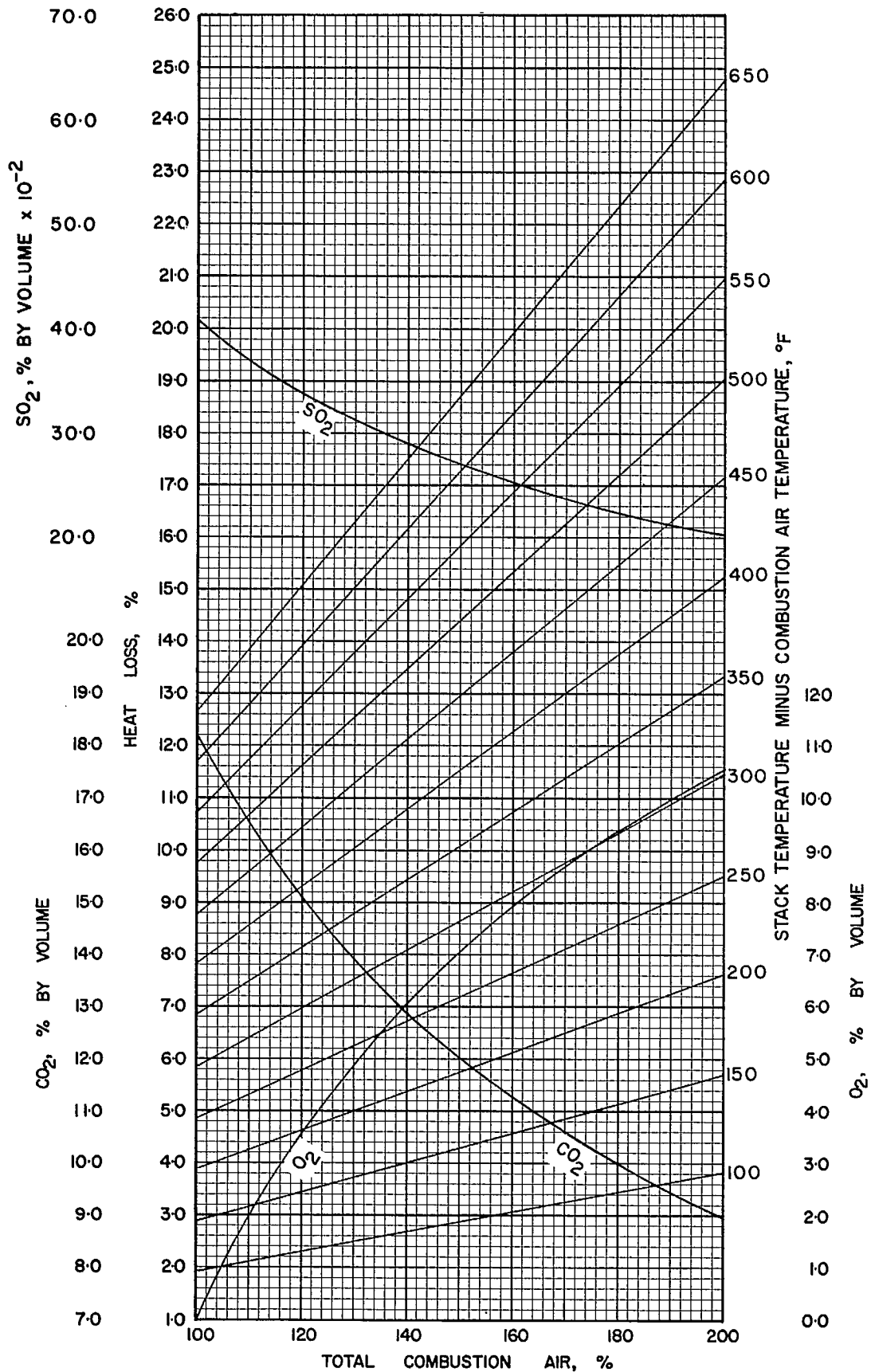


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US-0-4

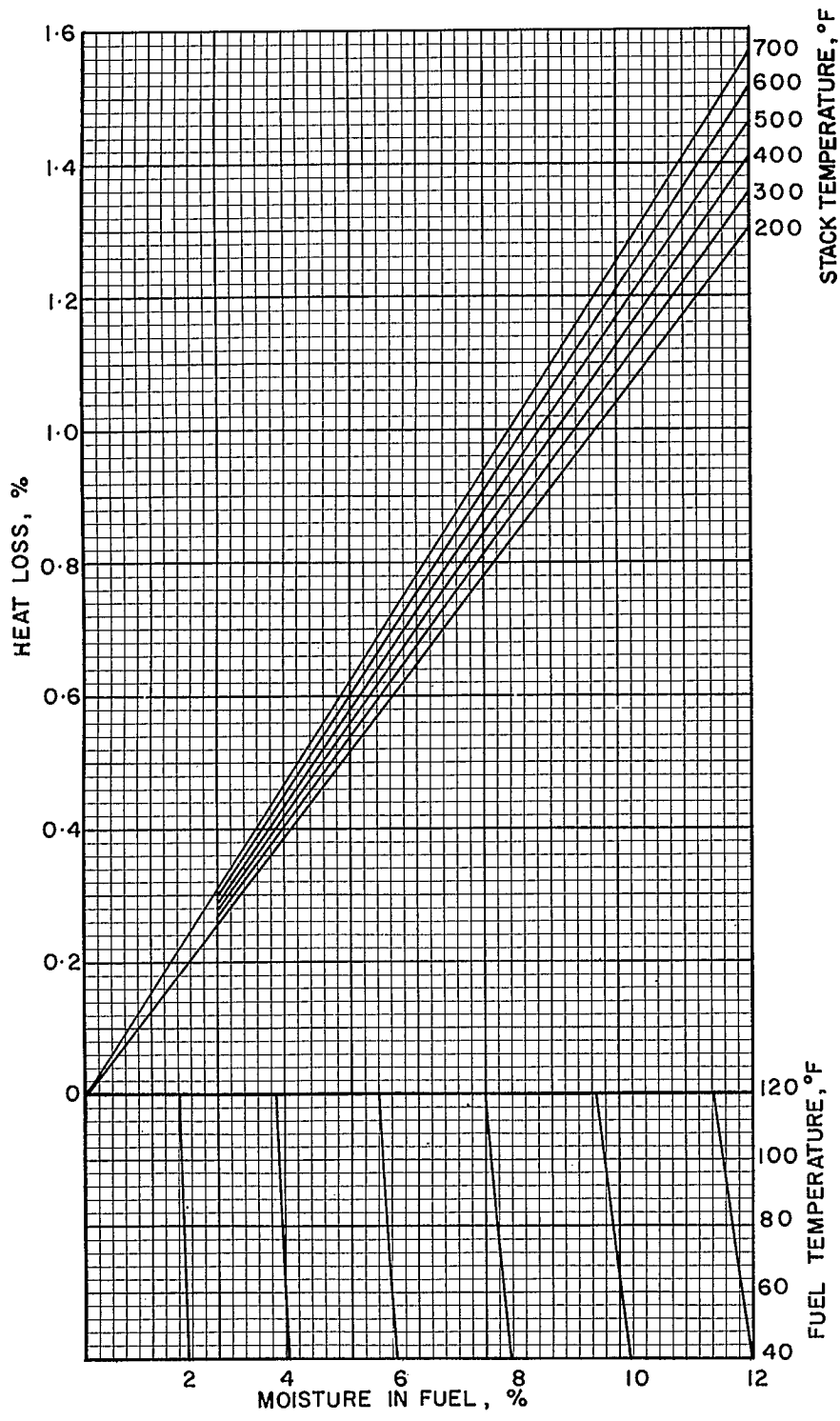


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·O·4

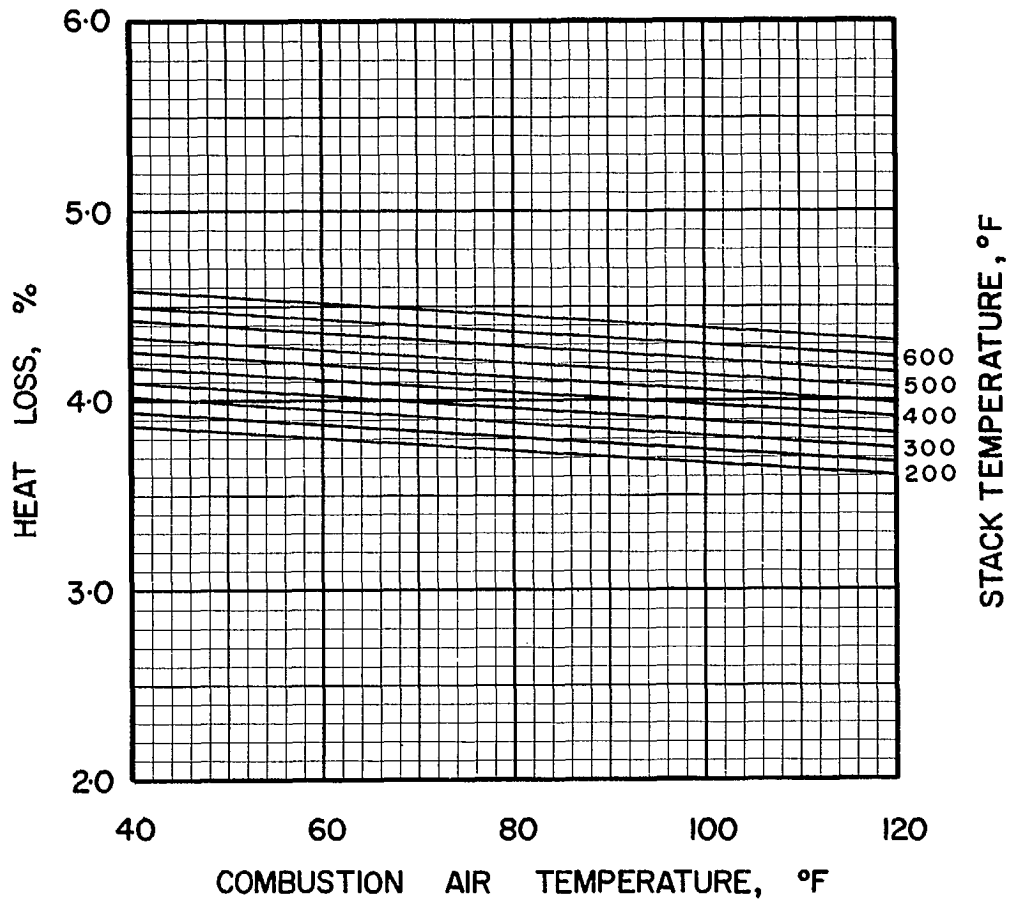


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·O·4

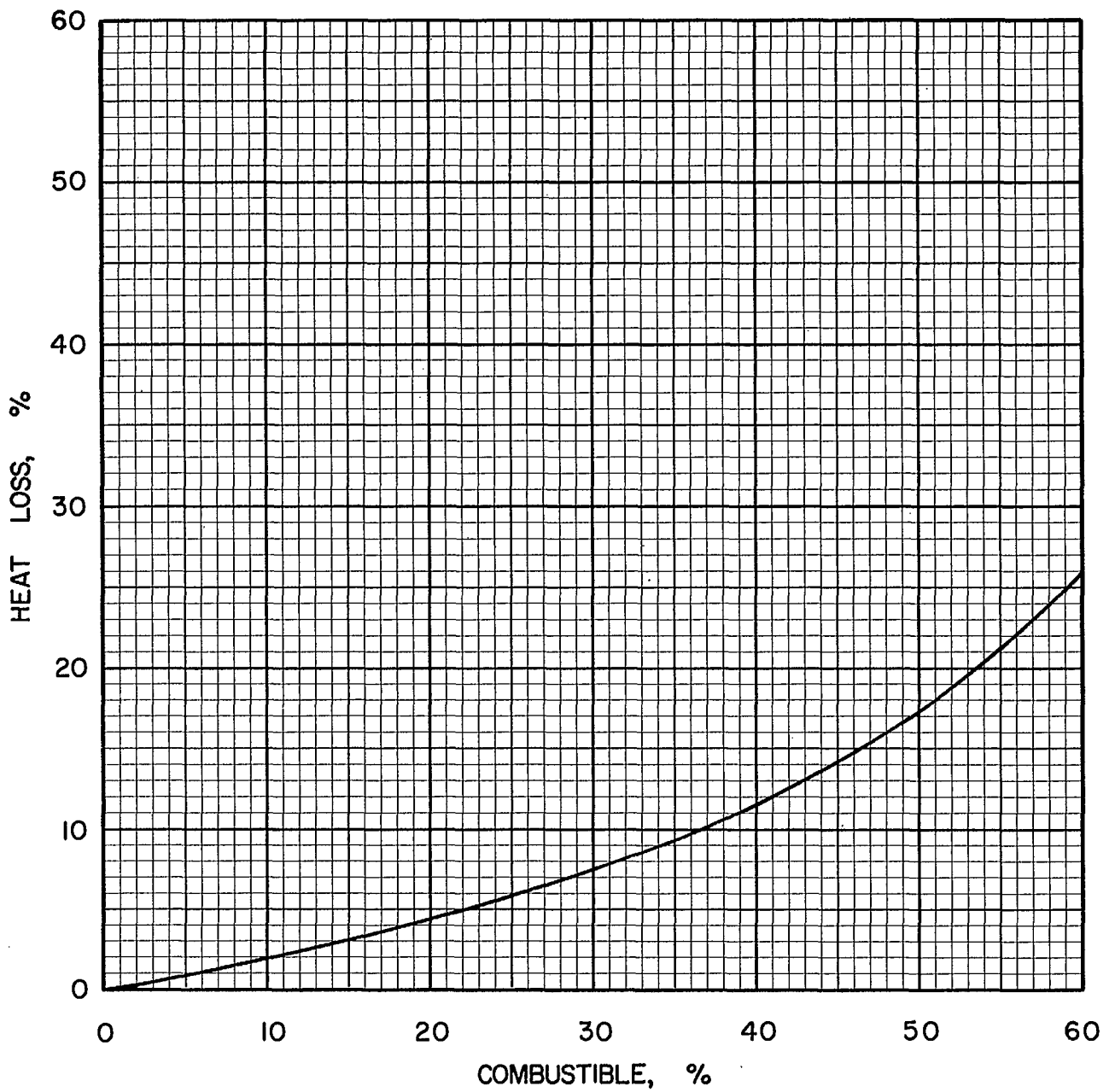


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·0·4

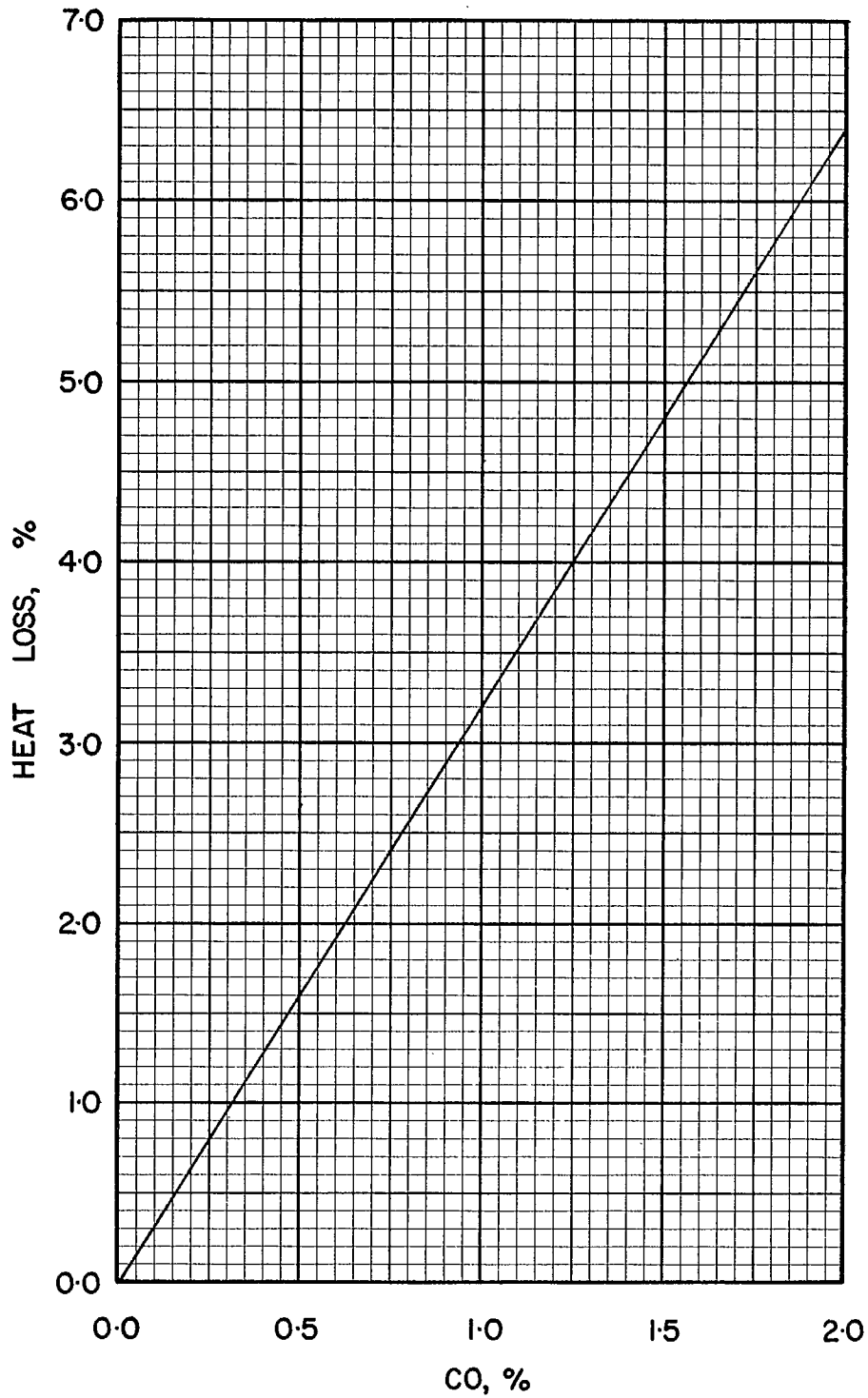


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US·0·4

## COAL US P-1, CADOGAN

Typical Moisture Range: 0–6%

### *Proximate Analysis (lb/lb dry coal)*

Ash	0.080
Volatile Matter	0.365
Fixed Carbon	<u>0.555</u>
Total	1.000

### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.769
Hydrogen (H)	0.055
Sulphur (S)	0.019
Nitrogen (N)	0.014
Oxygen (O)	0.063
Ash	<u>0.080</u>
Total	1.000

### *Gross Calorific Value*

Btu/lb:	13886
Btu/short ton:	$27.77 \times 10^6$
Btu/long ton:	$31.10 \times 10^6$
MJ/kg:	32.29

### *Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
$10^6$ Btu = 72.01	lb
$10^6$ Btu = 0.03601	short tons
$10^6$ Btu = 0.03215	long tons



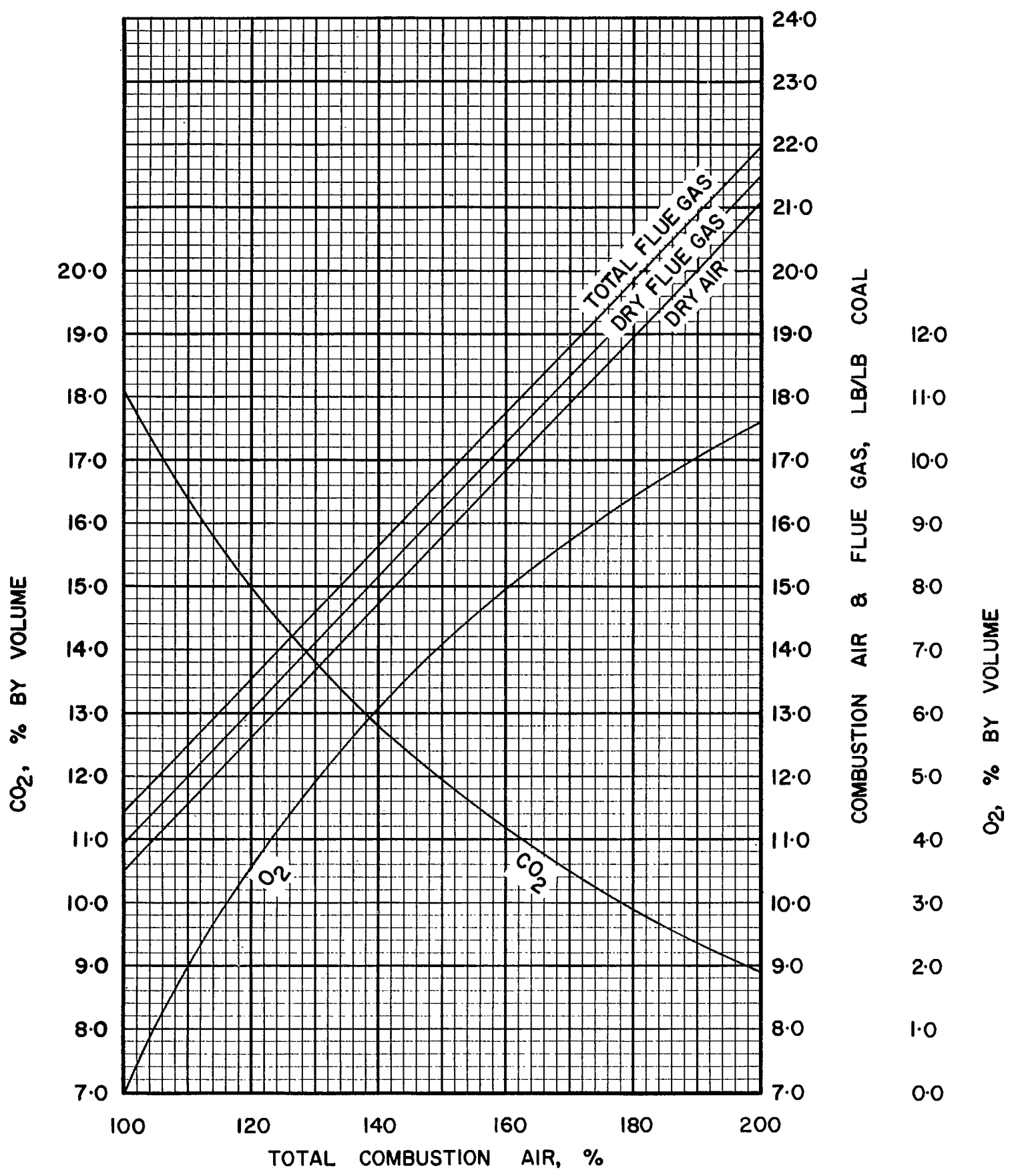


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·I

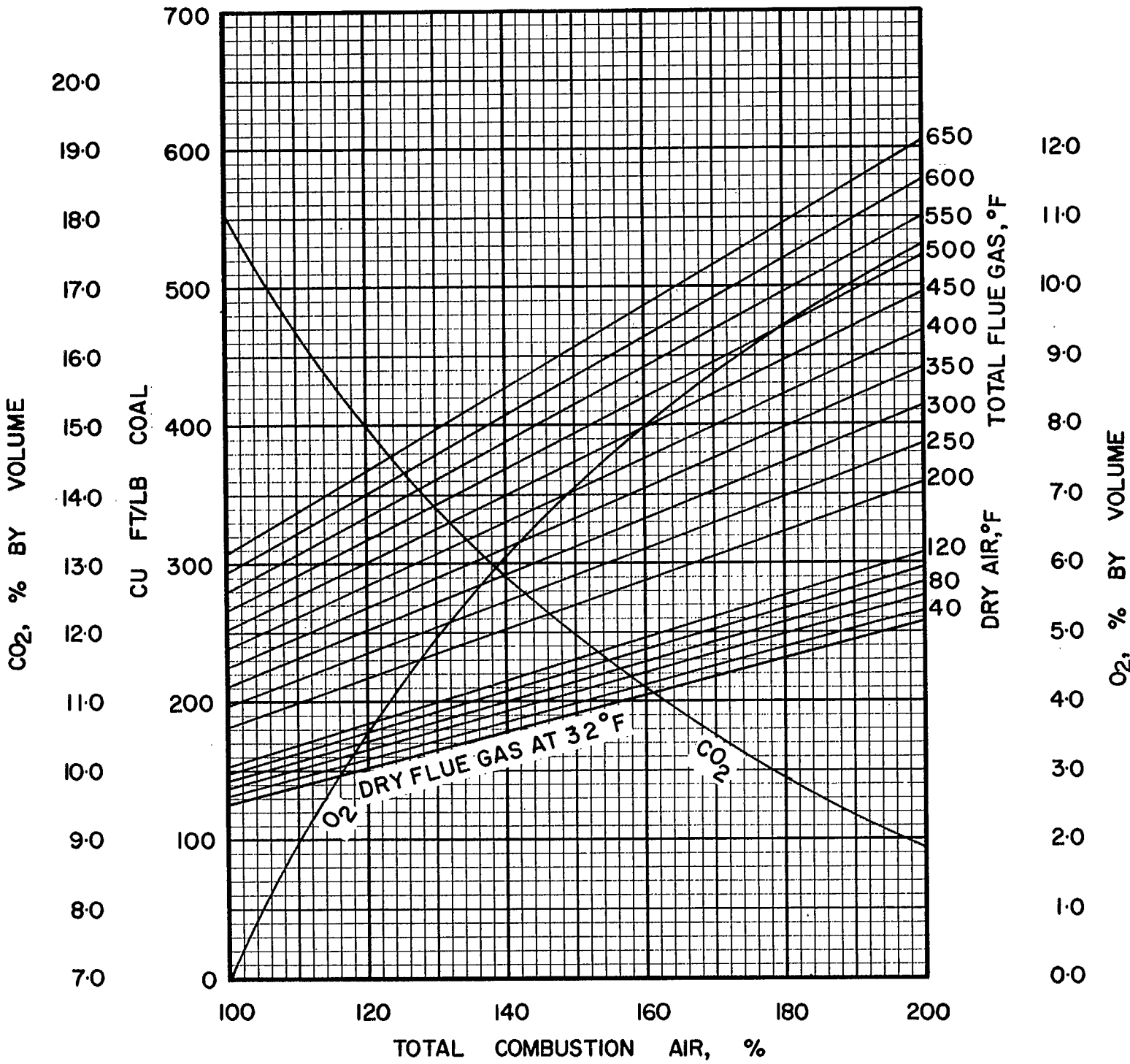


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US · P · 1

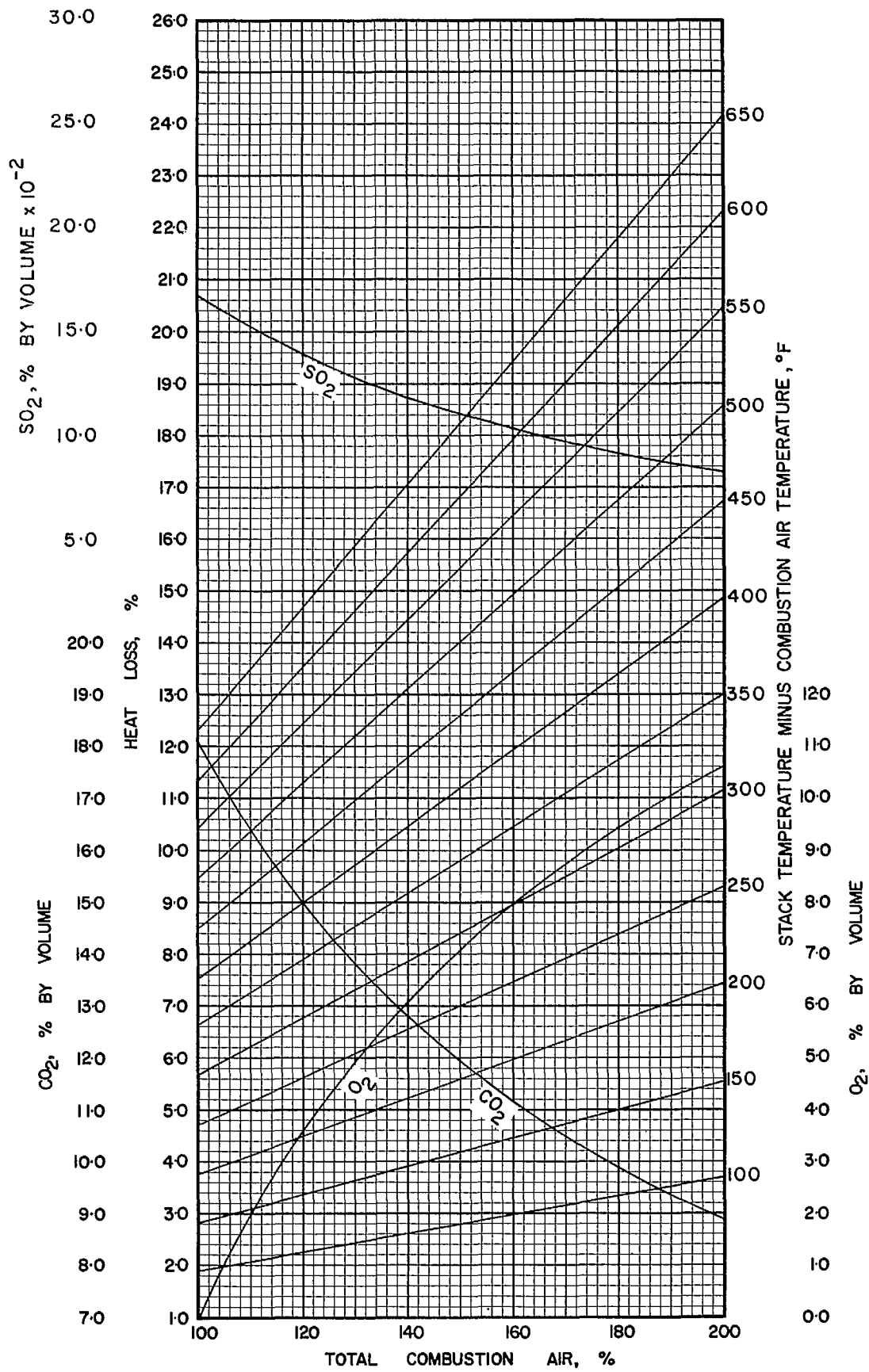


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·P·I

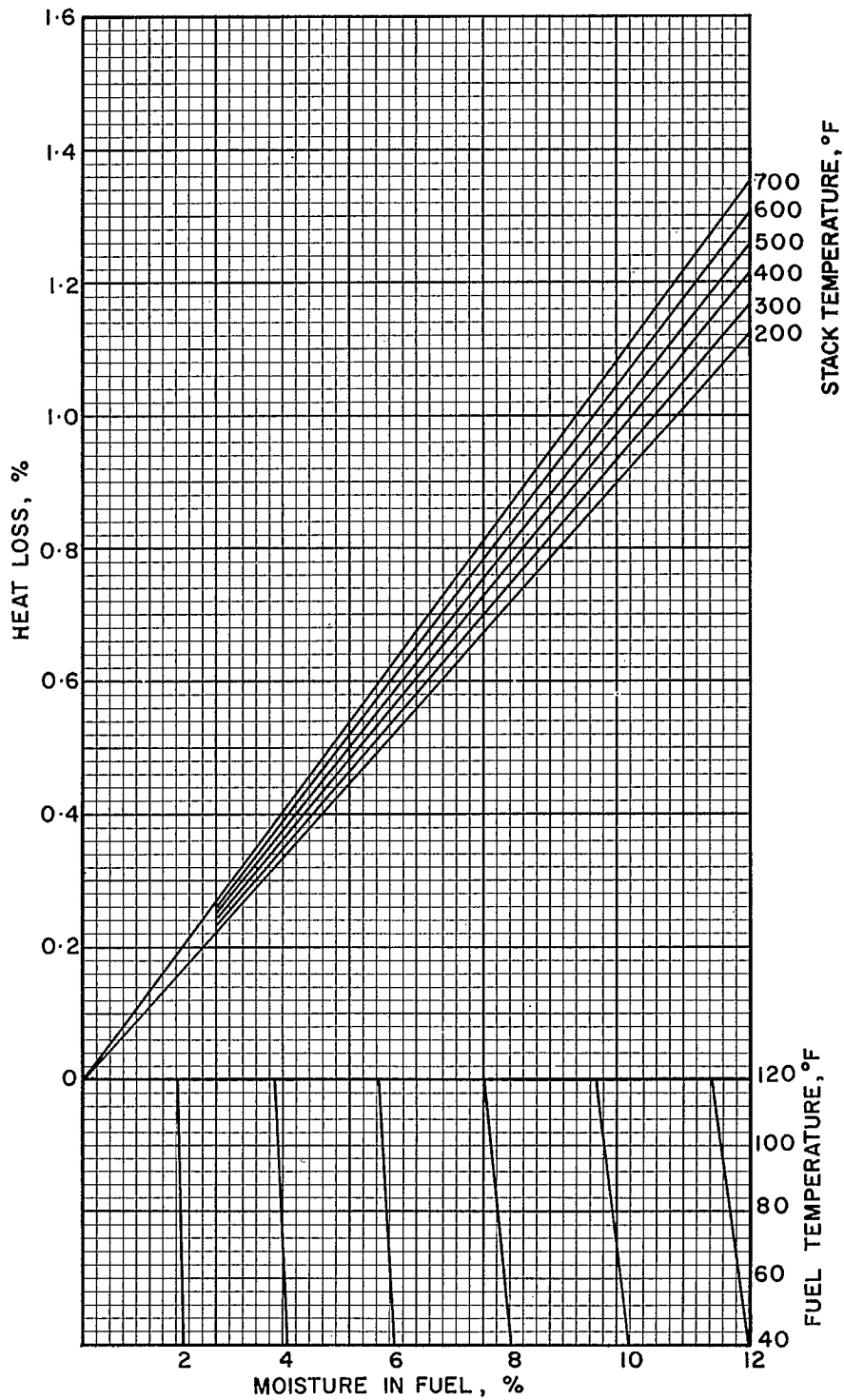


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·P·I

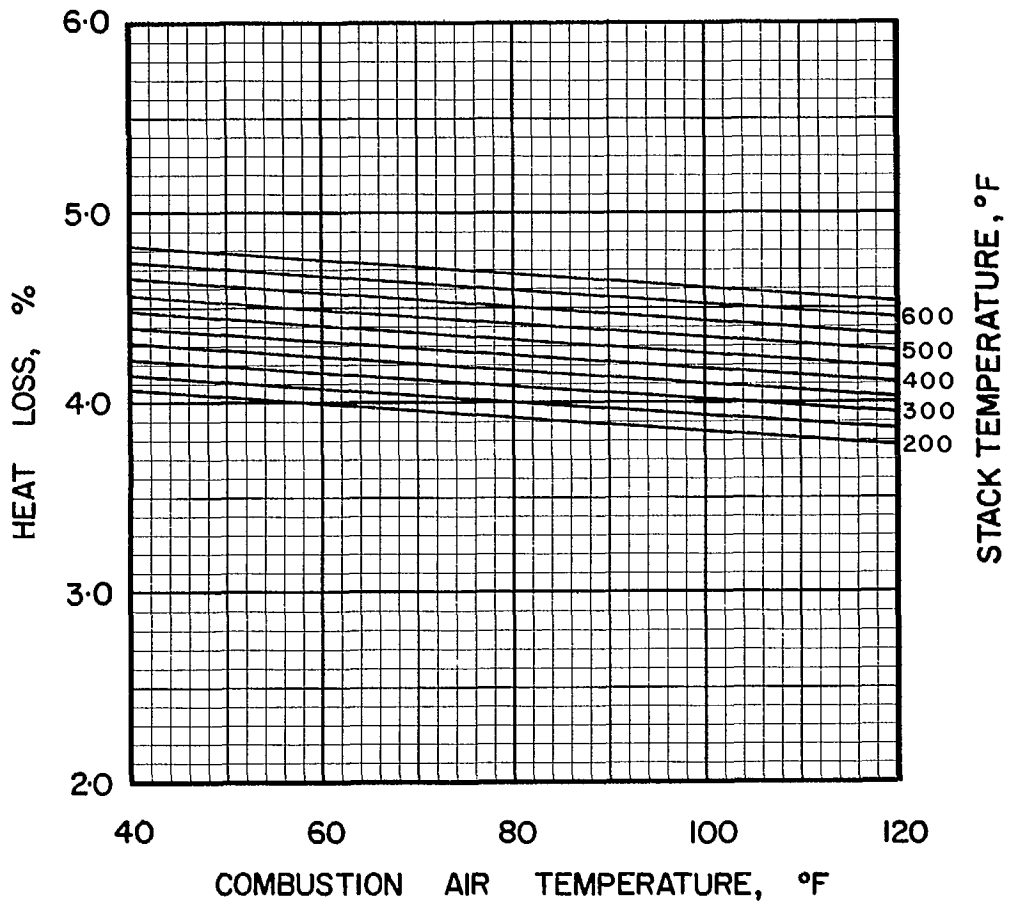


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·I

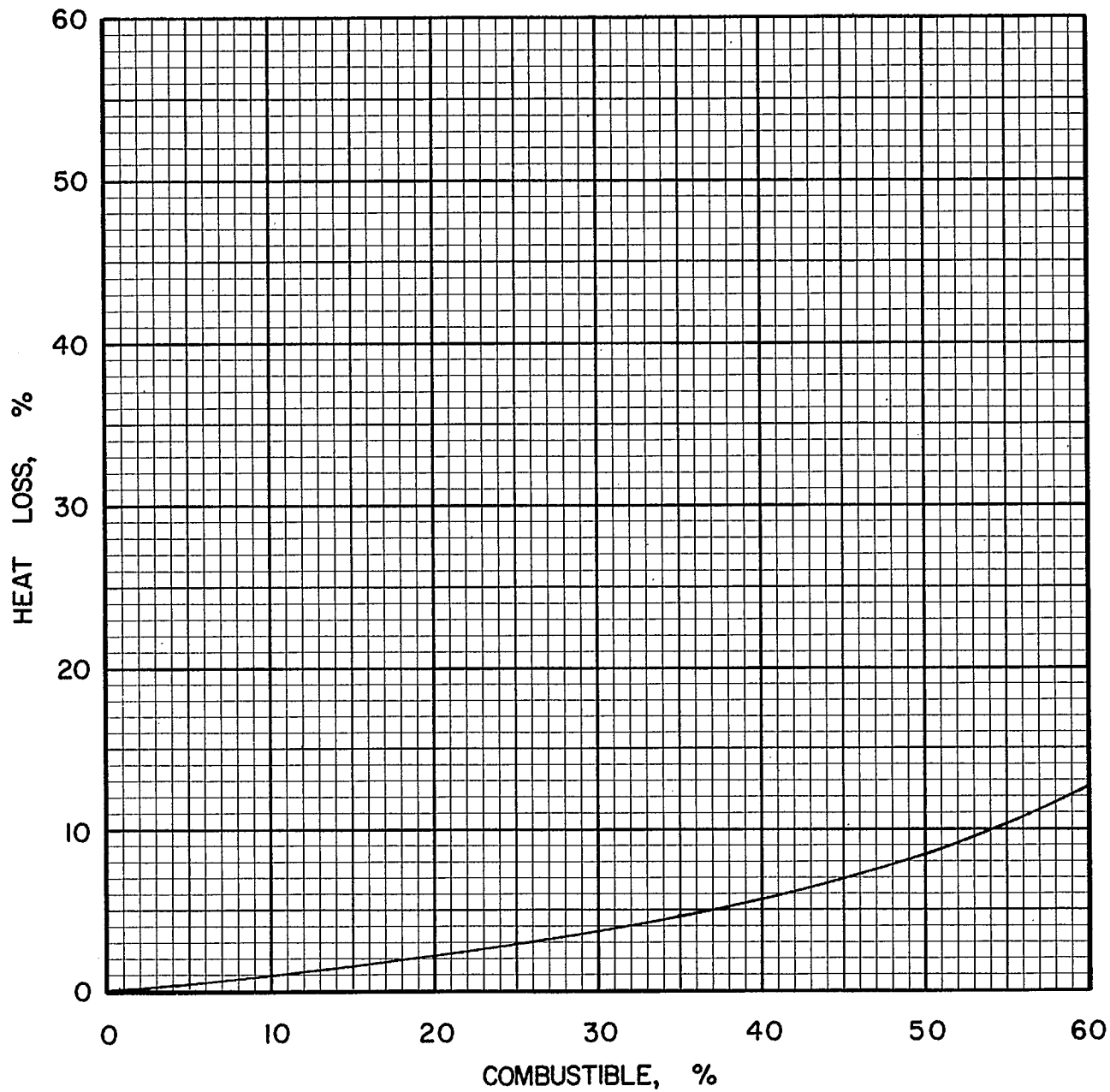


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·I

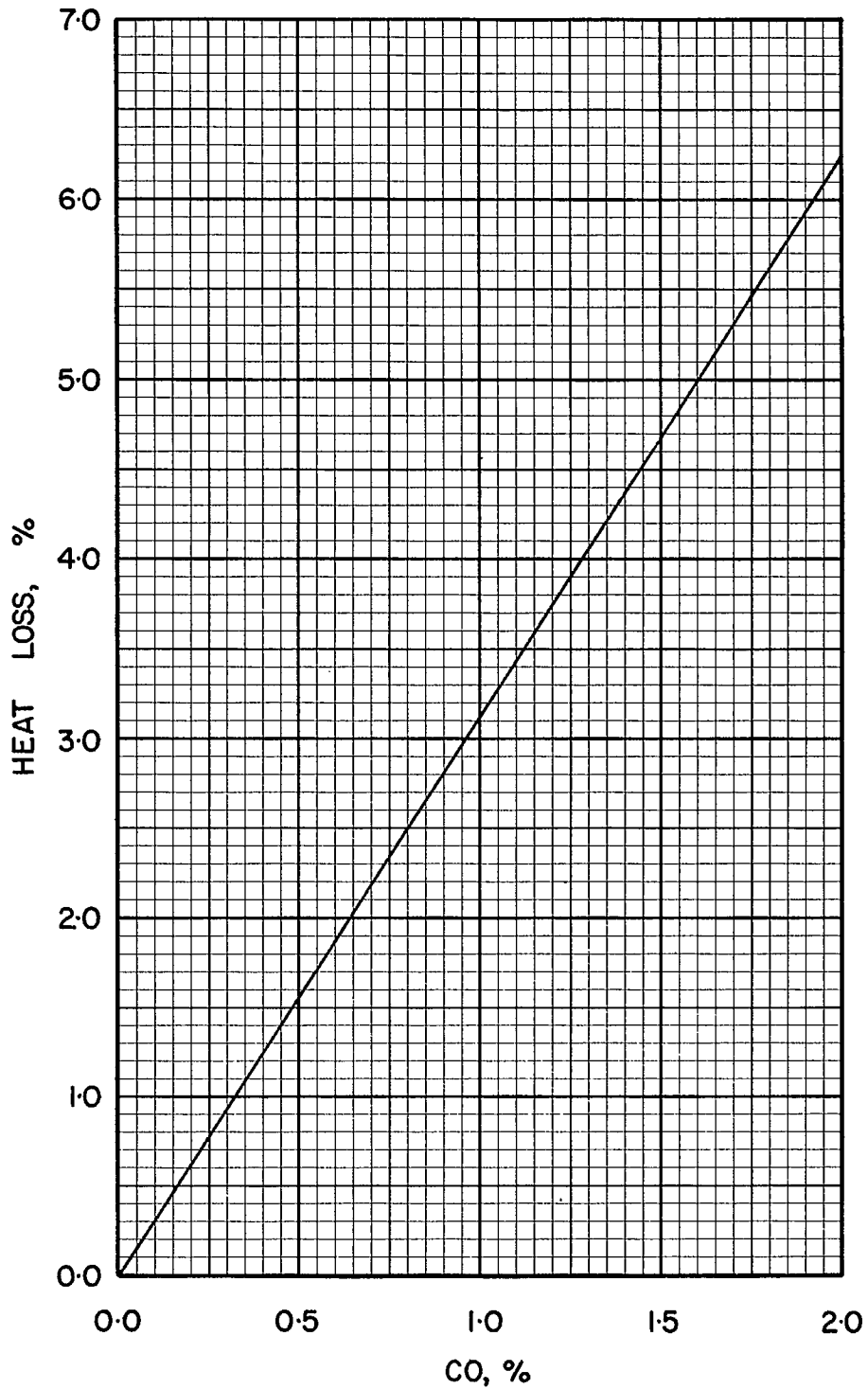


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US·P·I

**COAL US P-2, CALLAGHAN, JEFFERSON COUNTY,  
UPPER FREEPORT SEAM**

Typical Moisture Range: 4–10%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.119
Volatile Matter	0.340
Fixed Carbon	0.541
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.740
Hydrogen (H)	0.049
Sulphur (S)	0.016
Nitrogen (N)	0.016
Oxygen (O)	0.060
Ash	0.119
Total	1.000

*Gross Calorific Value*

Btu/lb:	12920
Btu/short ton:	$25.84 \times 10^6$
Btu/long ton:	$28.94 \times 10^6$
MJ/kg:	30.04

*Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 77.40 lb	
$10^6$ Btu	= 0.03870 short tons	
$10^6$ Btu	= 0.03455 long tons	



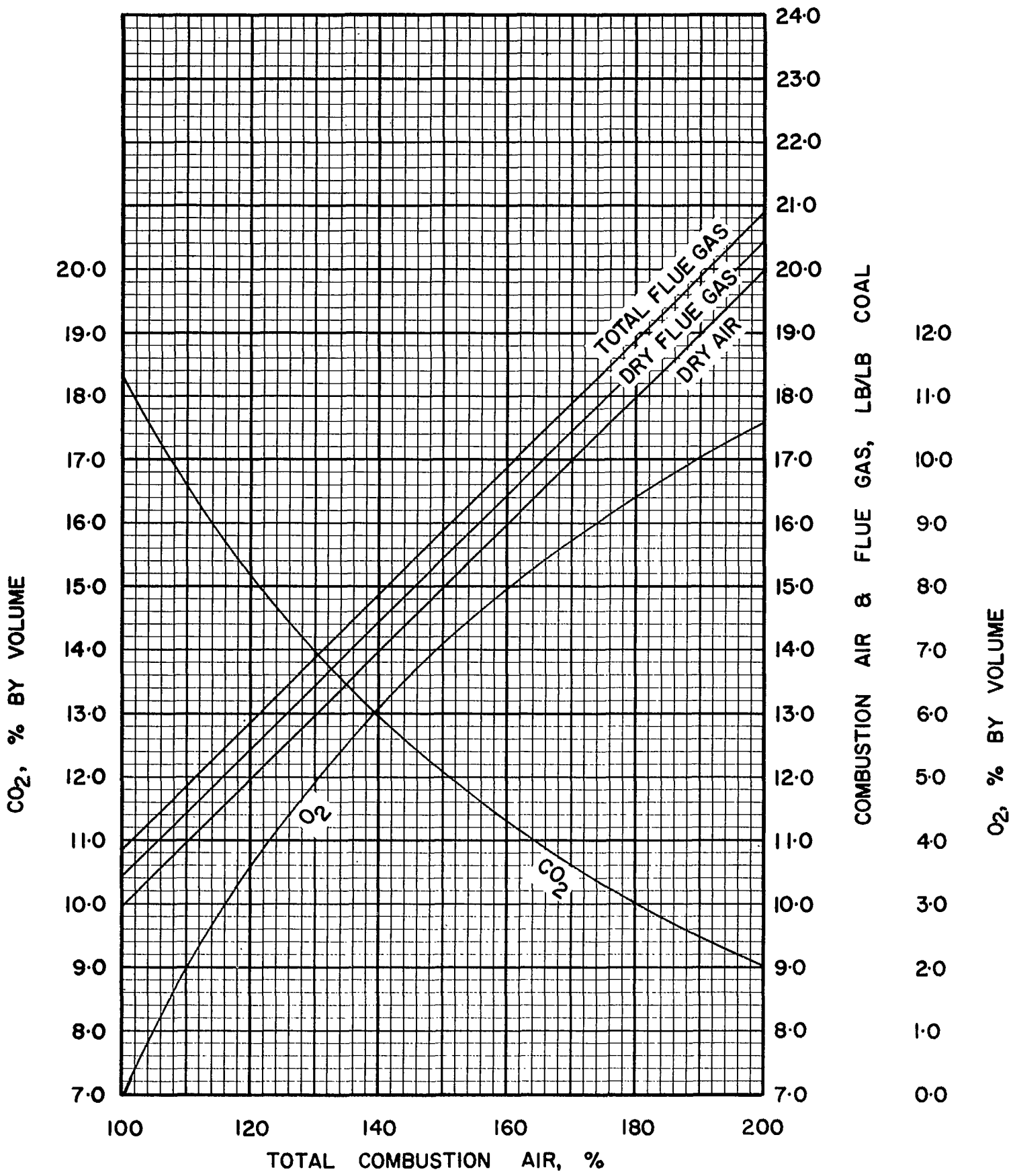


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·2

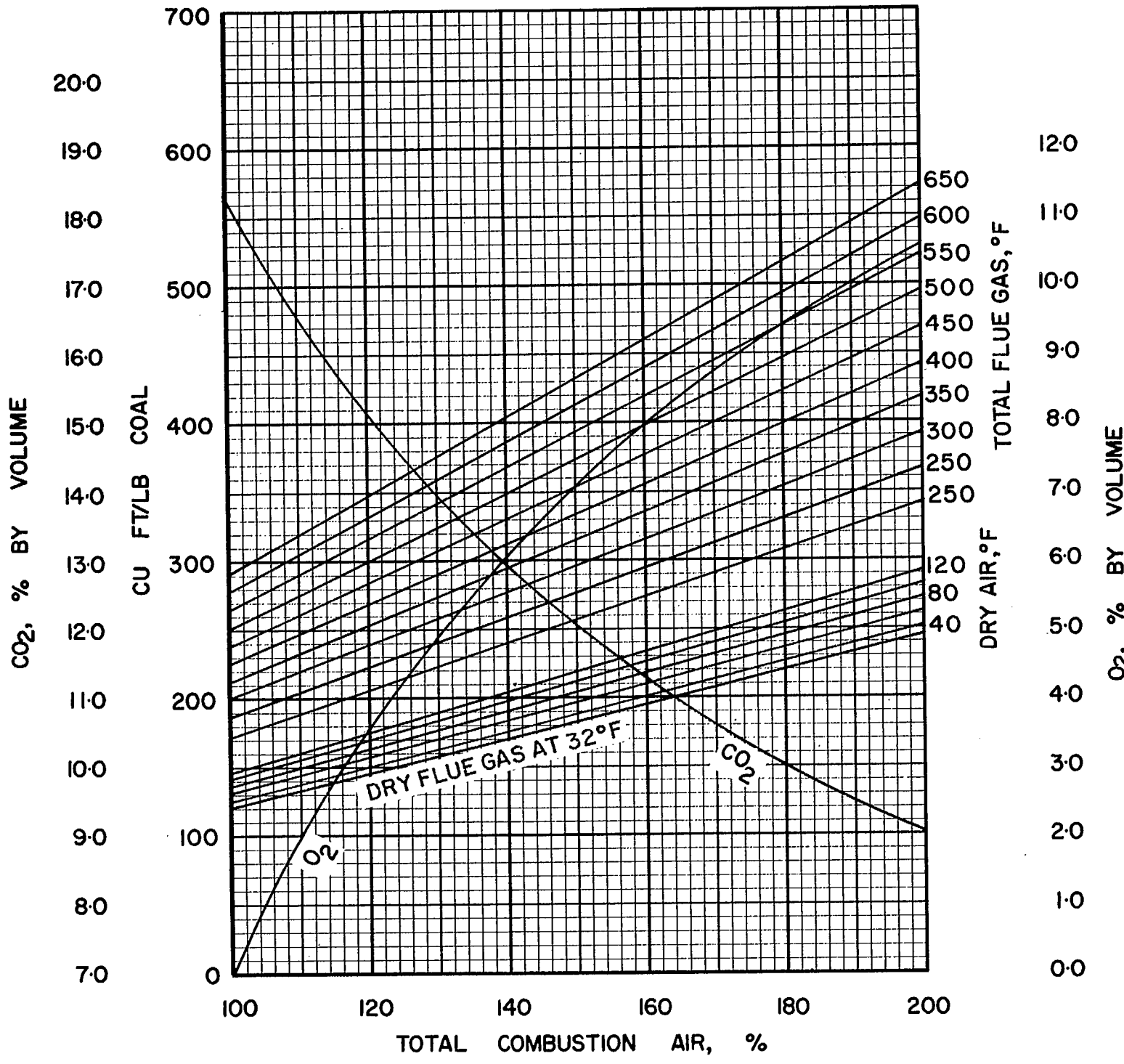


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·P·2

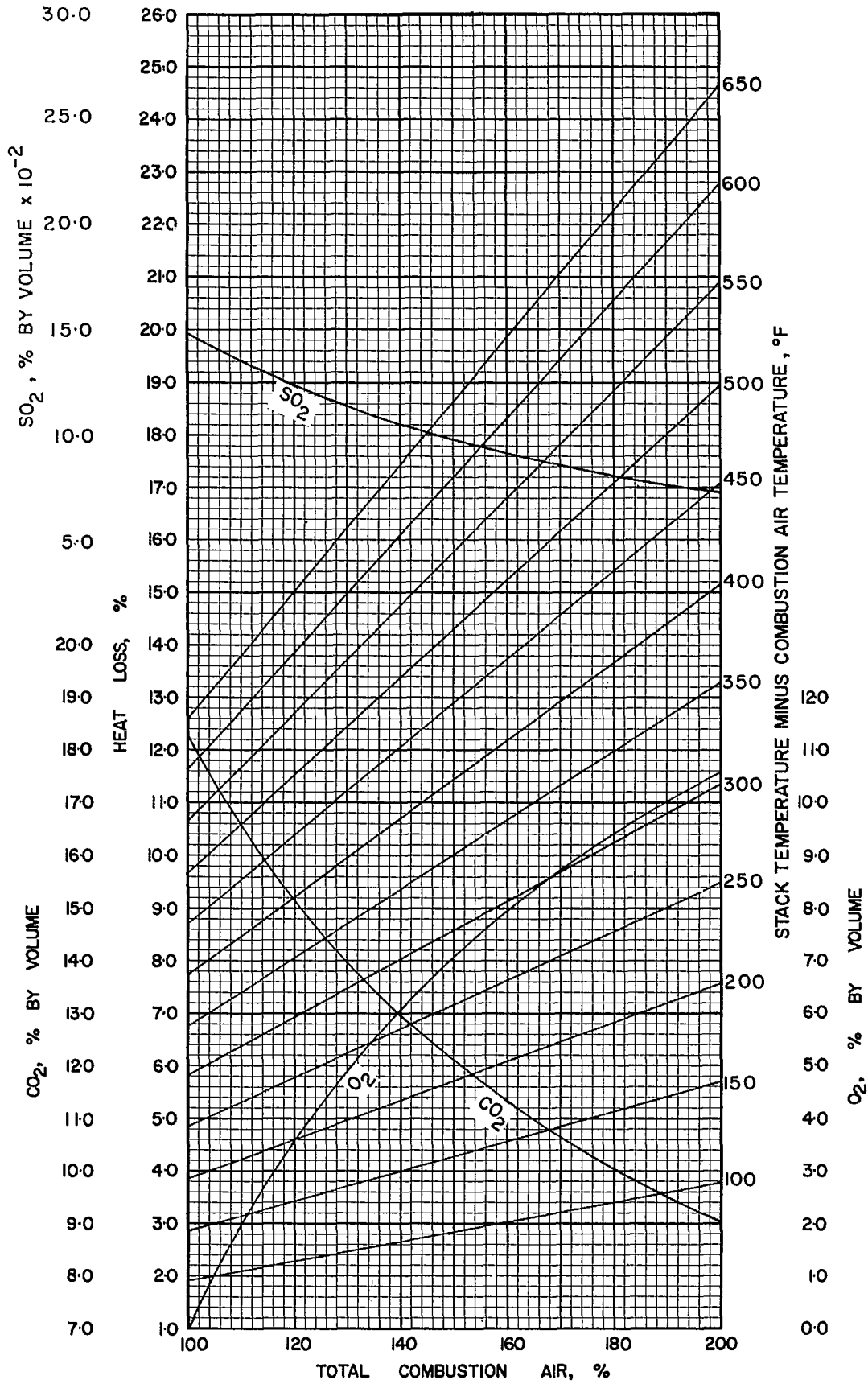


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·P·2

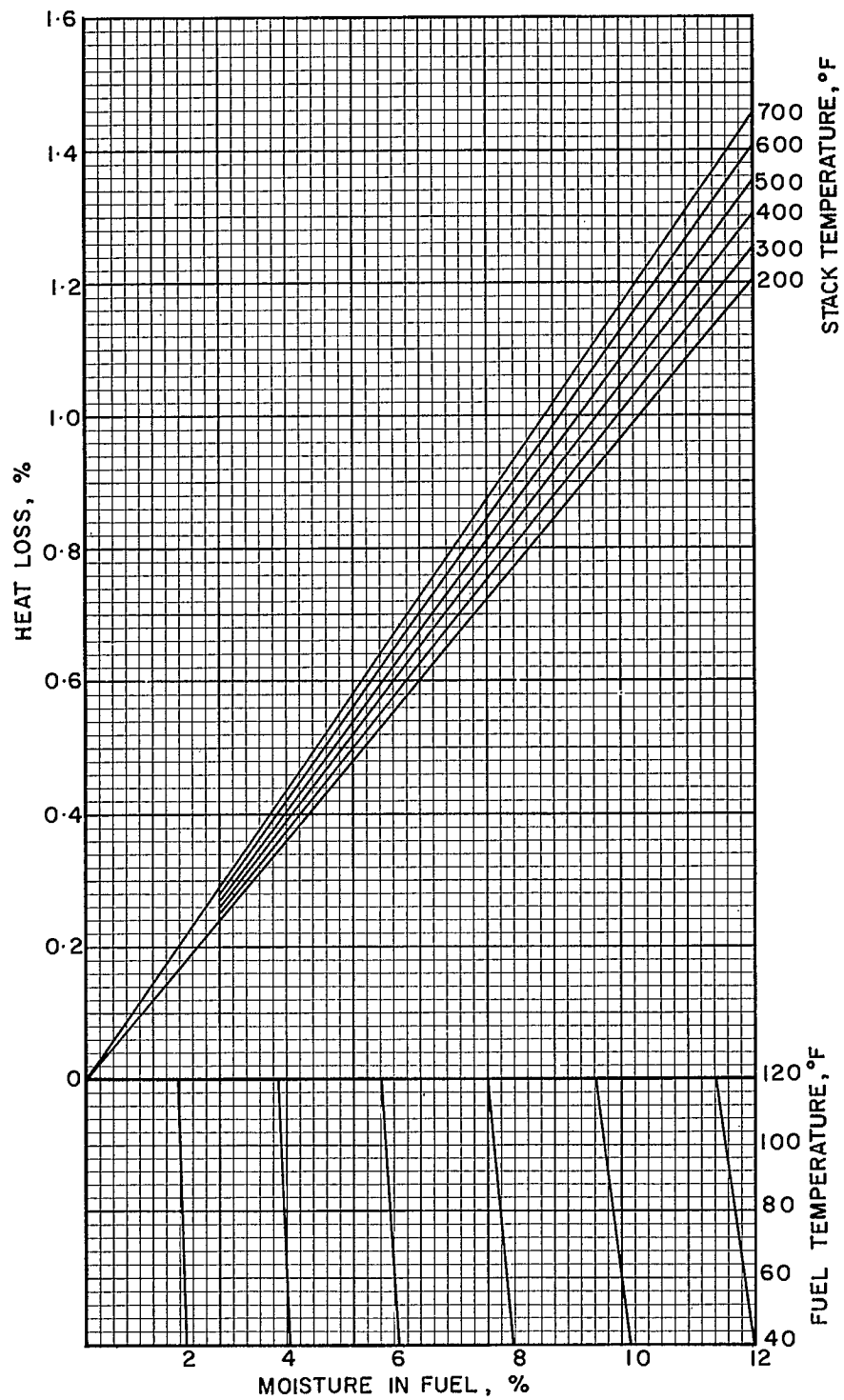


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·P·2

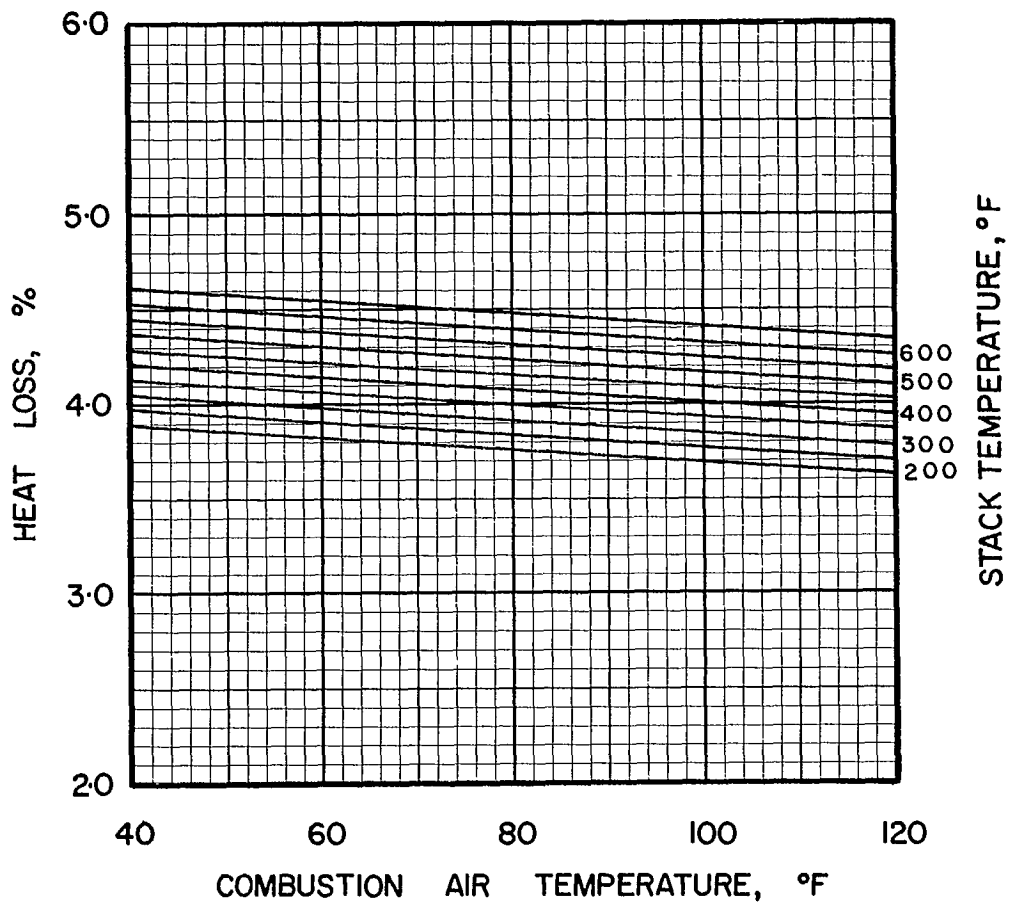


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

U.S.P. 2

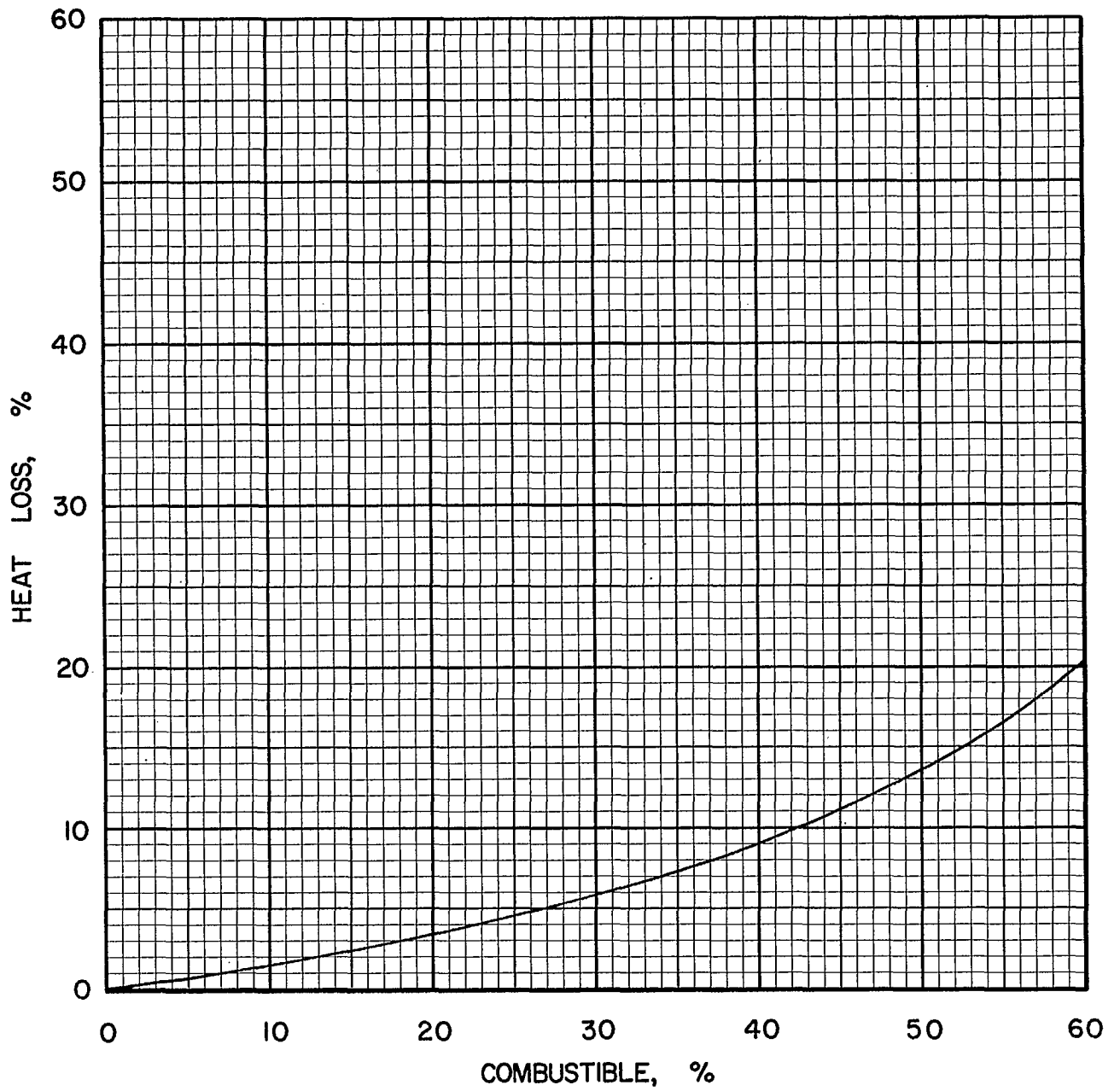


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·2

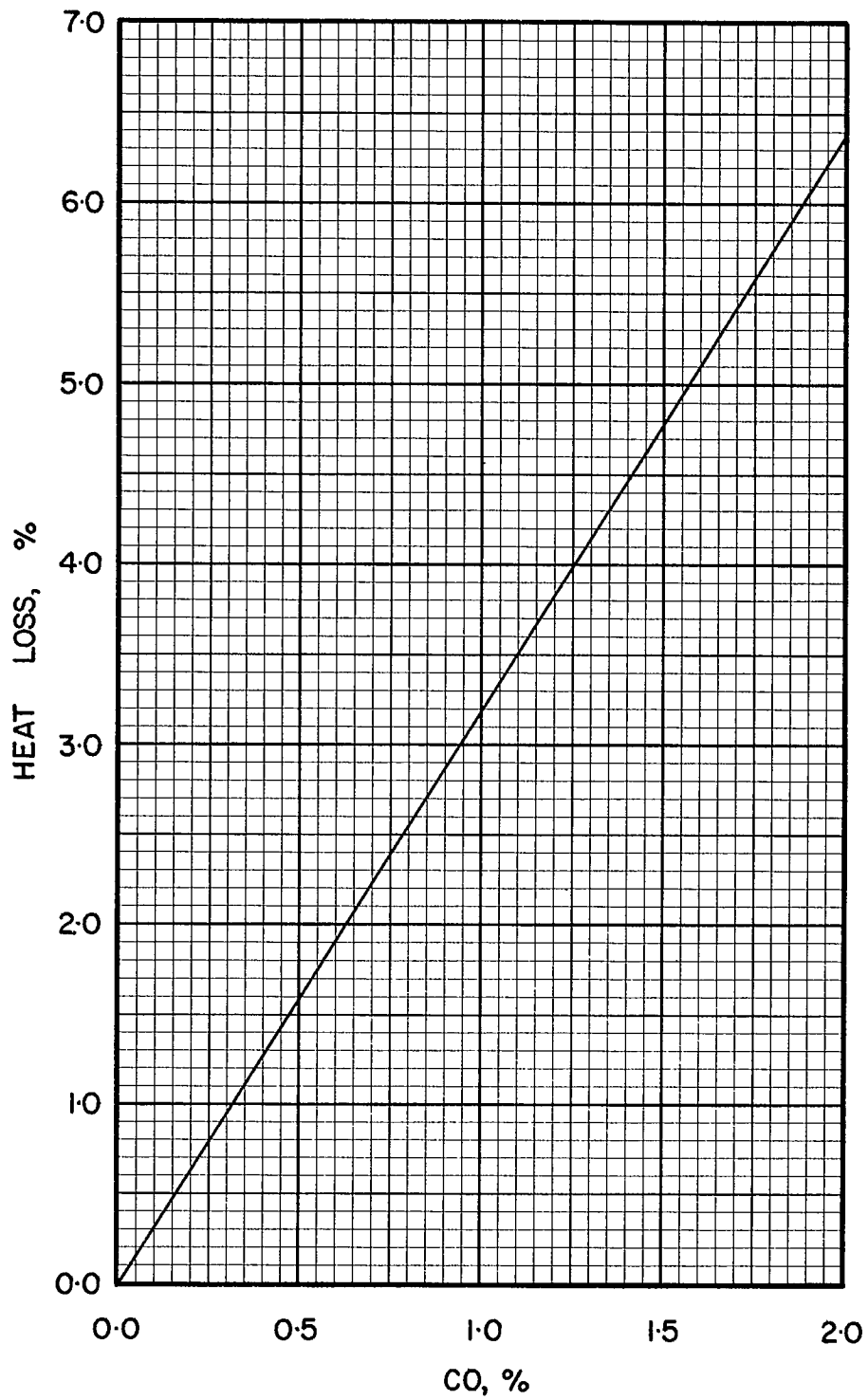


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US · P · 2

## COAL US P-3, CHAMPION

Typical Moisture Range: 0–8%

### *Proximate Analysis (lb/lb dry coal)*

Ash	0.099
Volatile Matter	0.366
Fixed Carbon	0.535
Total	<u>1.000</u>

### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.748
Hydrogen (H)	0.051
Sulphur (S)	0.018
Nitrogen (N)	0.021
Oxygen (O)	0.063
Ash	0.099
Total	<u>1.000</u>

### *Gross Calorific Value*

Btu/lb:	13498
Btu/short ton:	27.00 x 10 <sup>6</sup>
Btu/long ton:	30.24 x 10 <sup>6</sup>
MJ/kg:	31.39

### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
10 <sup>6</sup> Btu	= 74.09 lb	
10 <sup>6</sup> Btu	= 0.03704 short tons	
10 <sup>6</sup> Btu	= 0.03307 long tons	



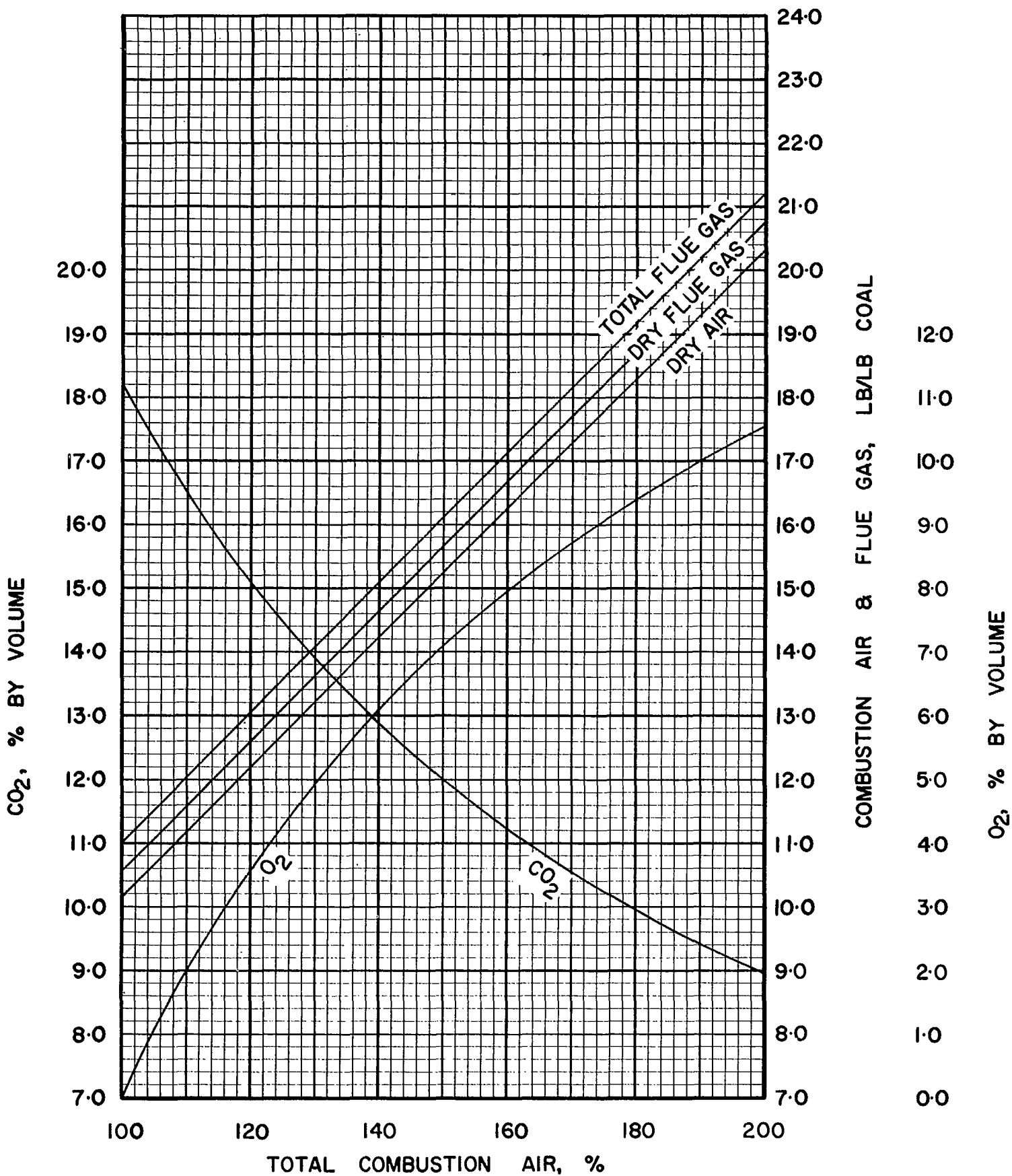


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·3

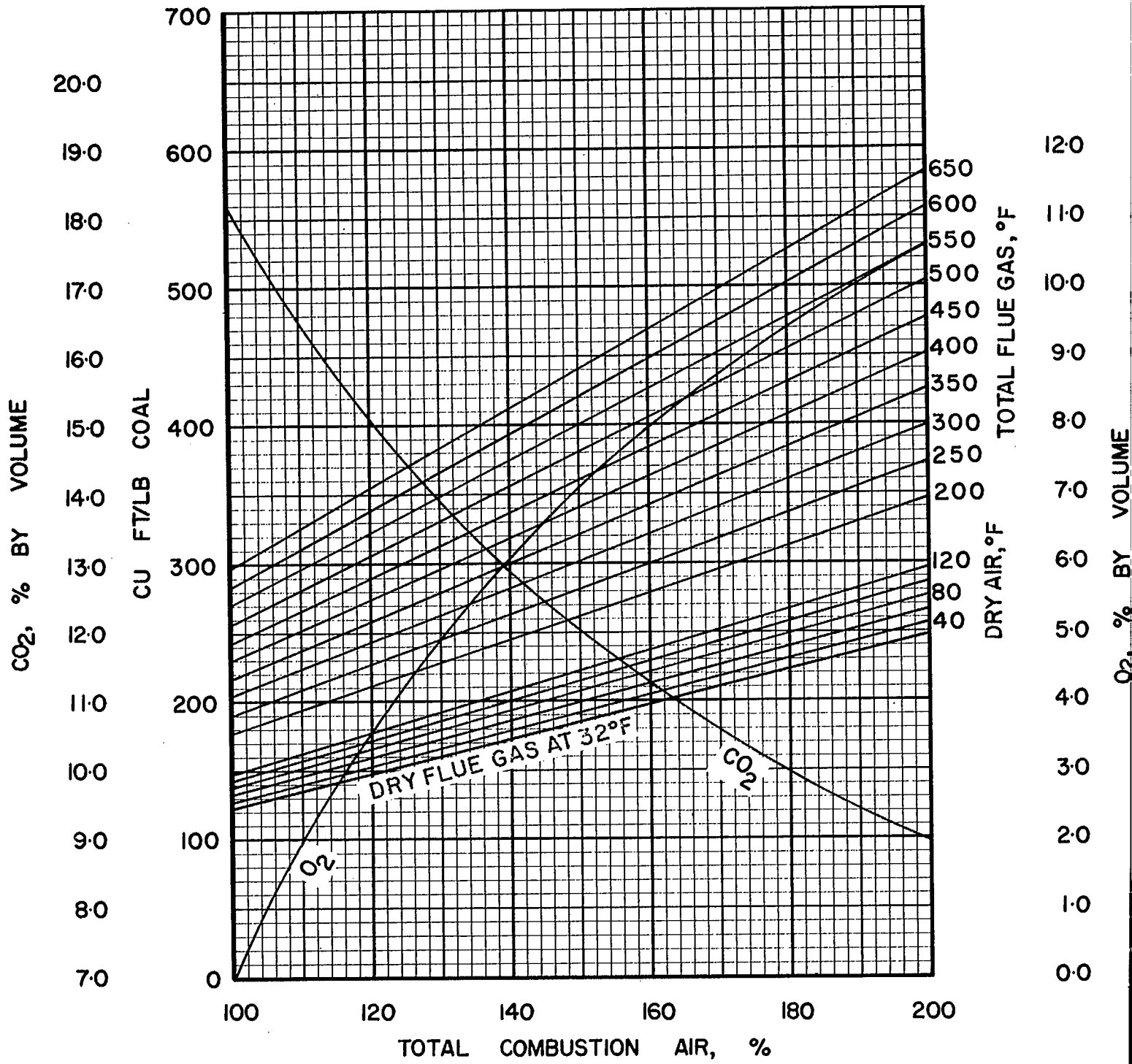


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·P·3

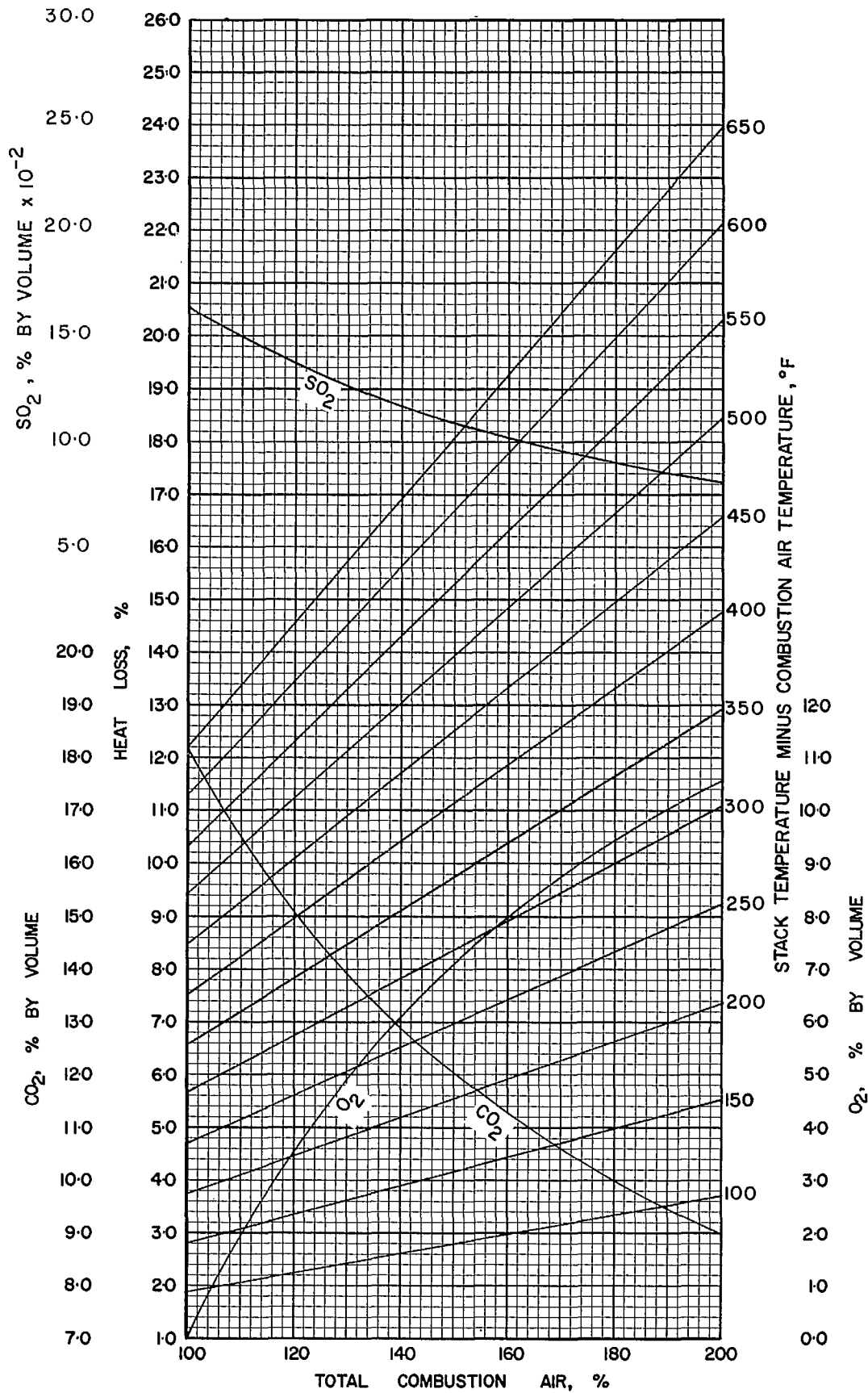


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·P·3

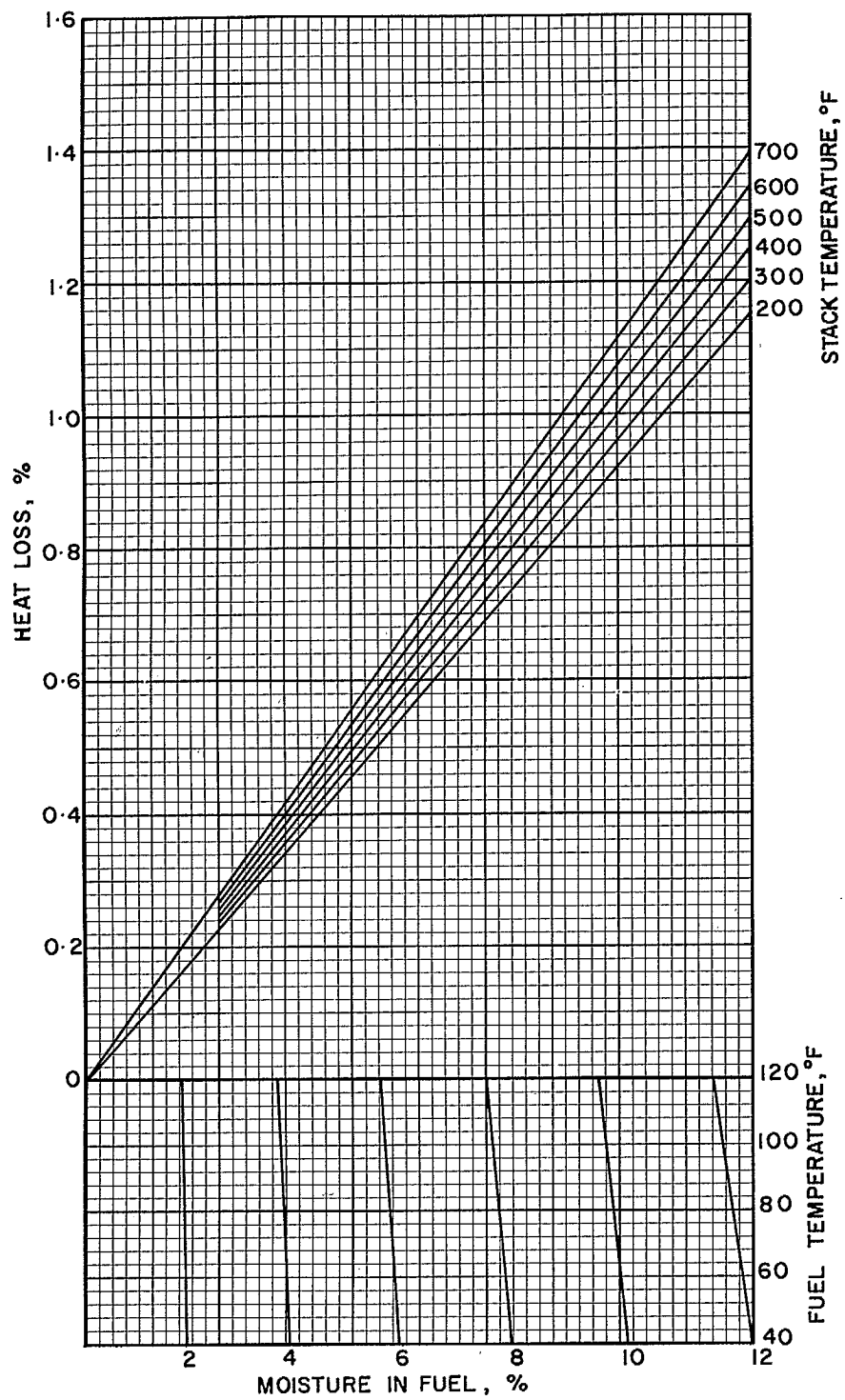


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·P·3

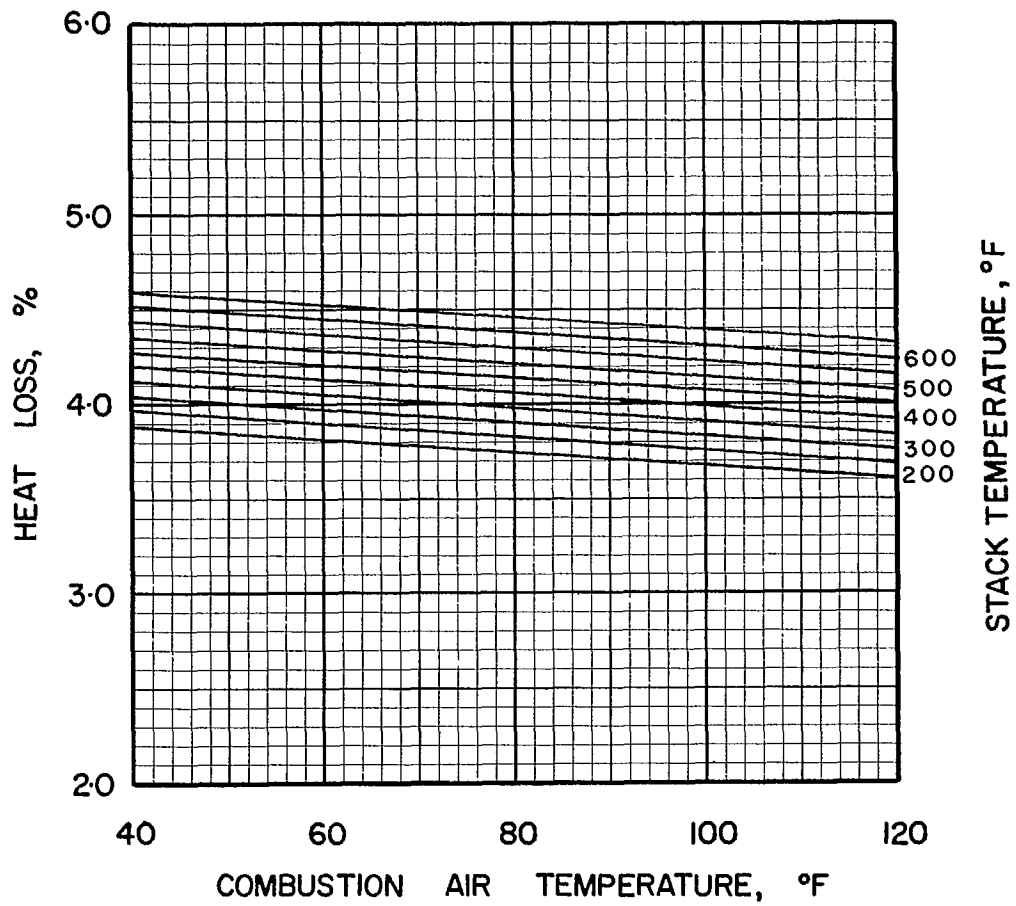


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·3

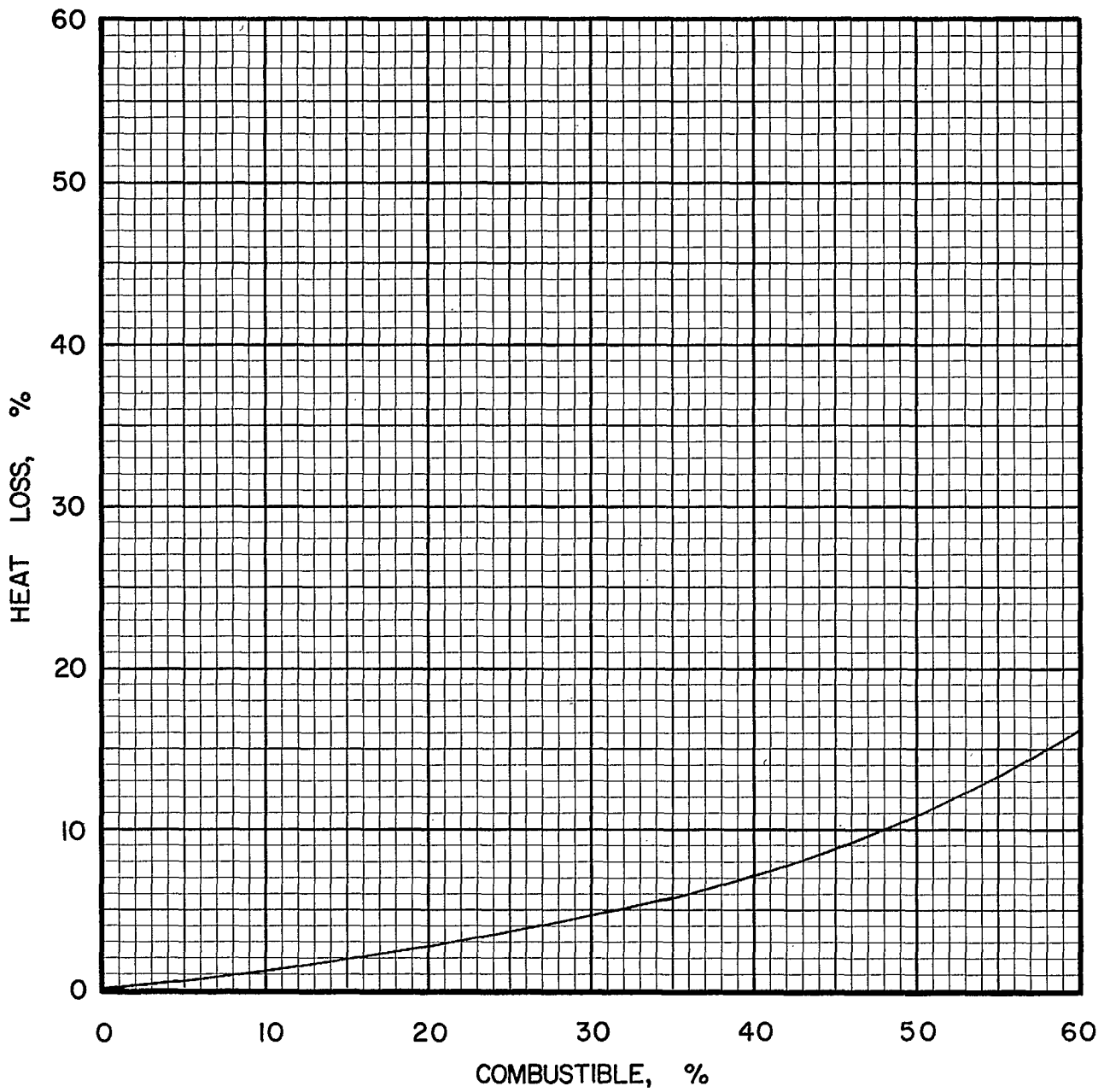


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE  
 US-P-3

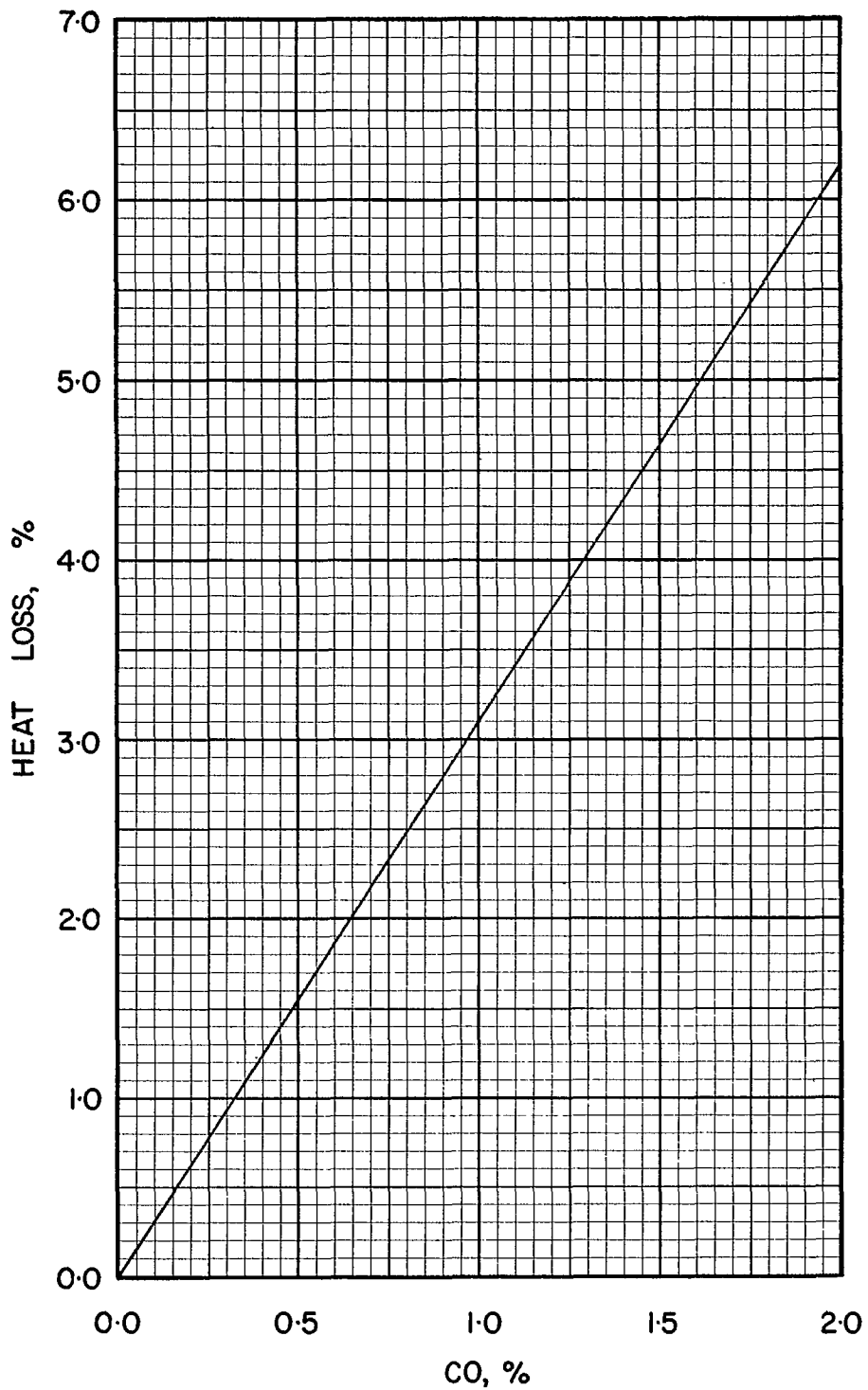


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US·P·3

**COAL US P-4, DELL, BUTLER COUNTY**

Typical Moisture Range: 4–12%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.085
Volatile Matter	0.348
Fixed Carbon	<u>0.567</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.769
Hydrogen (H)	0.051
Sulphur (S)	0.011
Nitrogen (N)	0.021
Oxygen (O)	0.063
Ash	<u>0.085</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	13470
Btu/short ton:	$26.94 \times 10^6$
Btu/long ton:	$30.17 \times 10^6$
MJ/kg:	31.32

*Conversion Factors*

1 short ton	= 0.8929	long tons	= 2000 lb
$10^6$ Btu	= 74.24	lb	
$10^6$ Btu	= 0.03712	short tons	
$10^6$ Btu	= 0.03314	long tons	



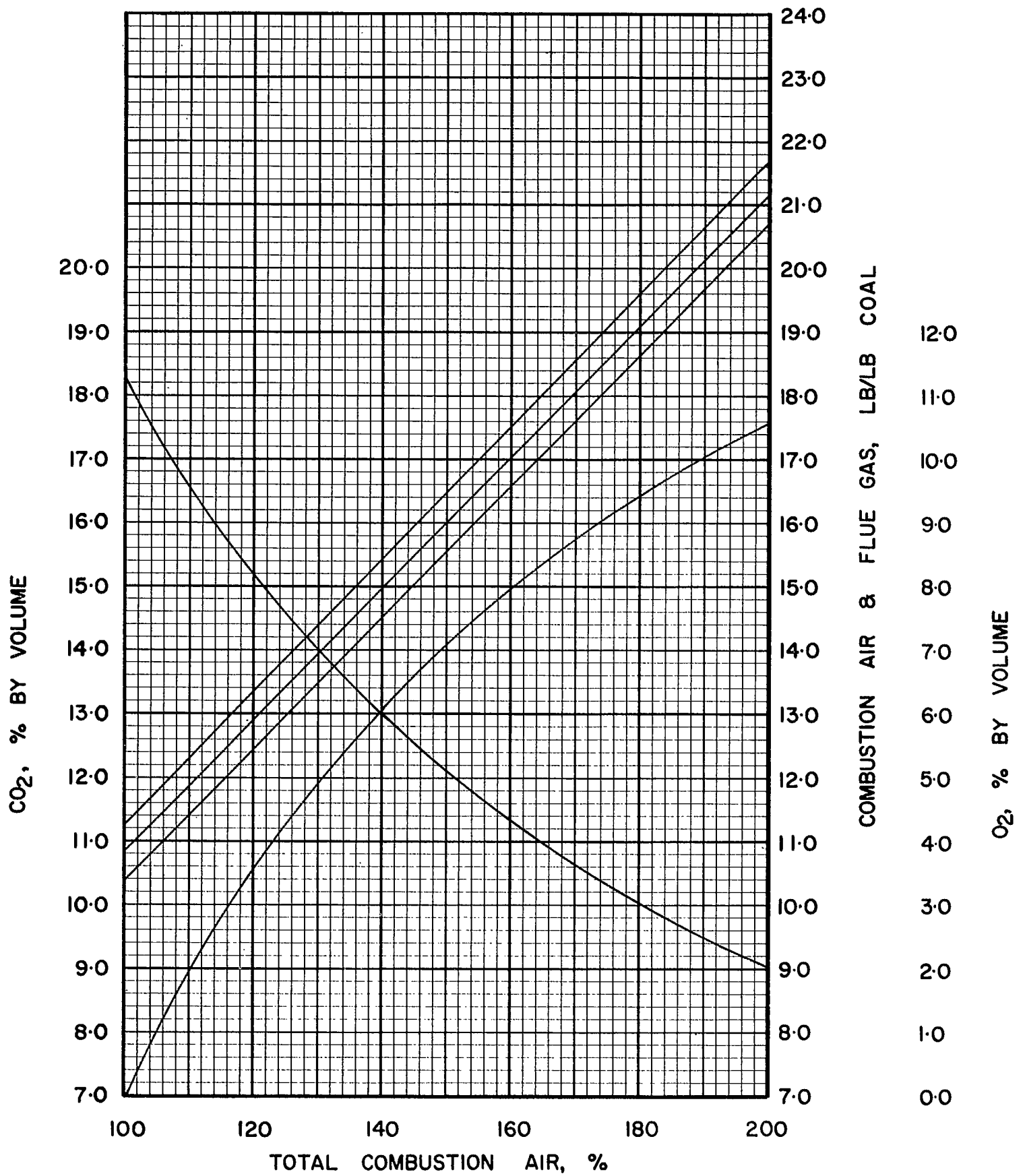


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

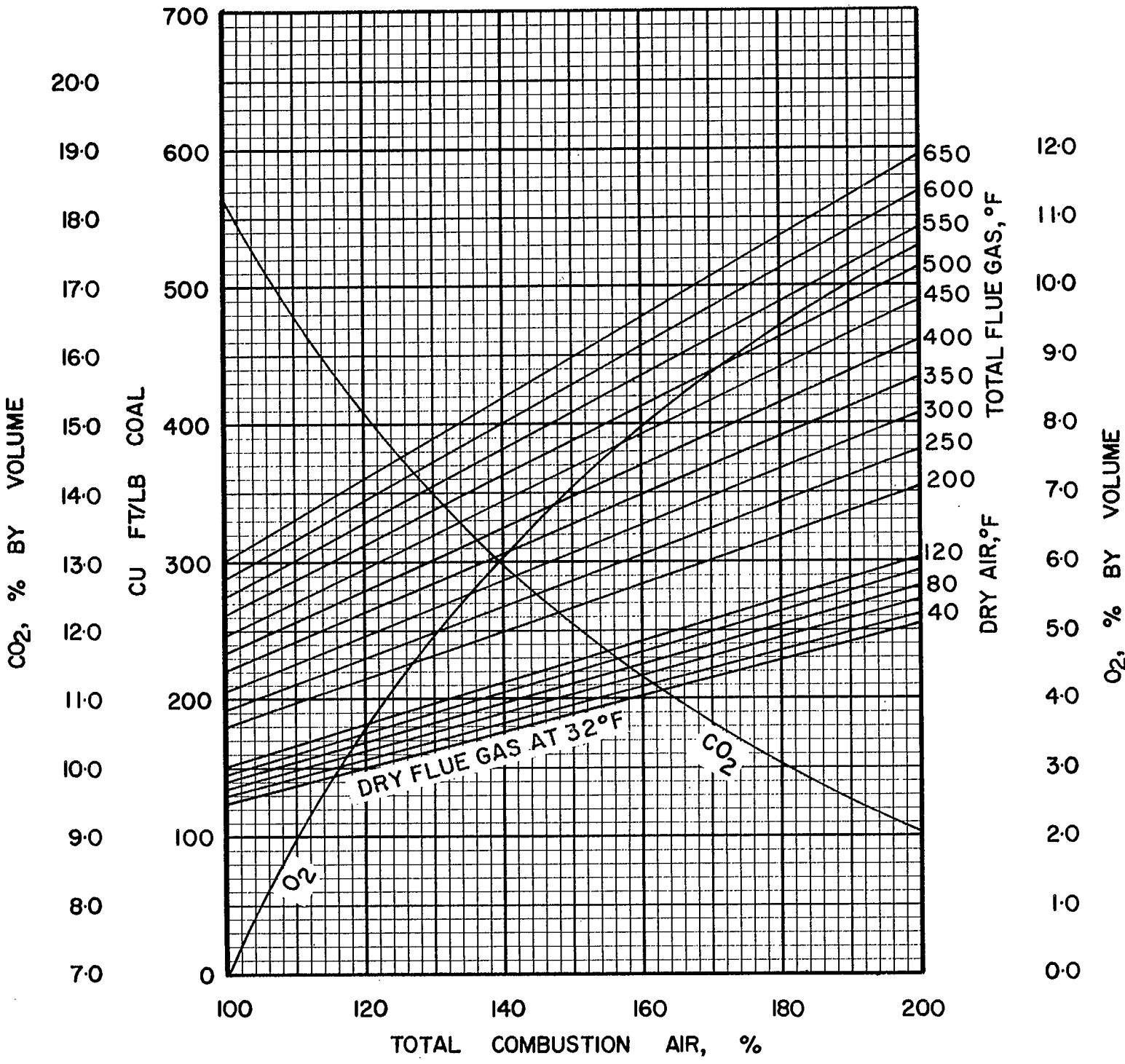


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US · P · 4

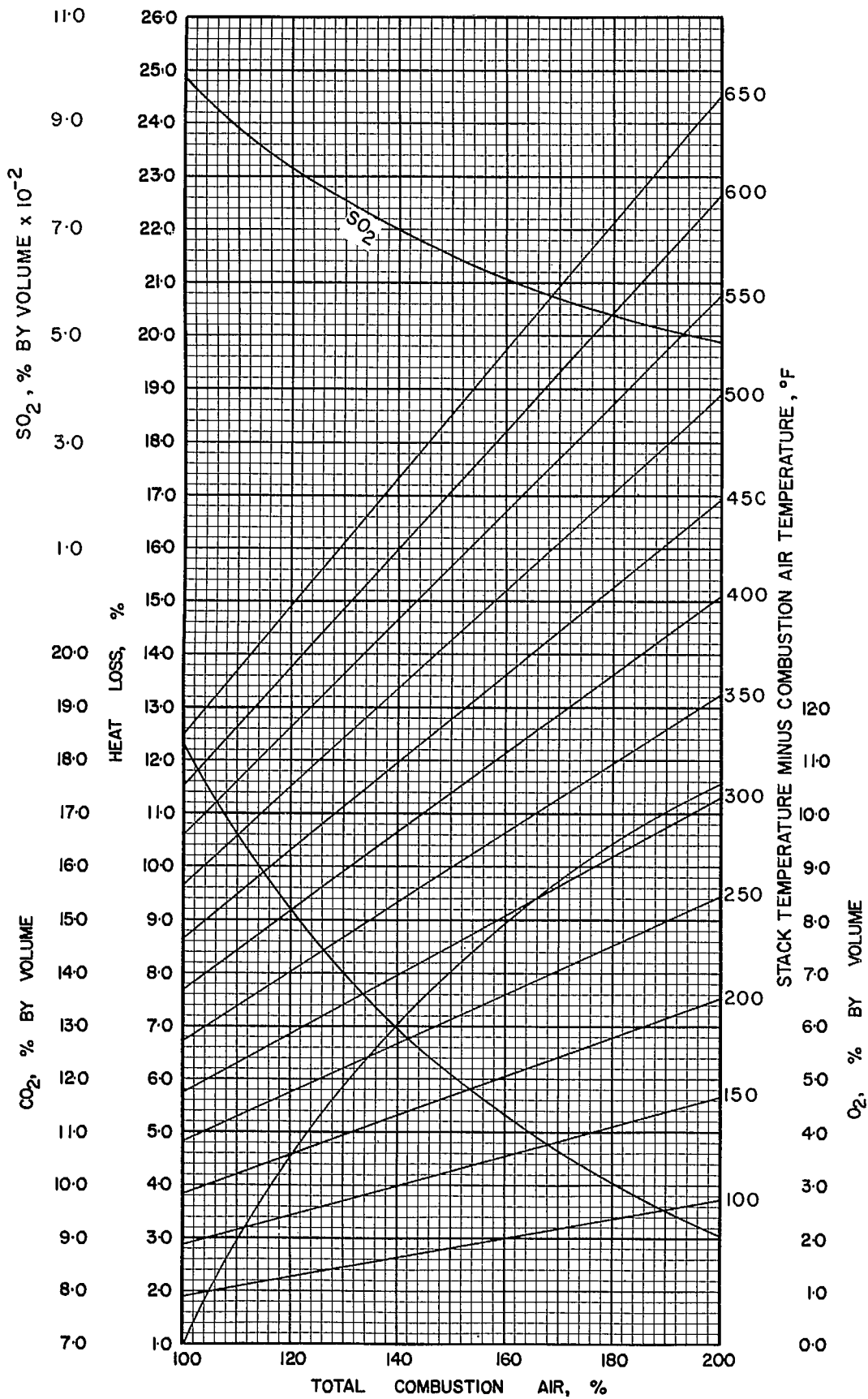


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US-P-4

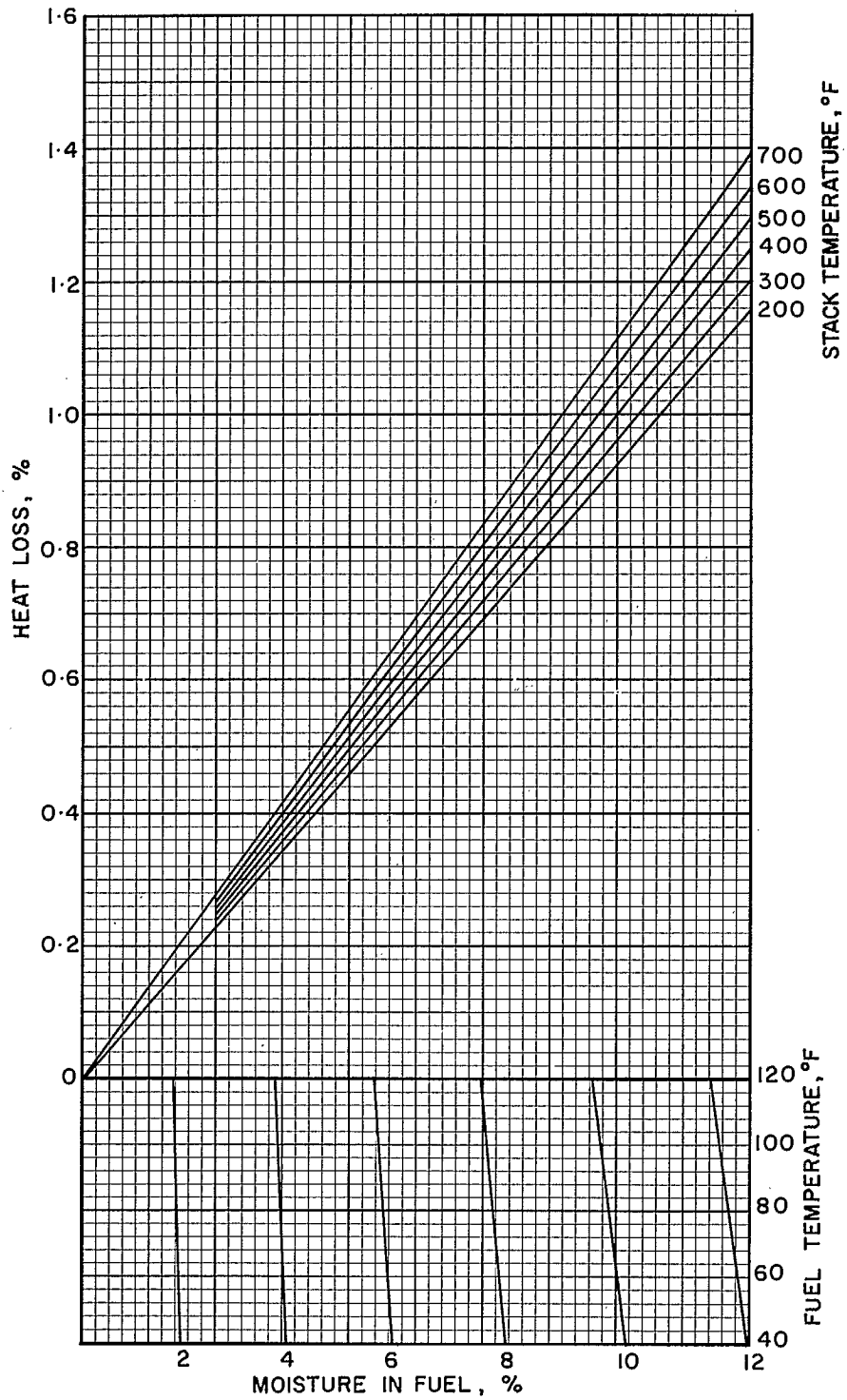


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US-P-4

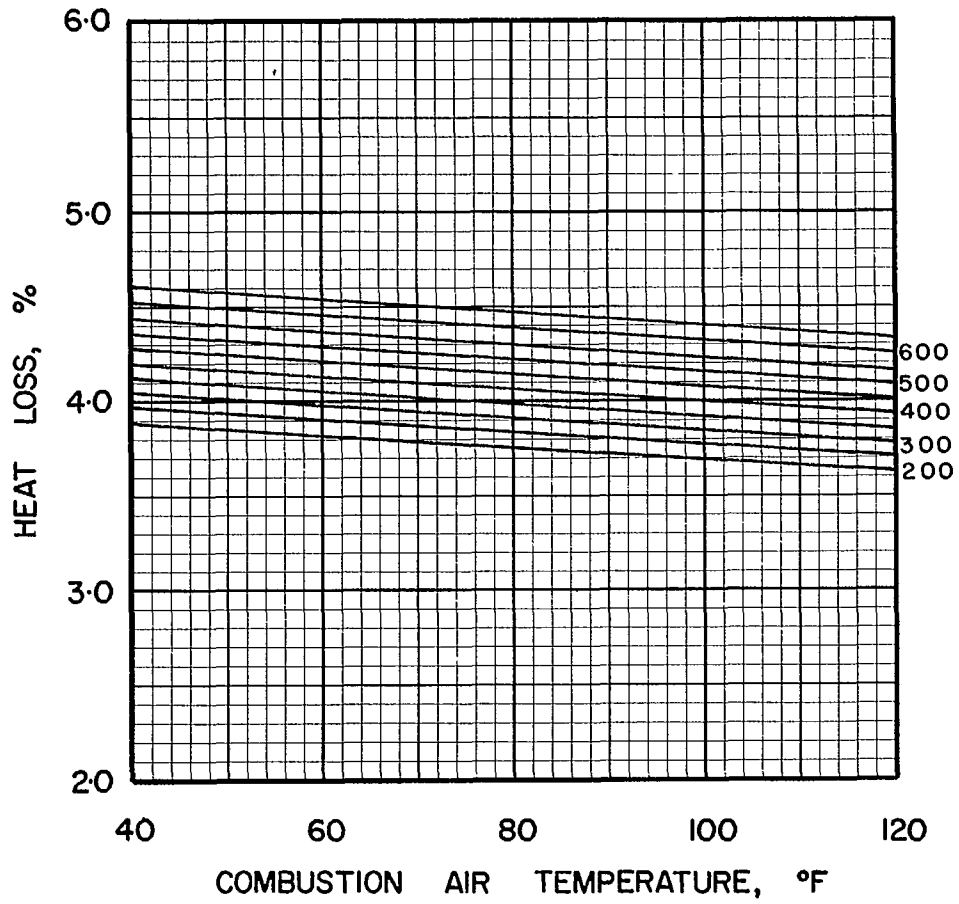


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·4

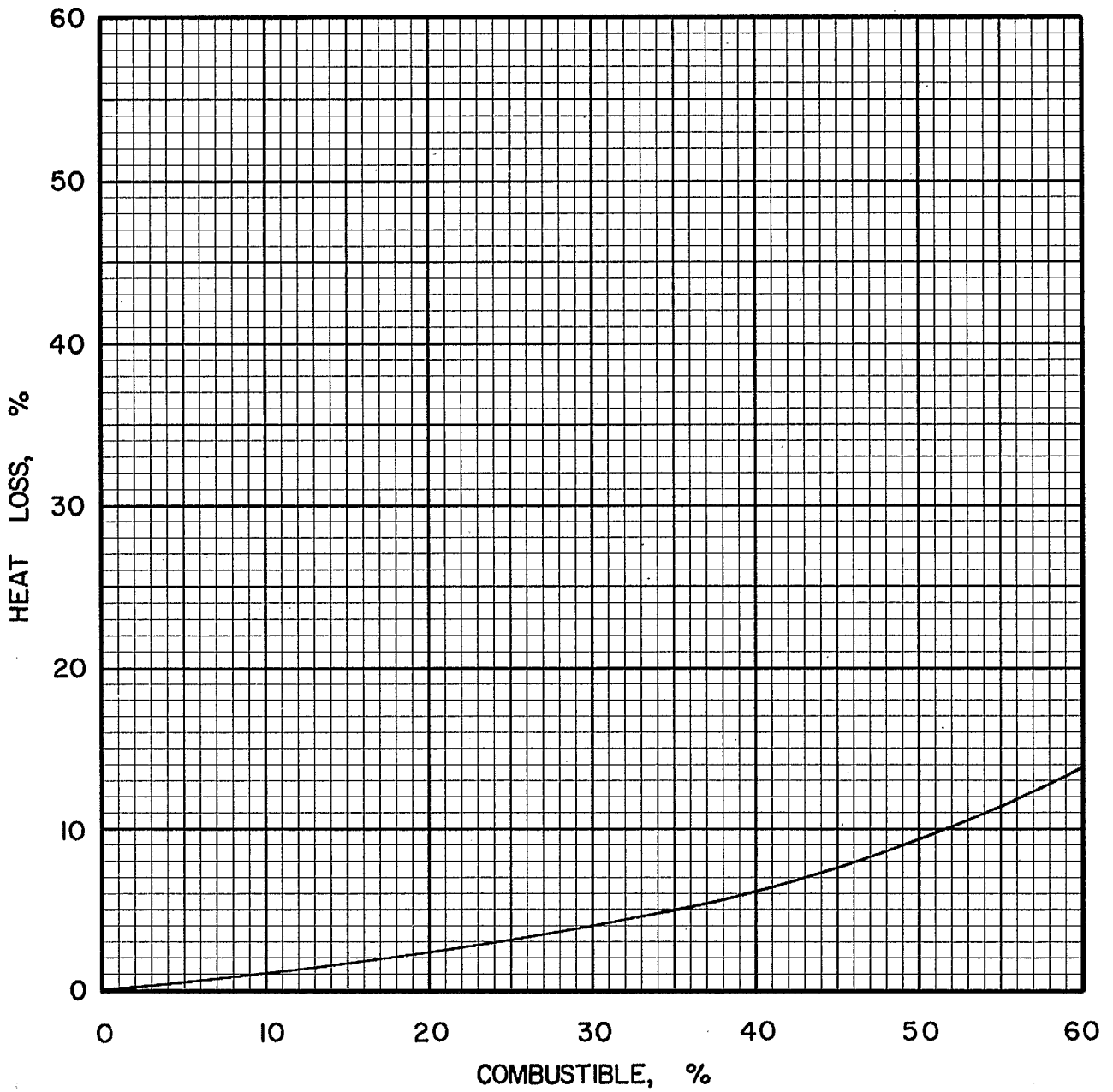


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US-P-4

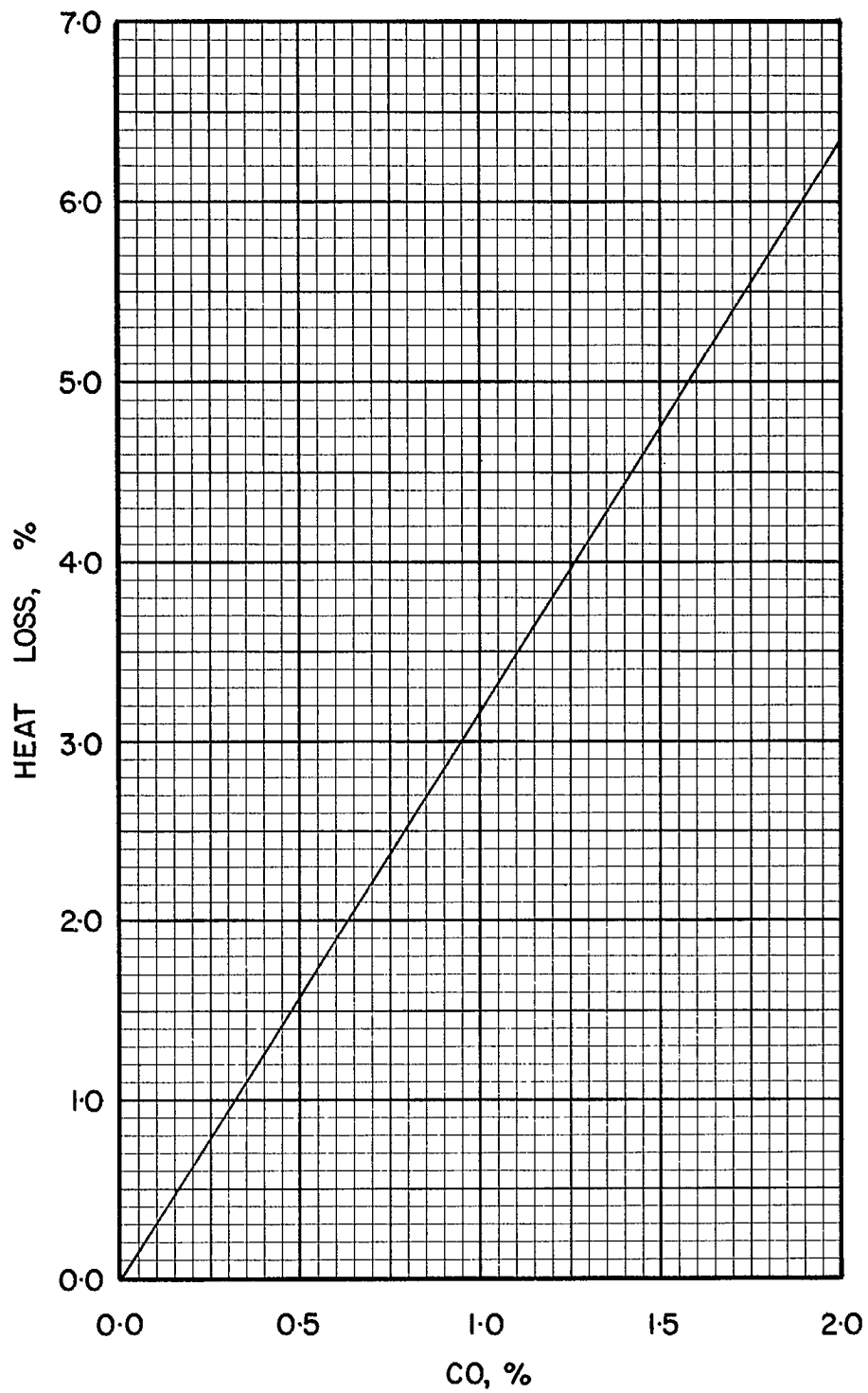


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US·P·4

## COAL US P-5, DEMONT, WESTMORELAND COUNTY

Typical Moisture Range: 0–8%

### *Proximate Analysis (lb/lb dry coal)*

Ash	0.093
Volatile Matter	0.335
Fixed Carbon	0.572
Total	<u>1.000</u>

### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.759
Hydrogen (H)	0.052
Sulphur (S)	0.025
Nitrogen (N)	0.016
Oxygen (O)	0.055
Ash	0.093
Total	<u>1.000</u>

### *Gross Calorific Value*

Btu/lb:	14027
Btu/short ton:	$28.05 \times 10^6$
Btu/long ton:	$31.42 \times 10^6$
MJ/kg:	32.62

### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 71.29 lb	
$10^6$ Btu	= 0.03565 short tons	
$10^6$ Btu	= 0.03183 long tons	



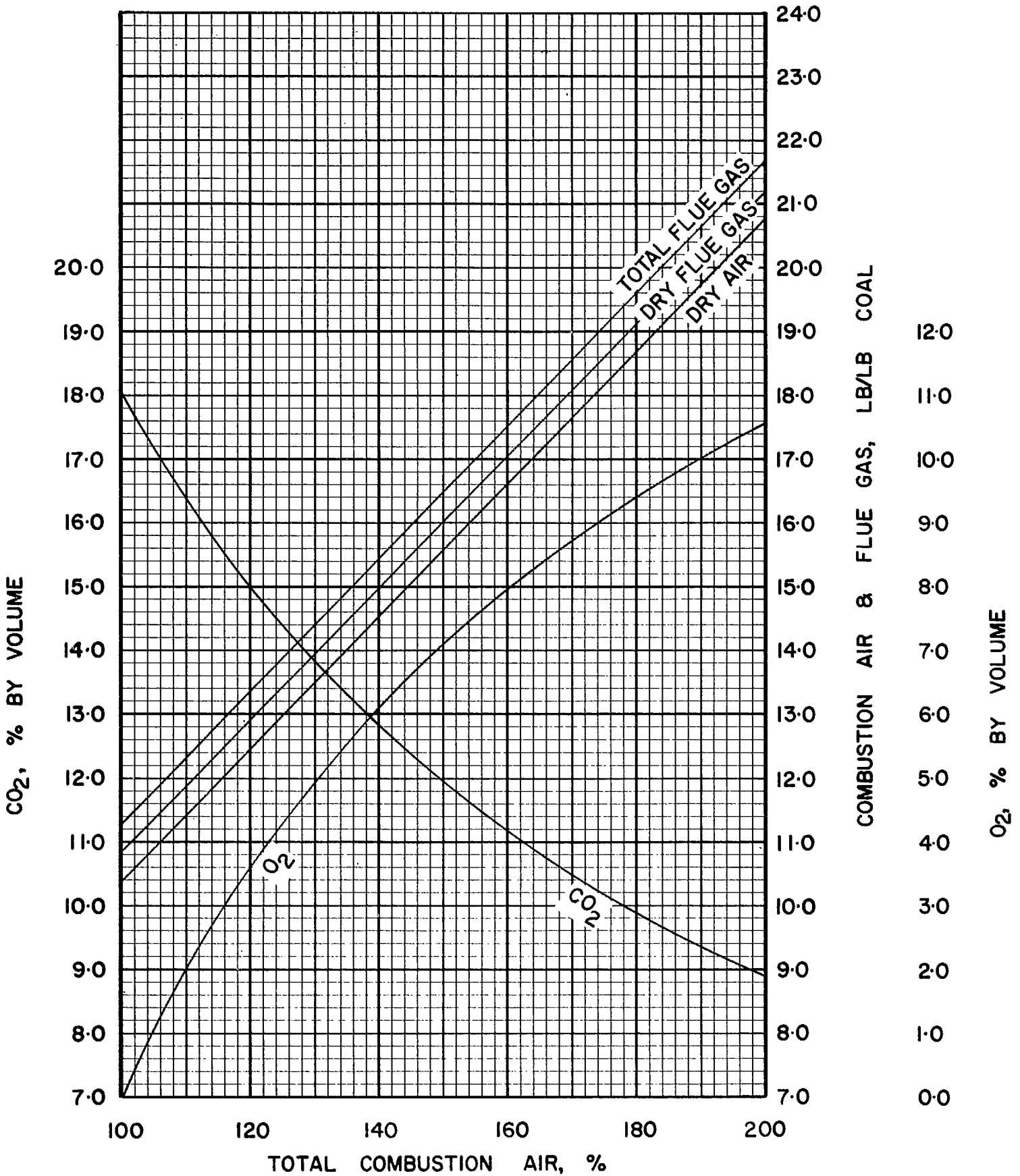


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-P-5

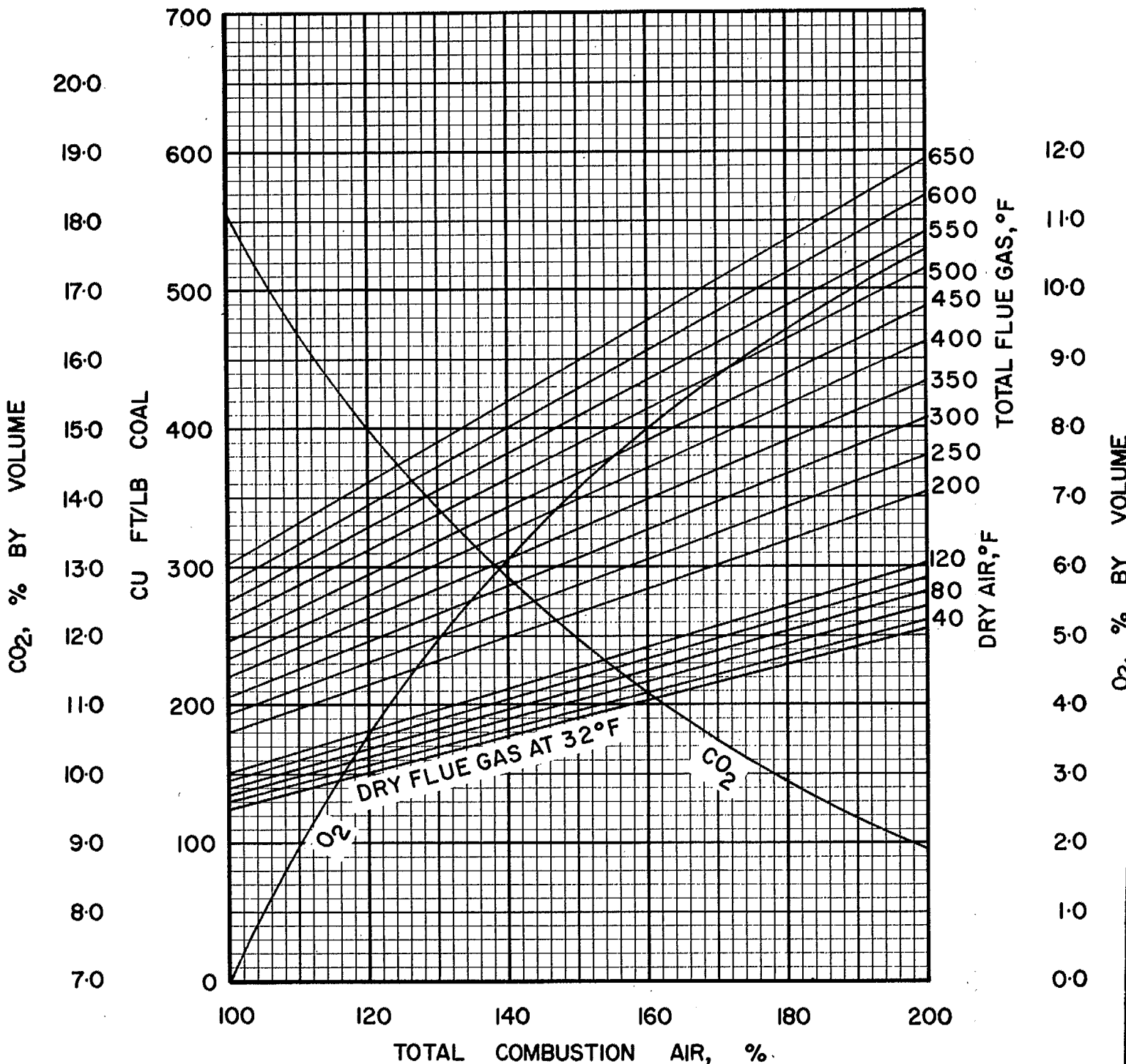


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·P·5

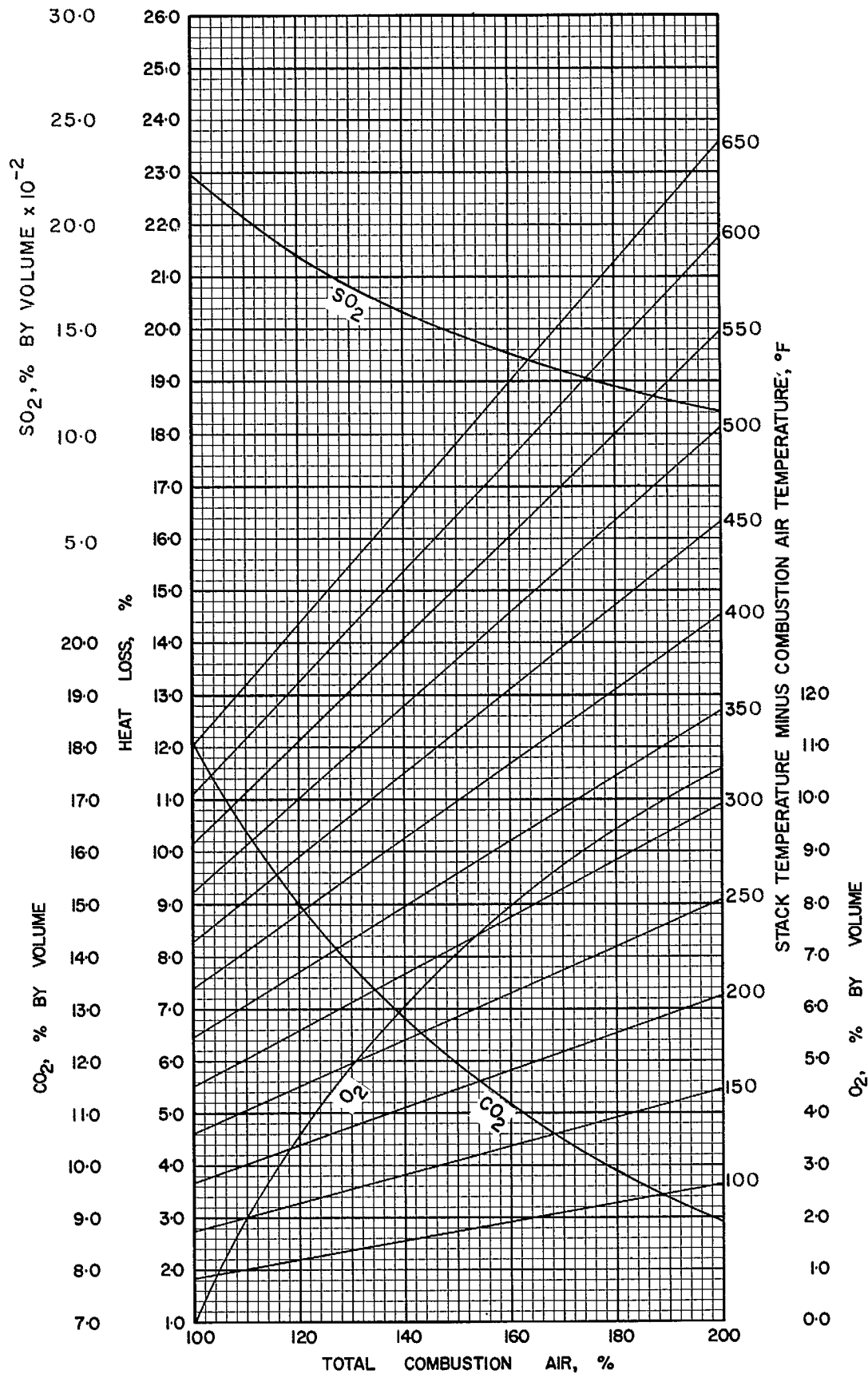


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·P·5

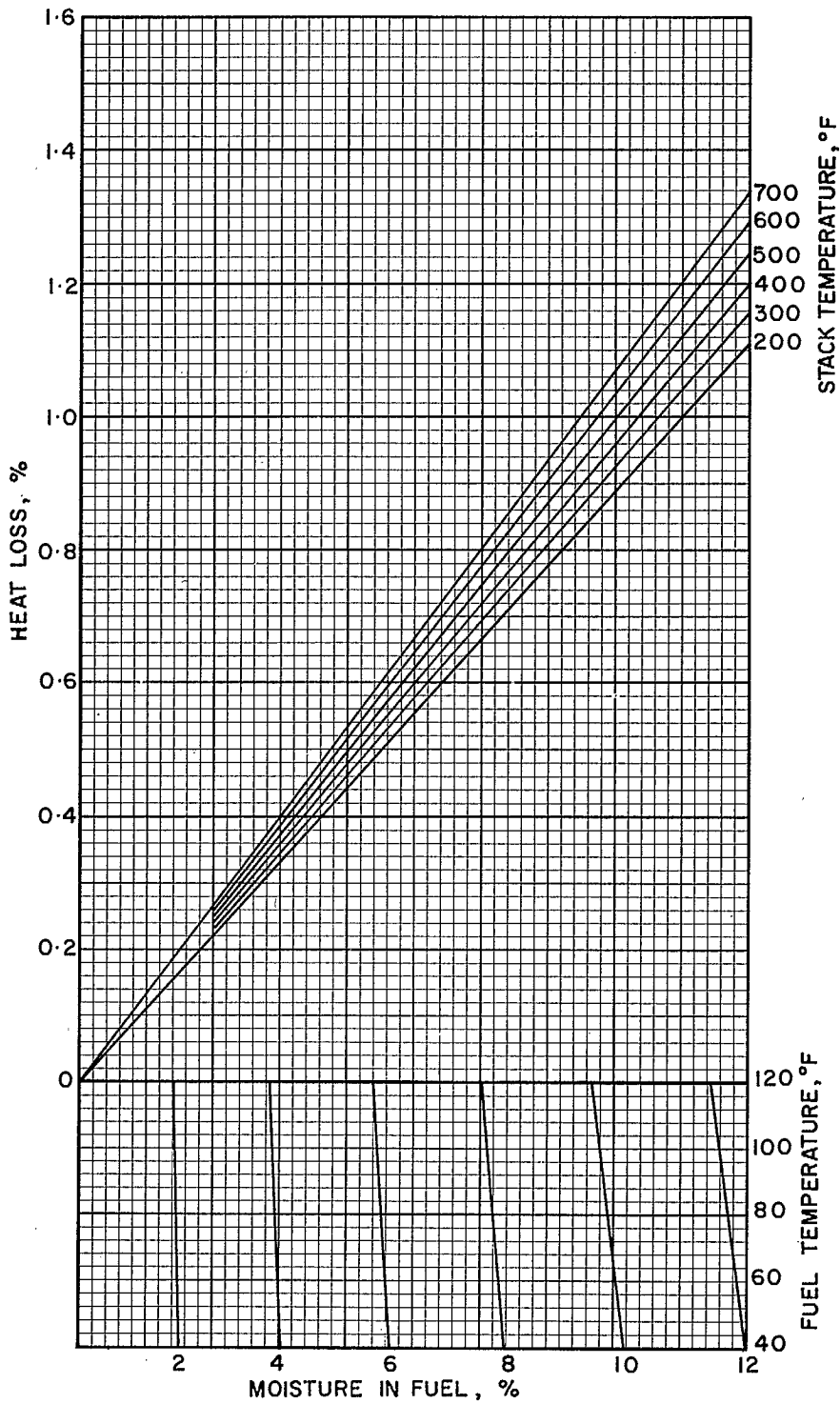


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US-P-5

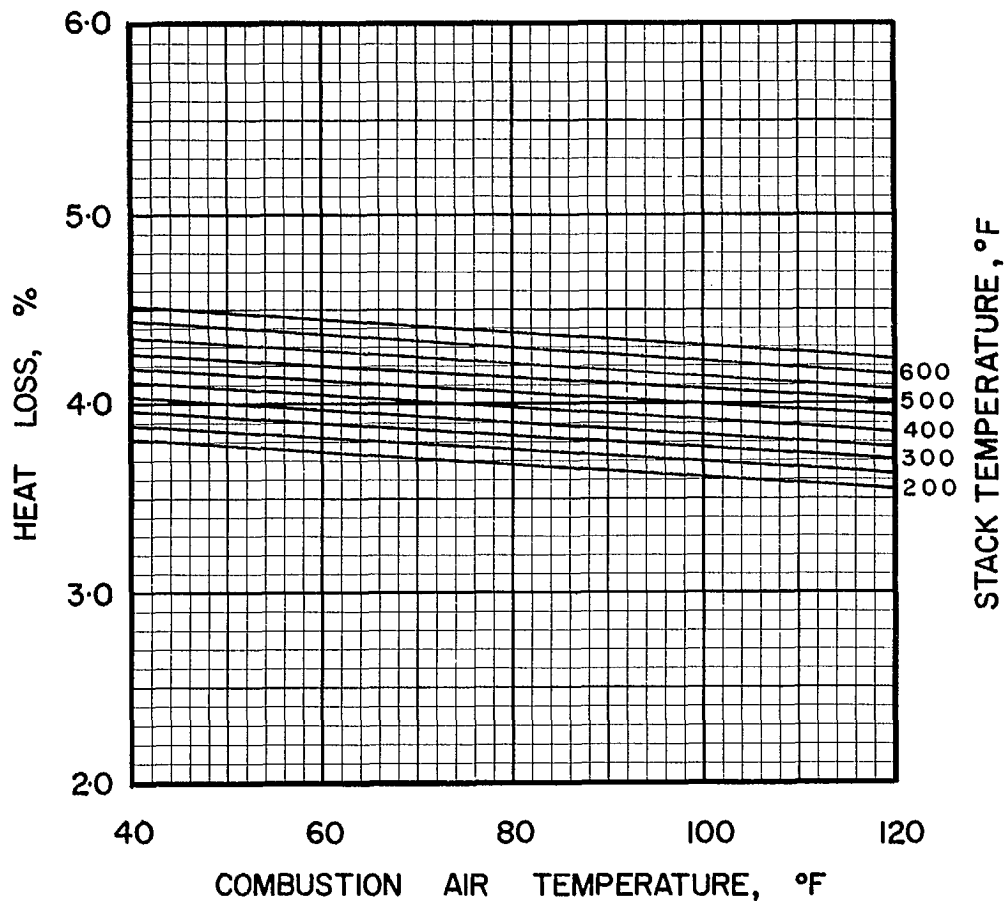


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·5

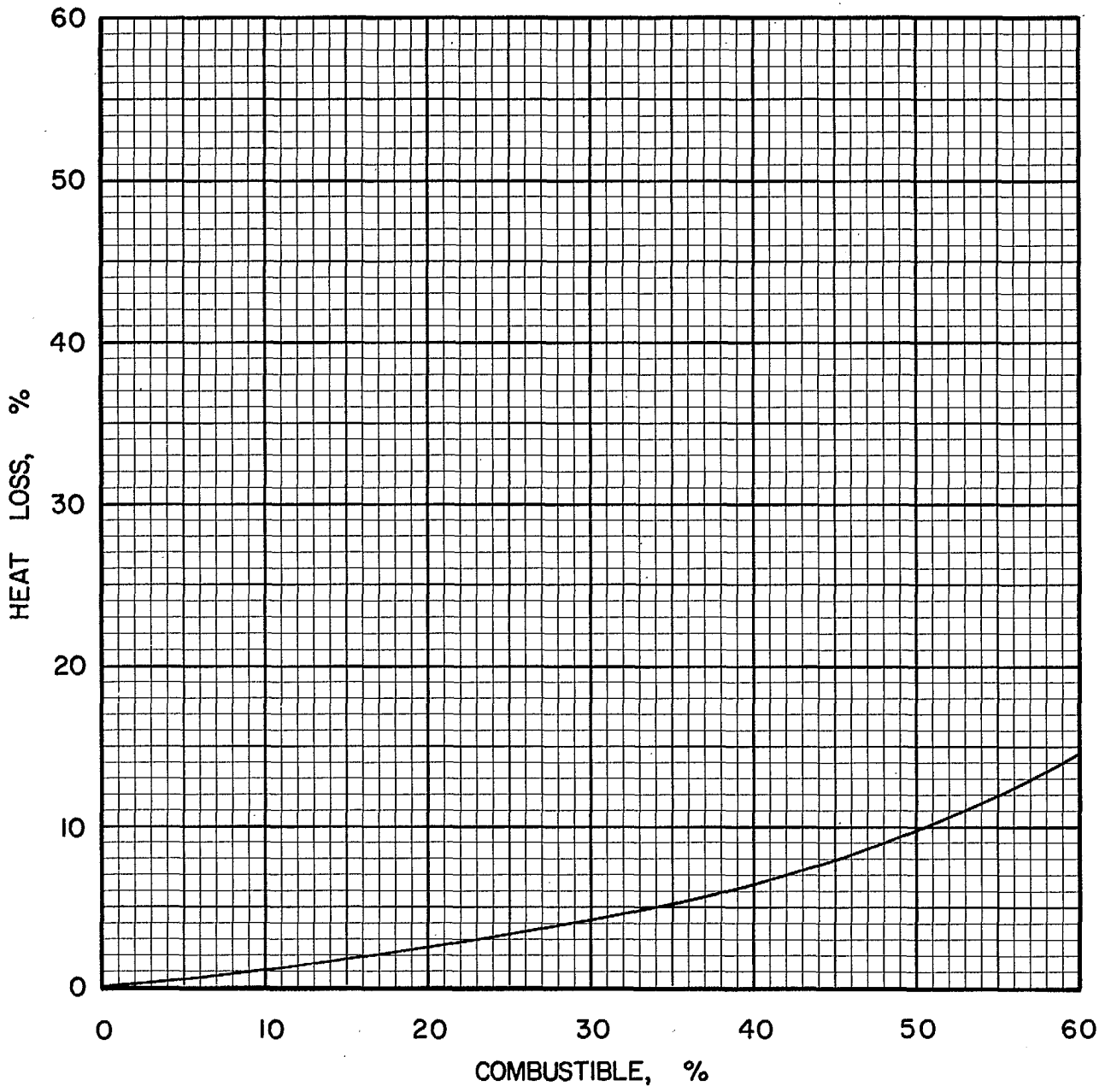


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·5

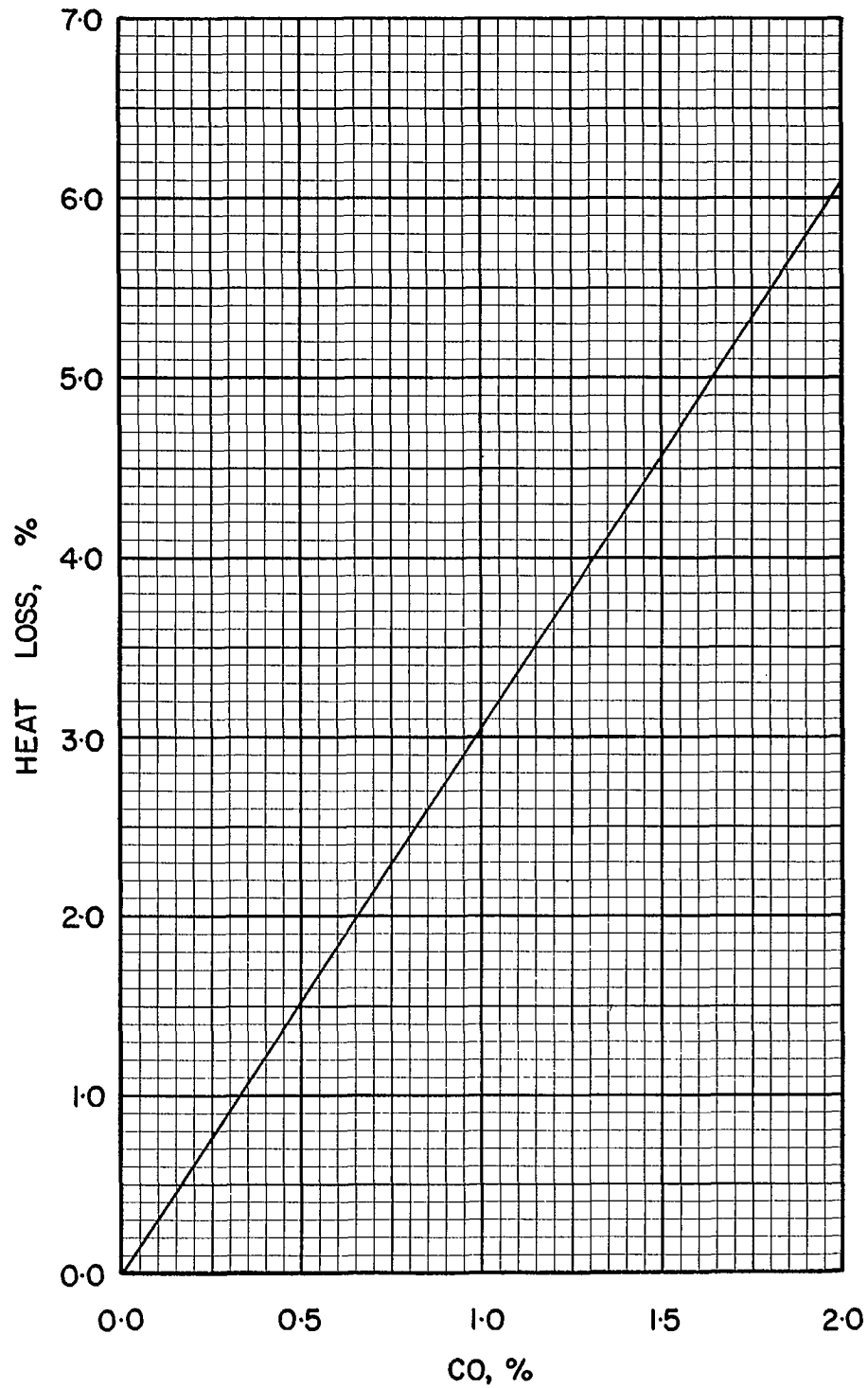


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·P·5

### COAL US P-6, FOSTER, ARMSTRONG COUNTY

Typical Moisture Range: 0-8%

#### *Proximate Analysis (lb/lb dry coal)*

Ash	0.131
Volatile Matter	0.349
Fixed Carbon	0.520
Total	<u>1.000</u>

#### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.719
Hydrogen (H)	0.050
Sulphur (S)	0.031
Nitrogen (N)	0.014
Oxygen (O)	0.055
Ash	0.131
Total	<u>1.000</u>

#### *Gross Calorific Value*

Btu/lb:	13271
Btu/short ton:	$26.54 \times 10^6$
Btu/long ton:	$29.73 \times 10^6$
MJ/kg:	30.86

#### *Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
$10^6$ Btu = 75.35	lb
$10^6$ Btu = 0.03768	short tons
$10^6$ Btu = 0.03364	long tons



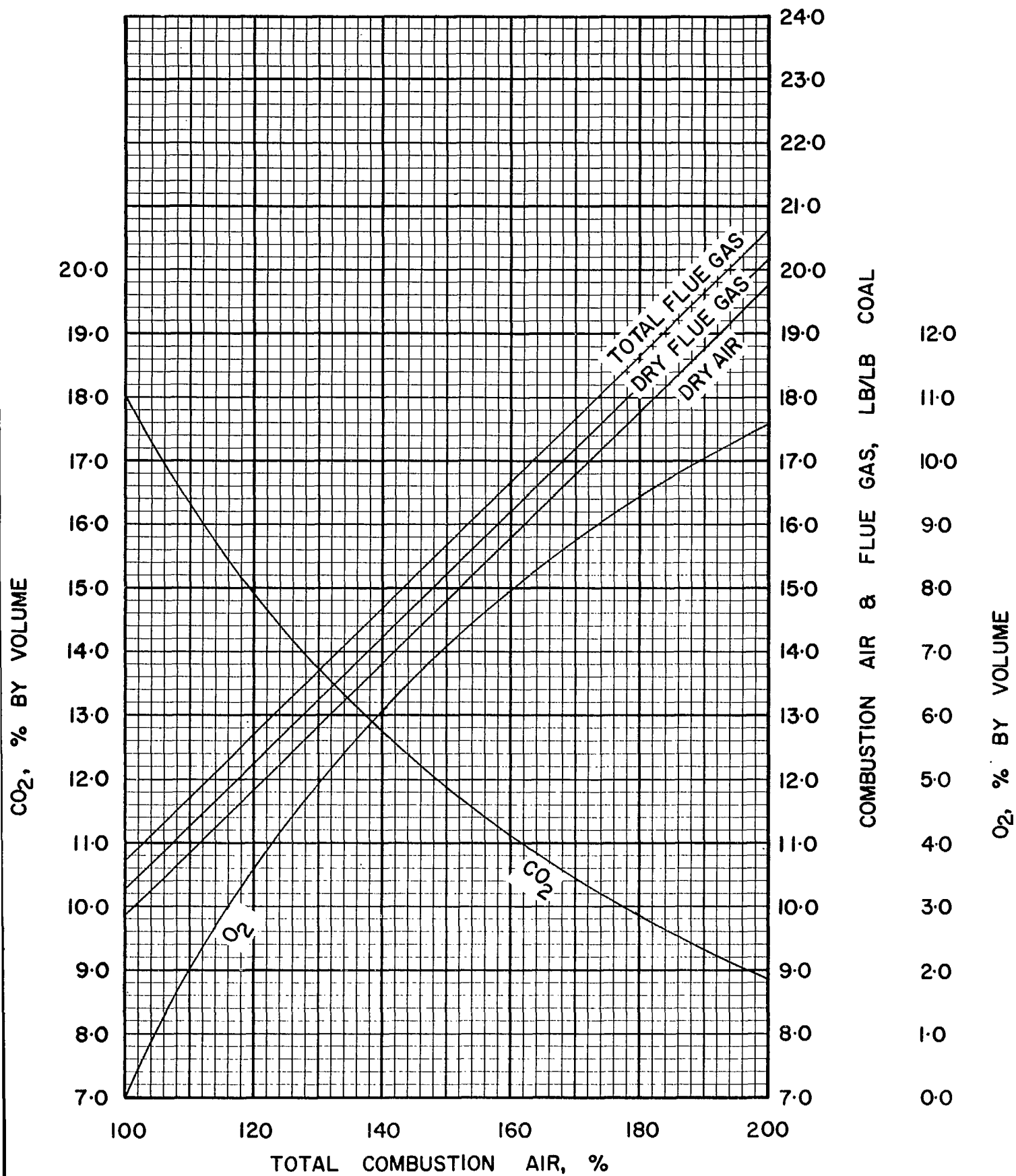


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·6

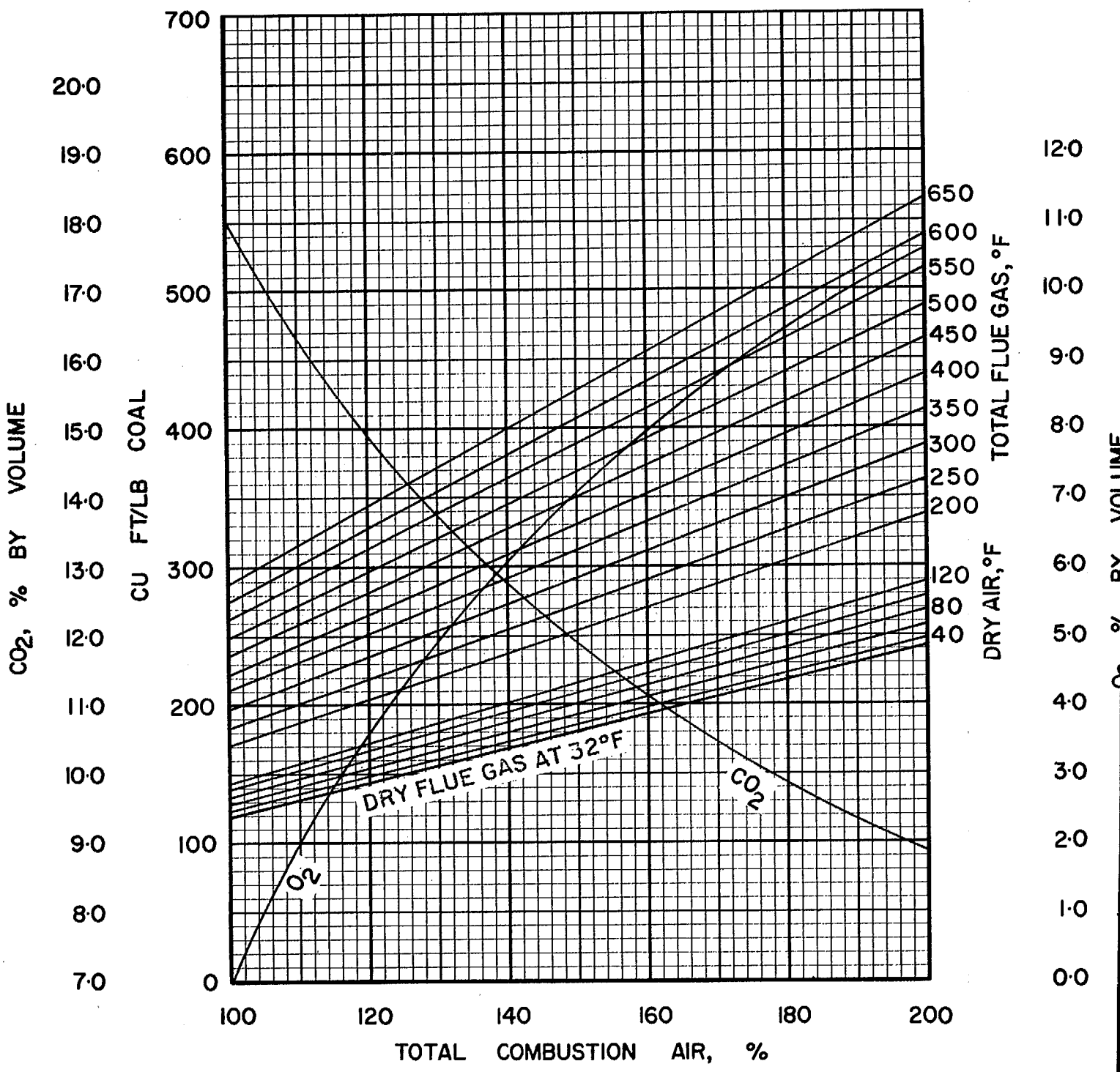


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·P·6

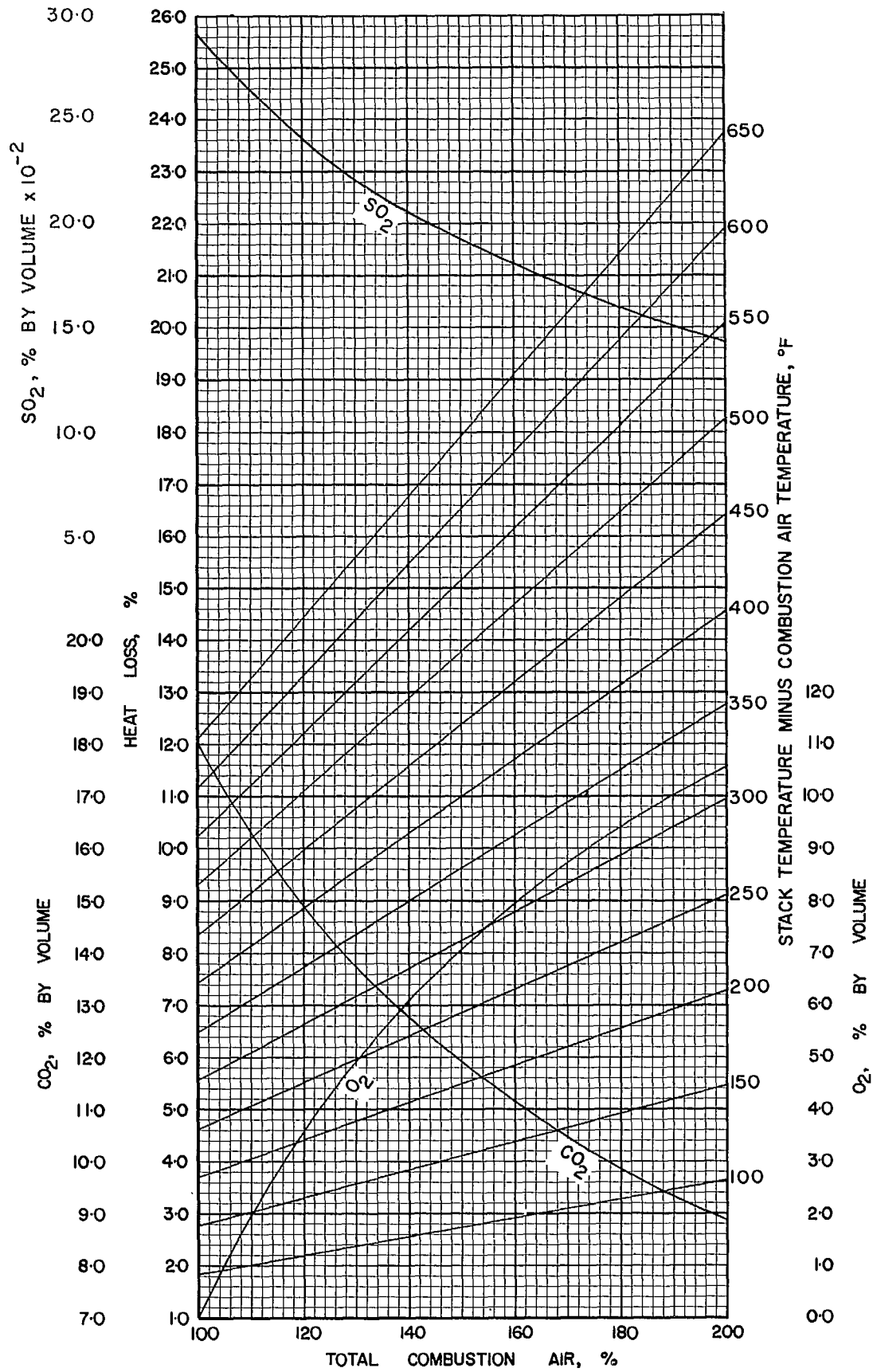


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US-P-6

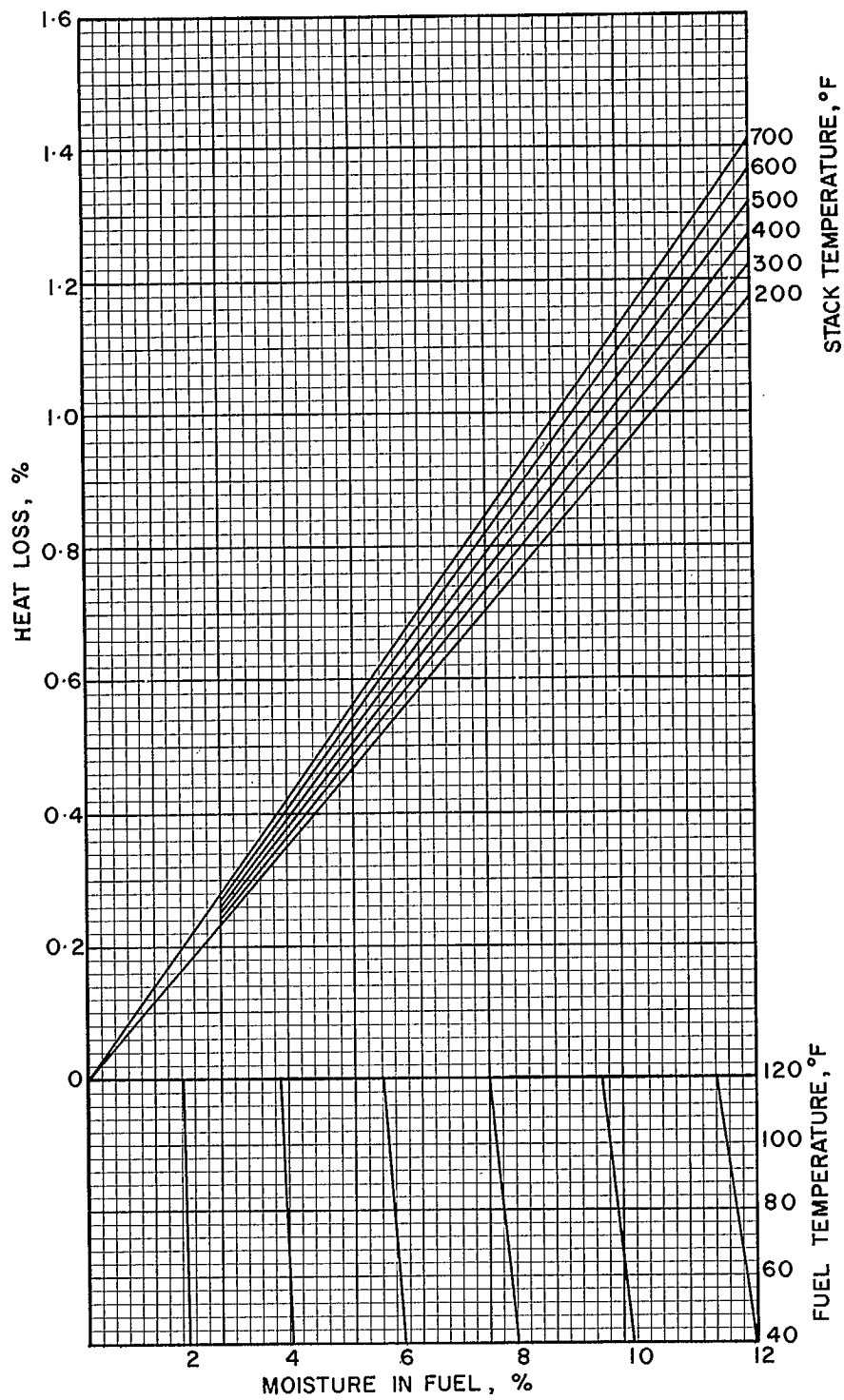


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·P·6

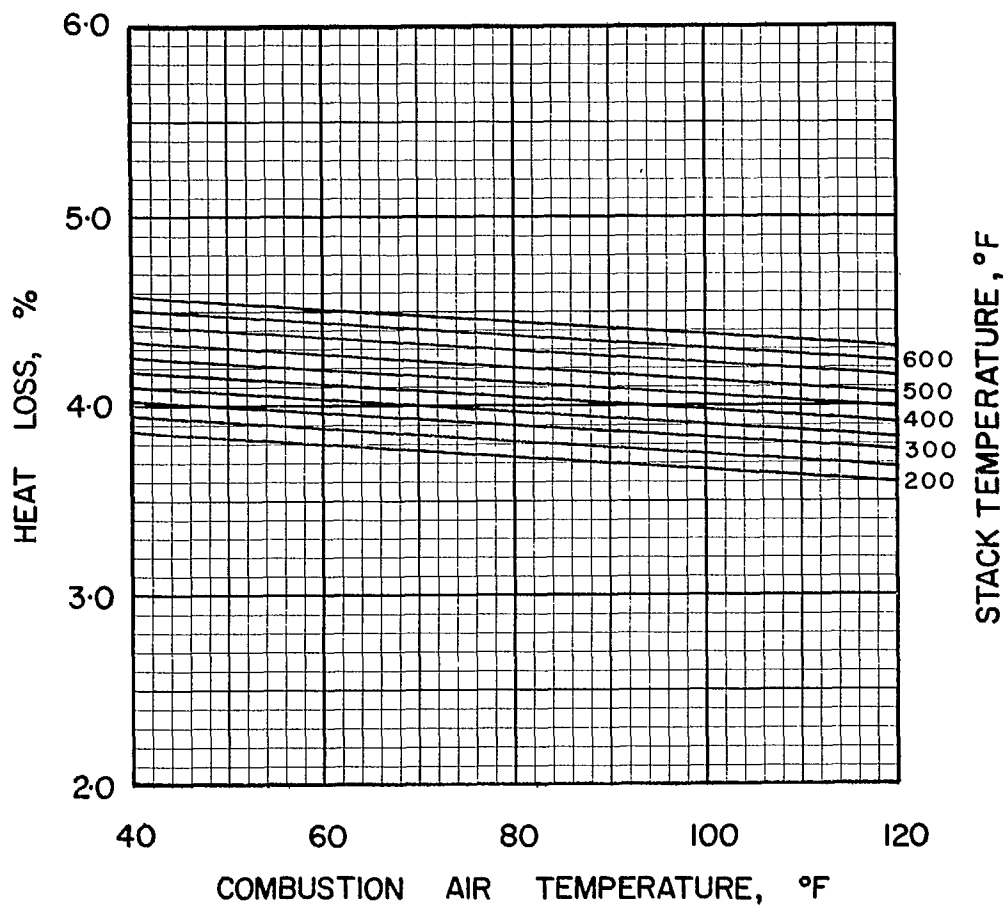


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·6

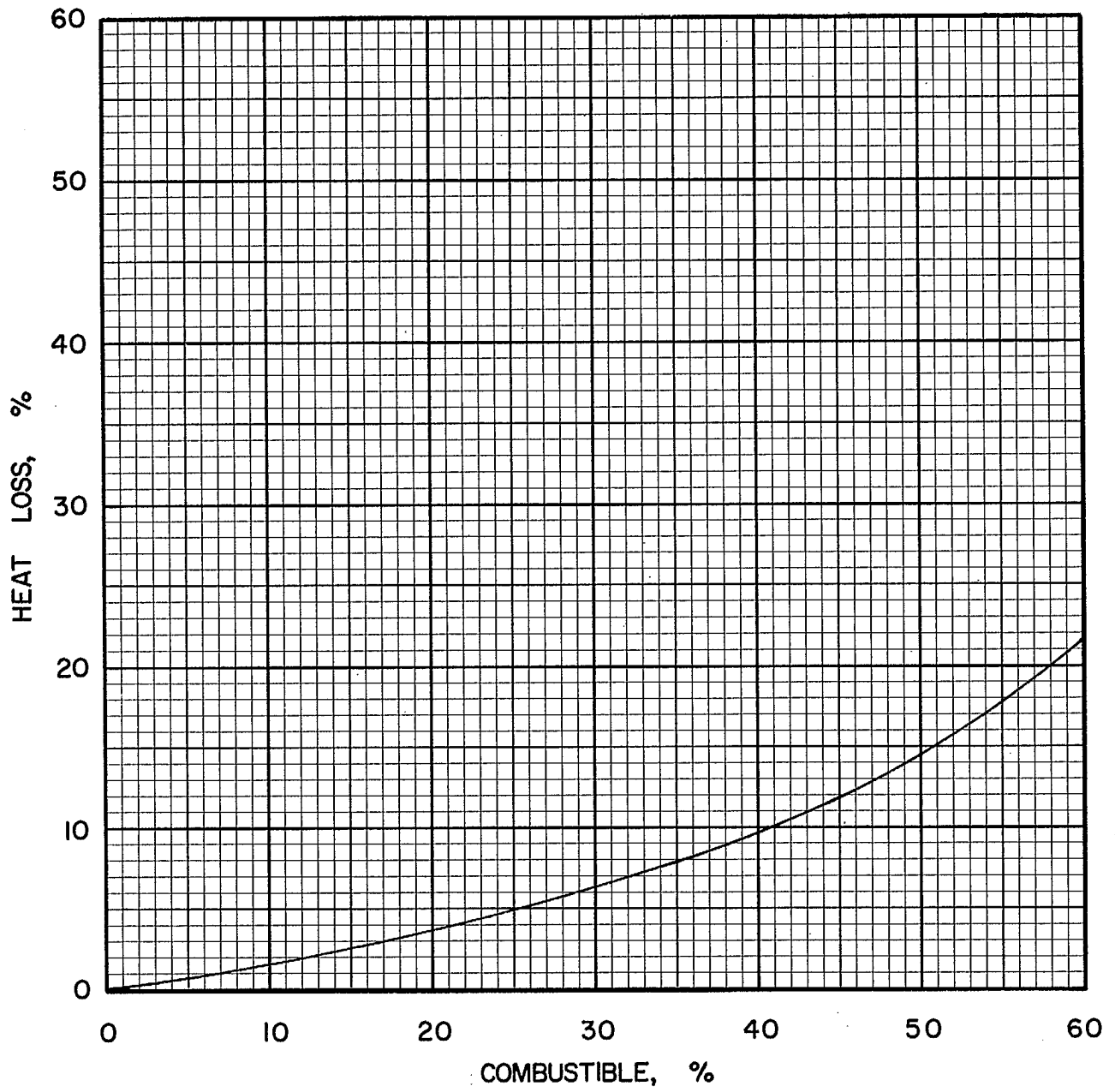


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·6

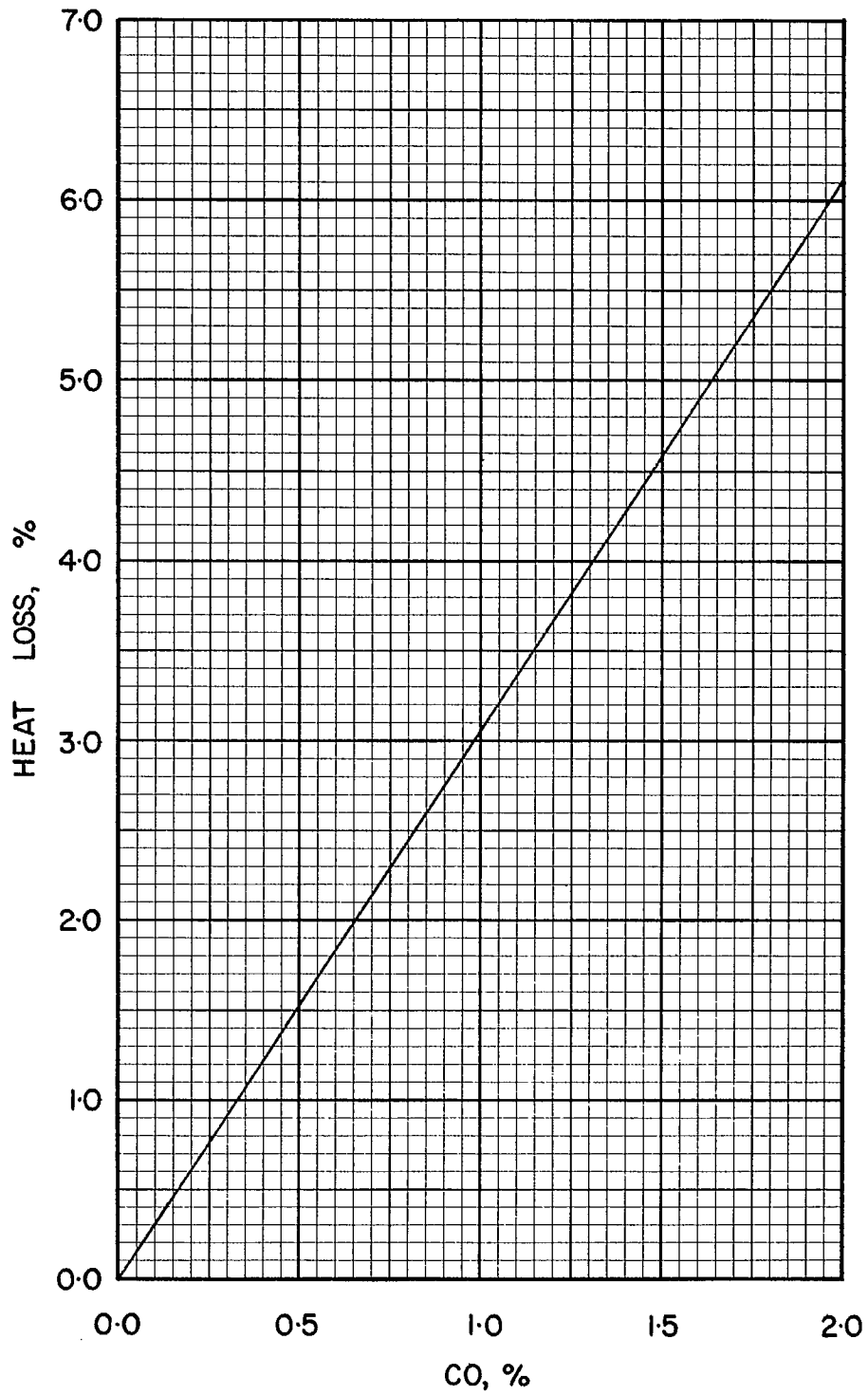


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·P·6

## COAL US P-7, HUTCHISON, WESTMORELAND COUNTY

Typical Moisture Range: 0–8%

### *Proximate Analysis (lb/lb dry coal)*

Ash	0.093
Volatile Matter	0.331
Fixed Carbon	<u>0.576</u>
Total	1.000

### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.773
Hydrogen (H)	0.050
Sulphur (S)	0.010
Nitrogen (N)	0.014
Oxygen (O)	0.060
Ash	<u>0.093</u>
Total	1.000

### *Gross Calorific Value*

Btu/lb:	13868
Btu/short ton:	$27.74 \times 10^6$
Btu/long ton:	$31.06 \times 10^6$
MJ/kg:	32.25

### *Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
$10^6$ Btu = 72.11	lb
$10^6$ Btu = 0.03605	short tons
$10^6$ Btu = 0.03219	long tons



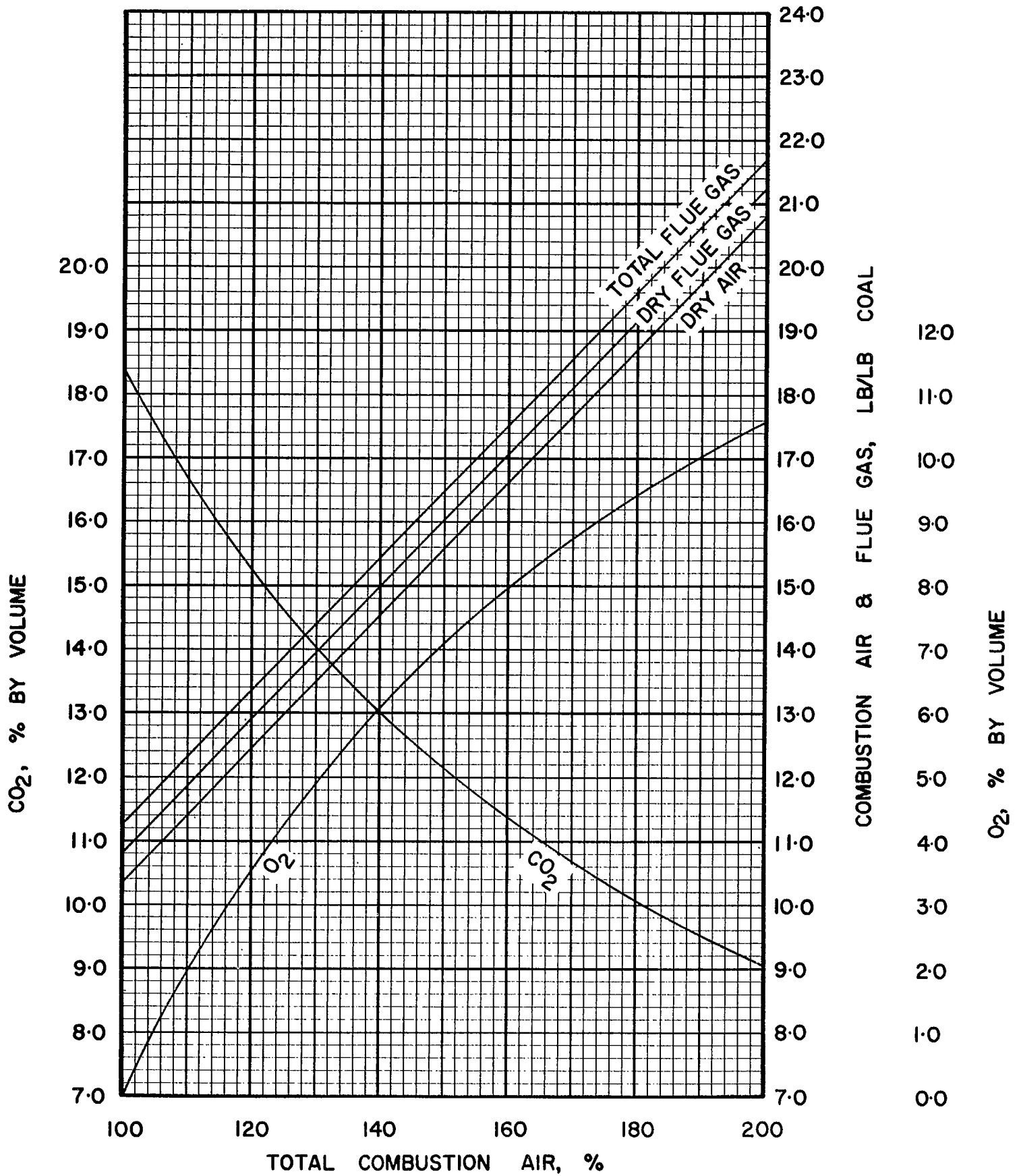


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-P-7

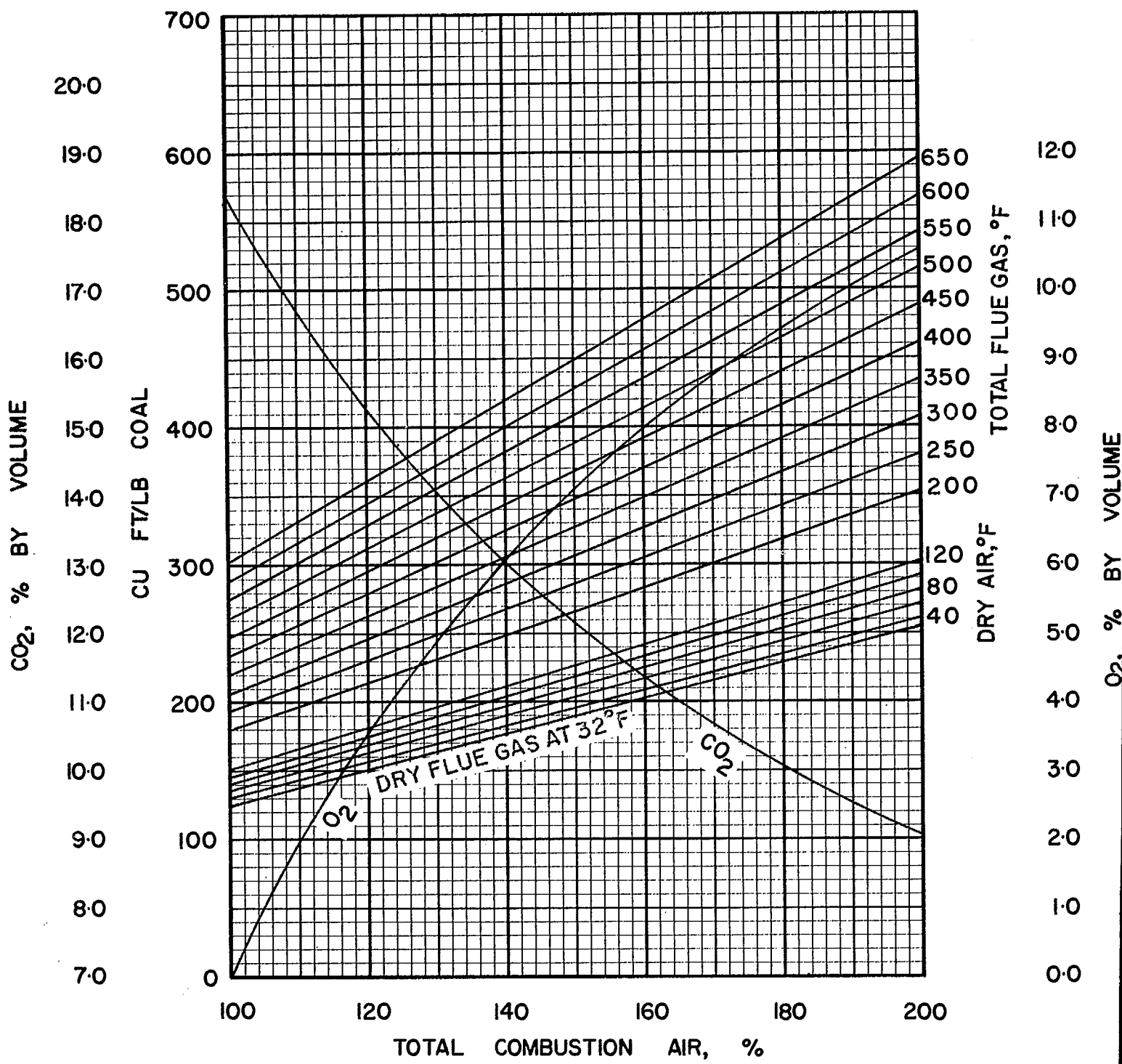


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·P·7

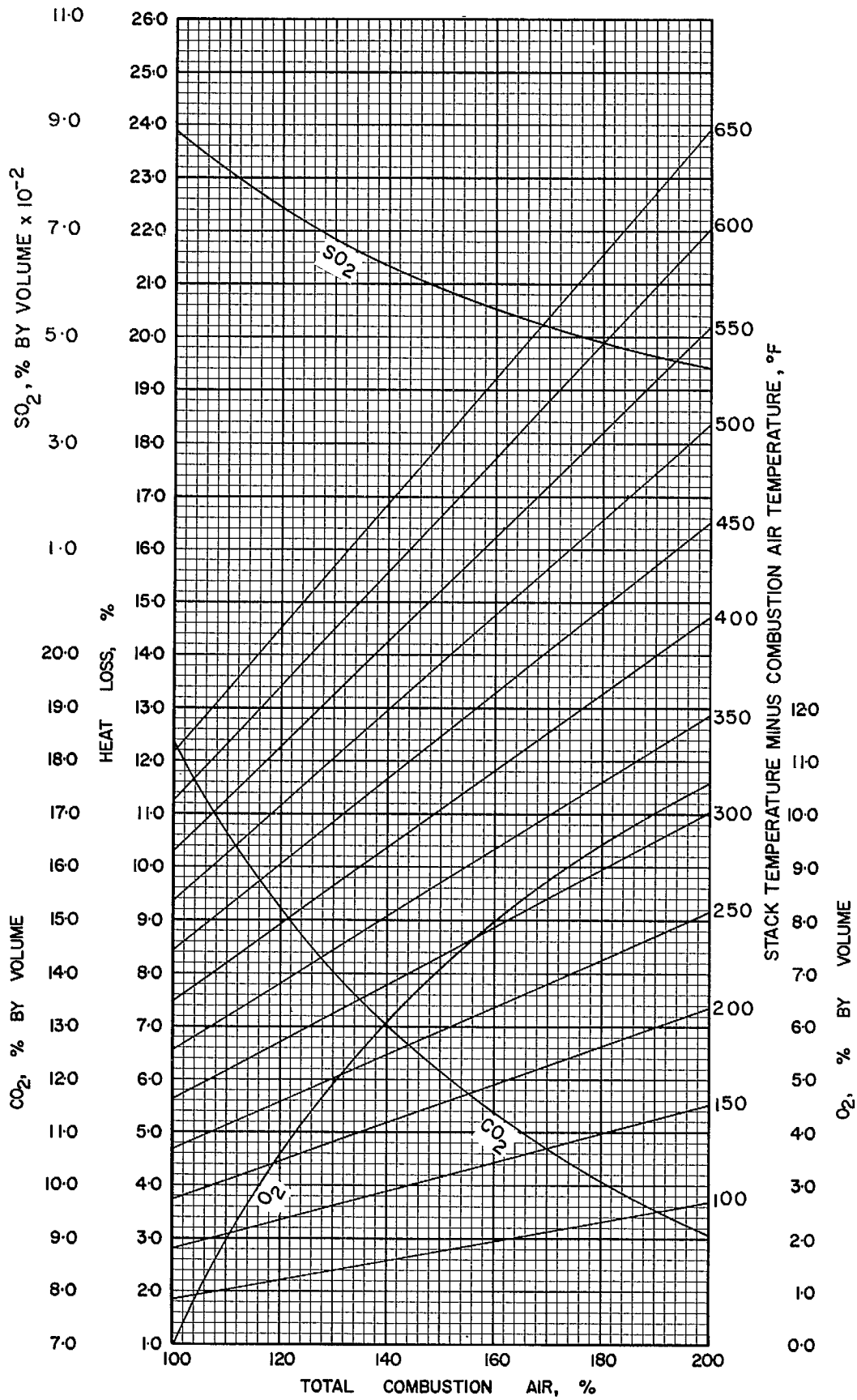


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·P·7

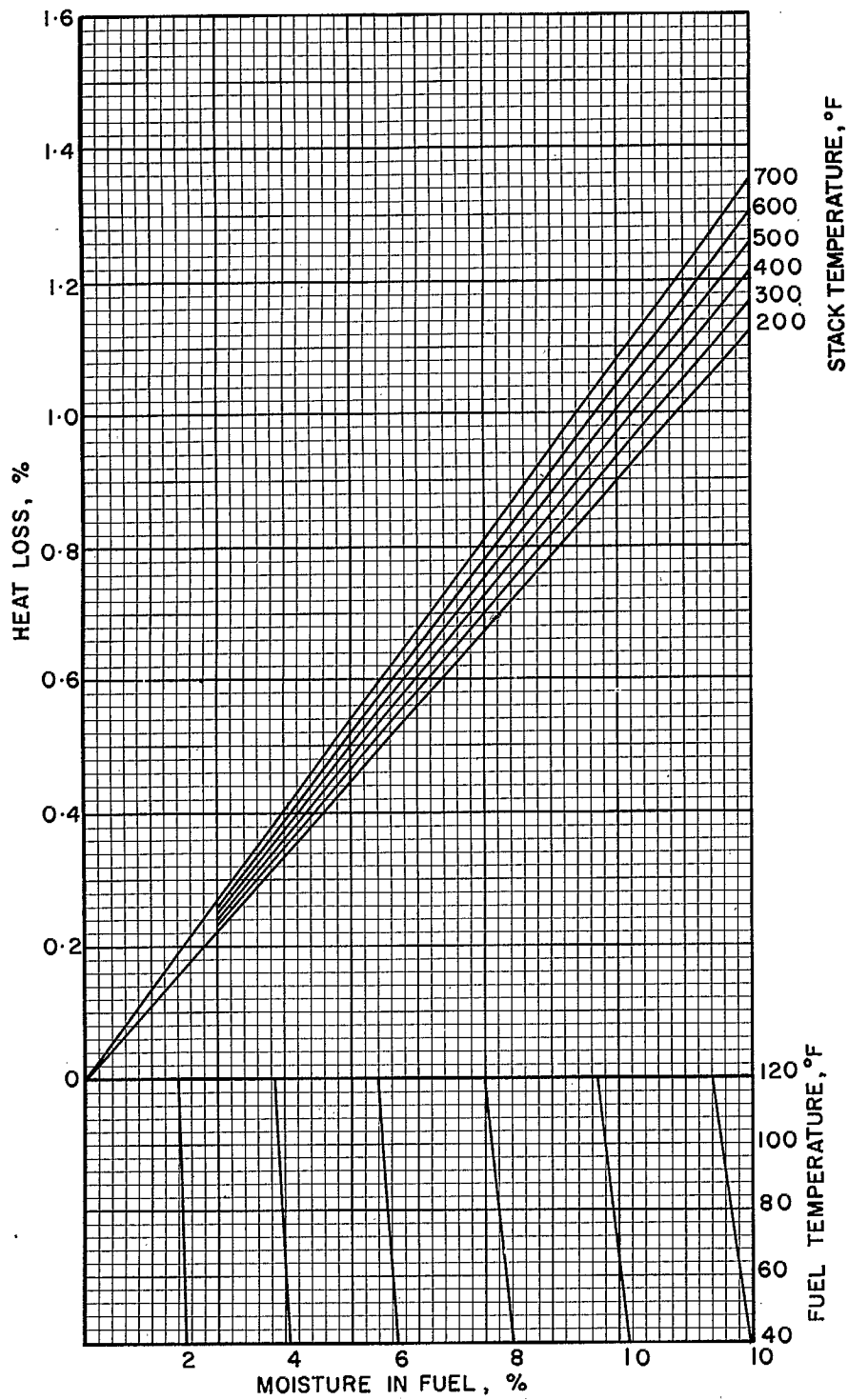


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US-P-7

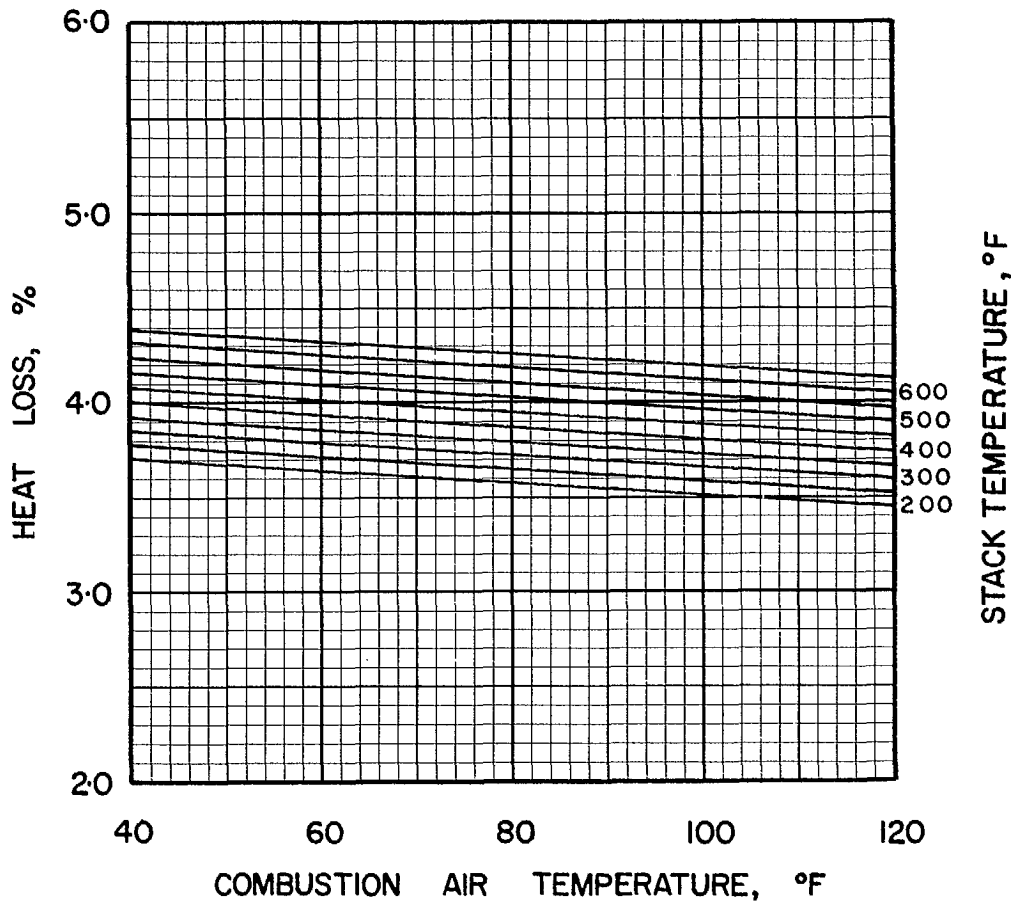


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·7

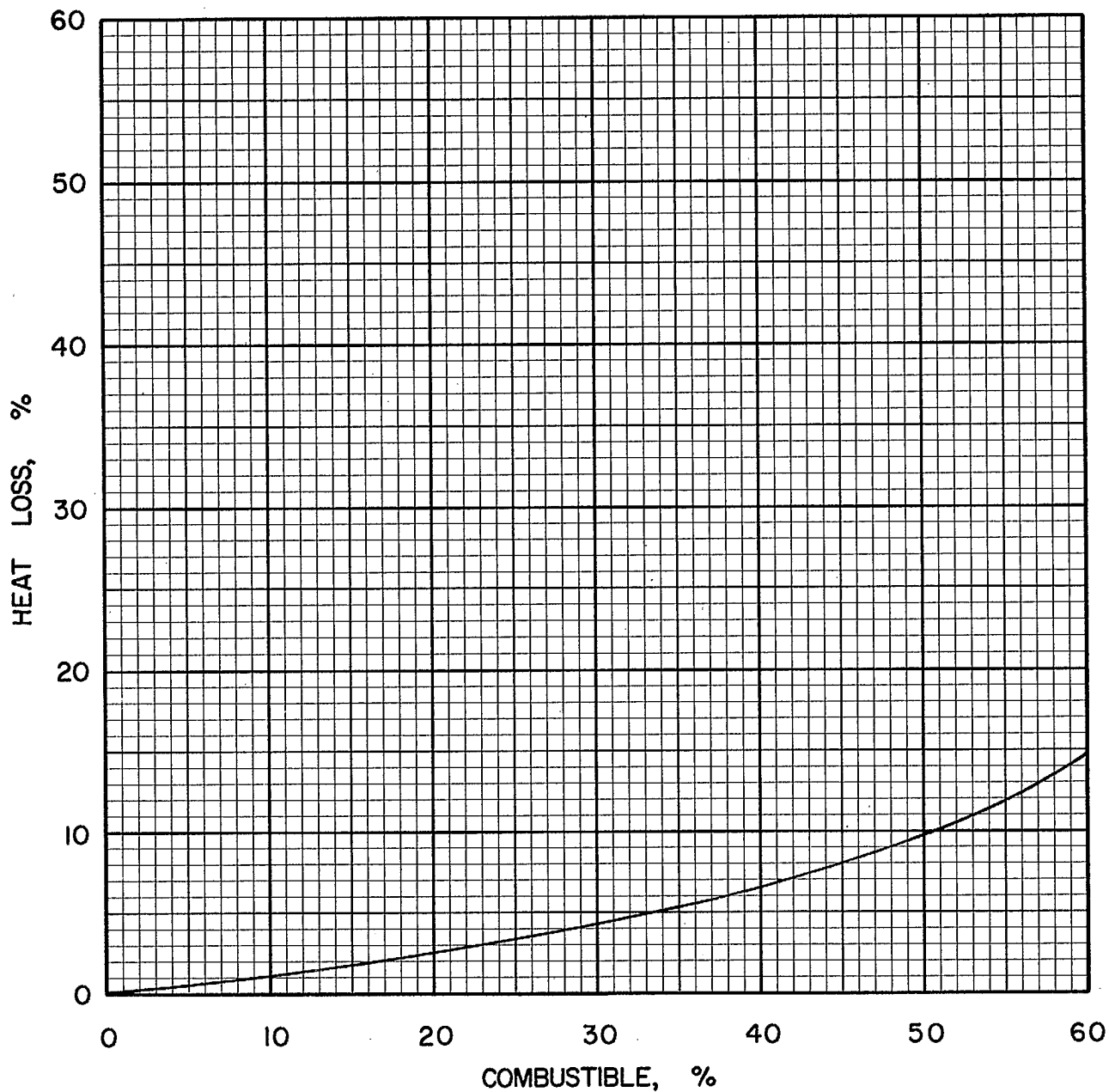


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·7

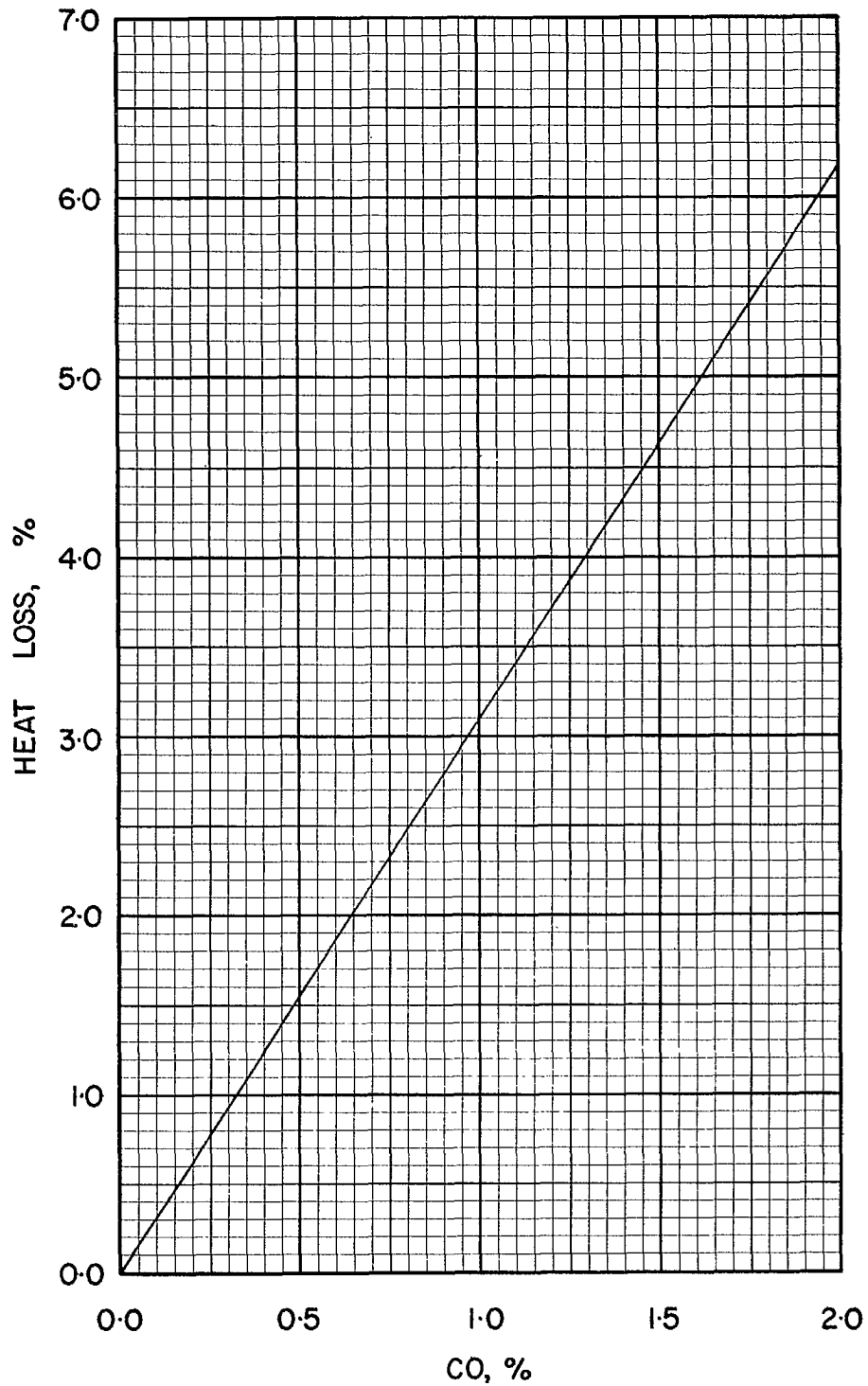


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US · P · 7

## COAL US P-8, JOANNE

Typical Moisture Range: 0–8%

### *Proximate Analysis (lb/lb dry coal)*

Ash	0.071
Volatile Matter	0.402
Fixed Carbon	0.527
Total	<u>1.000</u>

### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.775
Hydrogen (H)	0.052
Sulphur (S)	0.027
Nitrogen (N)	0.015
Oxygen (O)	0.060
Ash	<u>0.071</u>
Total	1.000

### *Gross Calorific Value*

Btu/lb:	14065
Btu/short ton:	$28.13 \times 10^6$
Btu/long ton:	$31.51 \times 10^6$
MJ/kg:	32.71

### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 71.11 lb	
$10^6$ Btu	= 0.03555 short tons	
$10^6$ Btu	= 0.03174 long tons	



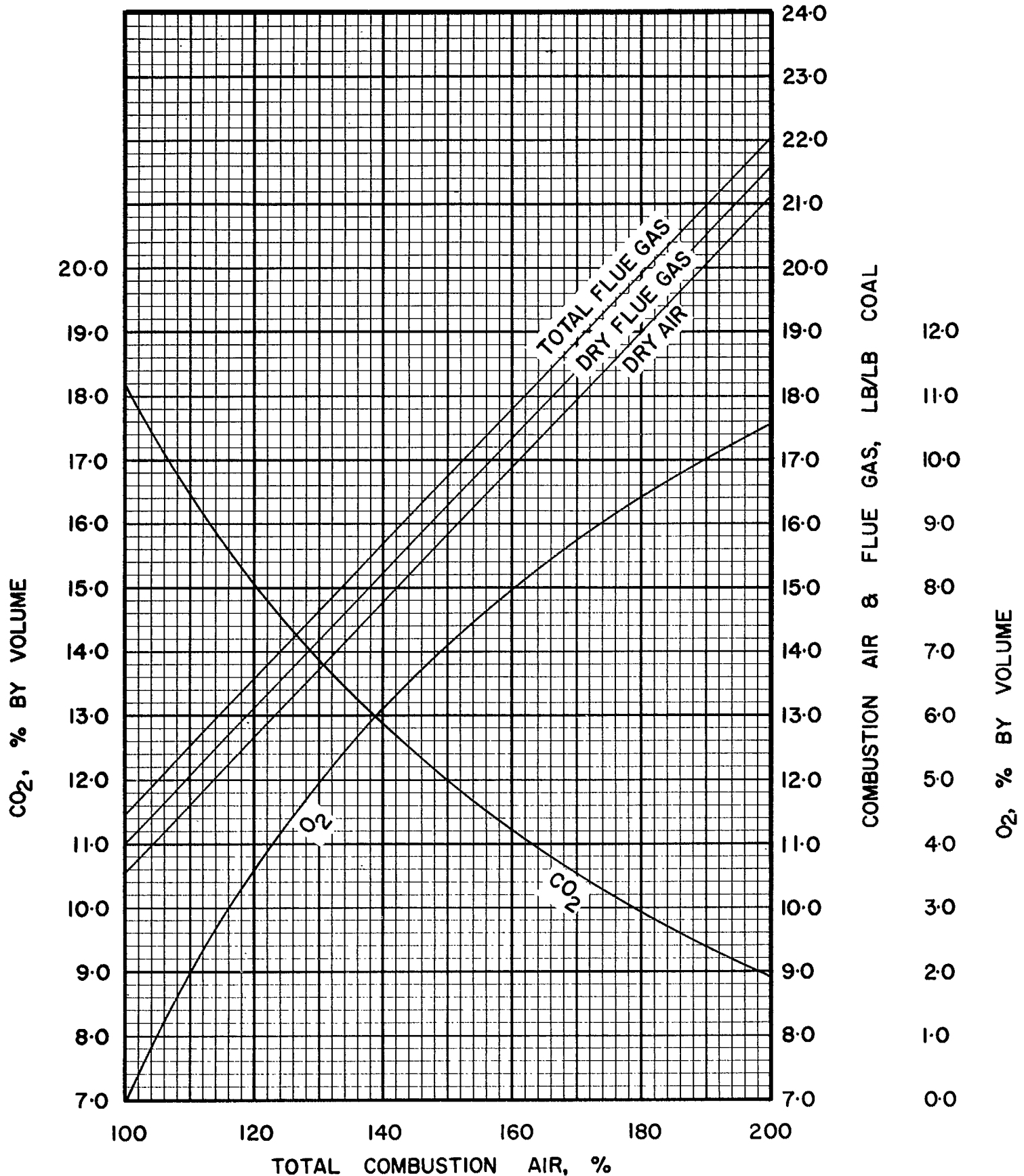


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·8

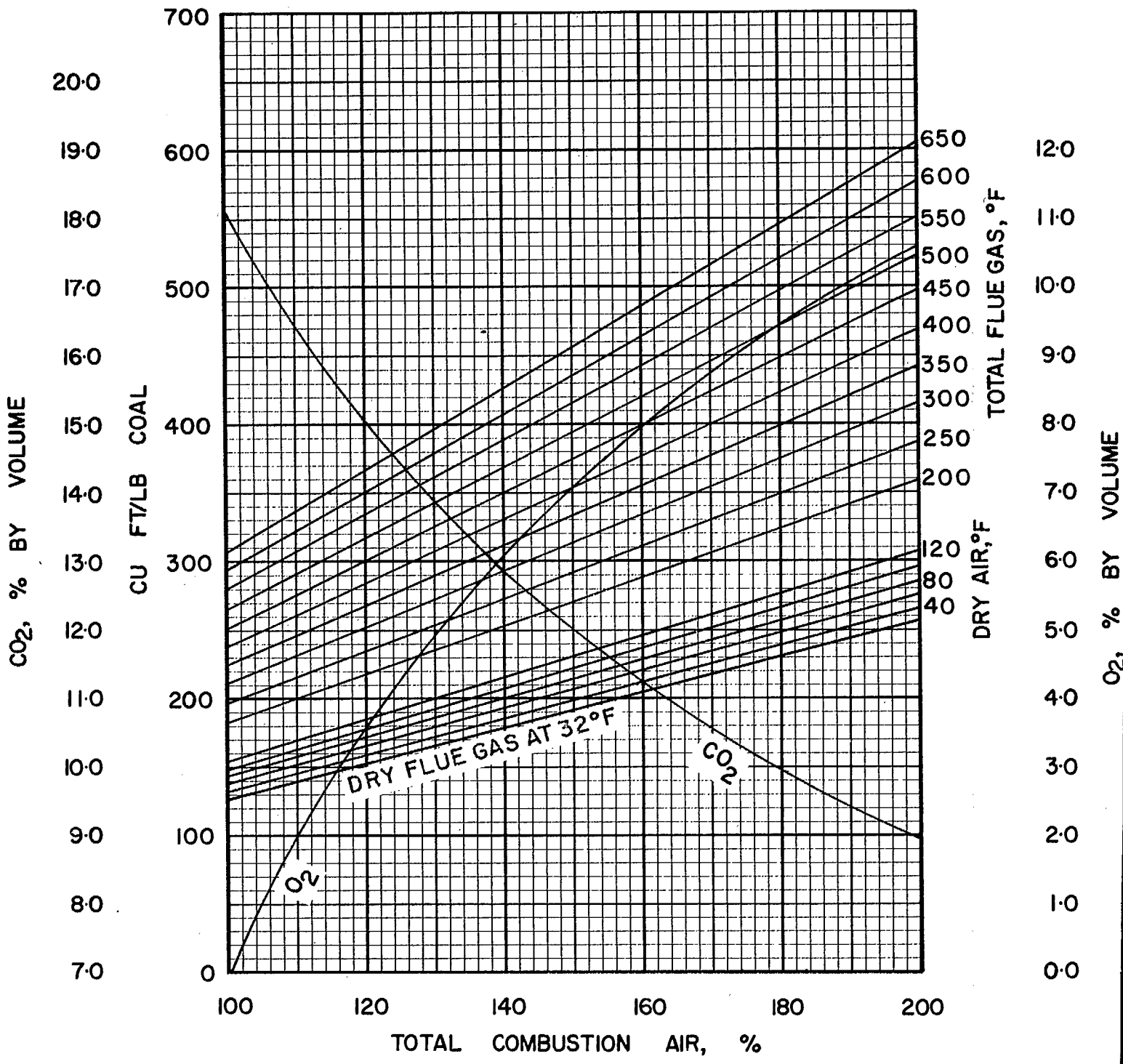


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US · P · 8

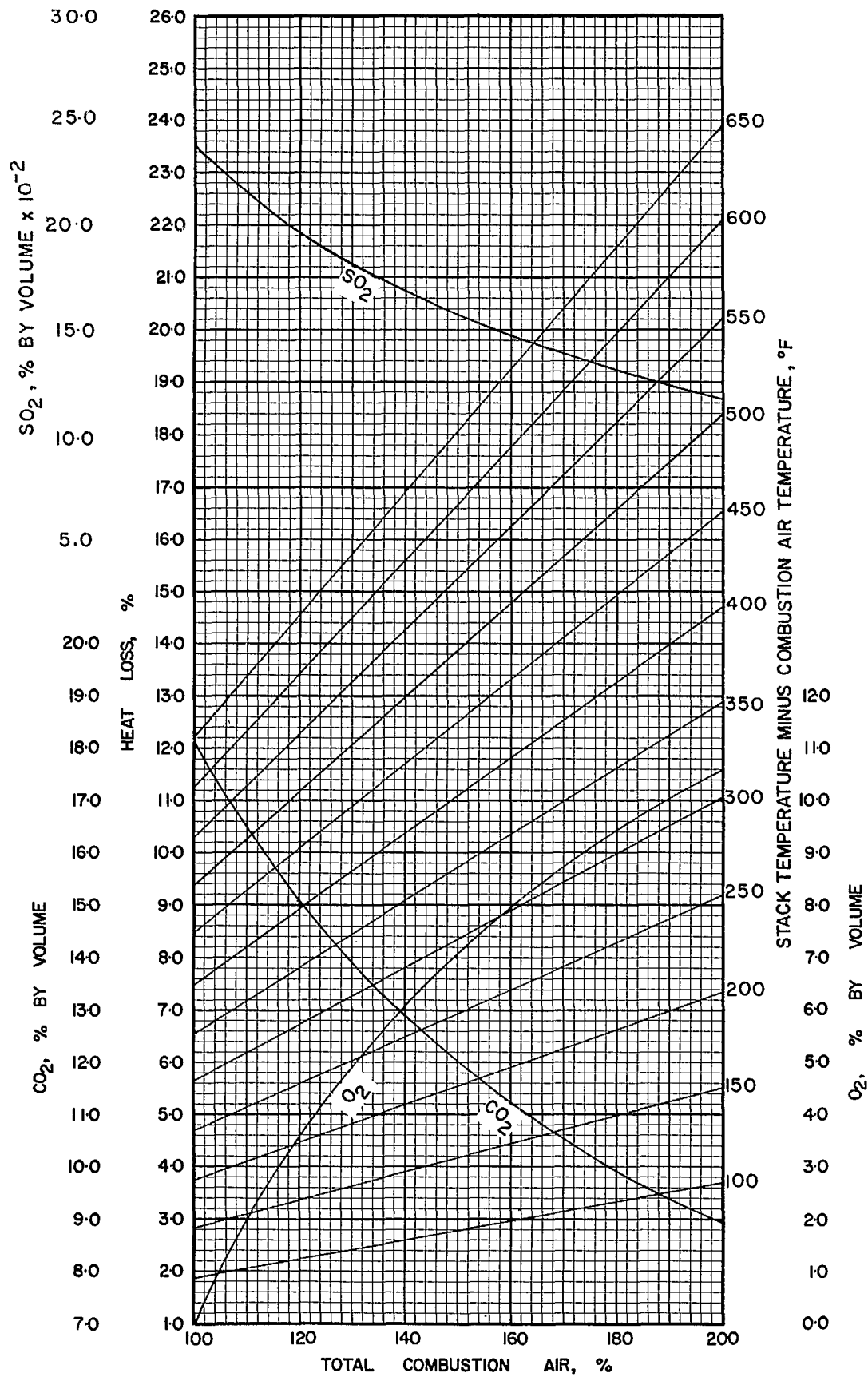


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US-P-8

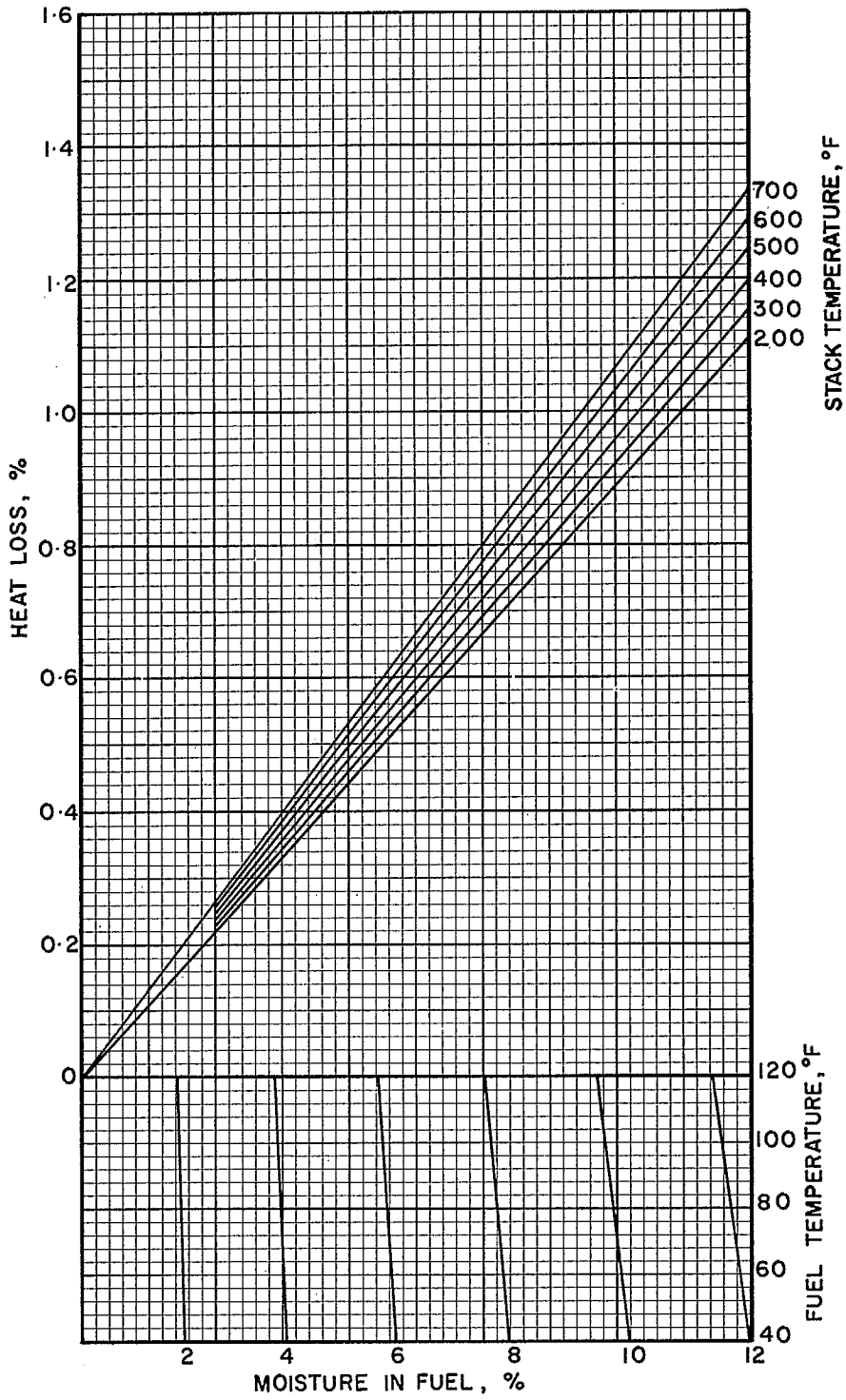


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·P·8

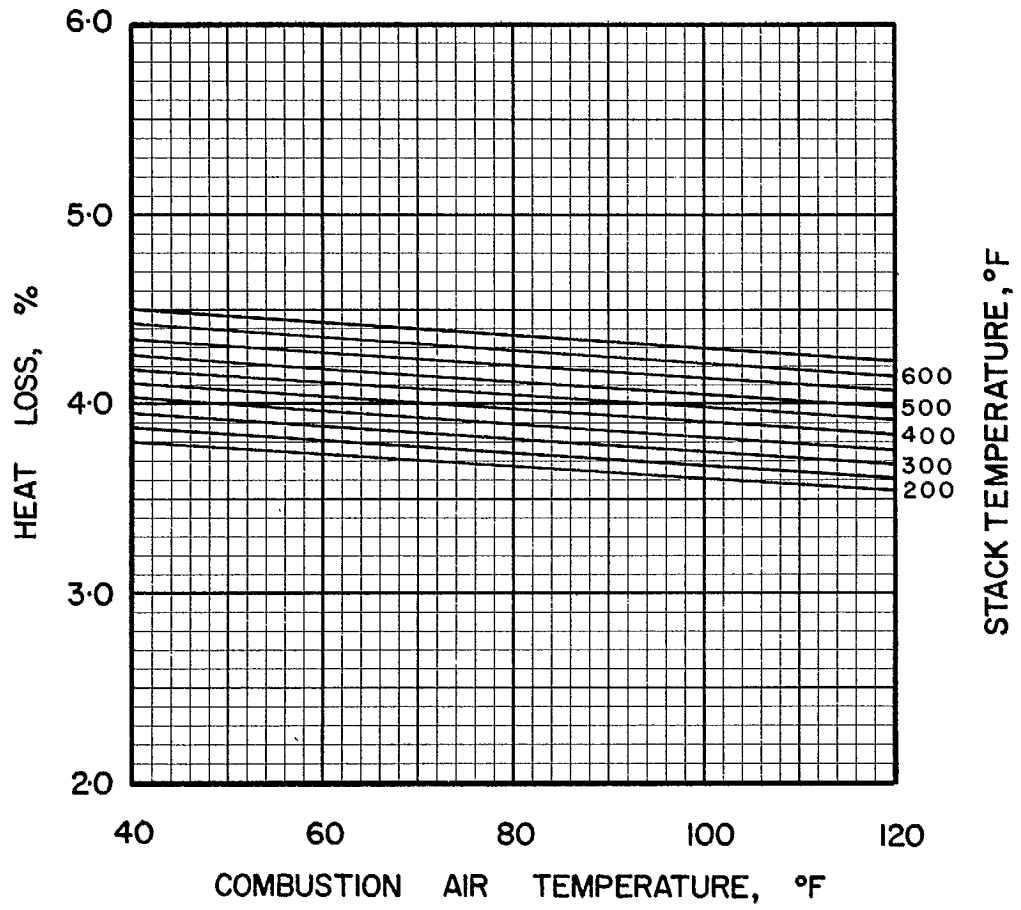


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·8

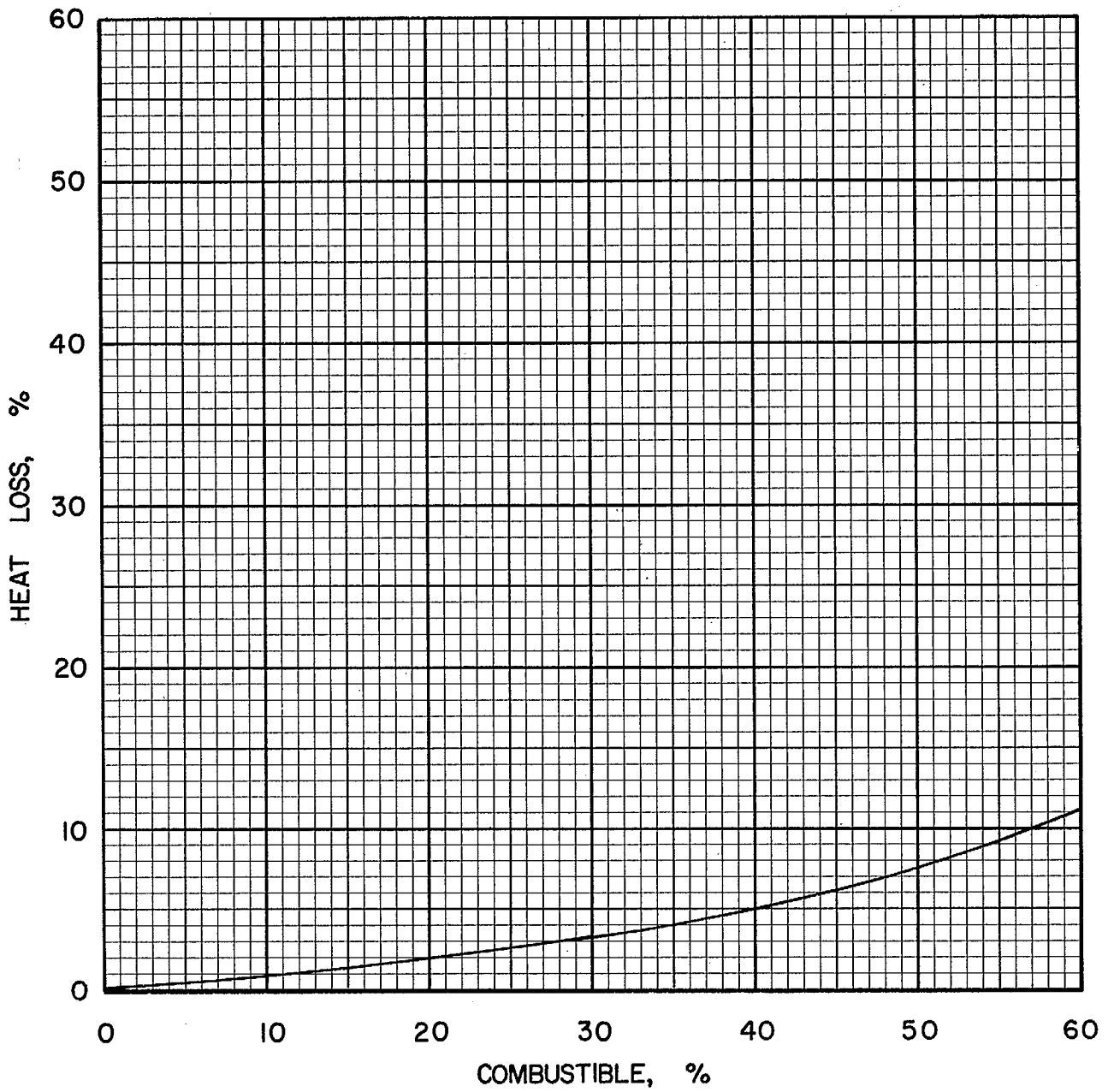


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·8

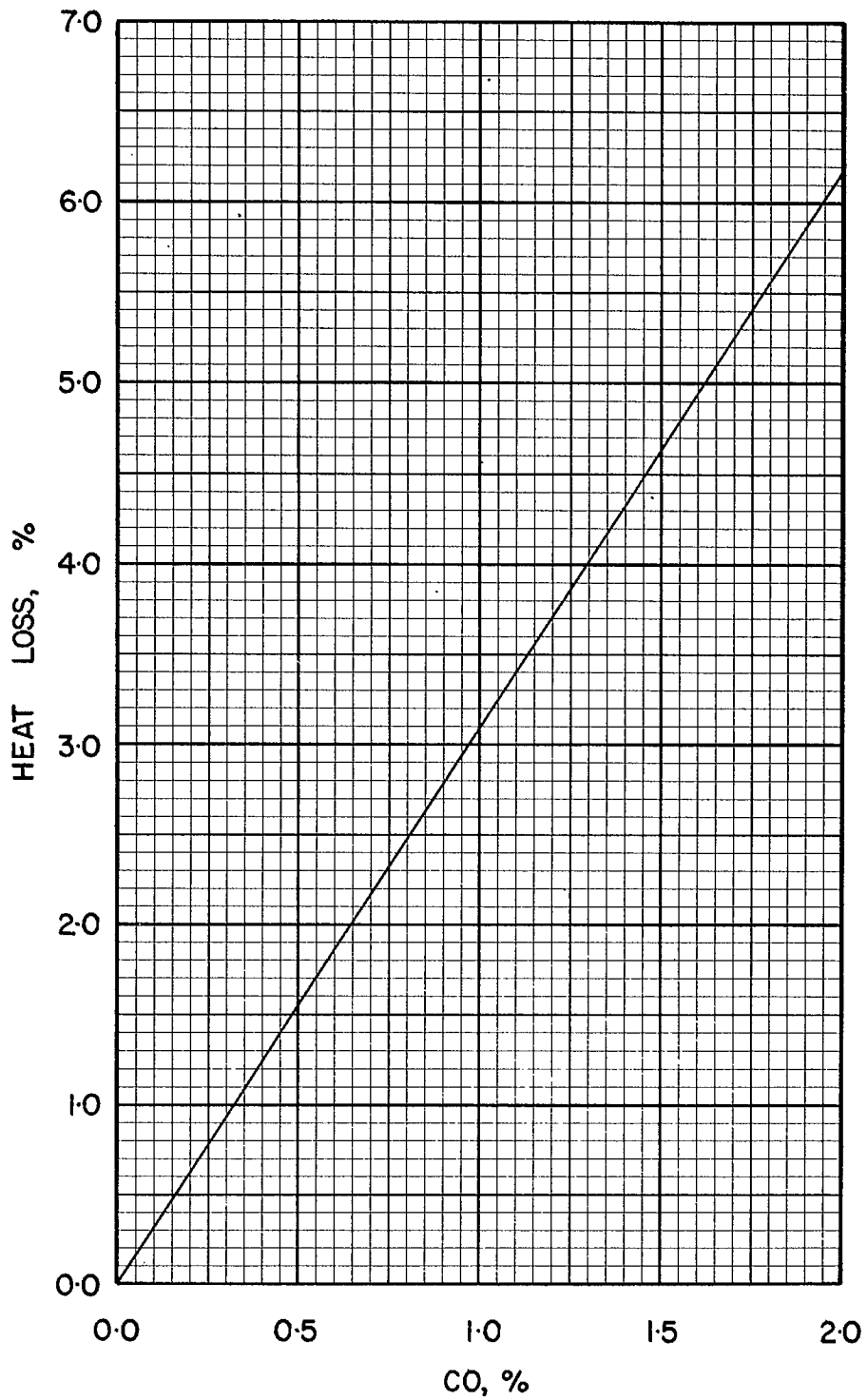


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·P·8

**COAL US P-9, MATHIES, WASHINGTON COUNTY**

Typical Moisture Range: 0–8%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.076
Volatile Matter	0.370
Fixed Carbon	<u>0.554</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.766
Hydrogen (H)	0.052
Sulphur (S)	0.017
Nitrogen (N)	0.014
Oxygen (O)	0.075
Ash	<u>0.076</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	13930
Btu/short ton:	$27.86 \times 10^6$
Btu/long ton:	$31.20 \times 10^6$
MJ/kg:	32.39

*Conversion Factors*

1 short ton	= 0.8929	long tons	= 2000 lb
$10^6$ Btu	= 71.78	lb	
$10^6$ Btu	= 0.03589	short tons	
$10^6$ Btu	= 0.03205	long tons	



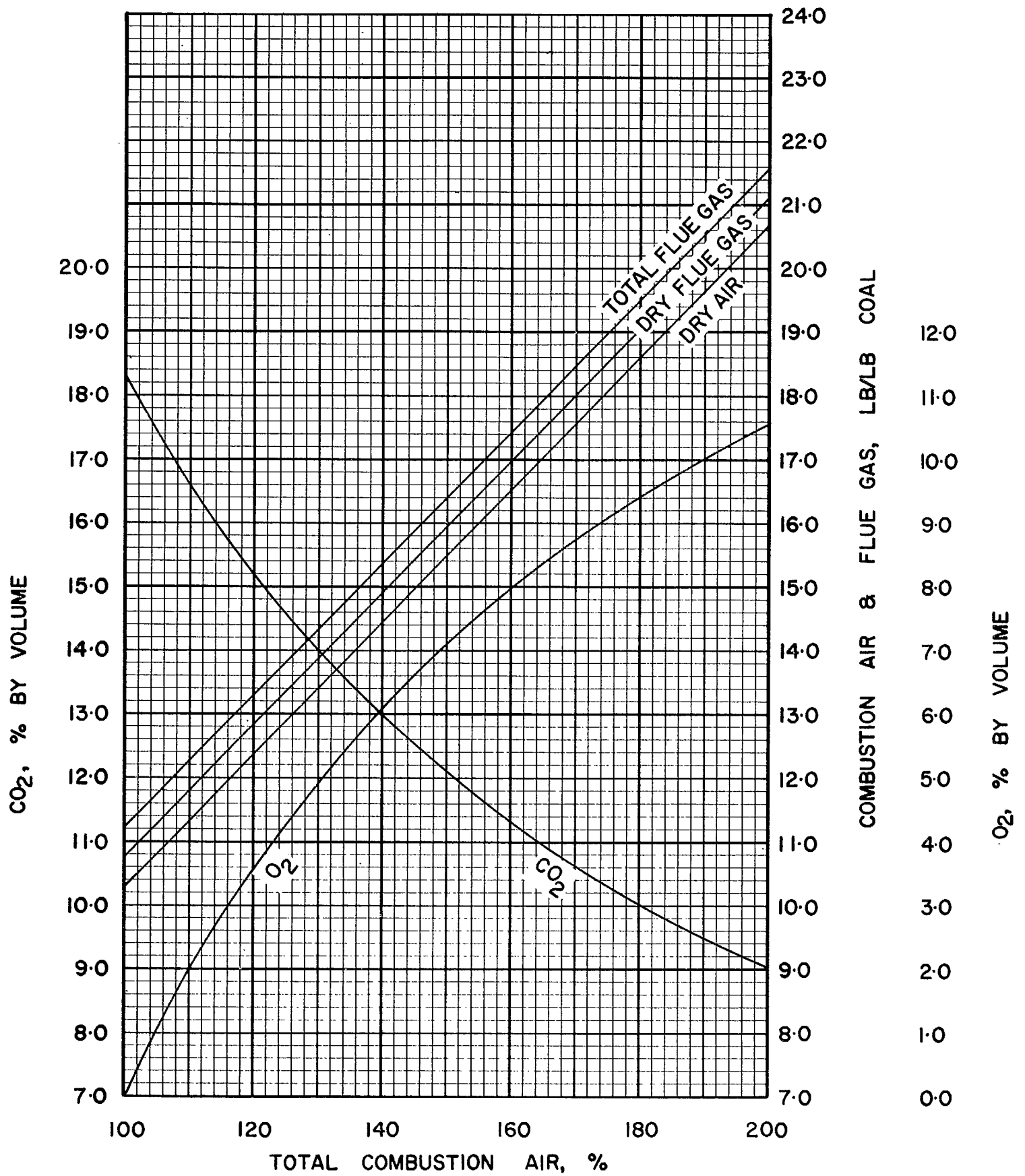


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·9

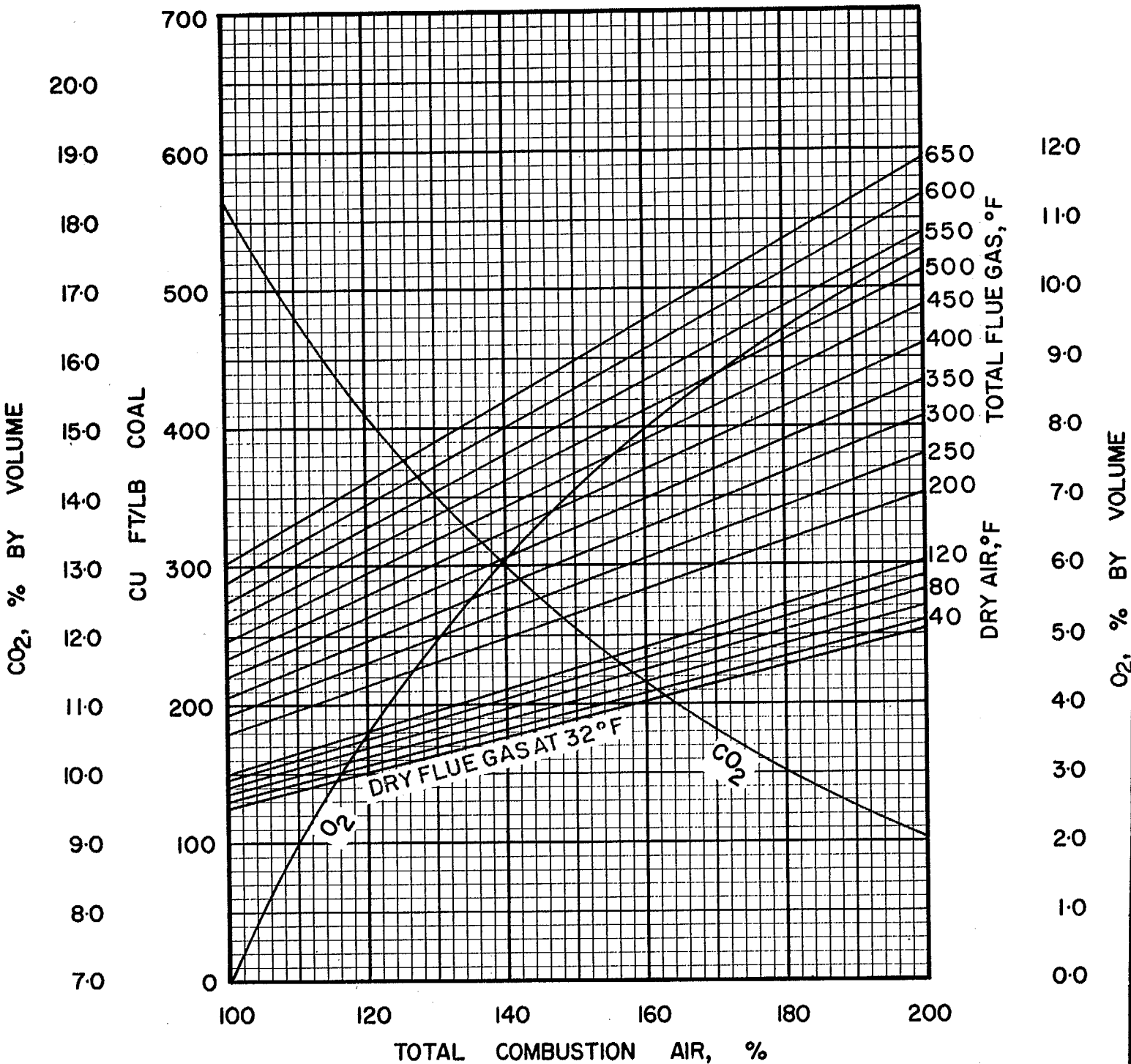


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·P·9

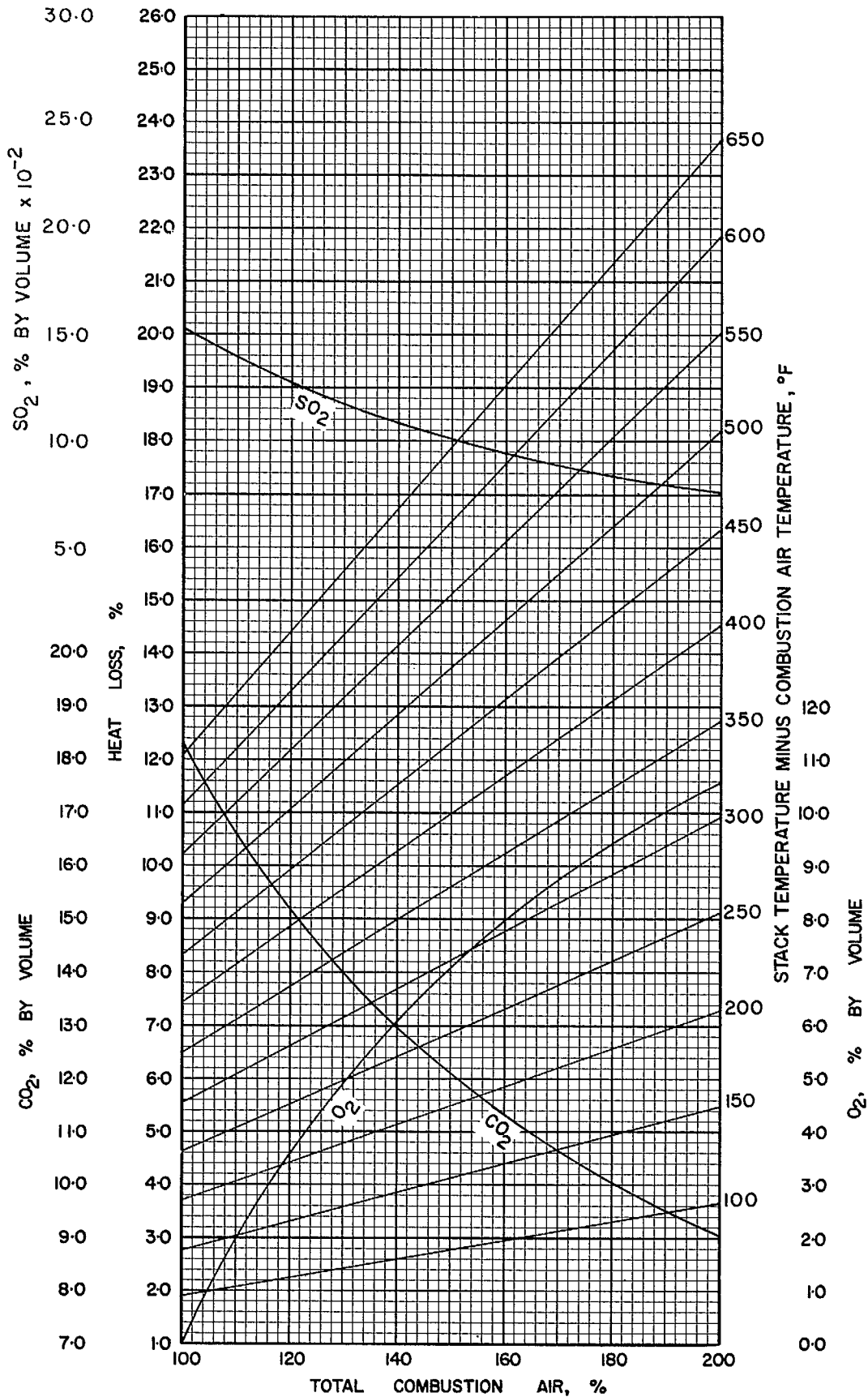


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US · P · 9

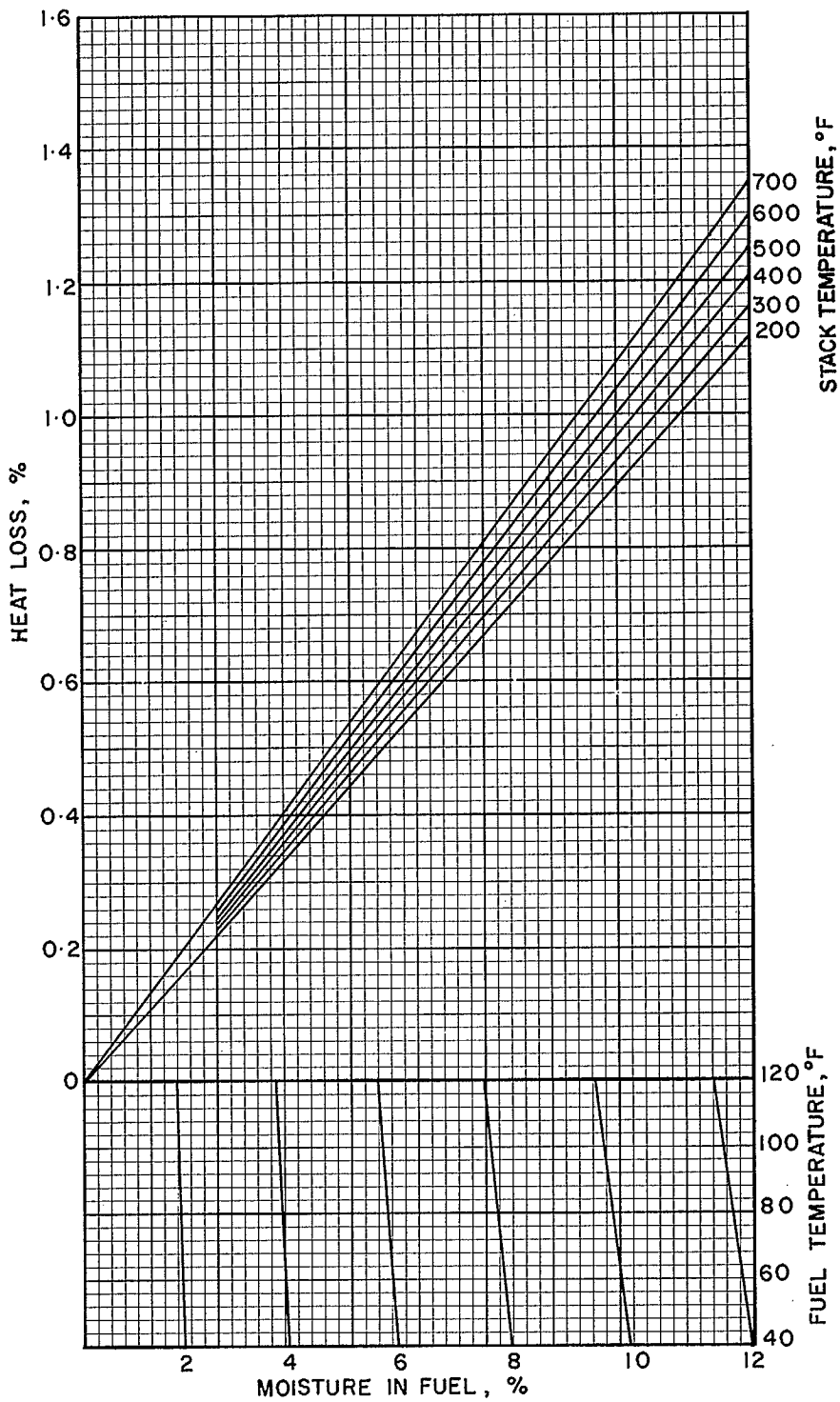


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·P·9

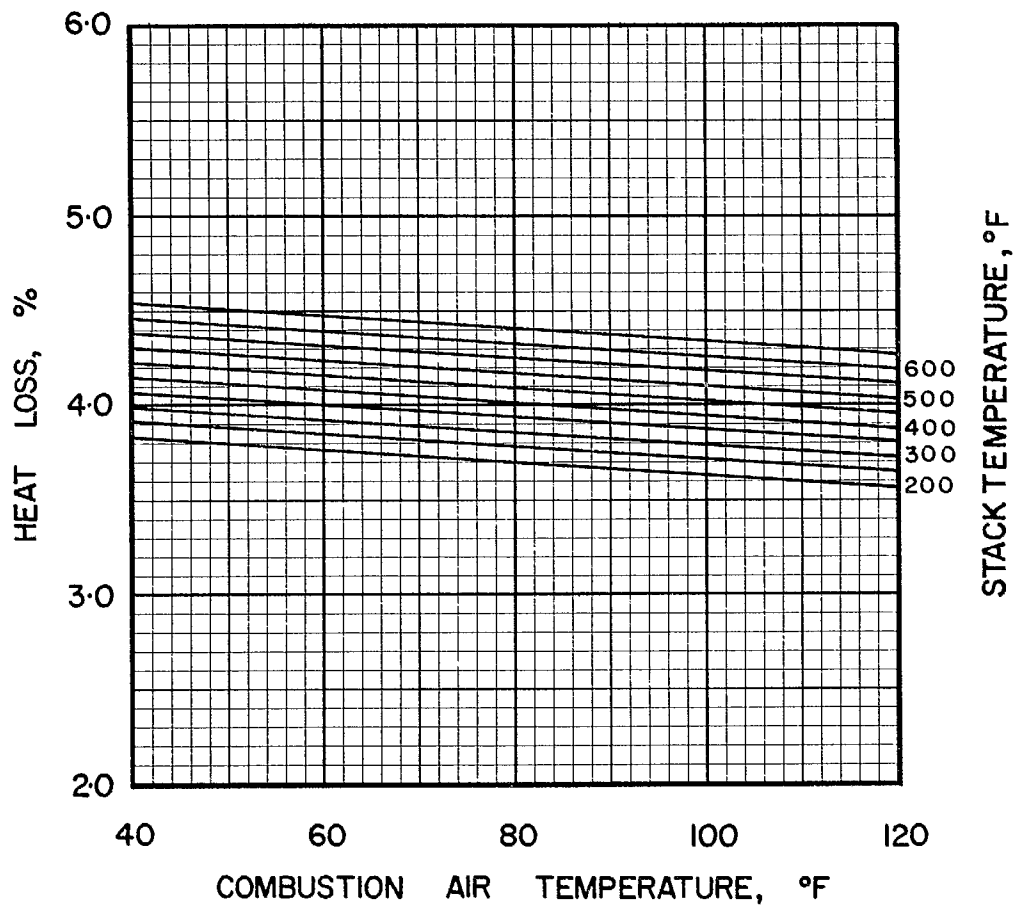


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·9

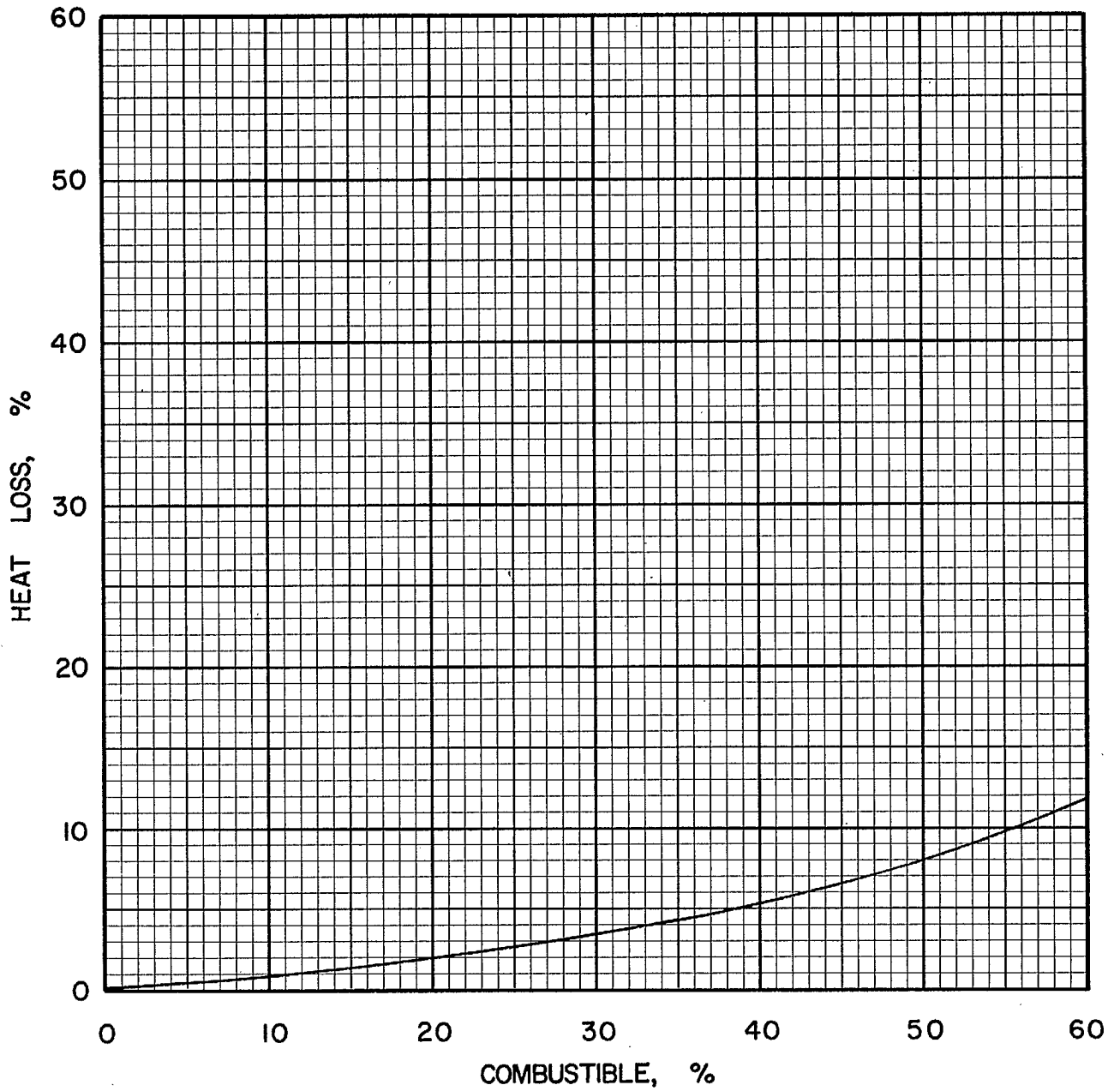


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·9

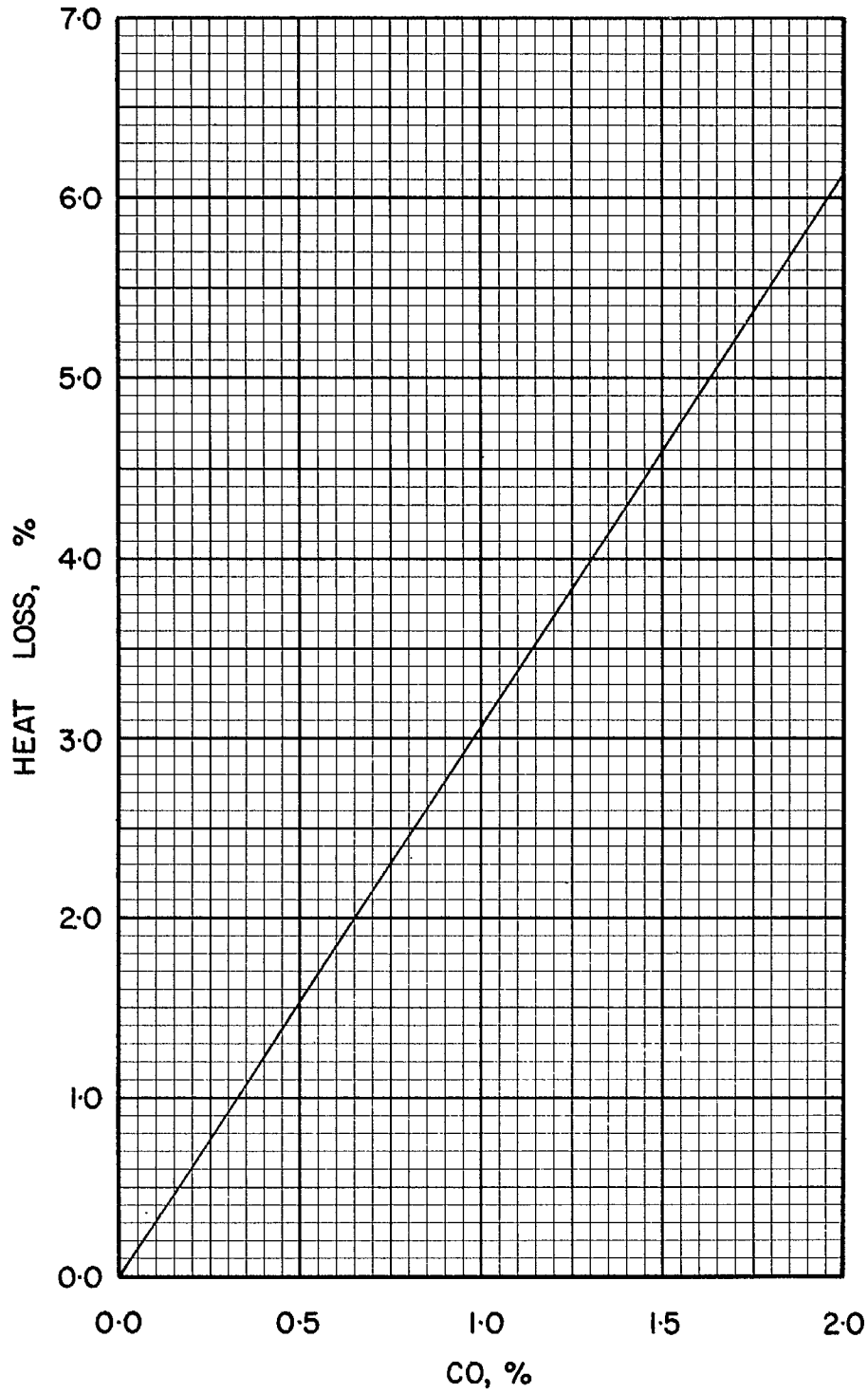


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US·P·9

## COAL US P-10, MARGARET, FREEPORT SEAM

Typical Moisture Range: 0–8%

### *Proximate Analysis (lb/lb dry coal)*

Ash	0.094
Volatile Matter	0.371
Fixed Carbon	<u>0.535</u>
Total	1.000

### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.788
Hydrogen (H)	0.048
Sulphur (S)	0.018
Nitrogen (N)	0.017
Oxygen (O)	0.035
Ash	<u>0.094</u>
Total	1.000

### *Gross Calorific Value*

Btu/lb:	13600
Btu/short ton:	$27.20 \times 10^6$
Btu/long ton:	$30.46 \times 10^6$
MJ/kg:	31.63

### *Conversion Factors*

1 short ton	= 0.8929	long tons	= 2000 lb
$10^6$ Btu	= 73.53	lb	
$10^6$ Btu	= 0.03676	short tons	
$10^6$ Btu	= 0.03283	long tons	



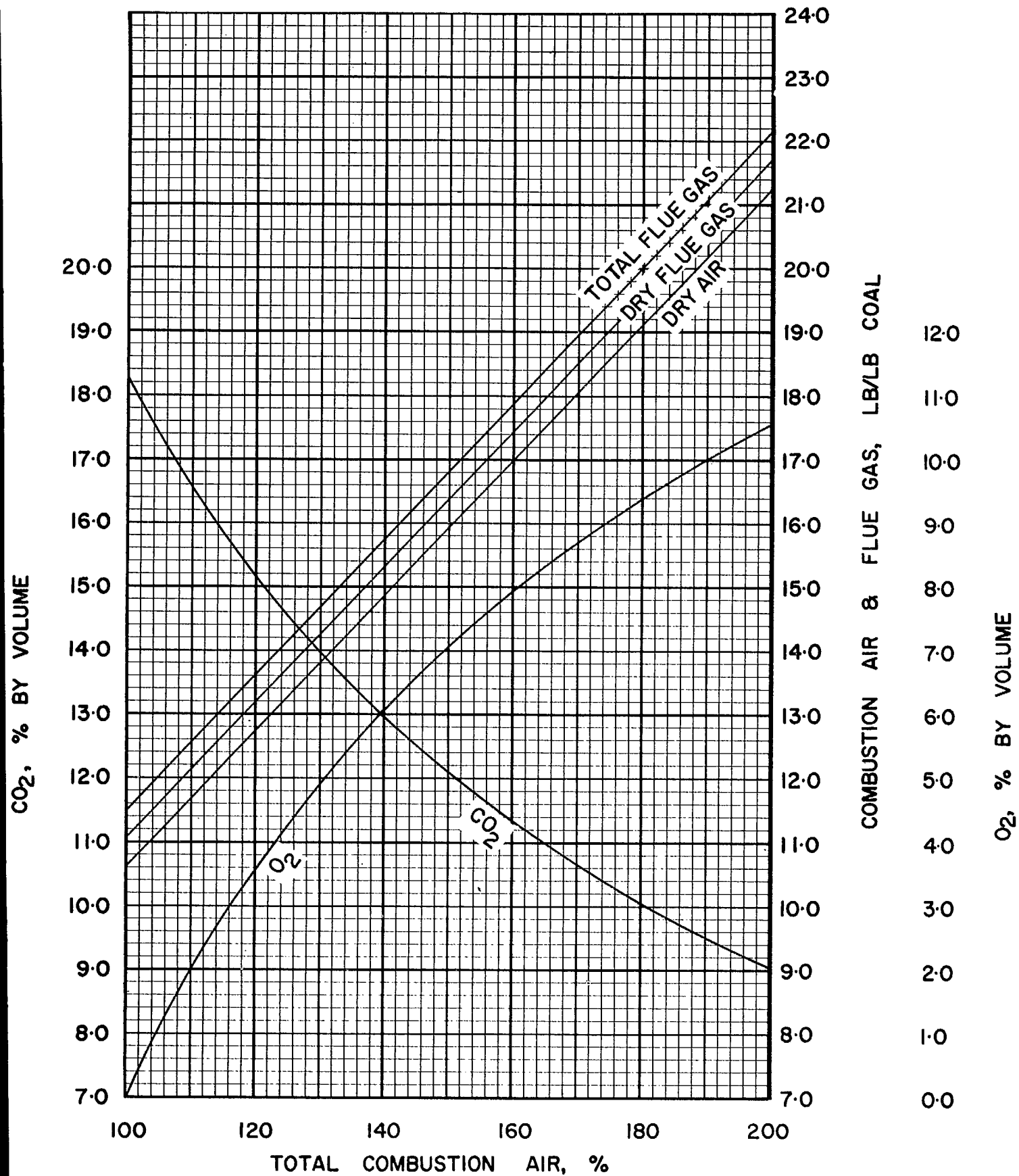


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US · P · 10

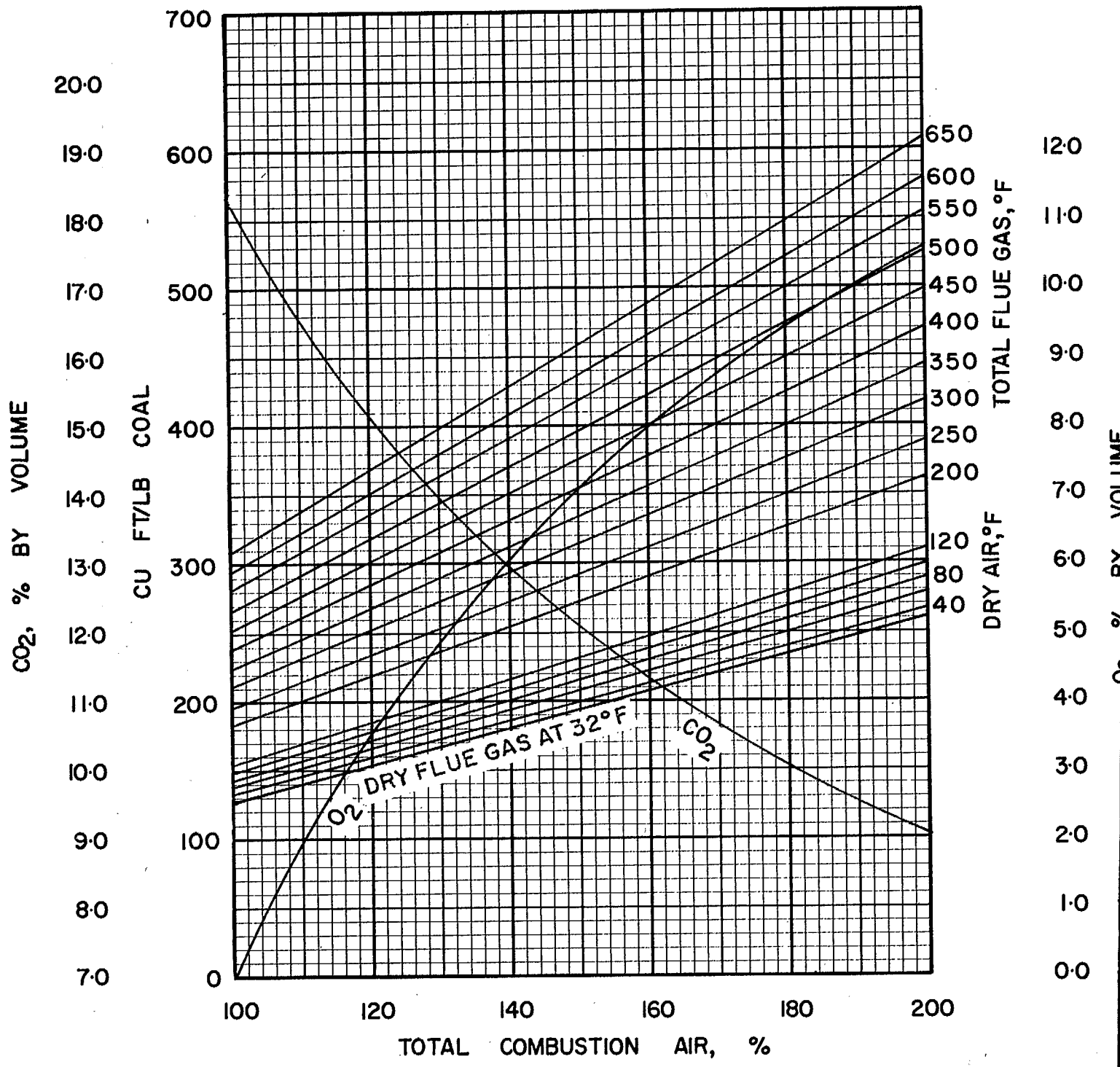


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US · P · 10

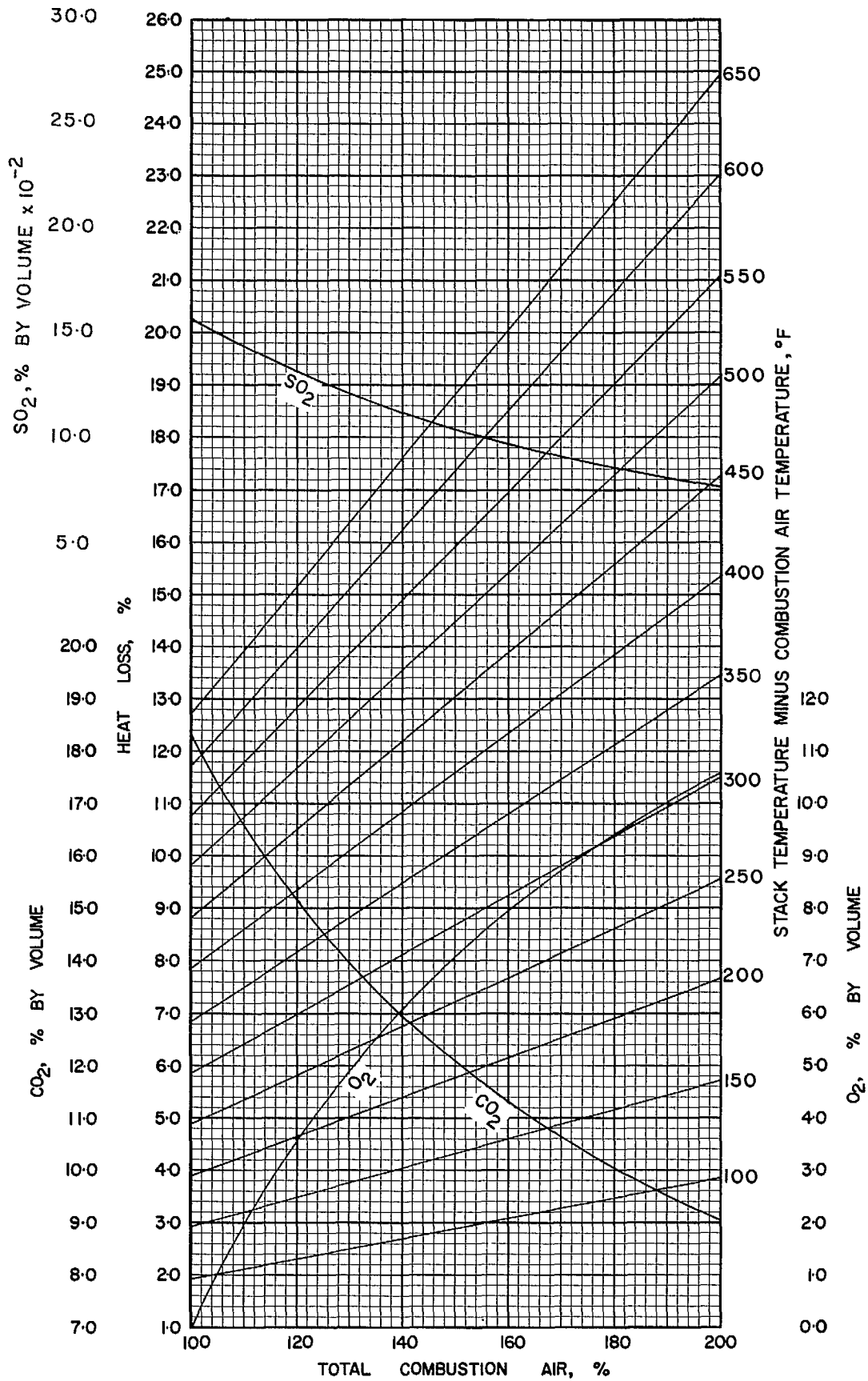


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·P·10

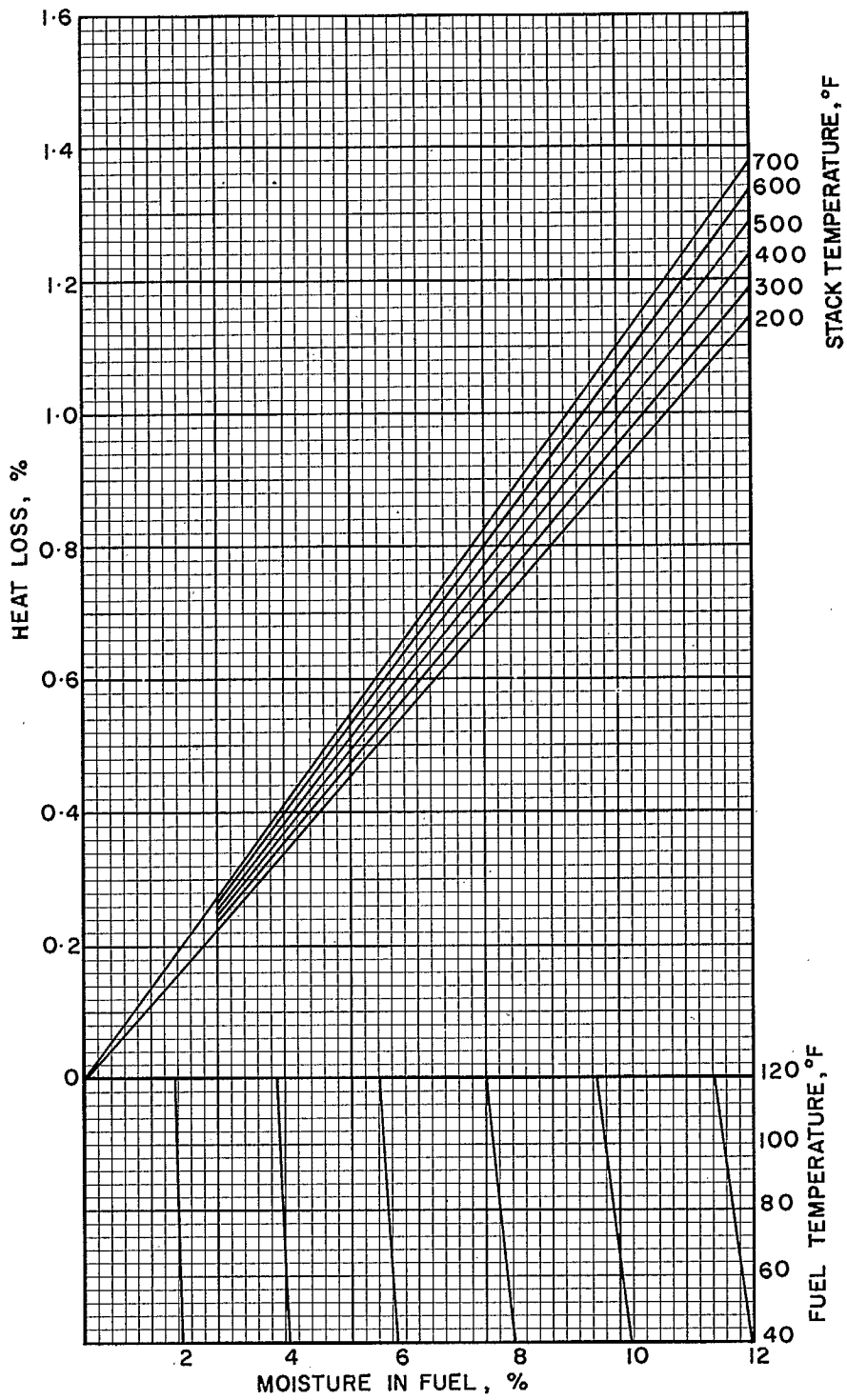


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·P·10

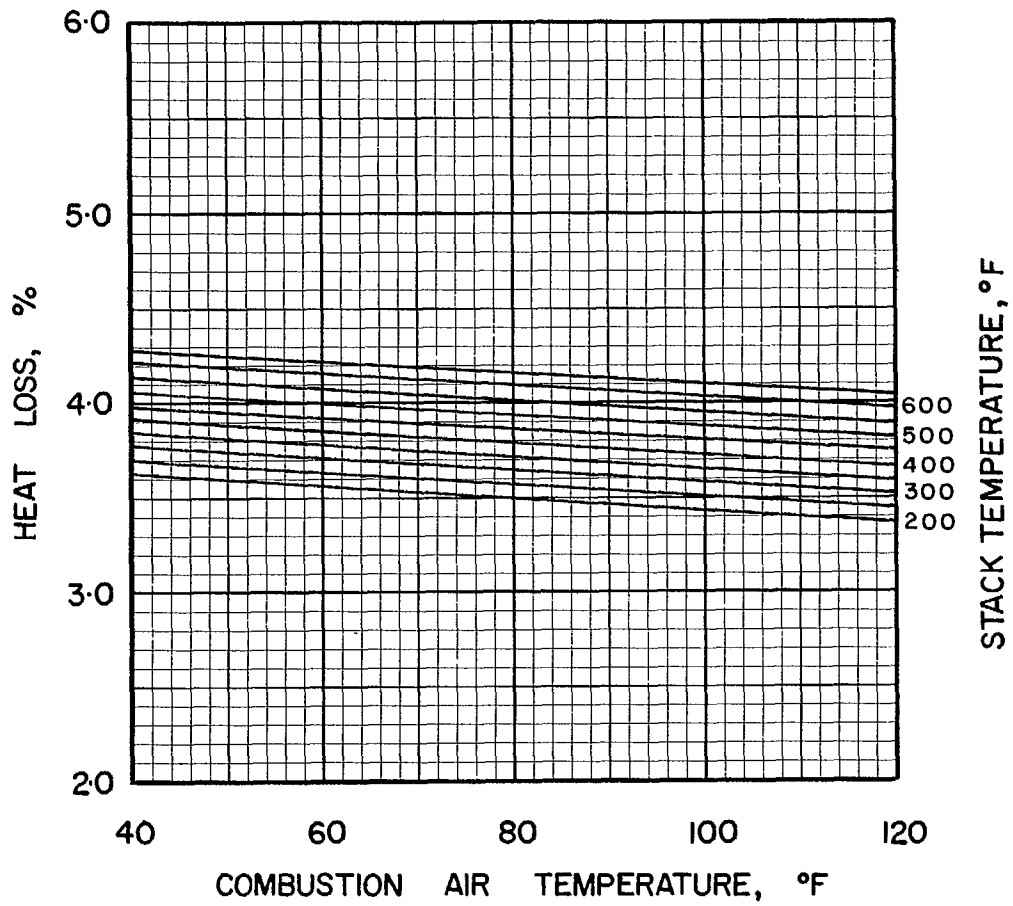


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·10

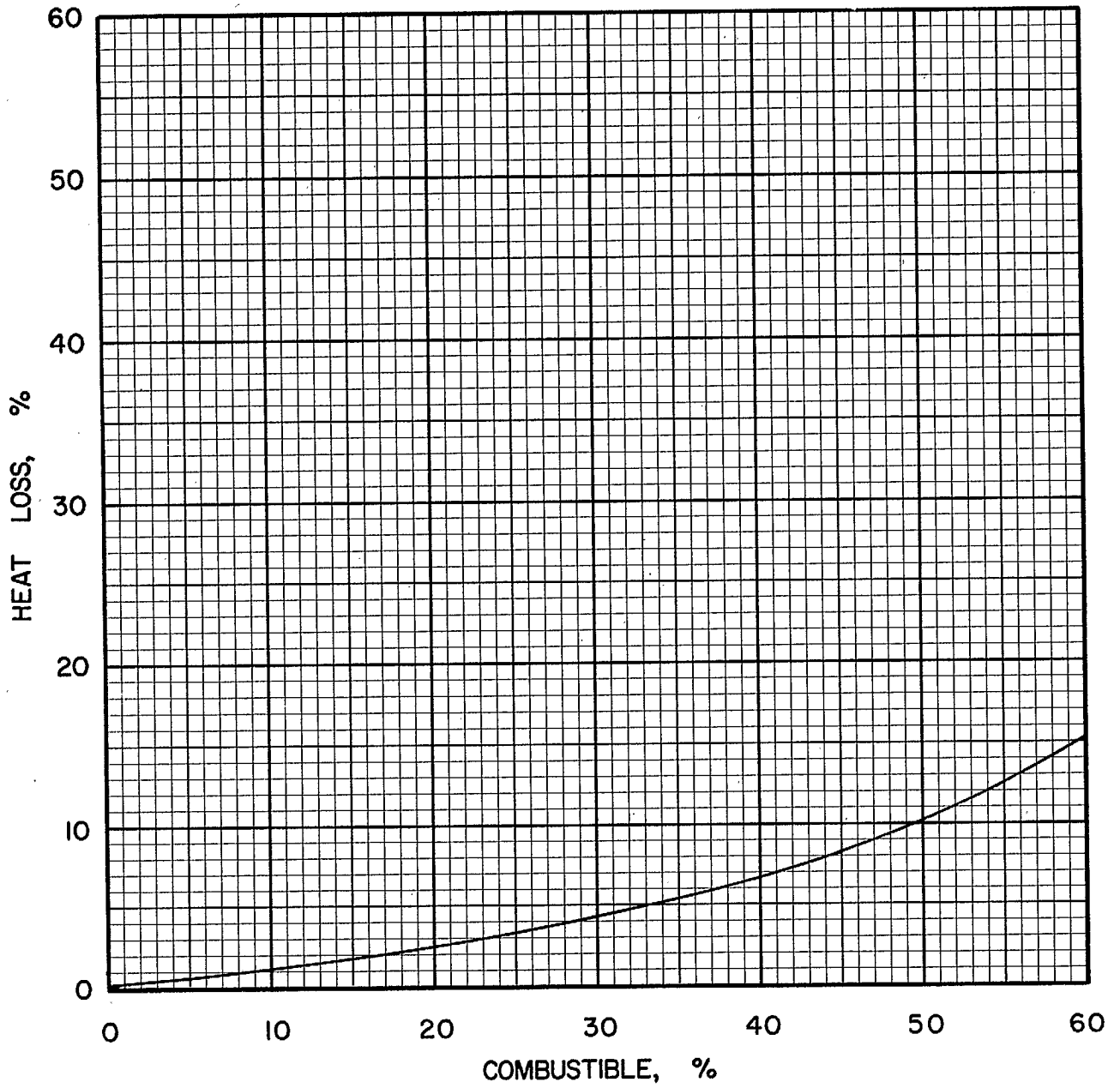


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·10

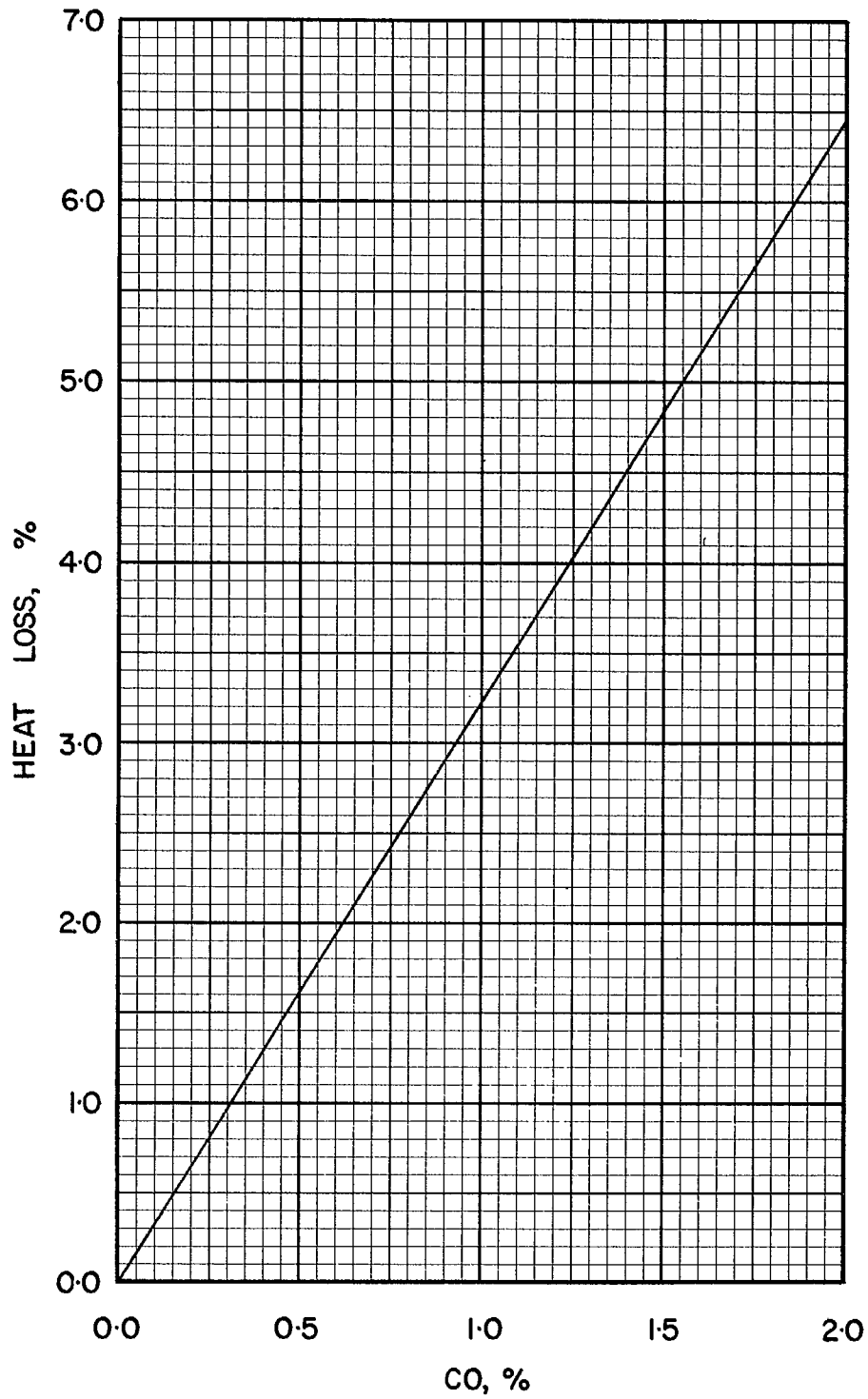


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US·P·10

COAL US P-11, PILGRIM, LAWRENCE COUNTY

Typical Moisture Range: 4–12%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.082
Volatile Matter	0.349
Fixed Carbon	<u>0.569</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.780
Hydrogen (H)	0.050
Sulphur (S)	0.011
Nitrogen (N)	0.015
Oxygen (O)	0.062
Ash	<u>0.082</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	13810
Btu/short ton:	$27.62 \times 10^6$
Btu/long ton:	$30.93 \times 10^6$
MJ/kg:	32.11

*Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 72.41 lb	
$10^6$ Btu	= 0.03621 short tons	
$10^6$ Btu	= 0.03233 long tons	



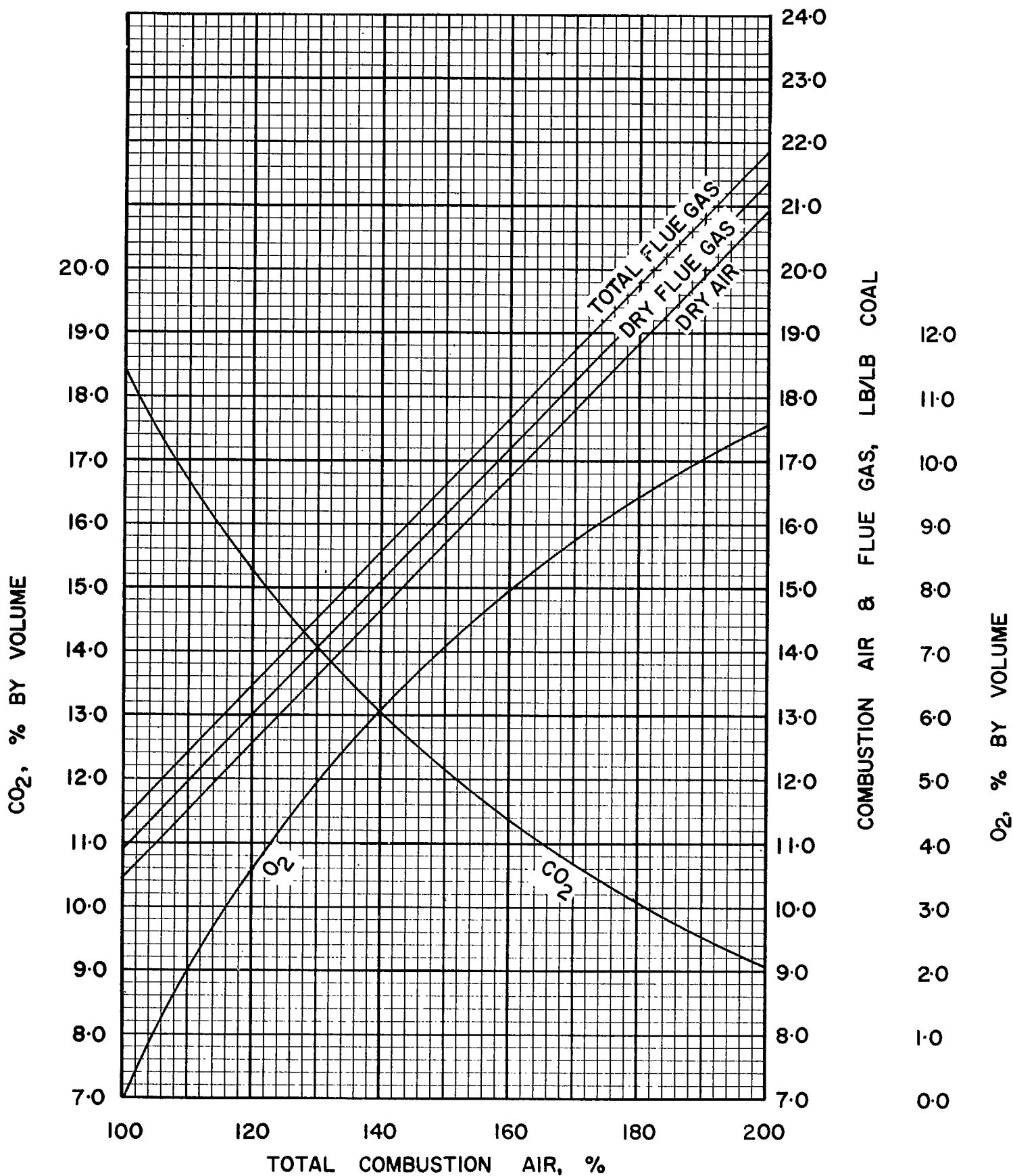


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·11

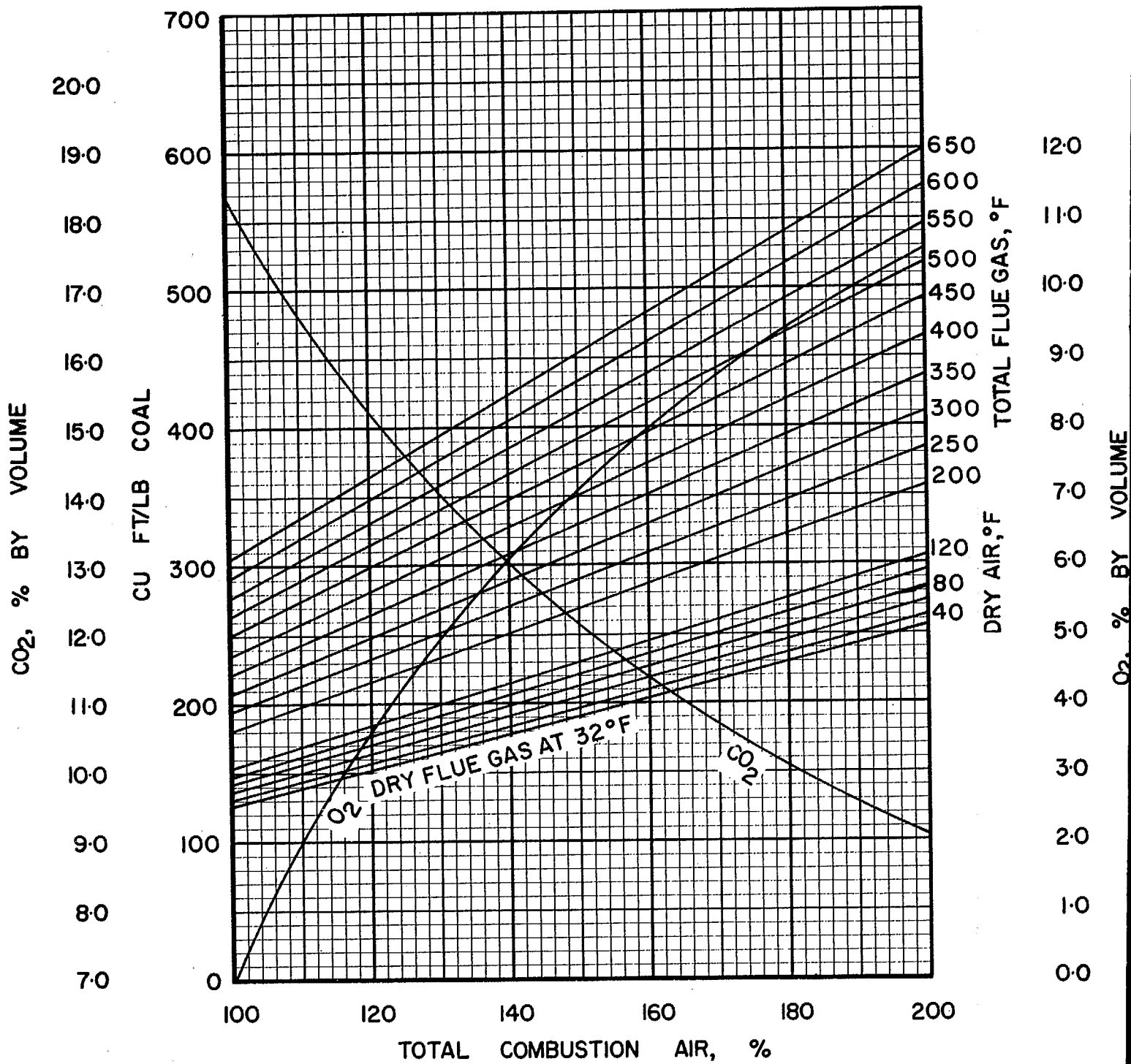


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·P·11

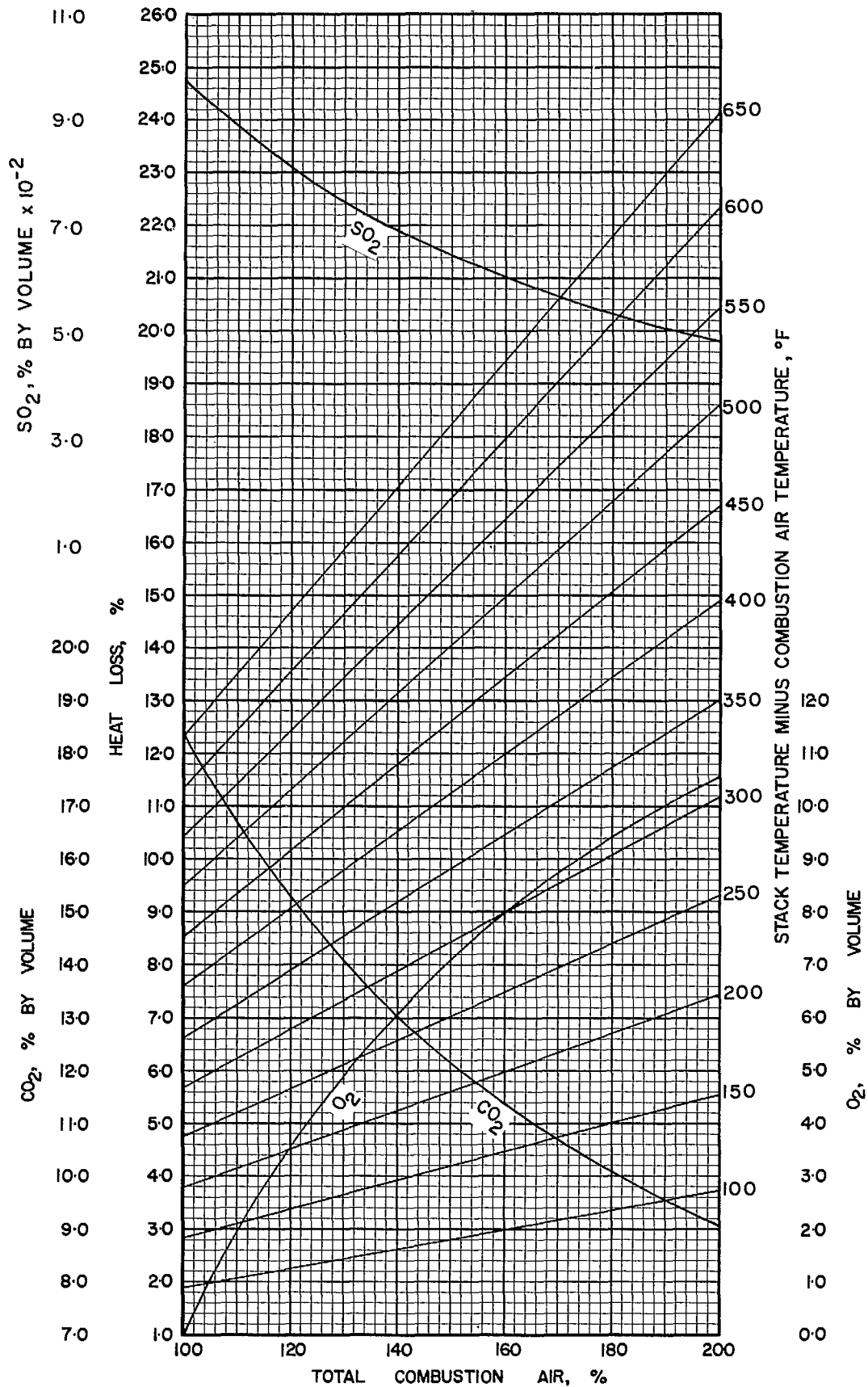


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·P·11

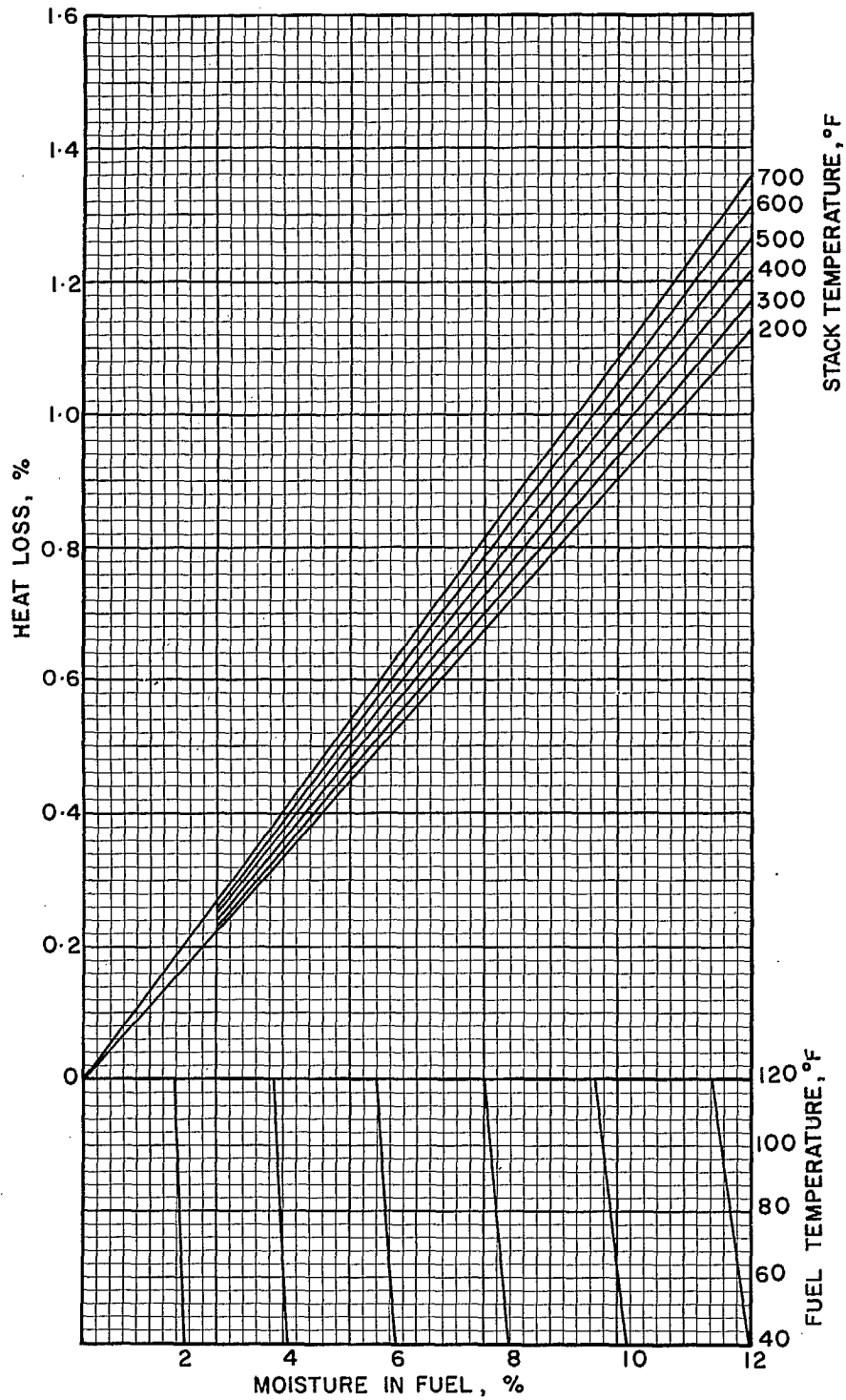


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·P·II

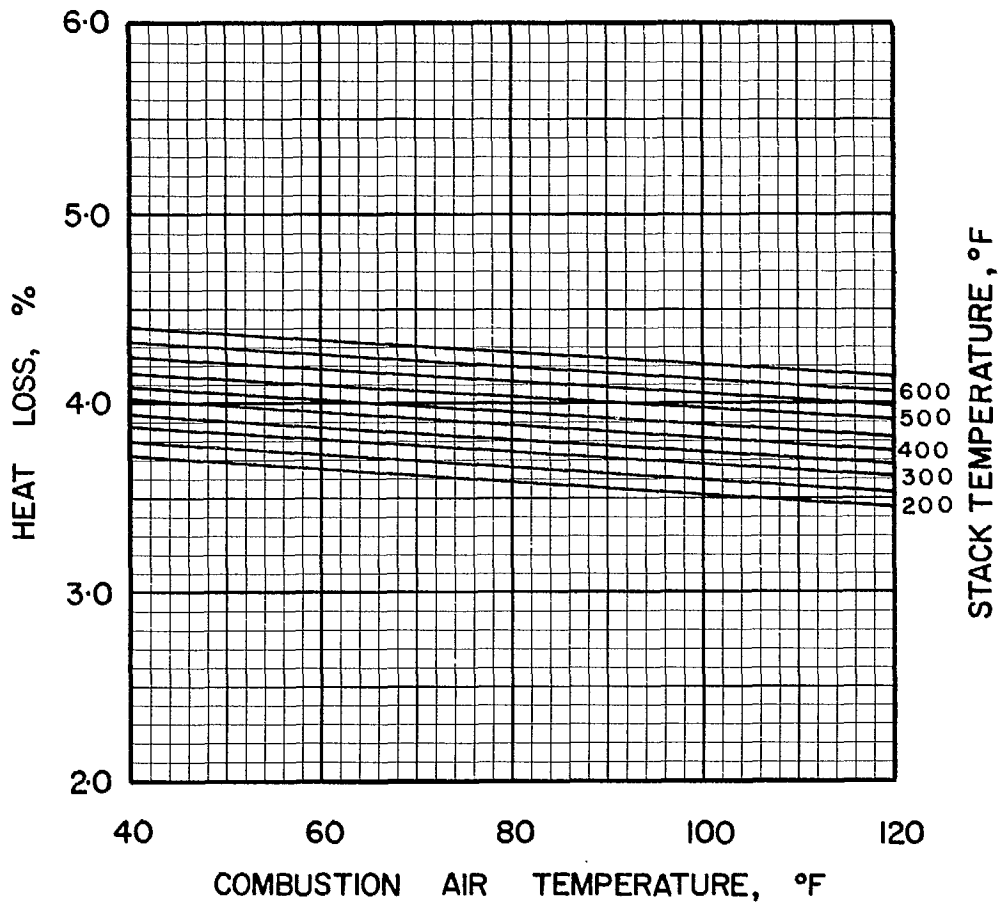


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·11

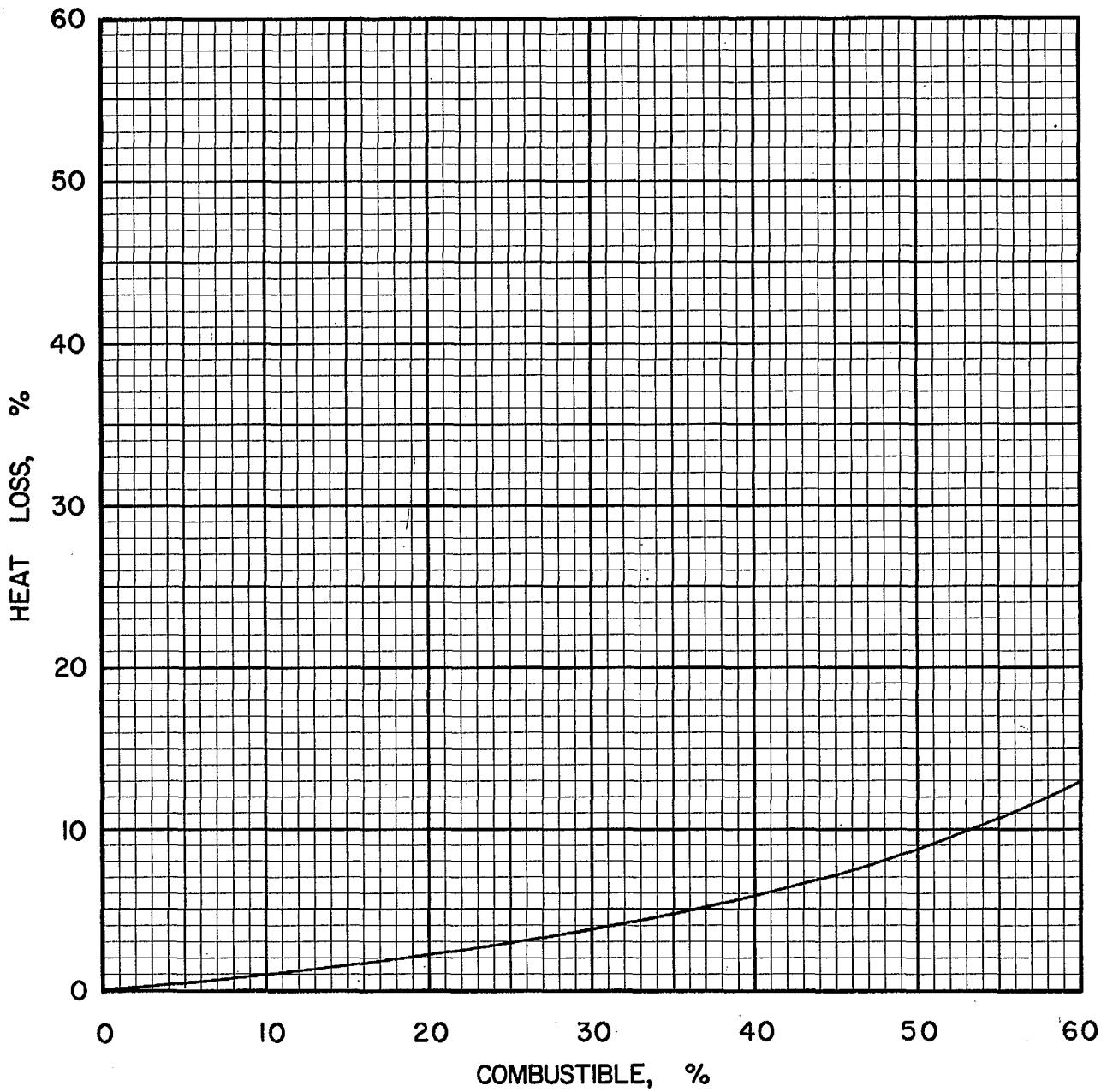


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·11

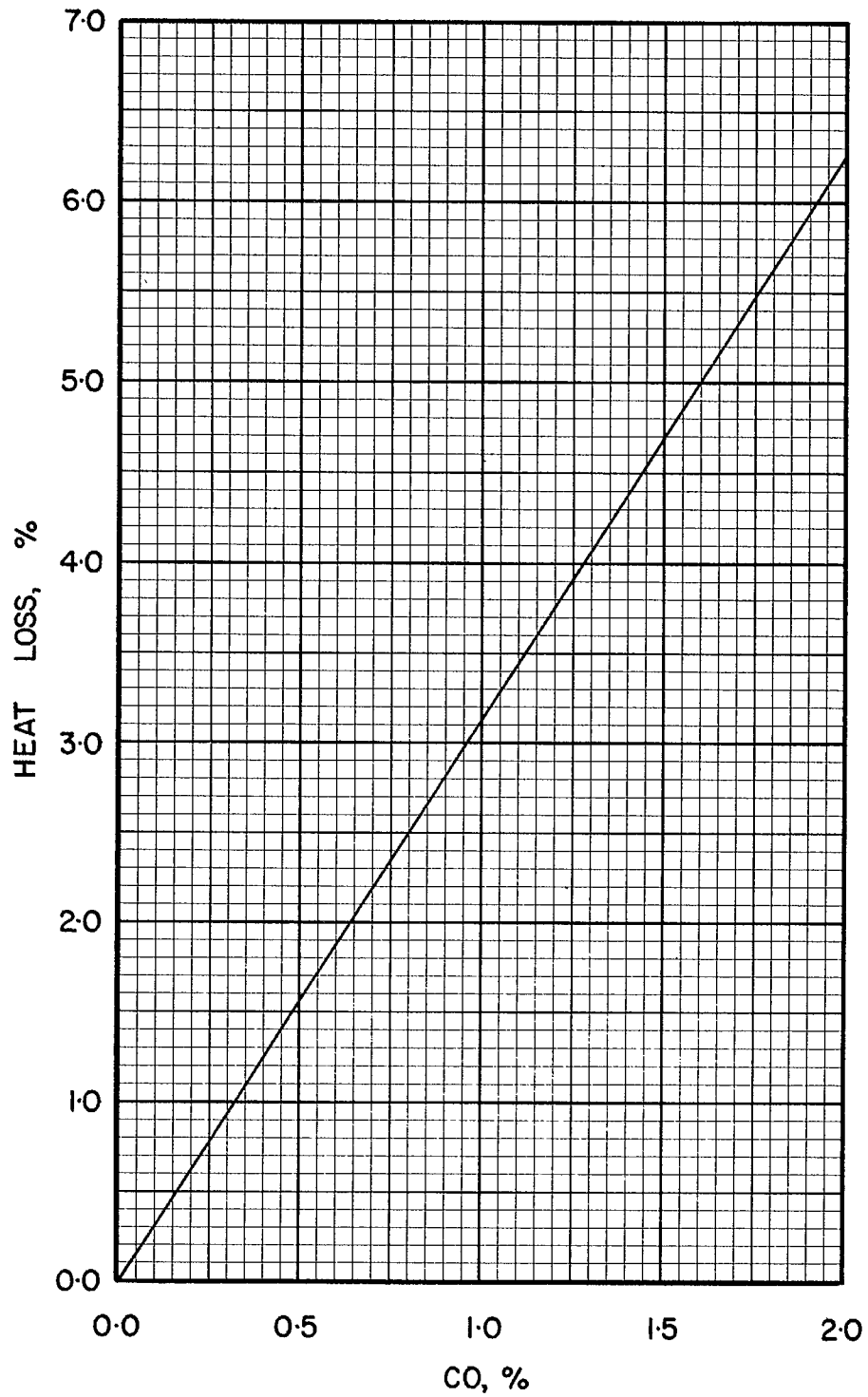


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·P·11

COAL US P-12, RENTON, ALLEGHENY COUNTY

Typical Moisture Range: 4–12%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.103
Volatile Matter	0.347
Fixed Carbon	0.550
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.754
Hydrogen (H)	0.052
Sulphur (S)	0.015
Nitrogen (N)	0.016
Oxygen (O)	0.060
Ash	0.103
Total	1.000

*Gross Calorific Value*

Btu/lb:	13694
Btu/short ton:	$27.39 \times 10^6$
Btu/long ton:	$30.67 \times 10^6$
MJ/kg:	31.84

*Conversion Factors*

1 short ton	= 0.8929	long tons	= 2000 lb
$10^6$ Btu	= 73.02	lb	
$10^6$ Btu	= 0.03651	short tons	
$10^6$ Btu	= 0.03260	long tons	



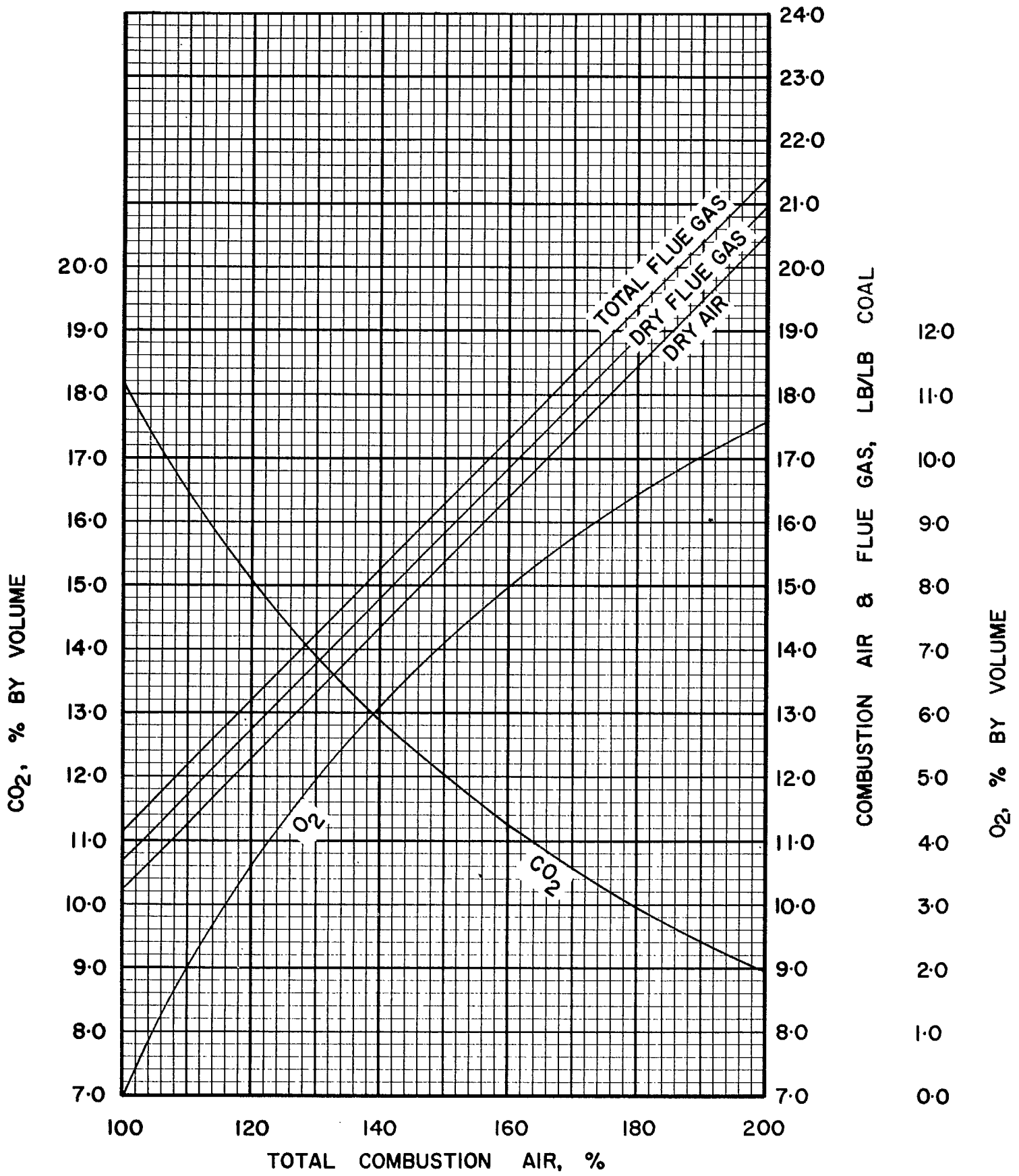


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·P·12

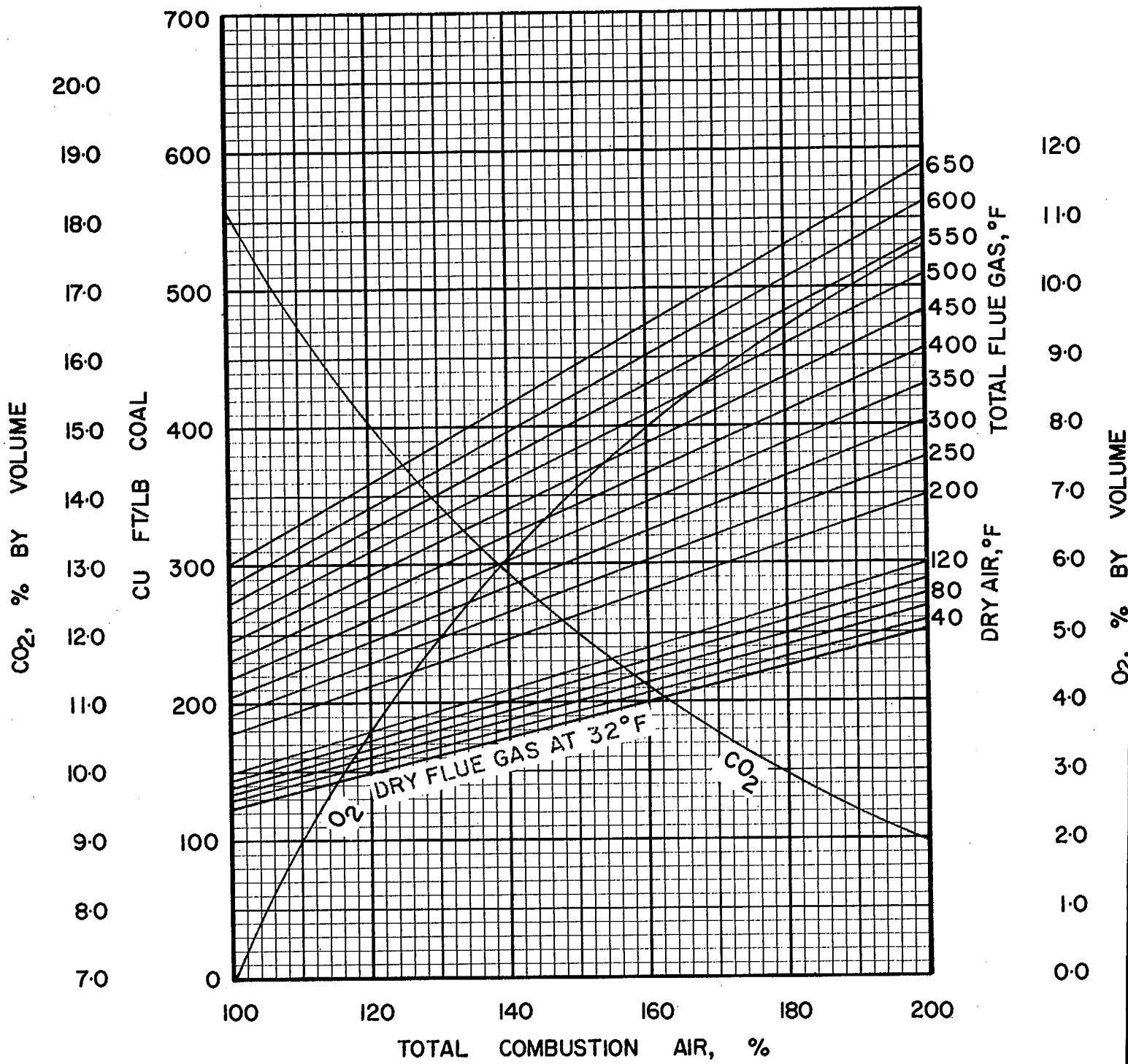


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US · P · 12

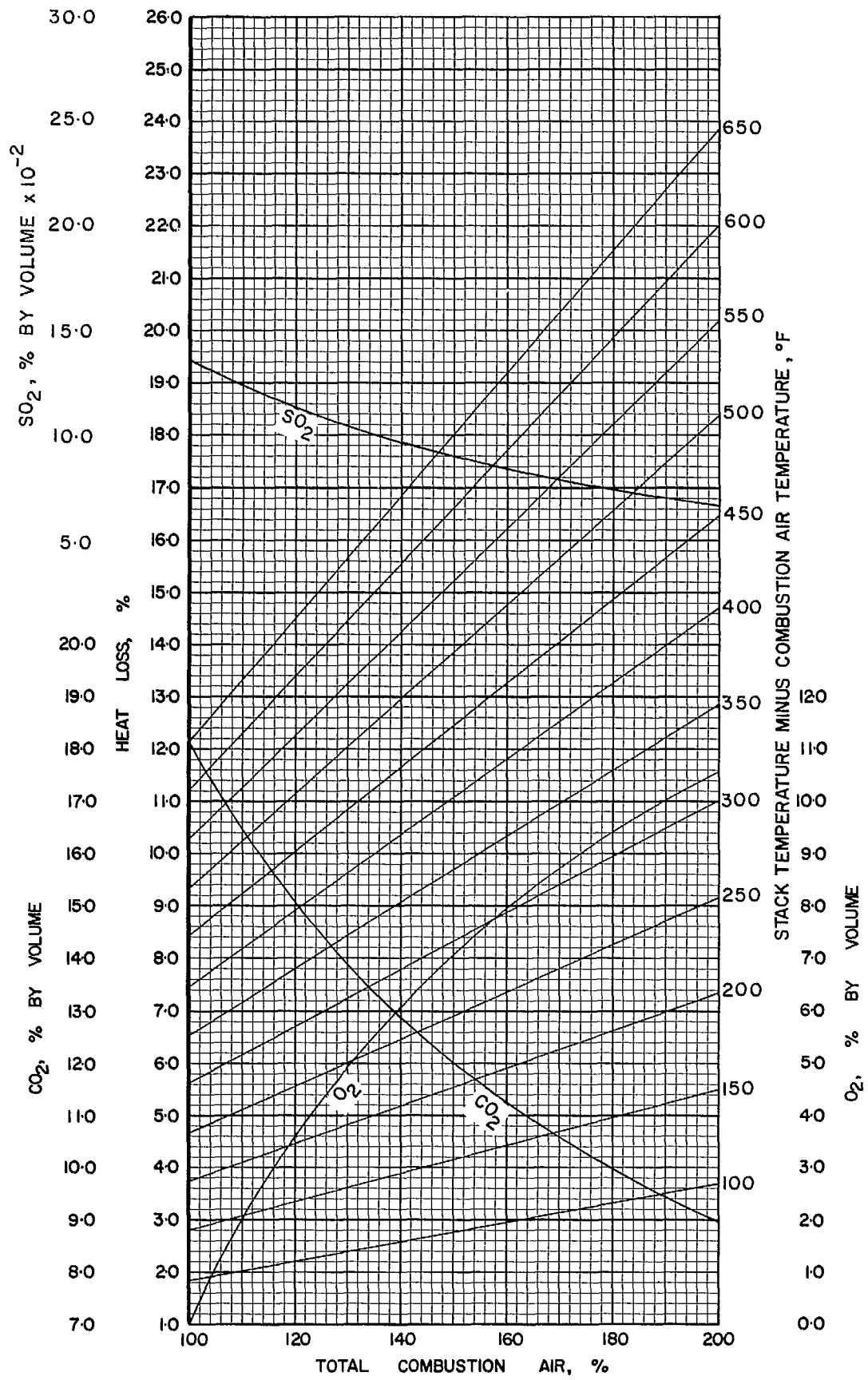


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US · P · 12

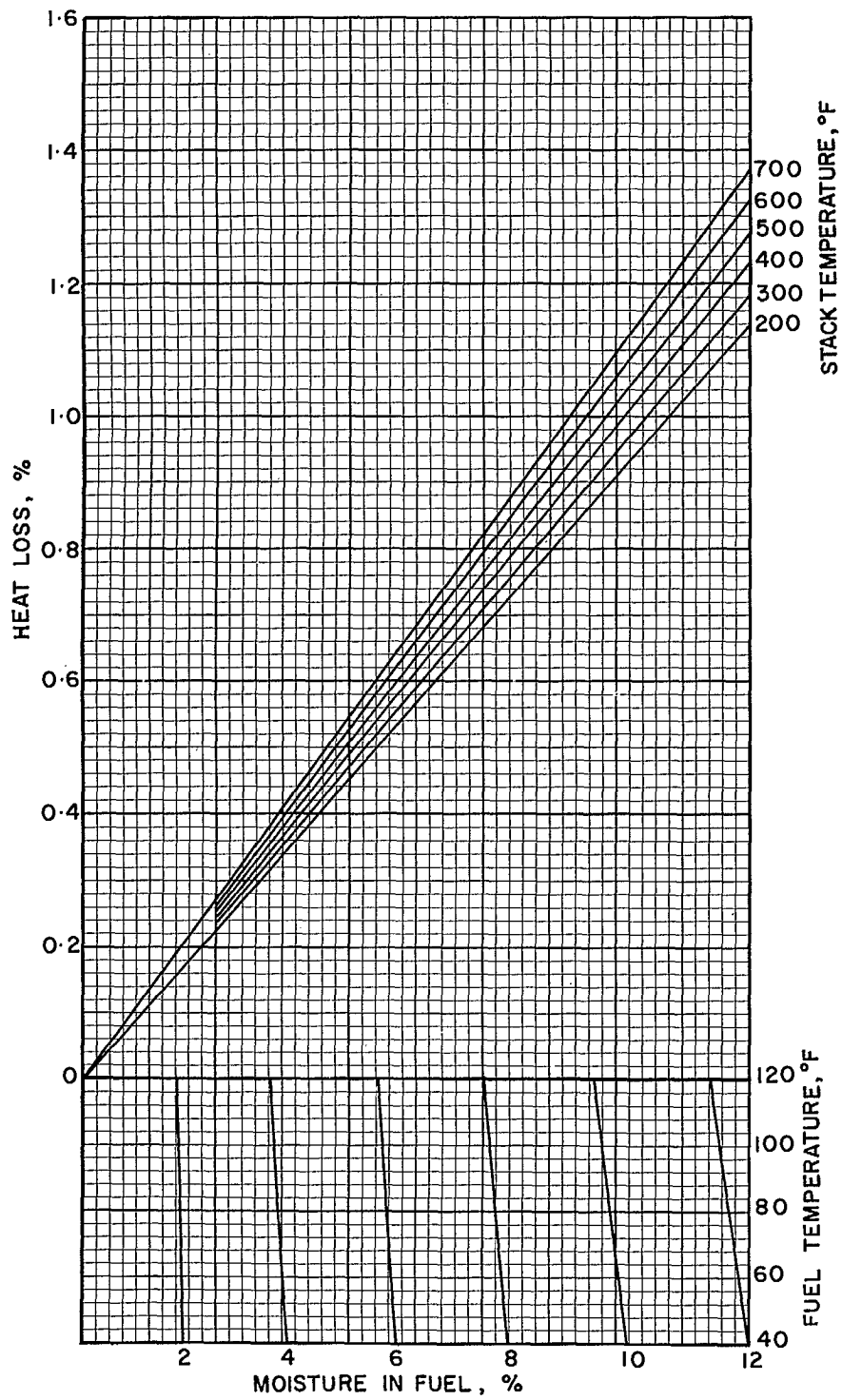


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·P·12

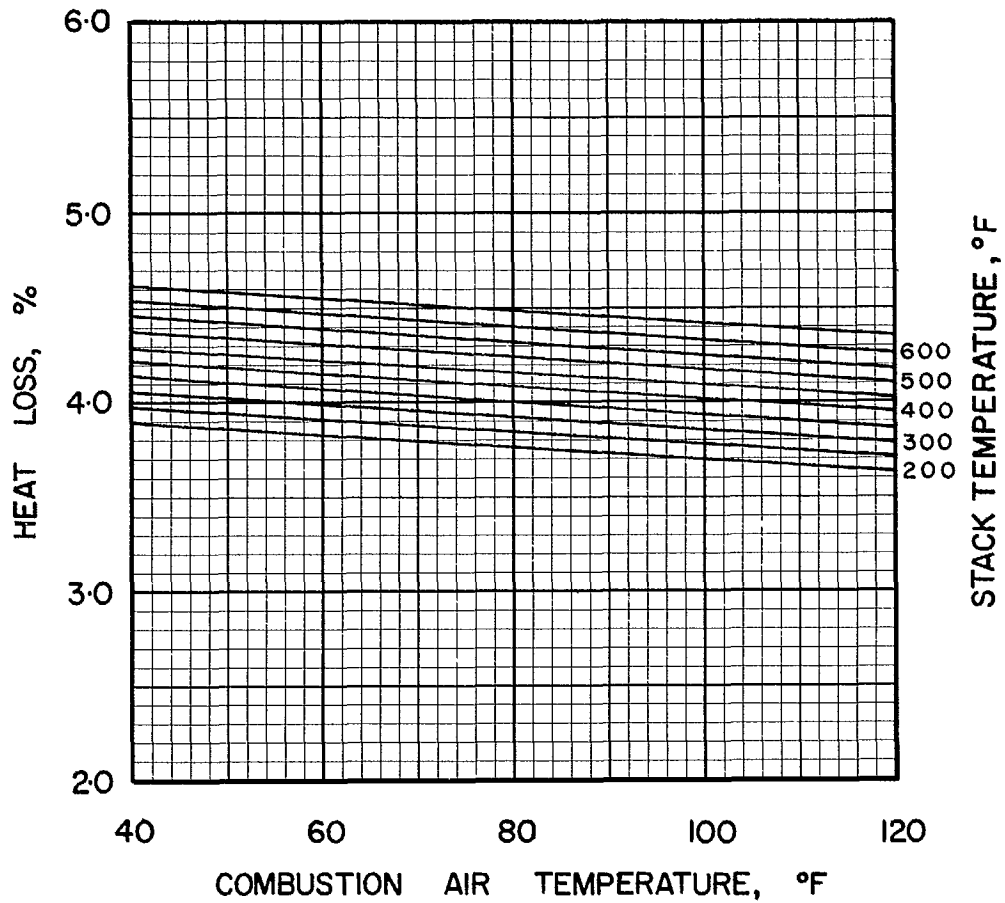


FIGURE 5 HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·P·12

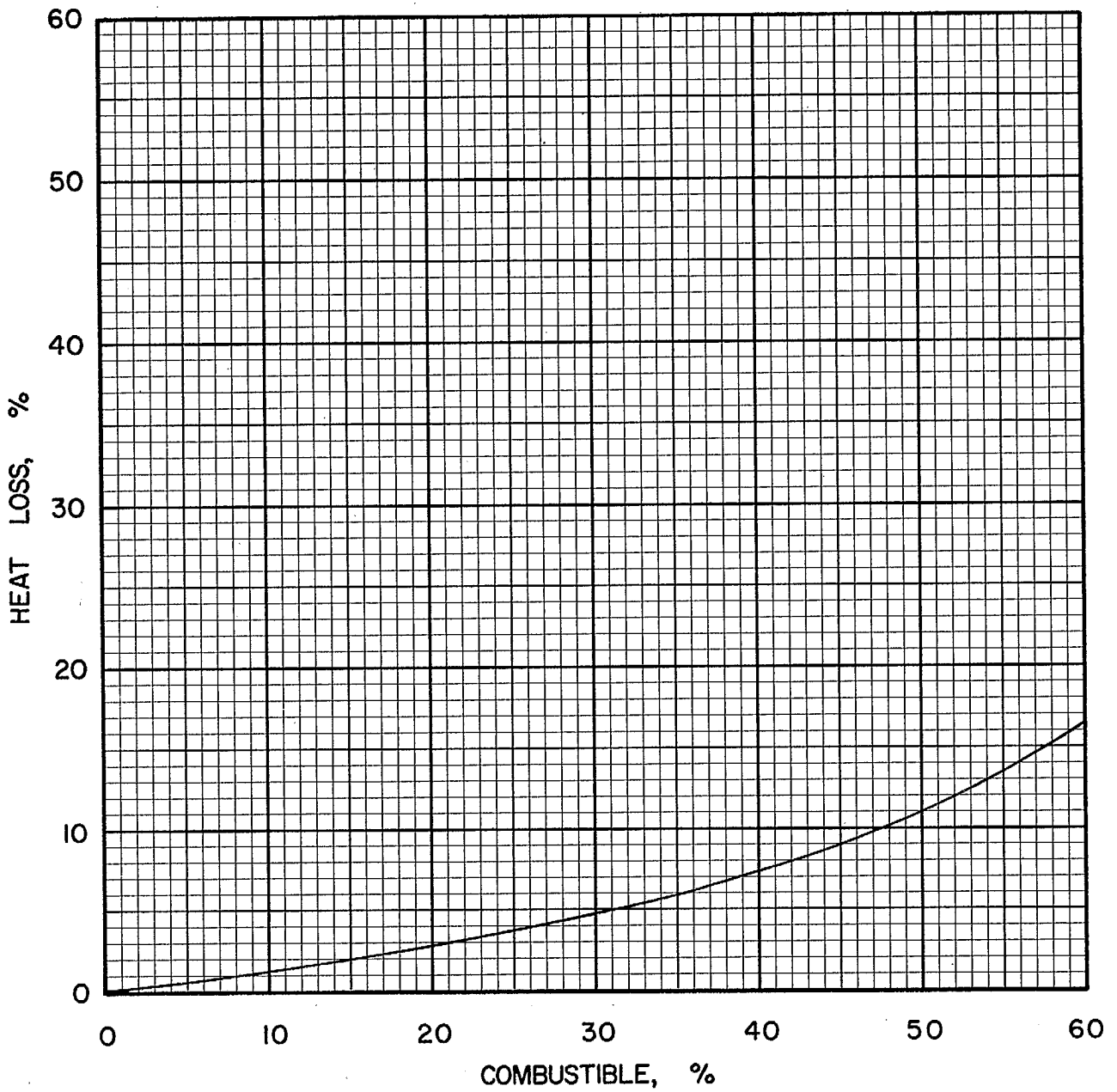


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·P·12

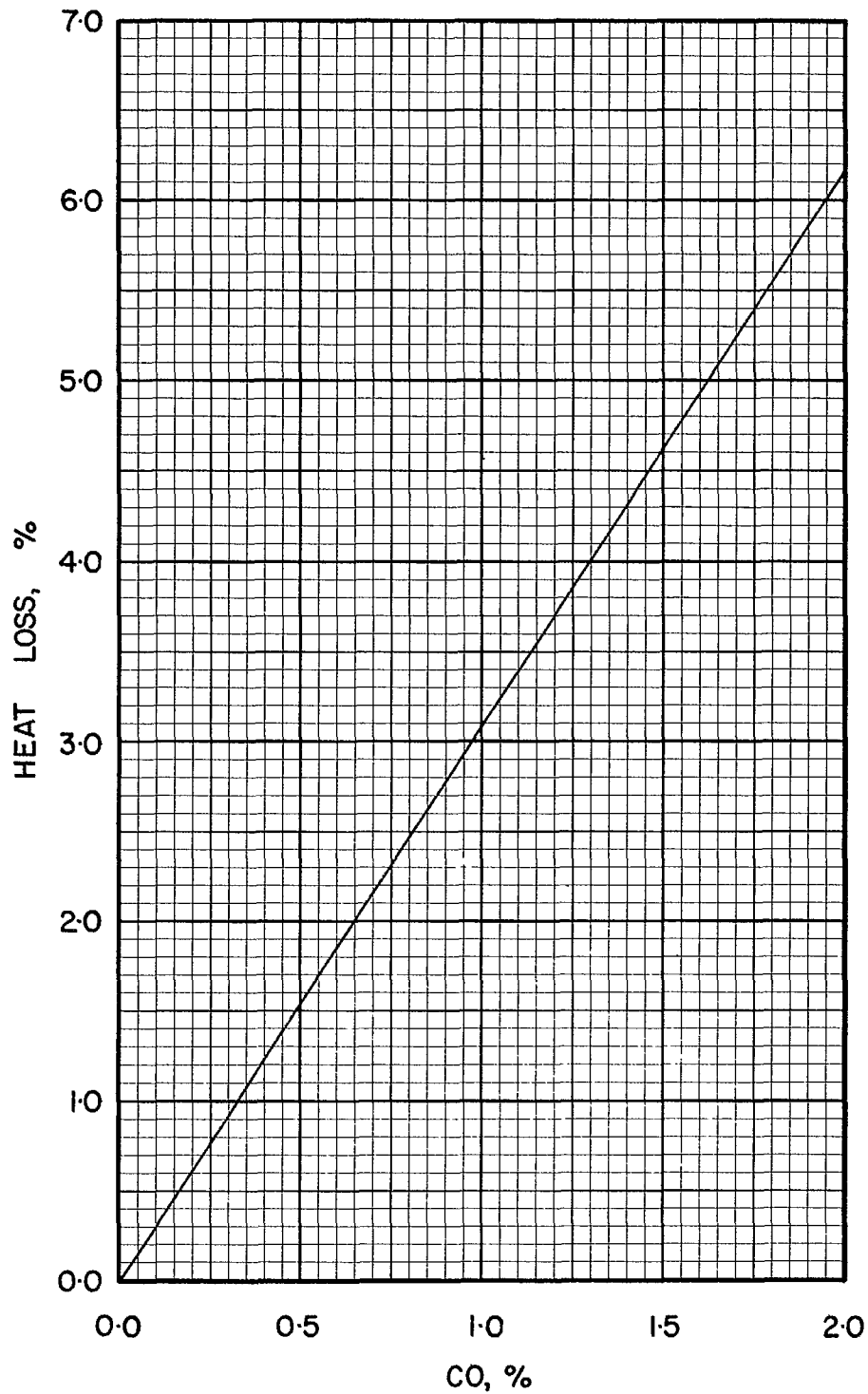


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US · P · 12

## COAL US V-1, LEVISA RIVER AND BLACK WATCH

Typical Moisture Range: 0-8%

### *Proximate Analysis (lb/lb dry coal)*

Ash	0.089
Volatile Matter	0.315
Fixed Carbon	0.596
Total	<u>1.000</u>

### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.797
Hydrogen (H)	0.049
Sulphur (S)	0.007
Nitrogen (N)	0.016
Oxygen (O)	0.042
Ash	0.089
Total	<u>1.000</u>

### *Gross Calorific Value*

Btu/lb:	13900
Btu/short ton:	$27.80 \times 10^6$
Btu/long ton:	$31.14 \times 10^6$
MJ/kg:	32.32

### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 71.94 lb	
$10^6$ Btu	= 0.03597 short tons	
$10^6$ Btu	= 0.03212 long tons	



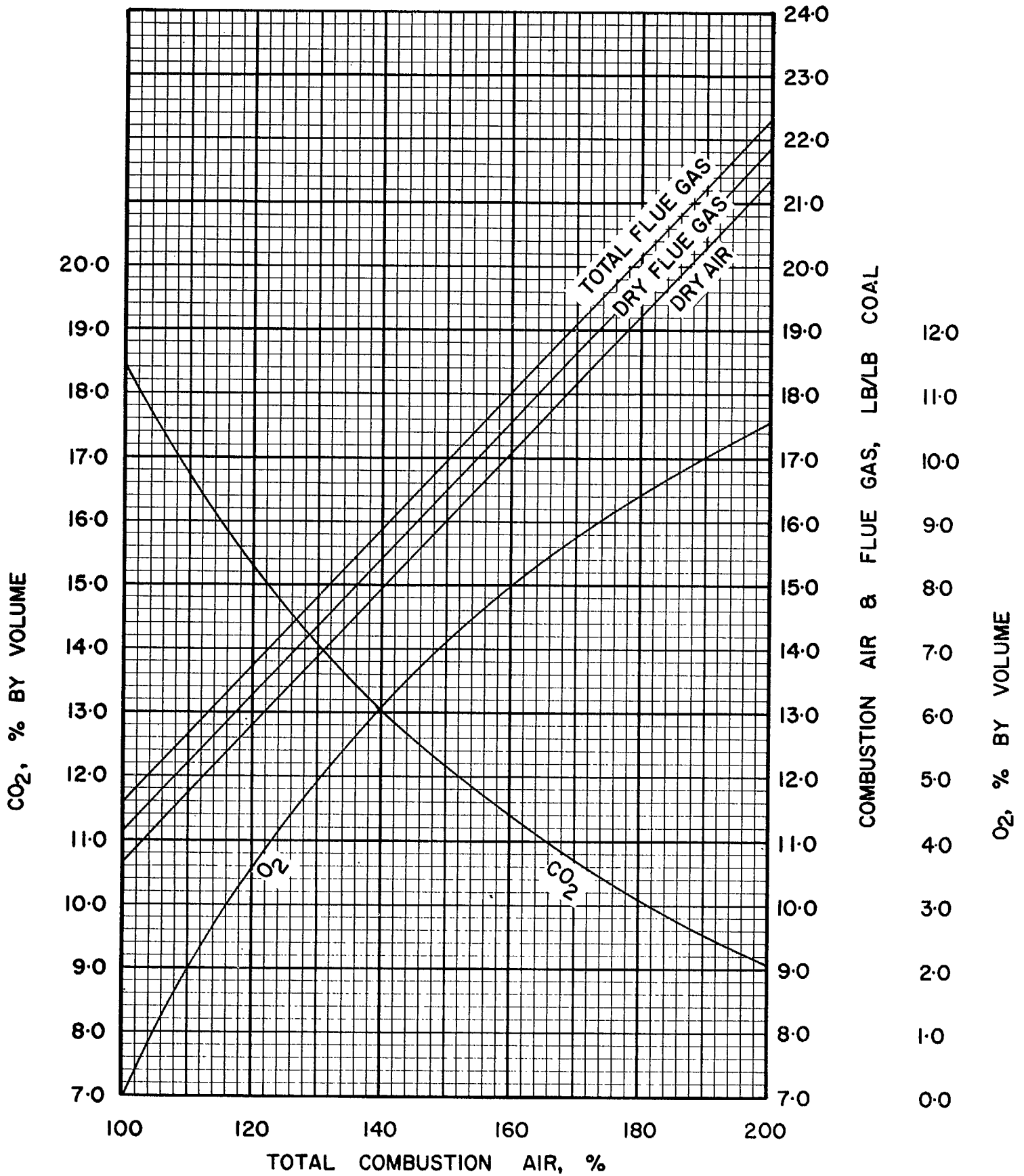


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·V·I

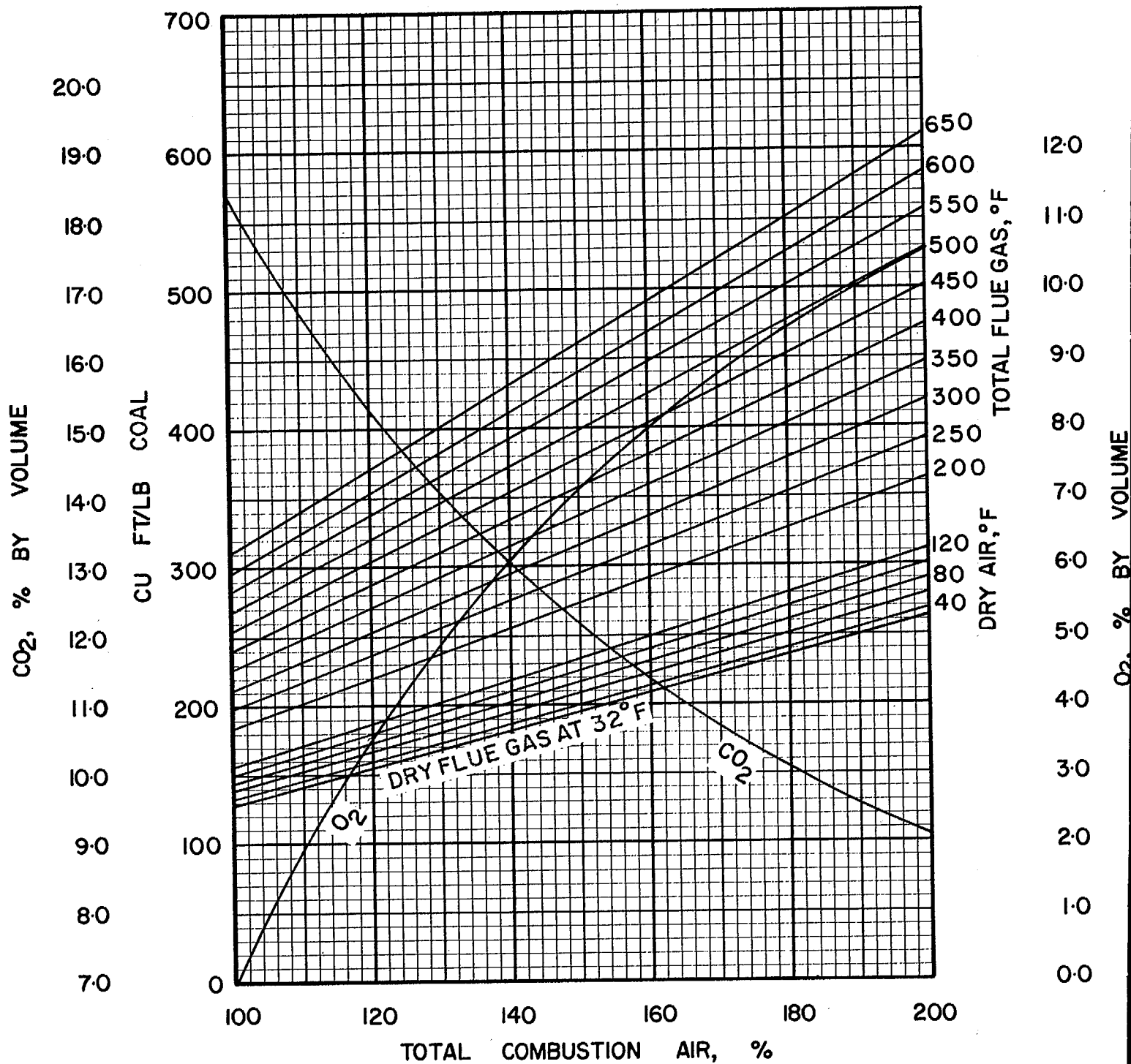


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US-V-1

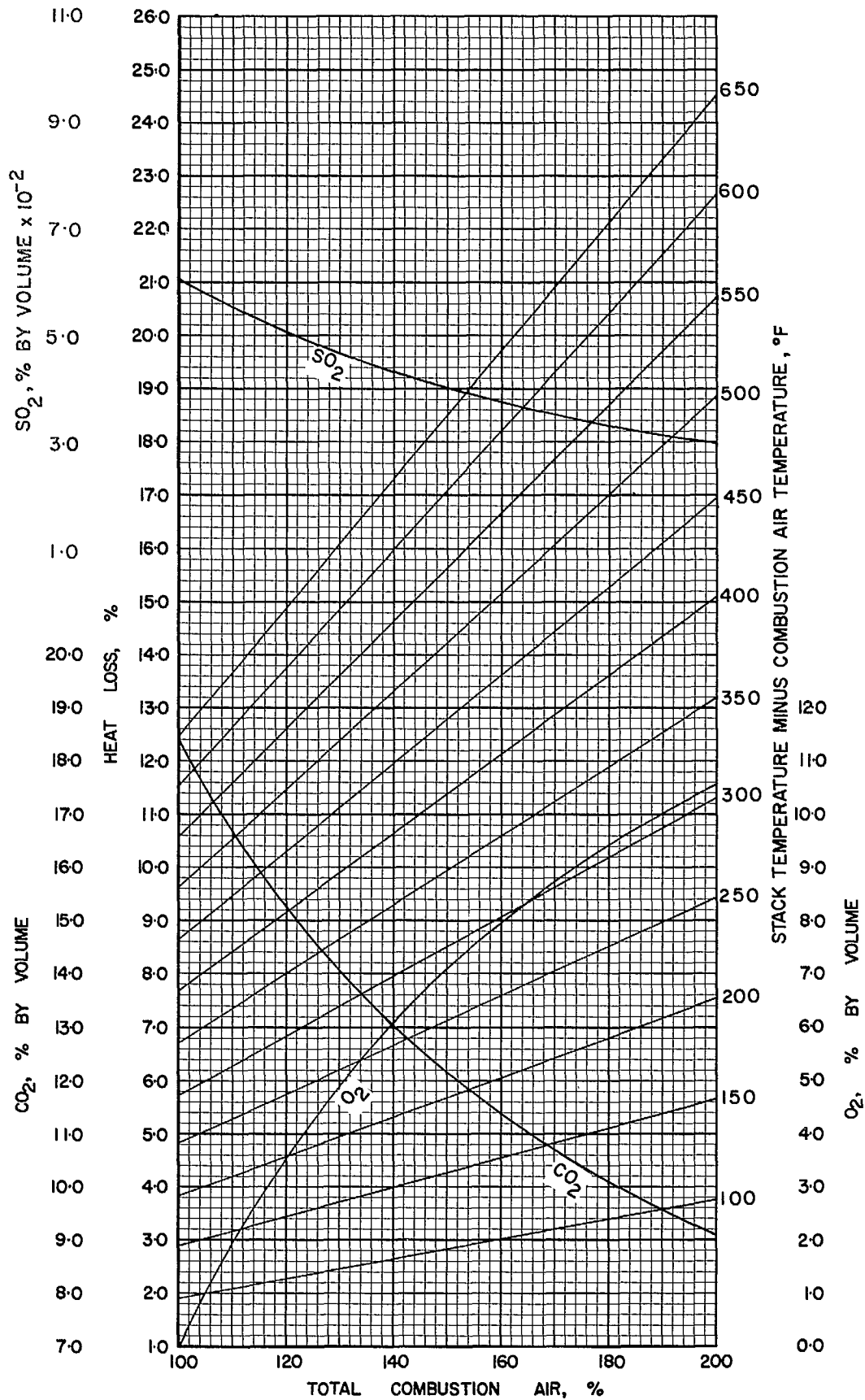


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·V·1

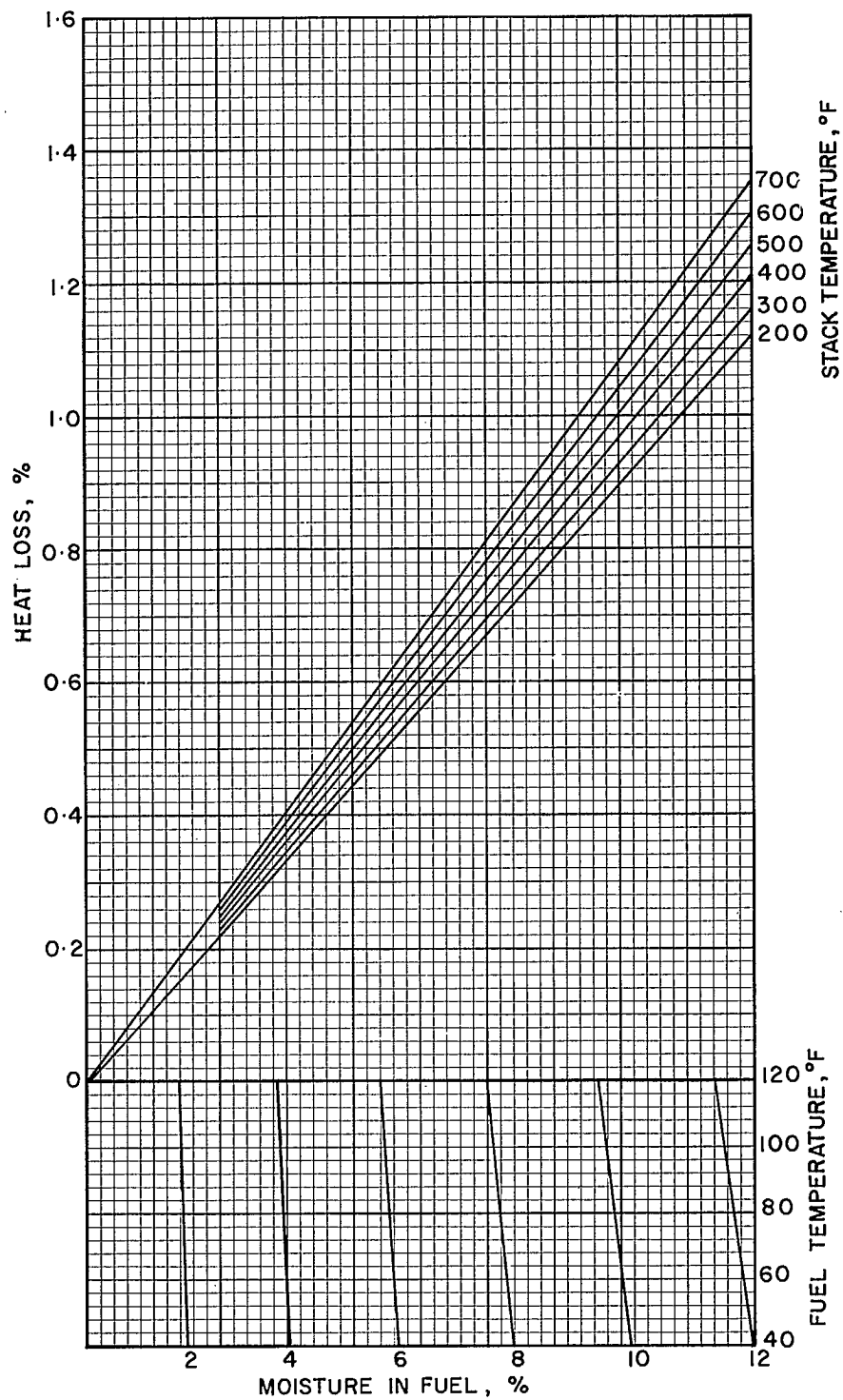


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·V·1

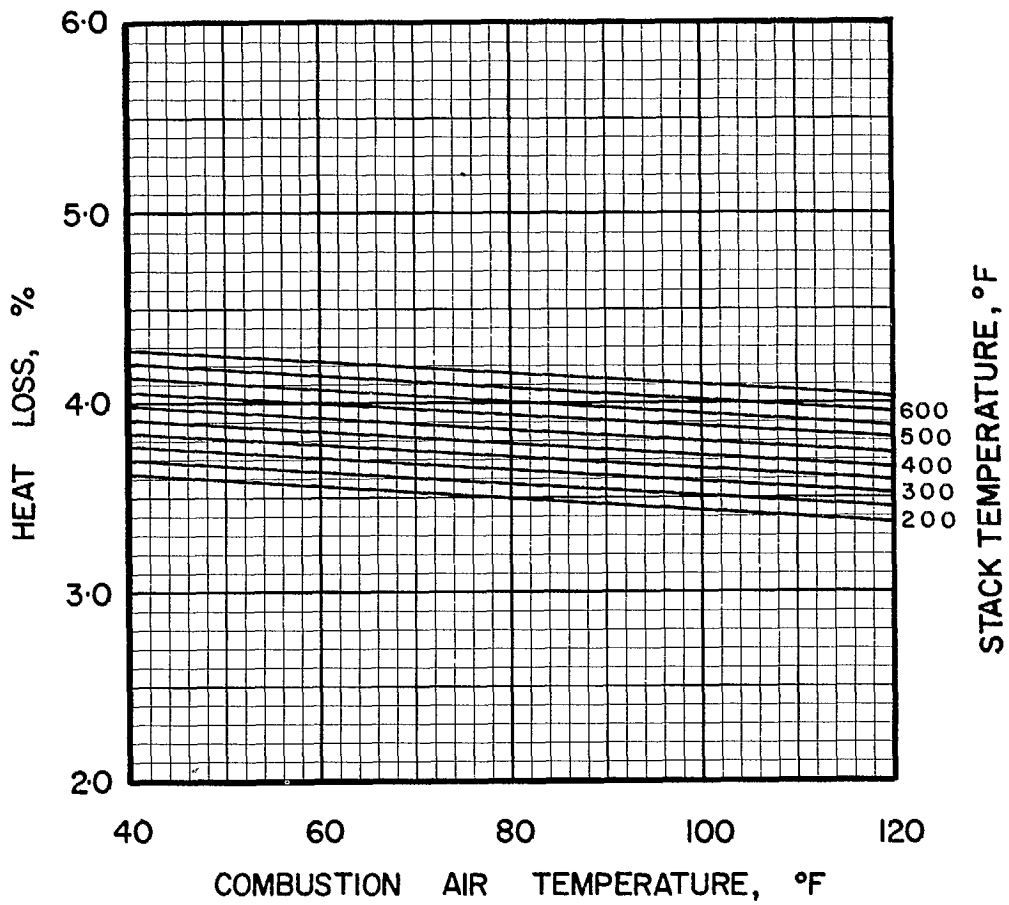


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·V·I

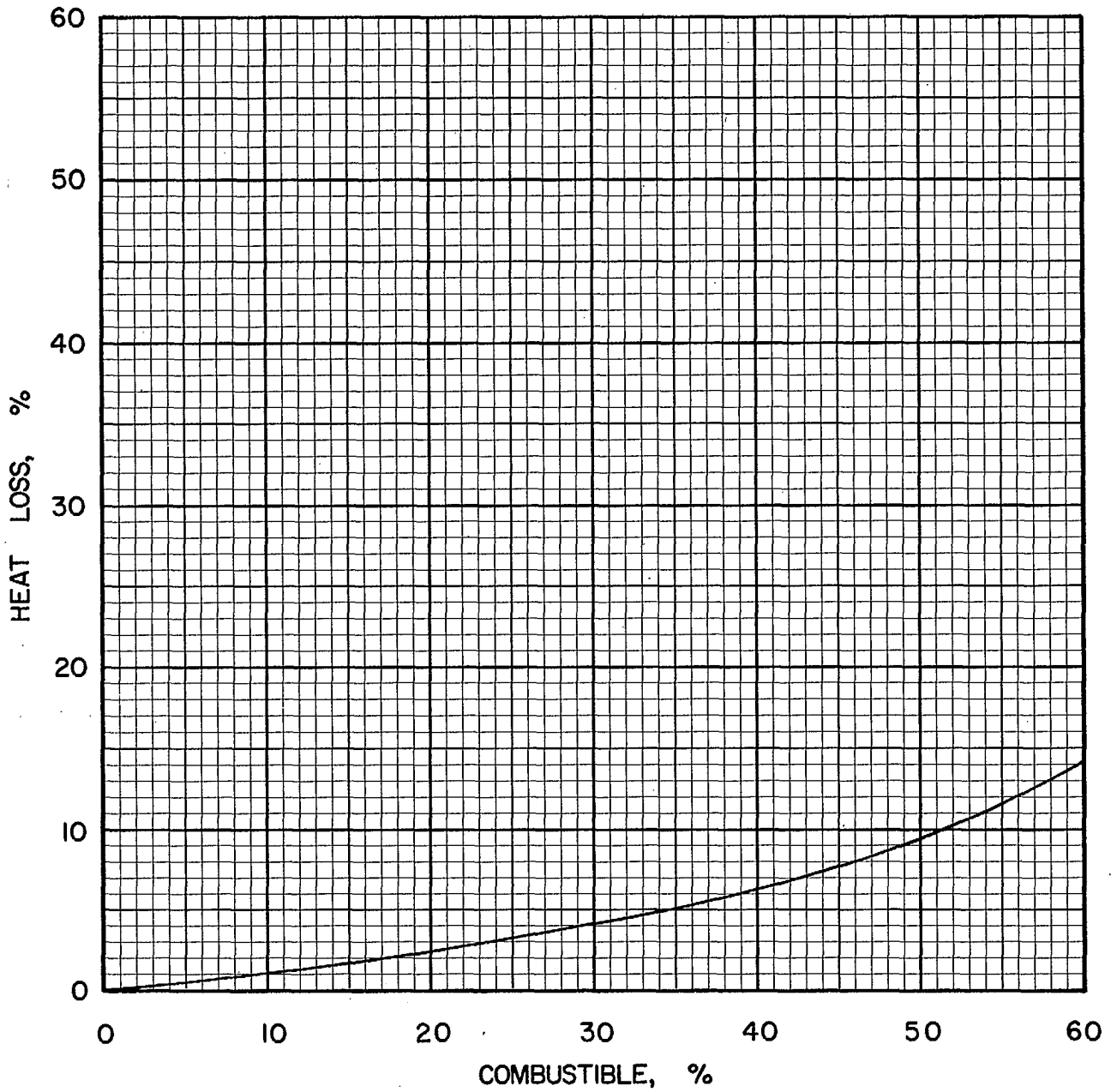


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US-V-1

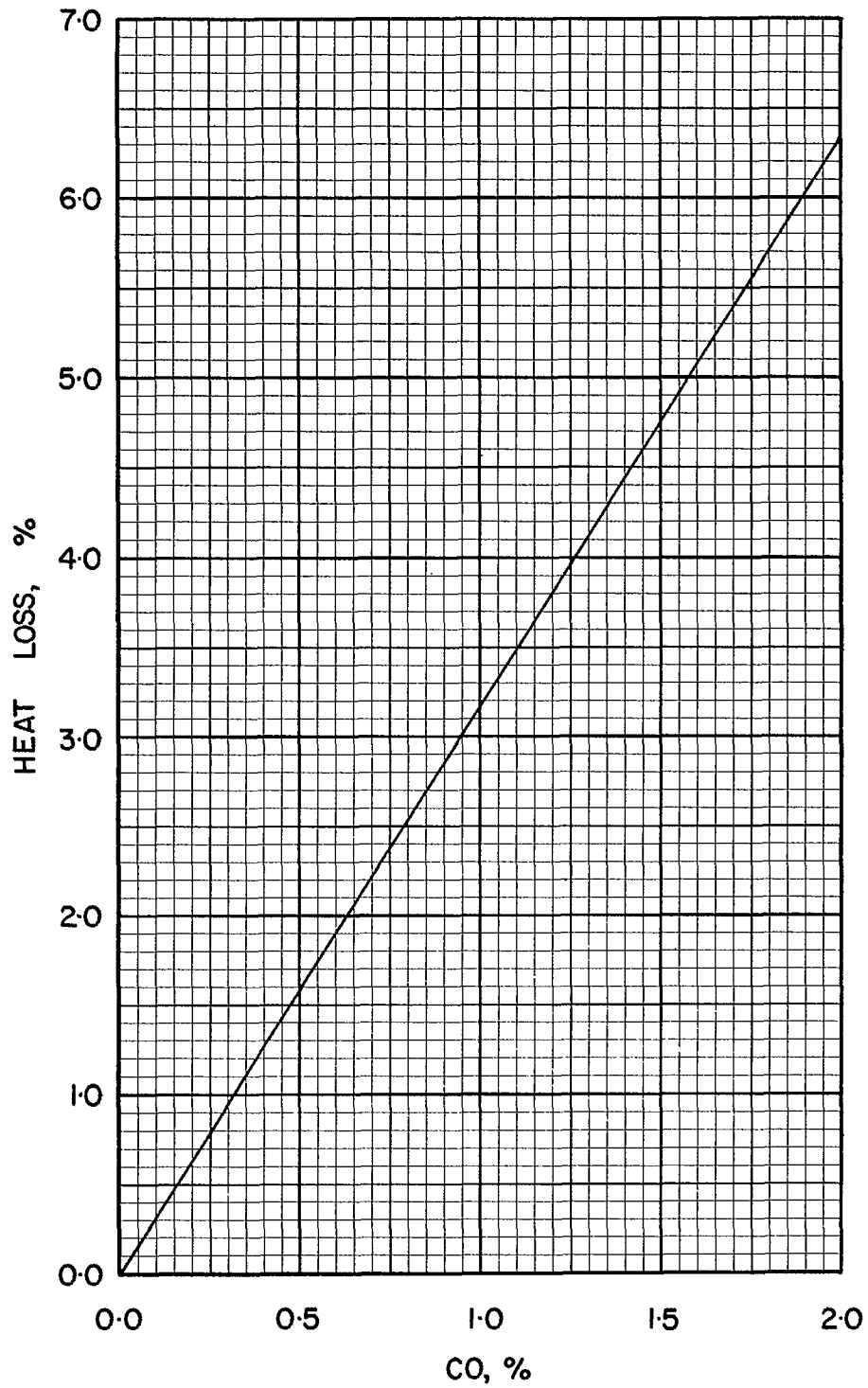


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLIGIBLE EXCESS AIR

US·V·I

COAL US V-2, VALLEY CAMP No. 8, COMMANDER

Typical Moisture Range: 0-8%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.0700
Volatile Matter	0.3650
Fixed Carbon	<u>0.5650</u>
Total	1.0000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.787
Hydrogen (H)	0.053
Sulphur (S)	0.008
Nitrogen (N)	0.015
Oxygen (O)	0.067
Ash	<u>0.070</u>
Total	1.000

*Calorific Value*

Btu/lb:	14197
Btu/short ton:	$28.39 \times 10^6$
Btu/long ton:	$31.80 \times 10^6$
MJ/kg:	33.01

*Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 70.44 lb	
$10^6$ Btu	= 0.03522 short tons	
$10^6$ Btu	= 0.03146 long tons	



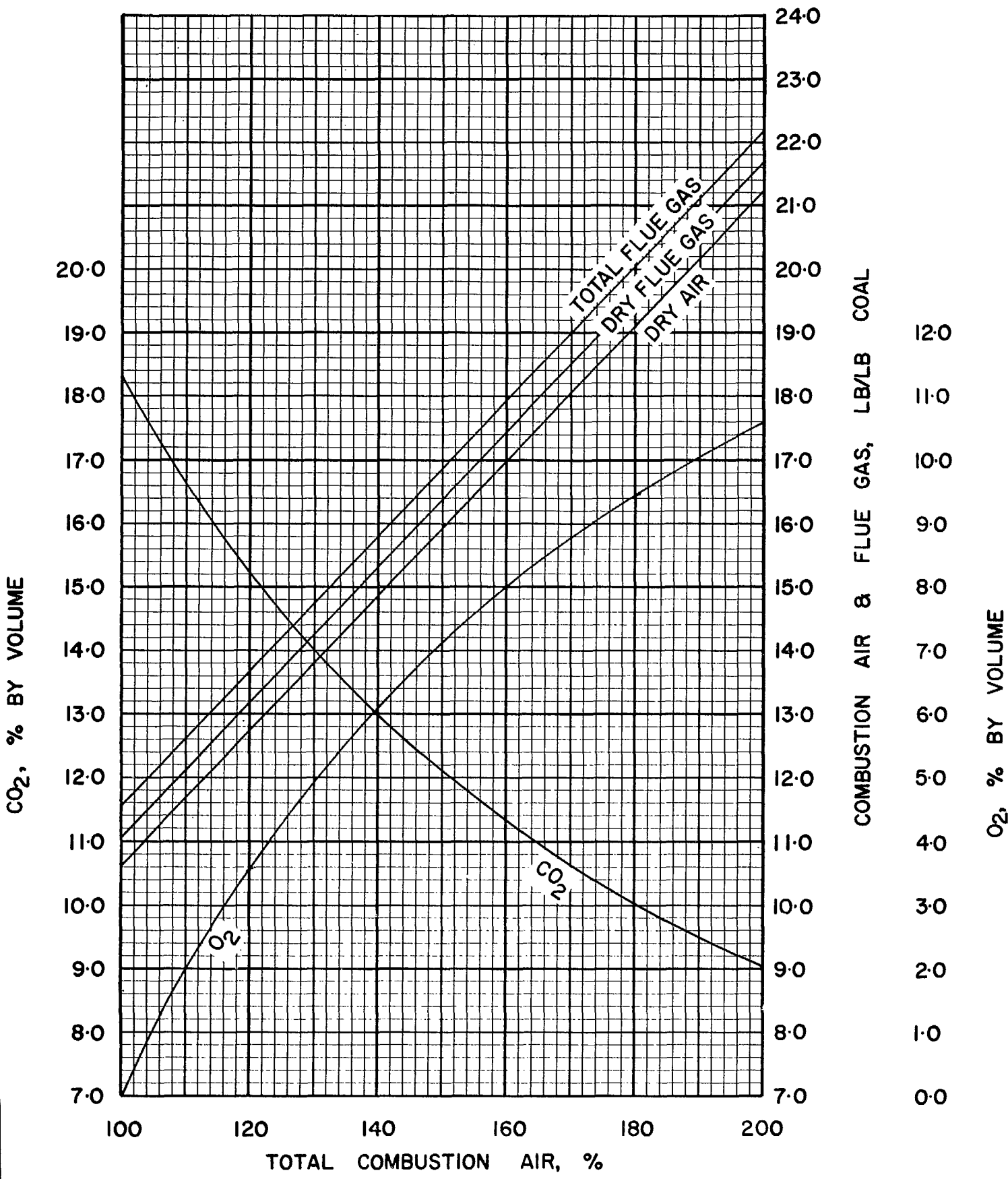


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-V-2

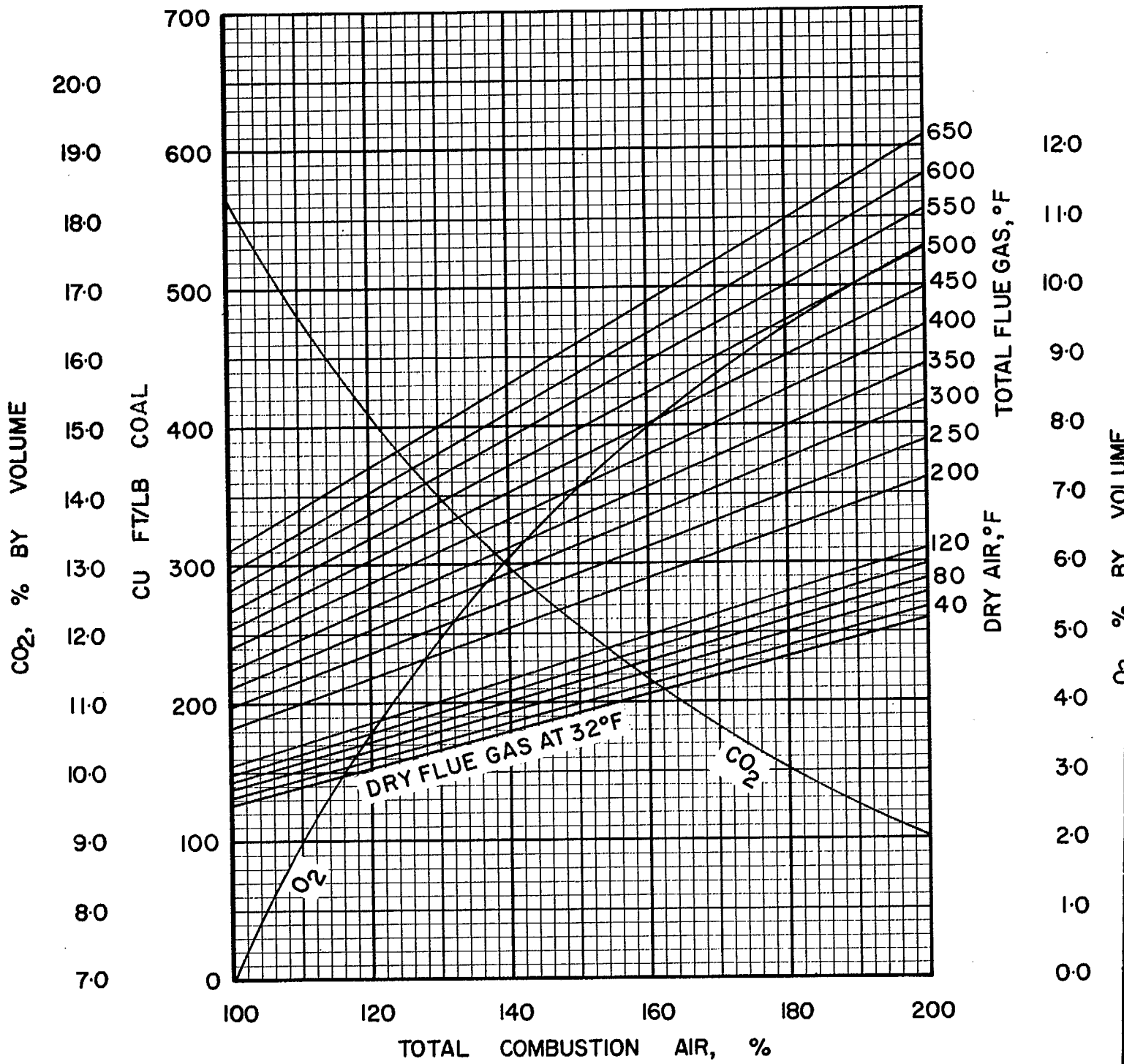


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US-V-2

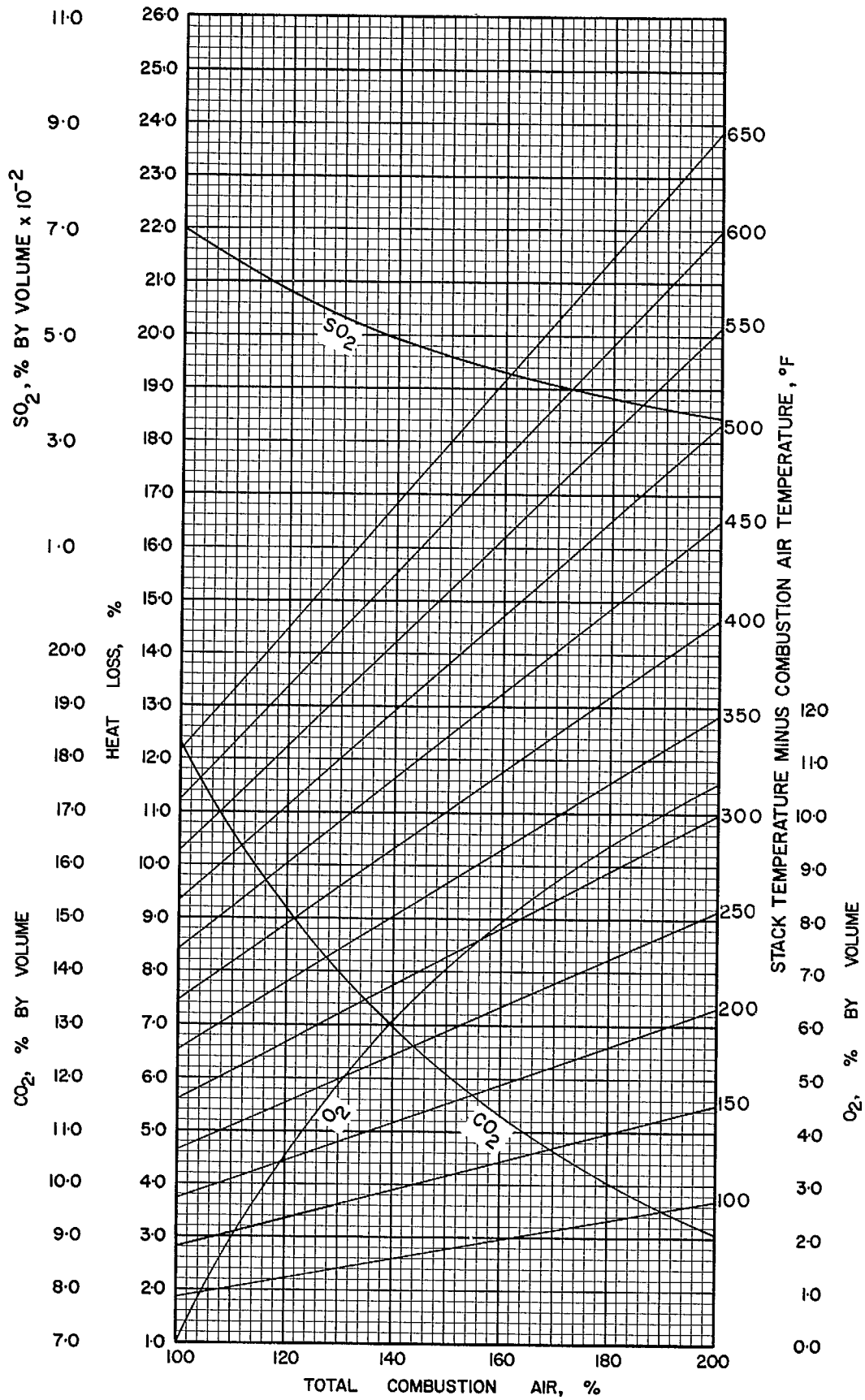


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US · V · 2

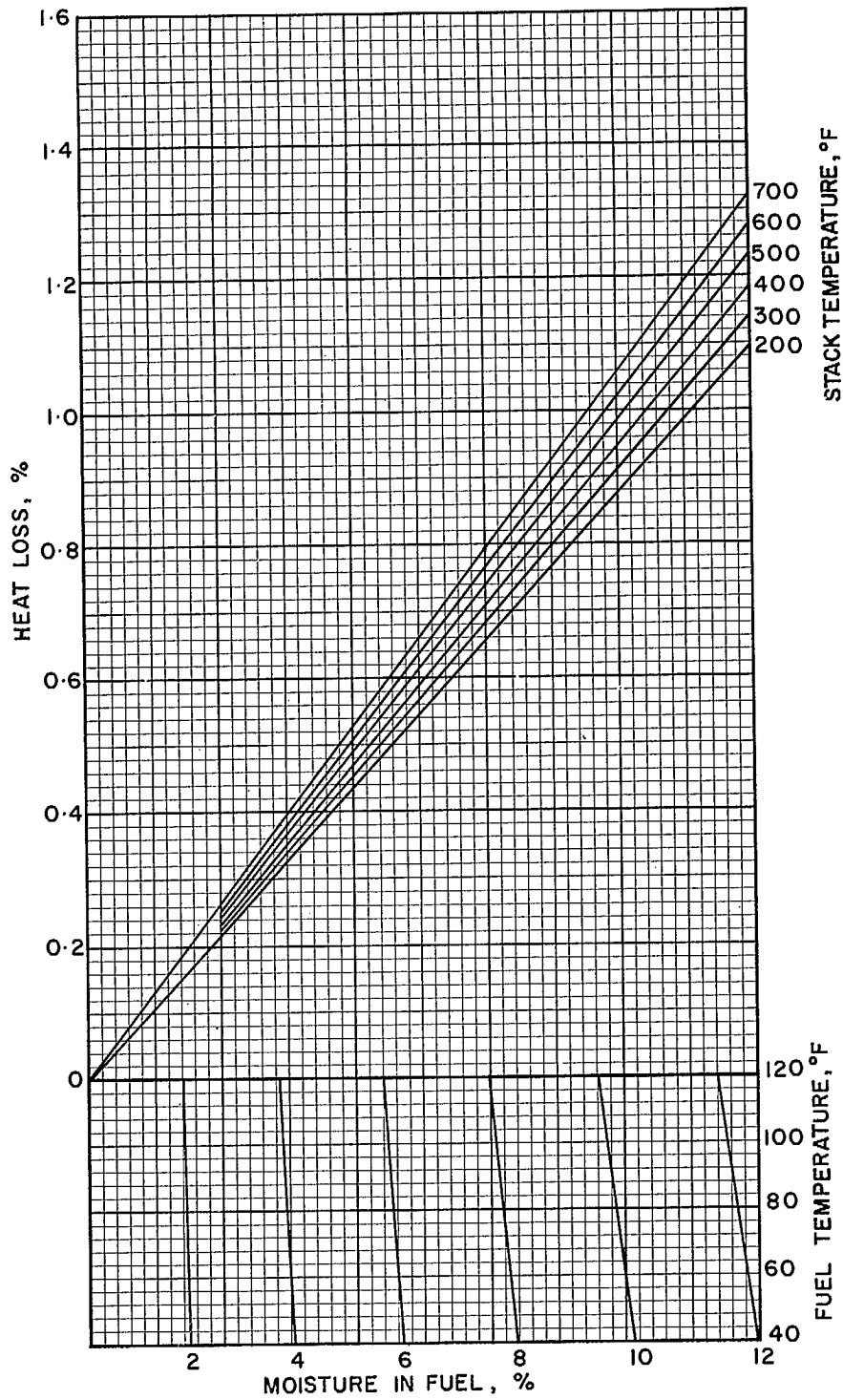


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US · V · 2

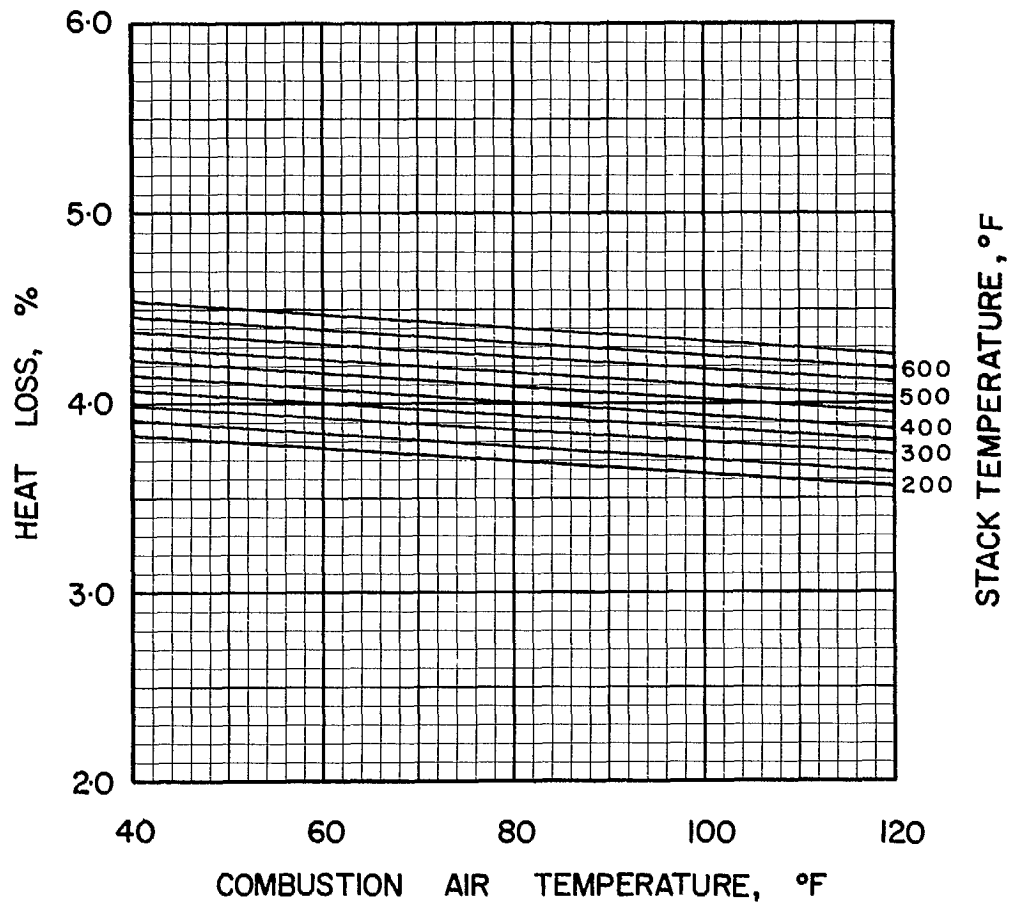


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US-V-2

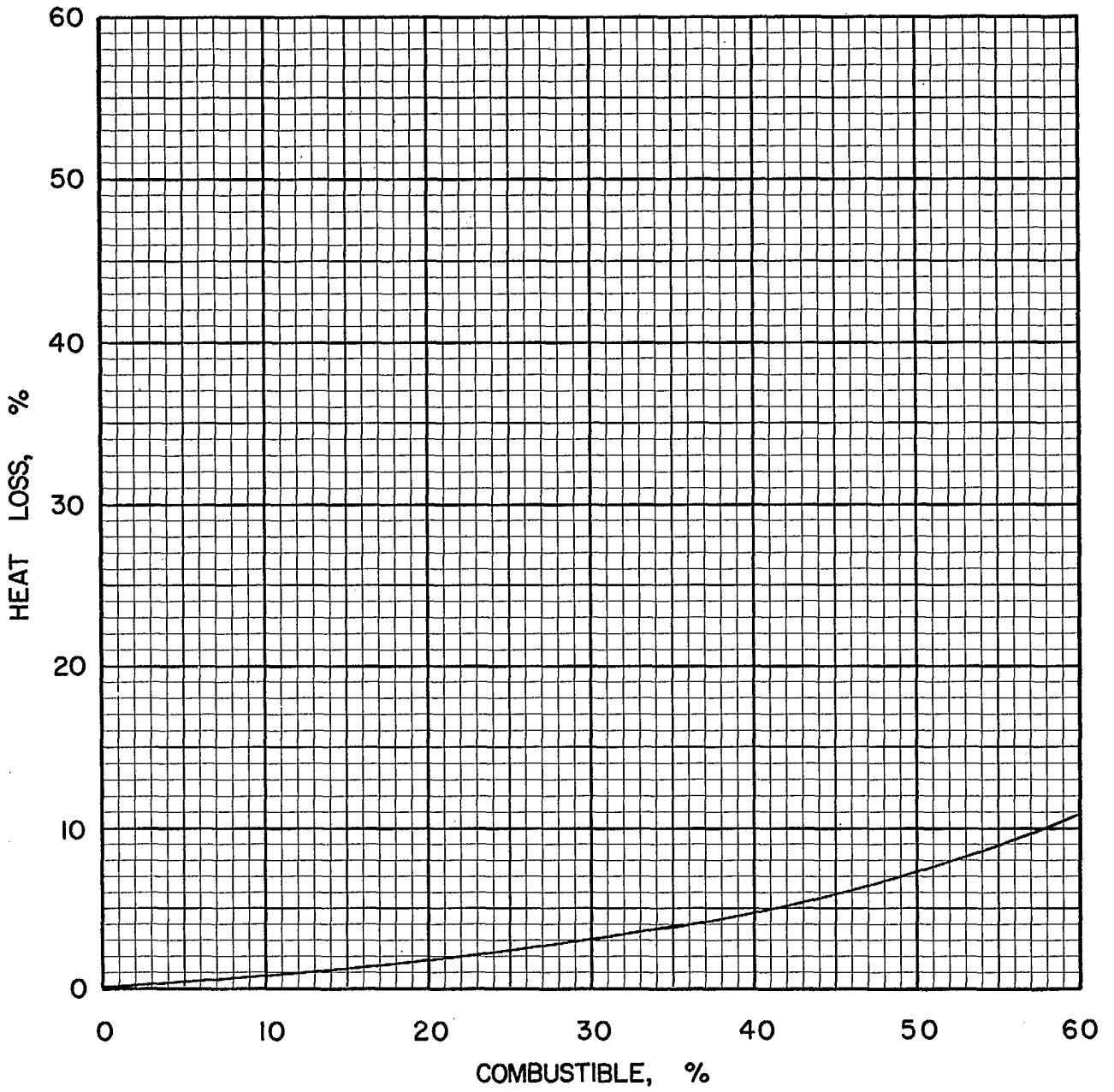


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE  
US·V·2

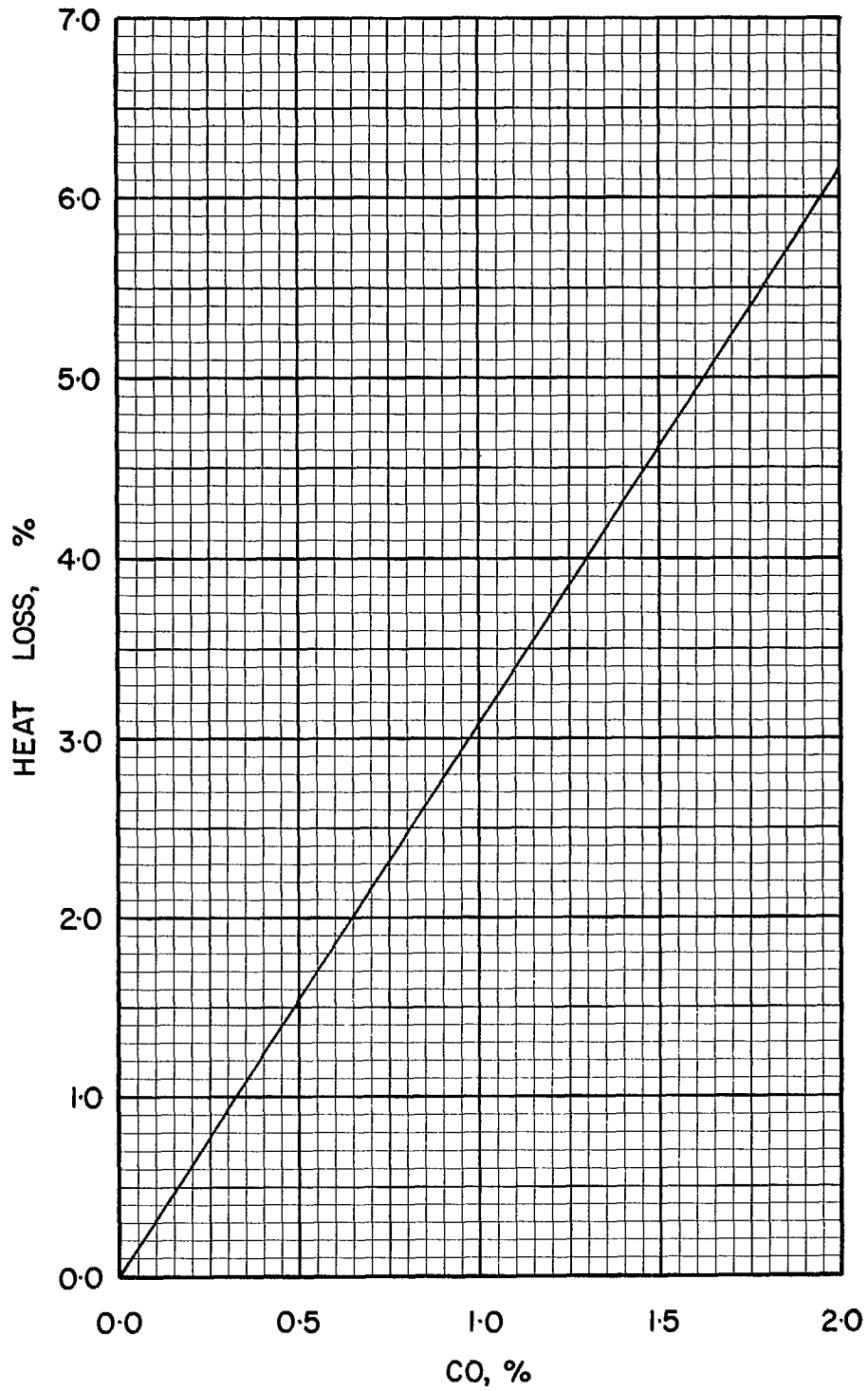


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLIGIBLE EXCESS AIR

US·V·2

### COAL US WV-1, CENTURY, BETHLEHEM MINES

Typical Moisture Range: 0-6%

#### *Proximate Analysis (lb/lb dry coal)*

Ash	0.1273
Volatile Matter	0.3558
Fixed Carbon	0.5169
Total	<u>1.0000</u>

#### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.7312
Hydrogen (H)	0.0490
Sulphur (S)	0.0295
Nitrogen (N)	0.0140
Oxygen (O)	0.0490
Ash	0.1273
Total	<u>1.0000</u>

#### *Gross Calorific Value*

Btu/lb:	13145
Btu/short ton:	$26.29 \times 10^6$
Btu/long ton:	$29.44 \times 10^6$
MJ/kg:	30.57

#### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 76.07 lb	
$10^6$ Btu	= 0.03804 short tons	
$10^6$ Btu	= 0.03396 long tons	



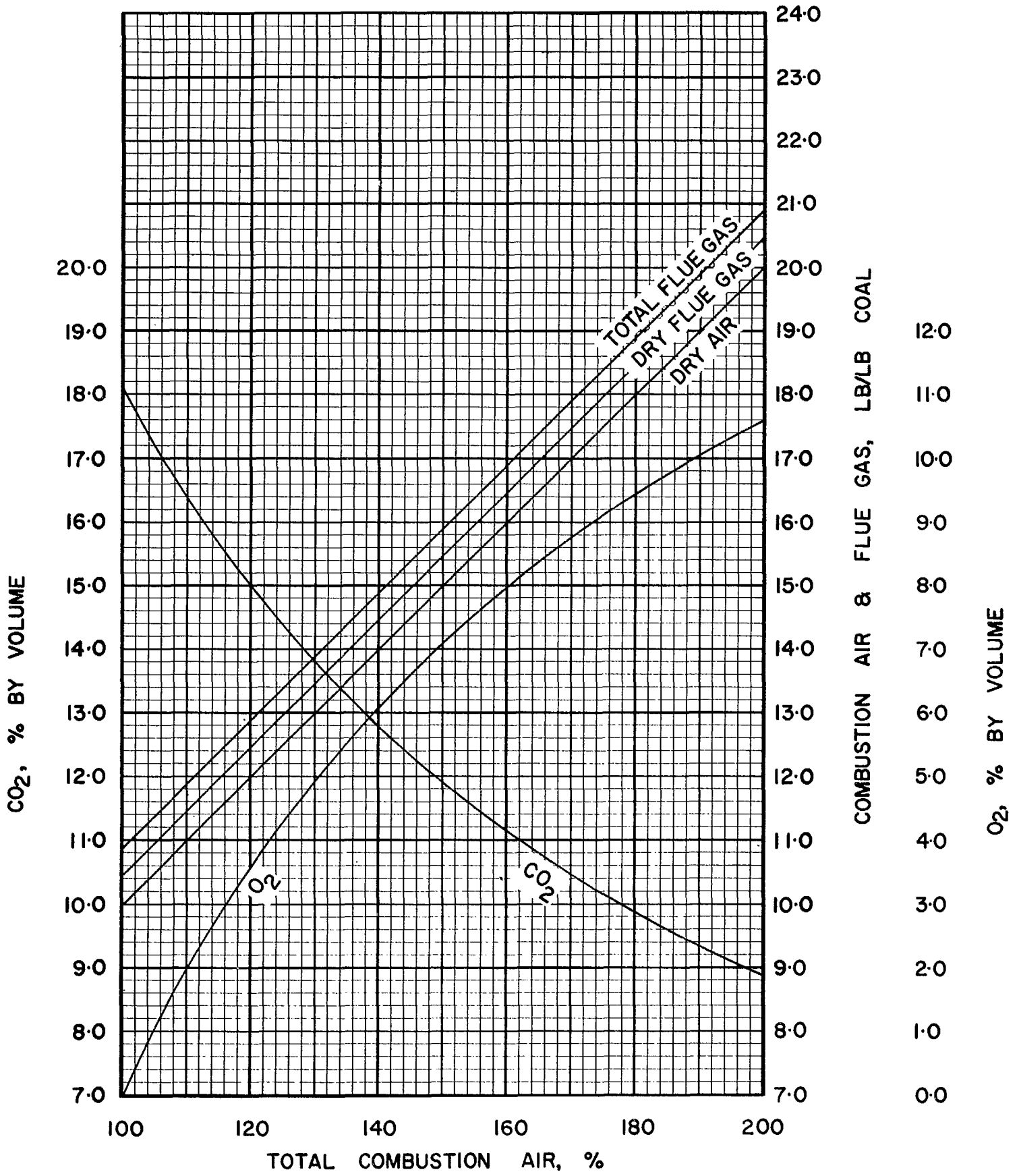


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·1

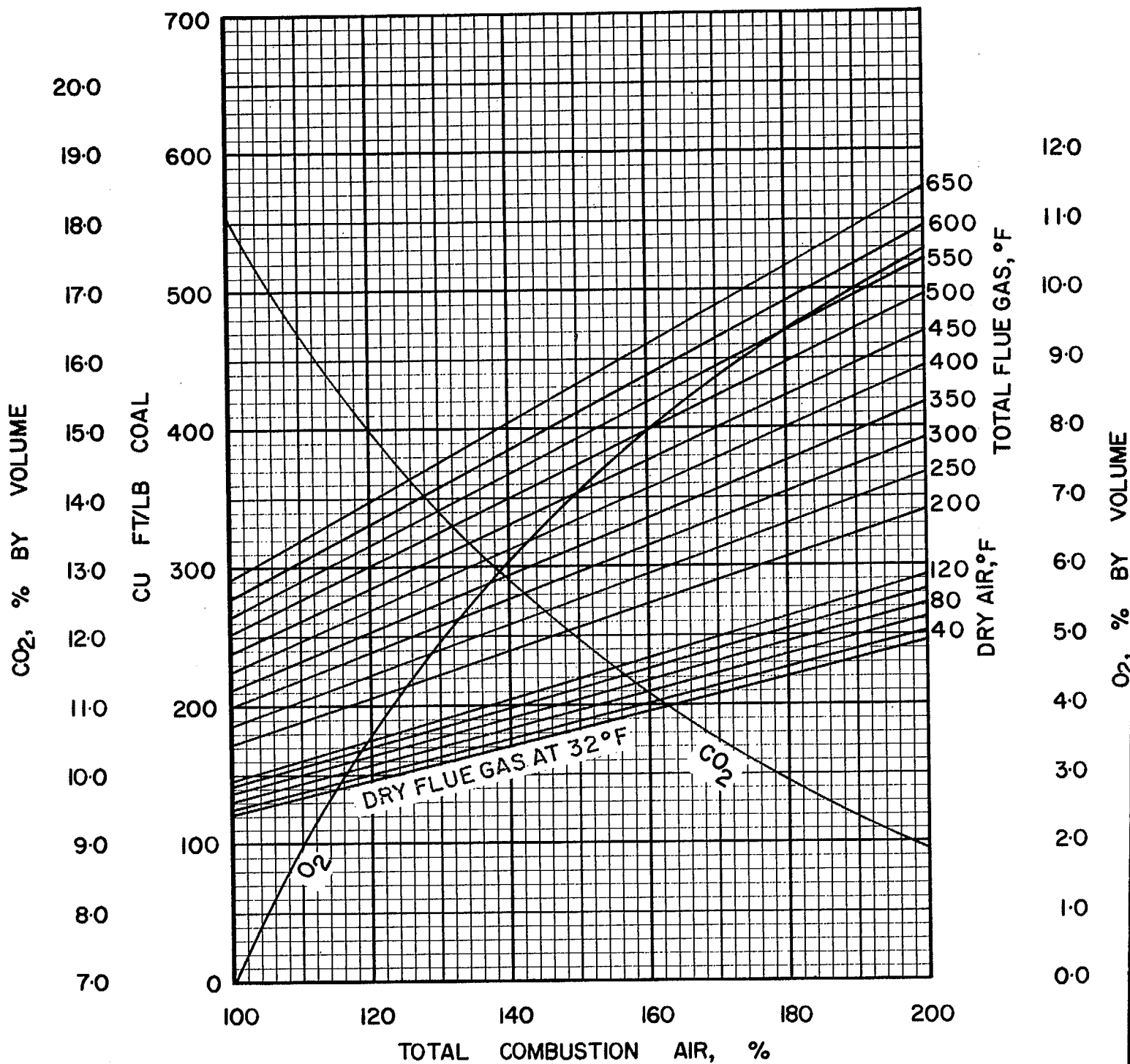


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·I

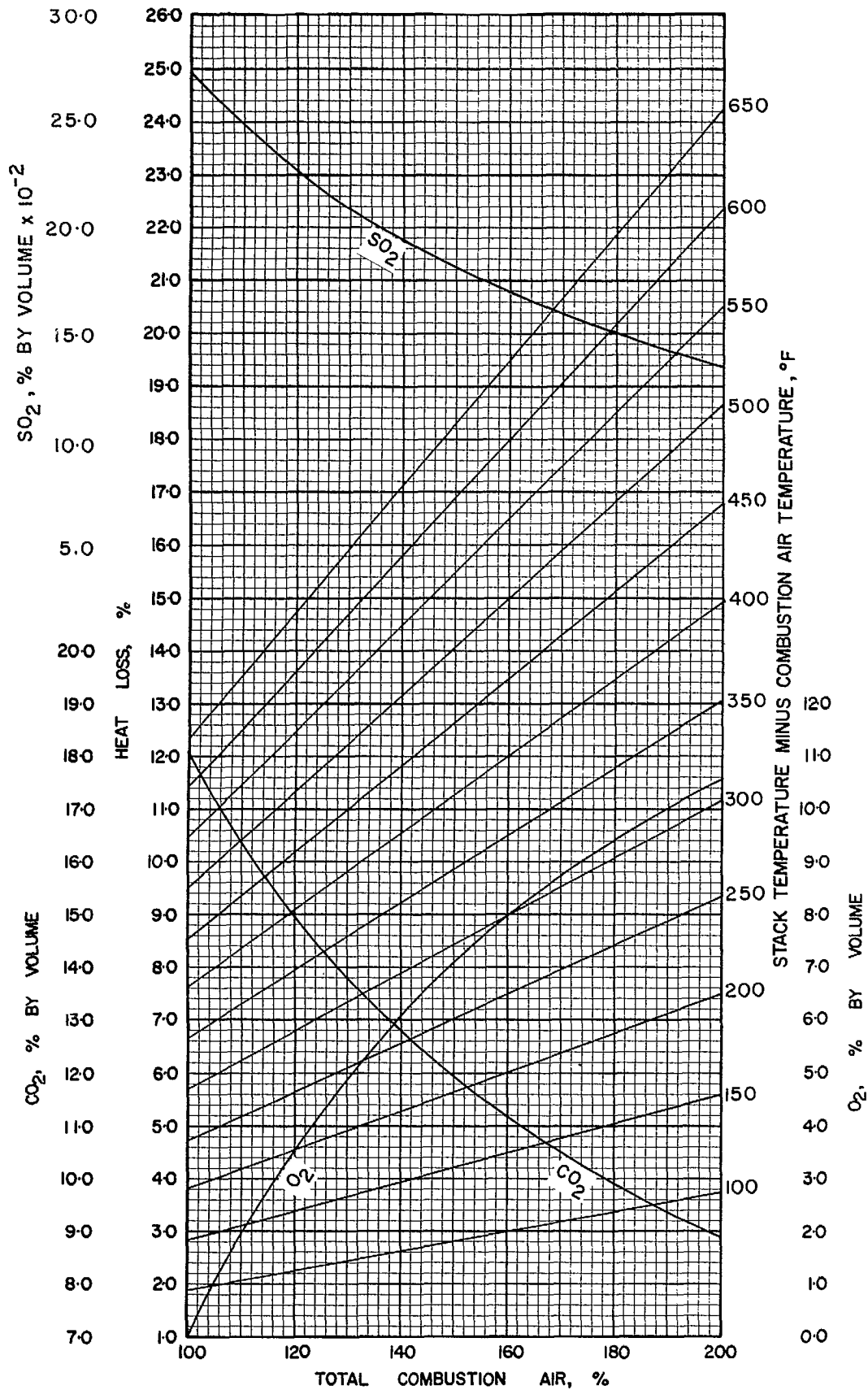


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·1

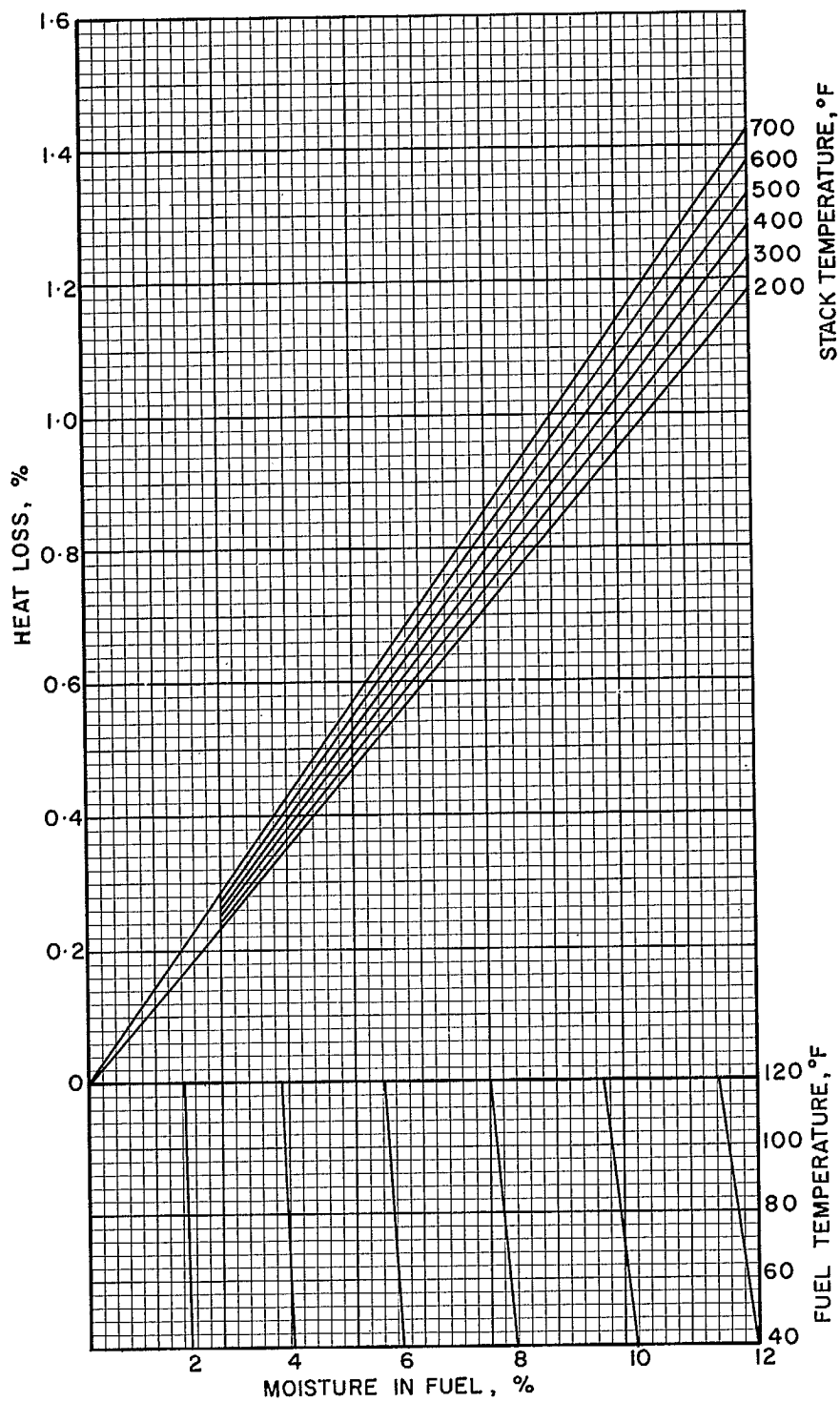


FIGURE 4. HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·1

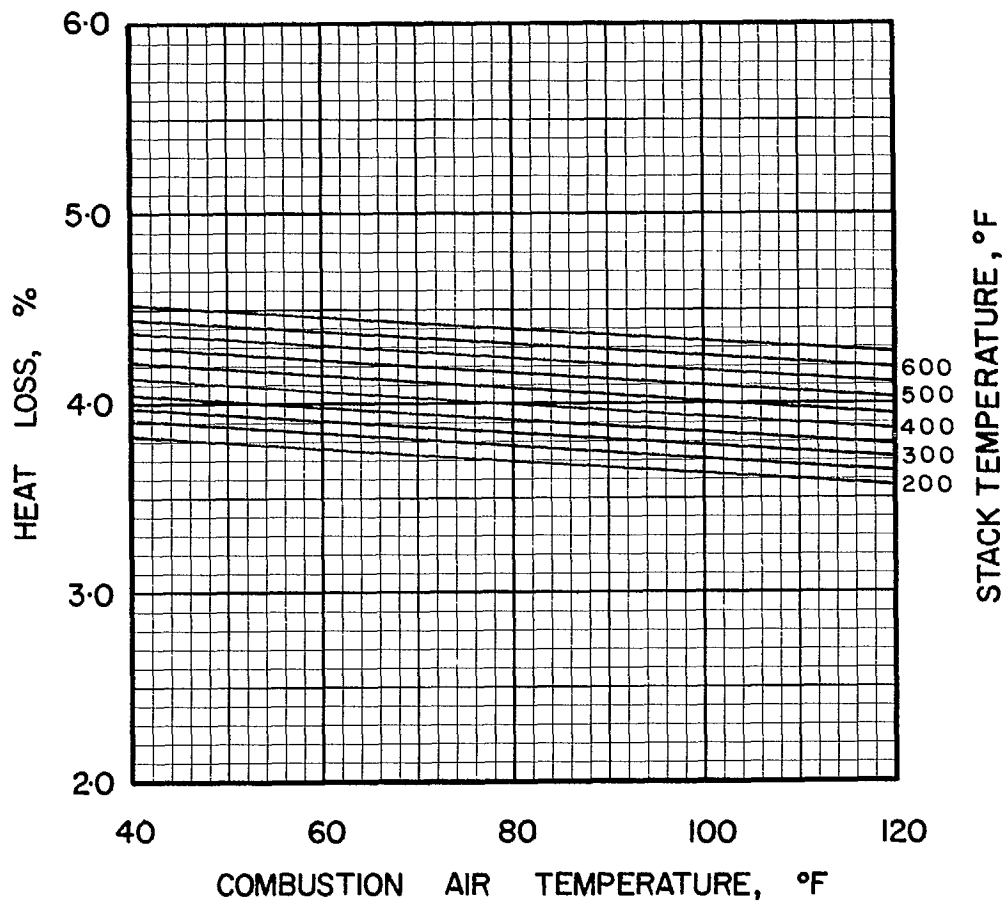


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US · WV · I

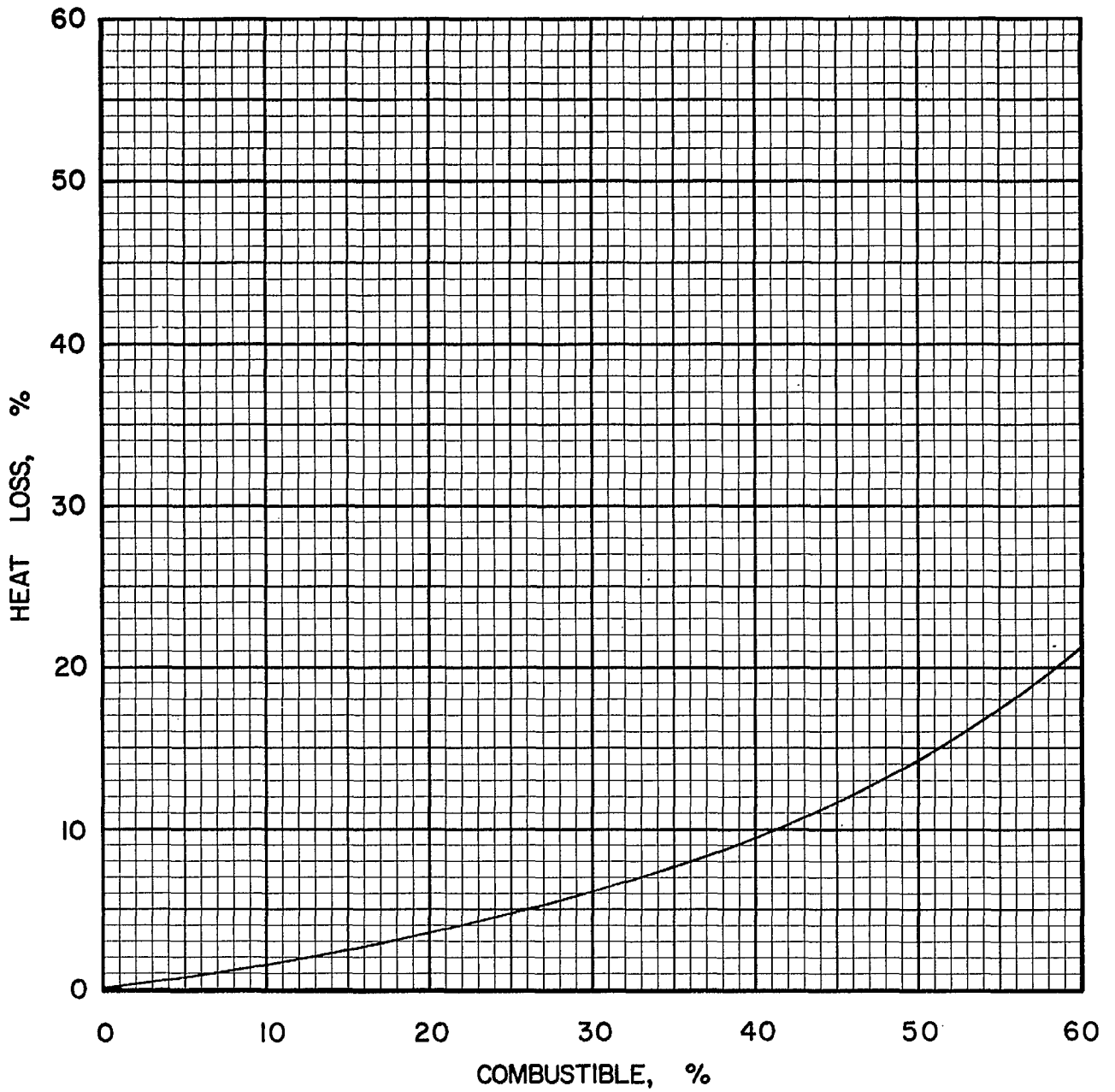


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·I

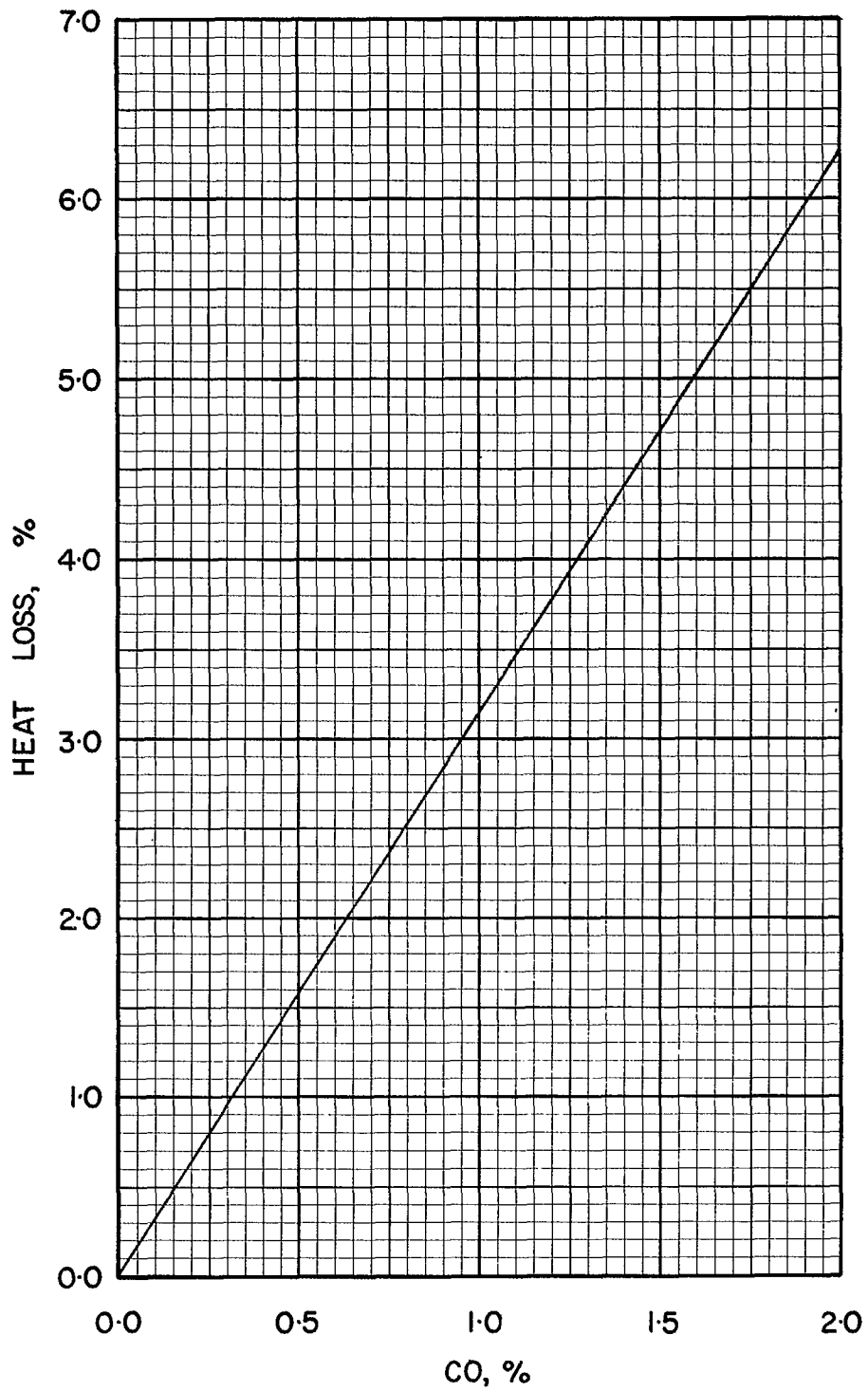


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US · WV · 1

COAL US WV-2, DAWSON, SIMPSON CREEK

Typical Moisture Range: 0-6%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.123
Volatile Matter	0.390
Fixed Carbon	<u>0.487</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.734
Hydrogen (H)	0.049
Sulphur (S)	0.038
Nitrogen (N)	0.013
Oxygen (O)	0.043
Ash	<u>0.123</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	13157
Btu/short ton:	$26.31 \times 10^6$
Btu/long ton:	$29.47 \times 10^6$
MJ/kg:	30.60

*Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 76.01 lb	
$10^6$ Btu	= 0.03800 short tons	
$10^6$ Btu	= 0.03393 long tons	



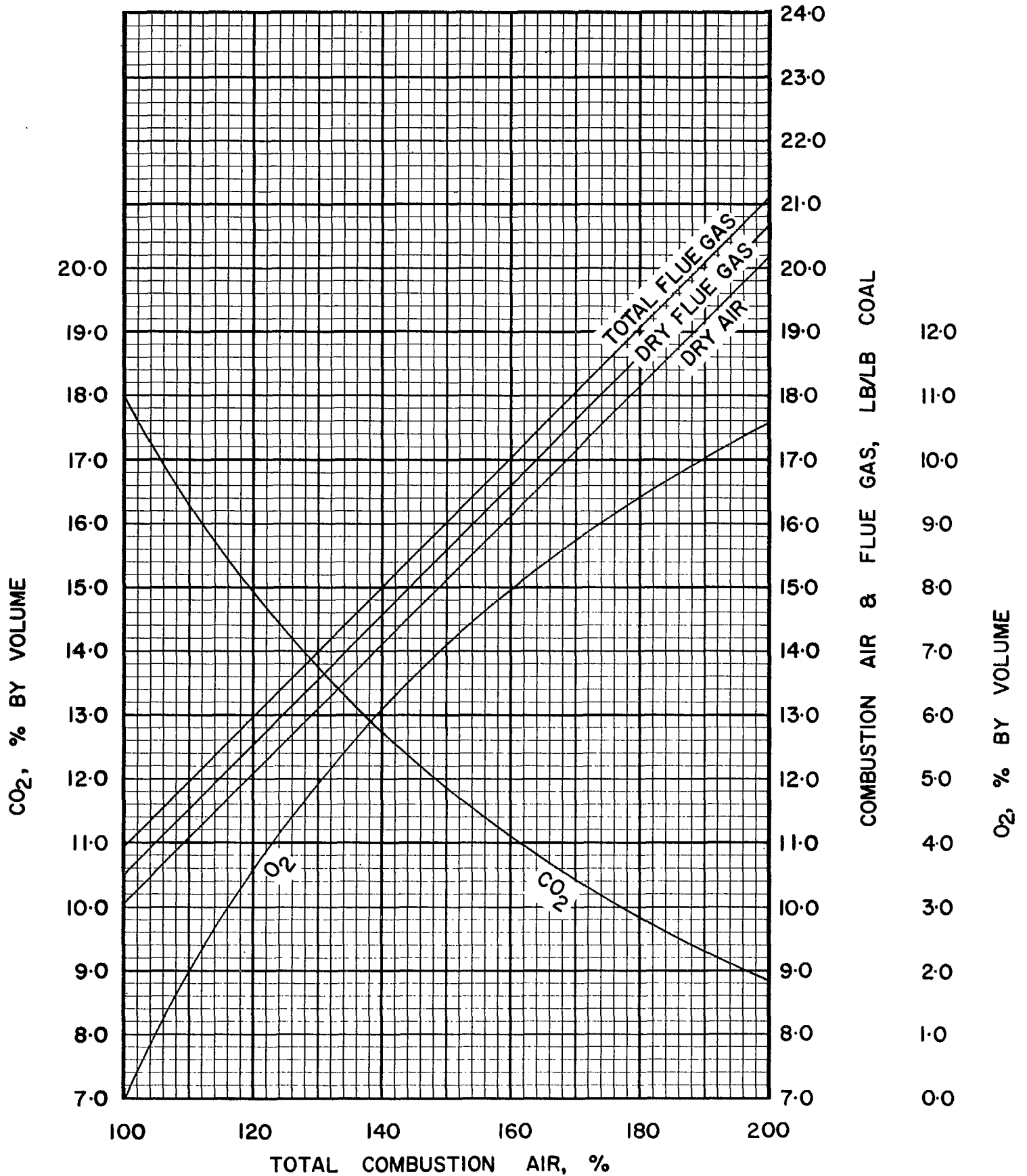


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·2

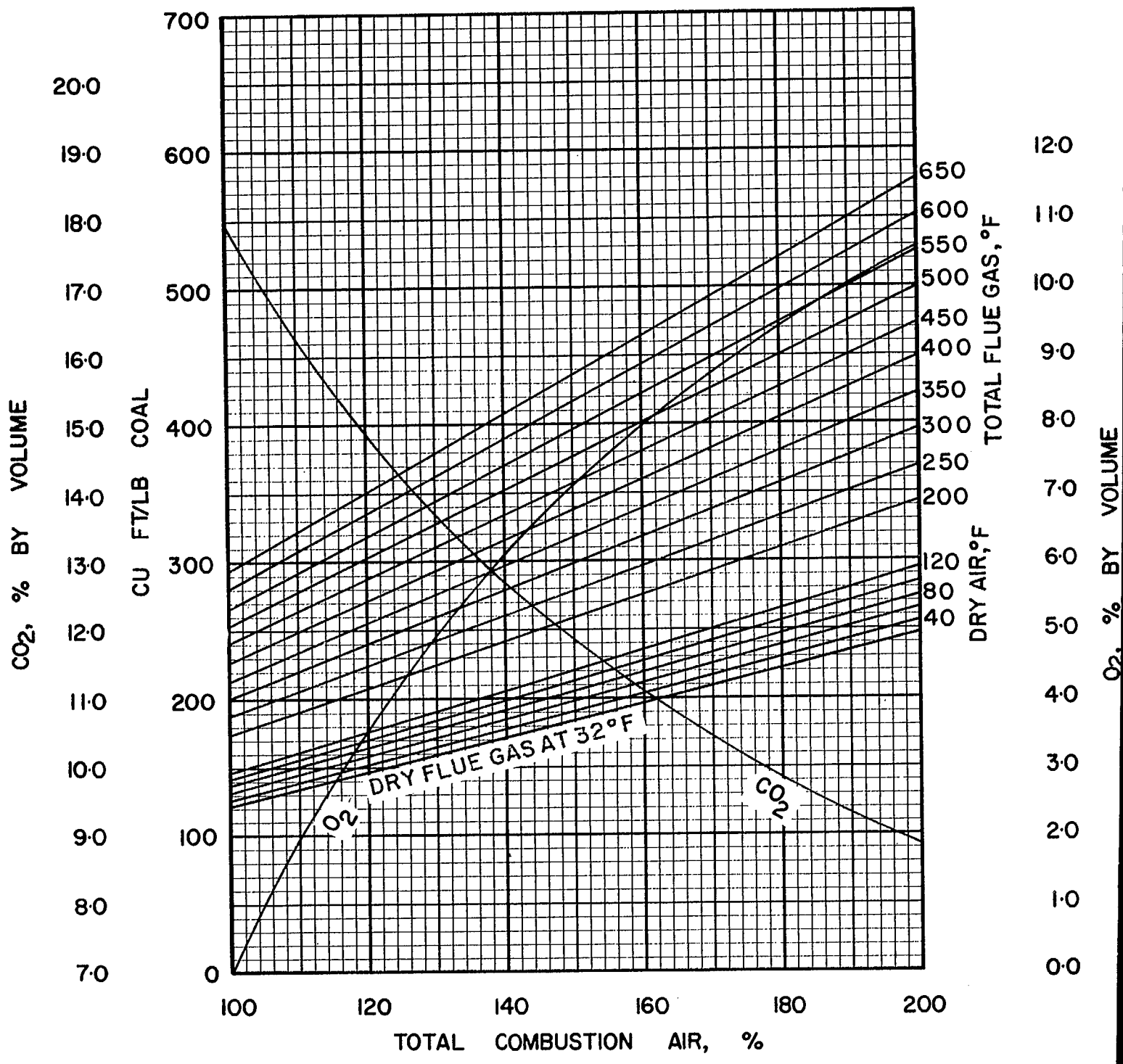


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·2

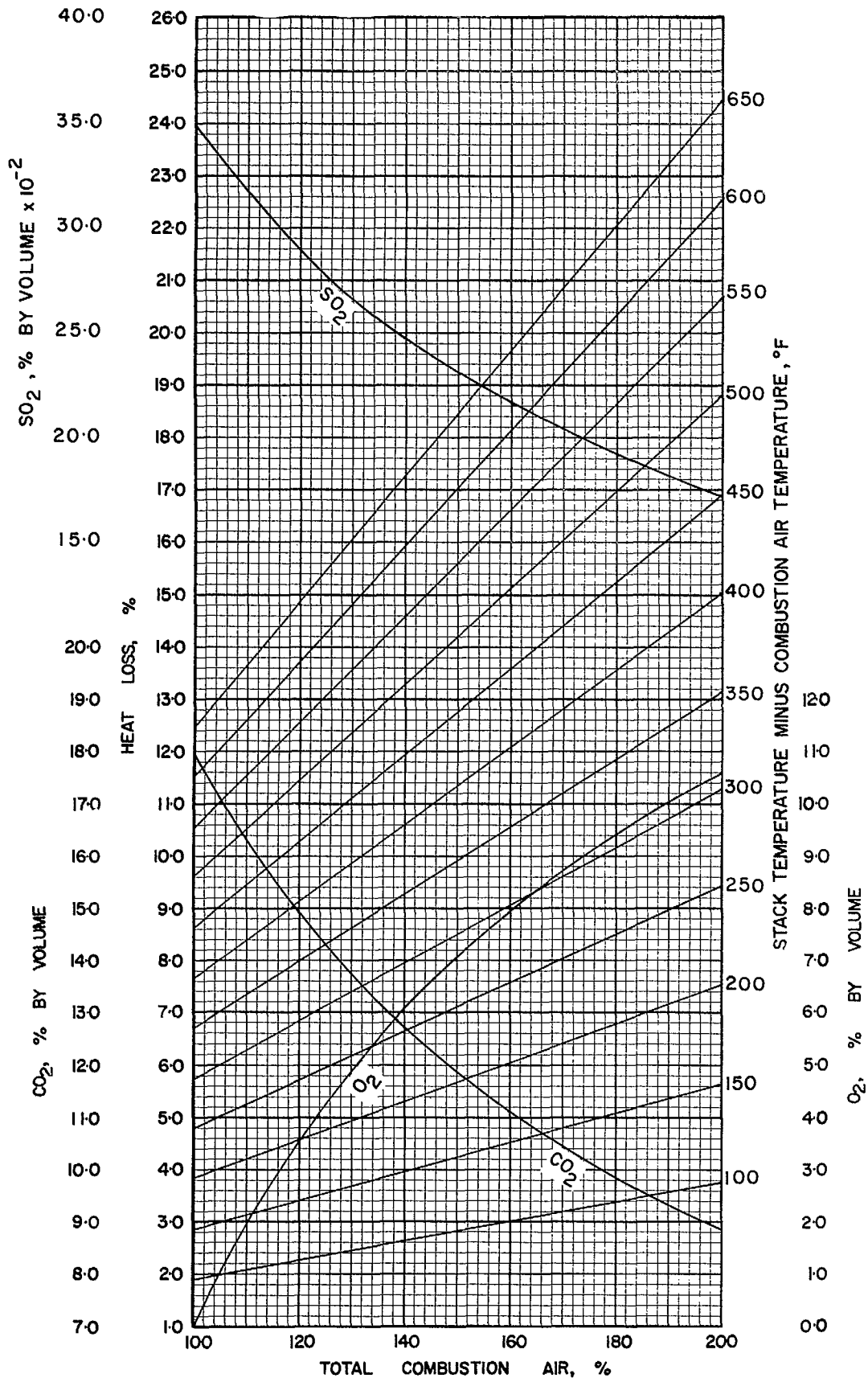


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·2

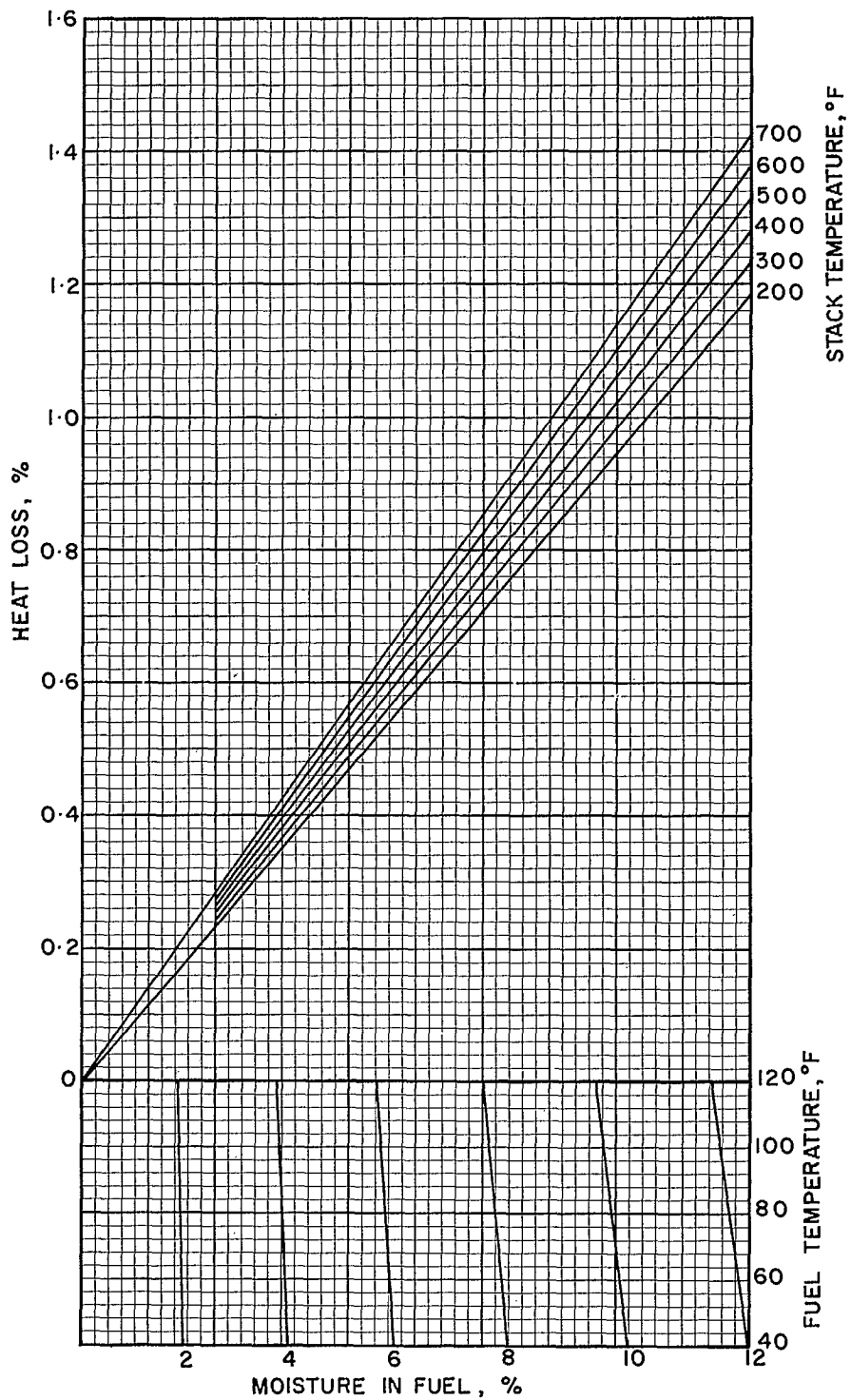


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·2

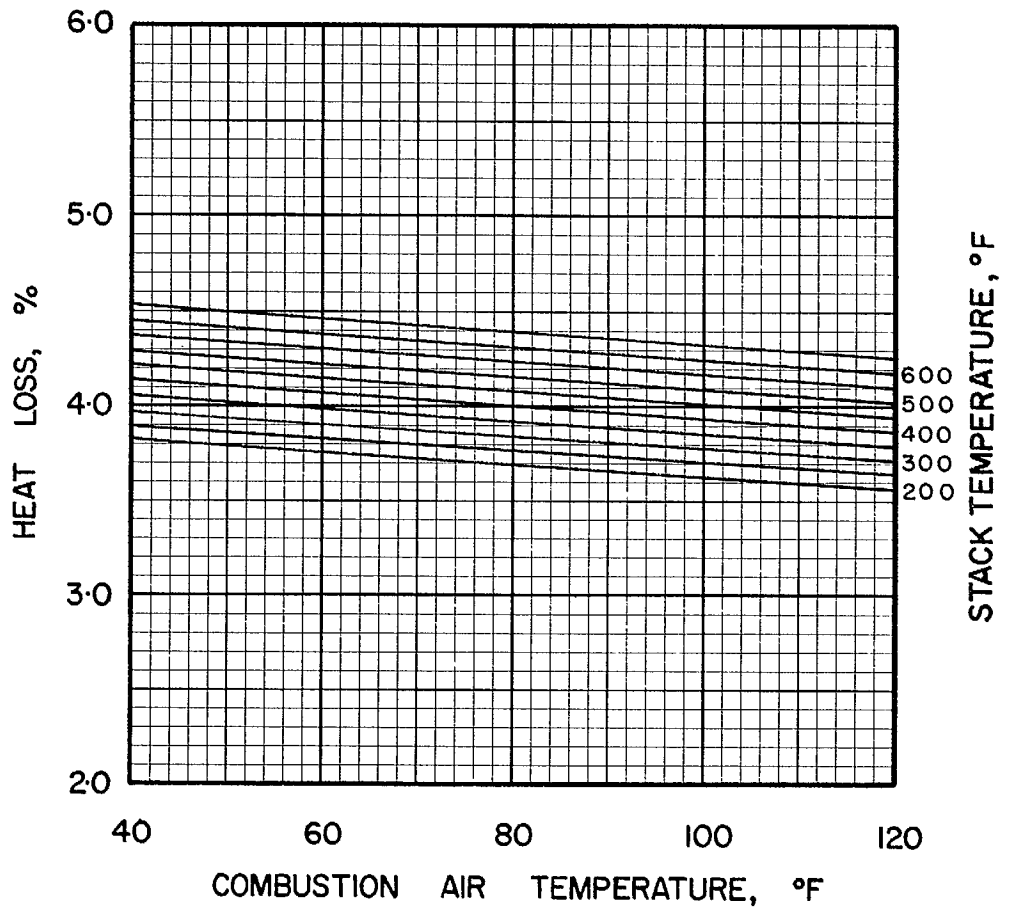


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·2

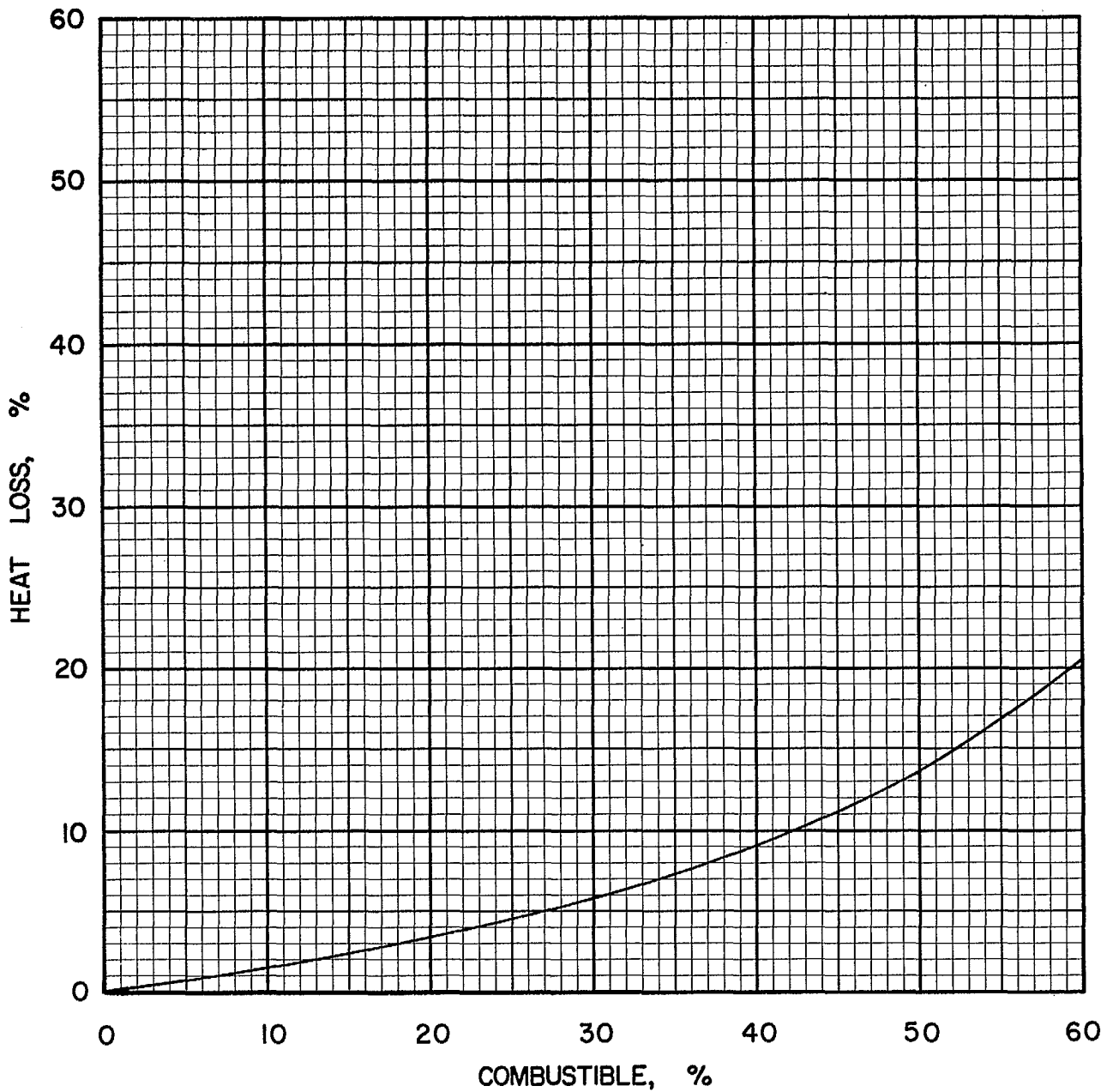


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·2

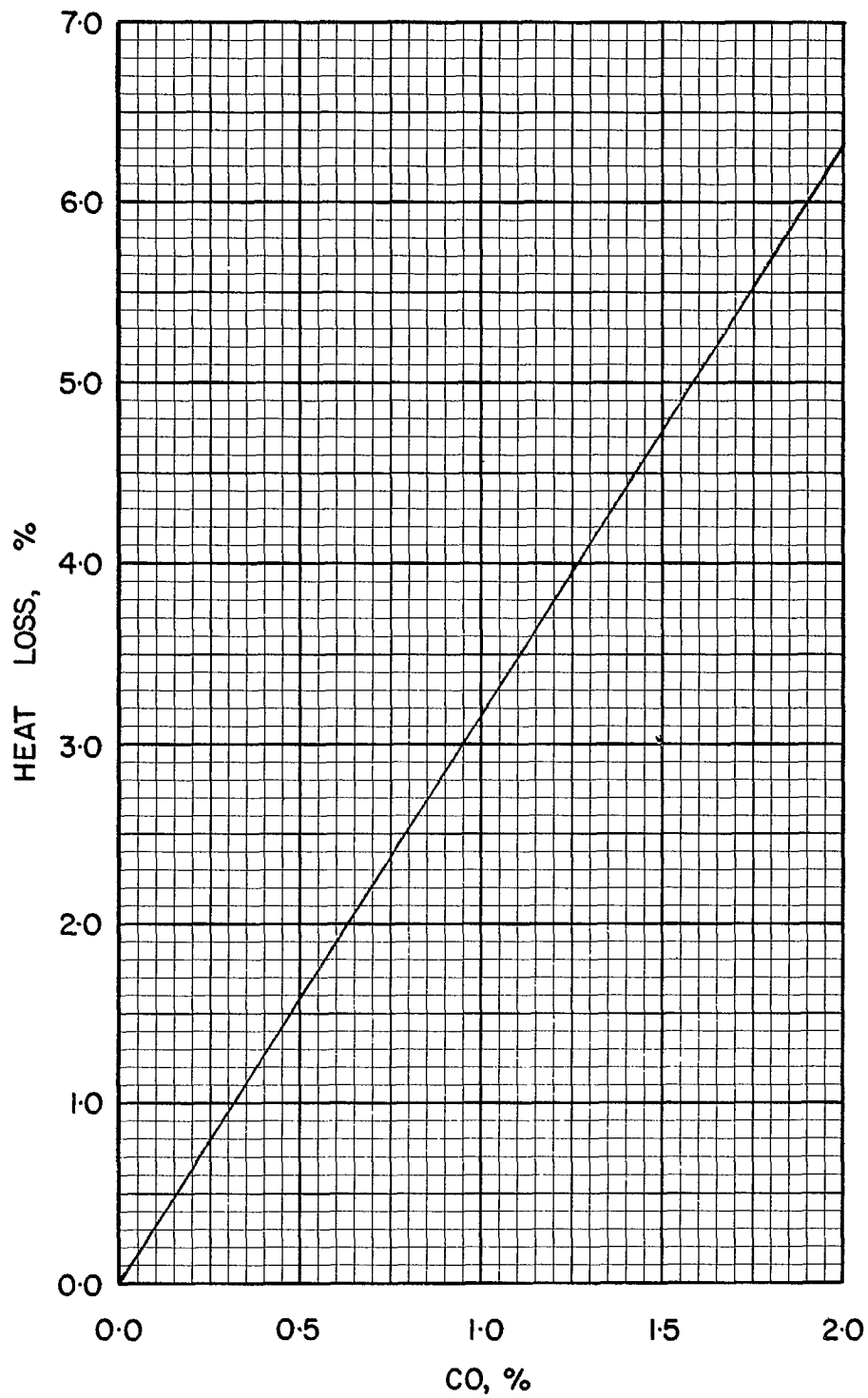


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US · WV · 2

**COAL US WV-3, FEDERAL No. 1, EASTERN ASSOCIATED**

Typical Moisture Range: 0-6%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.071
Volatile Matter	0.388
Fixed Carbon	<u>0.541</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.788
Hydrogen (H)	0.052
Sulphur (S)	0.026
Nitrogen (N)	0.013
Oxygen (O)	0.050
Ash	<u>0.071</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	14028
Btu/short ton:	28.06 x 10 <sup>6</sup>
Btu/long ton:	31.42 x 10 <sup>6</sup>
MJ/kg:	32.62

*Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
10 <sup>6</sup> Btu = 71.29	lb
10 <sup>6</sup> Btu = 0.03564	short tons
10 <sup>6</sup> Btu = 0.03182	long tons



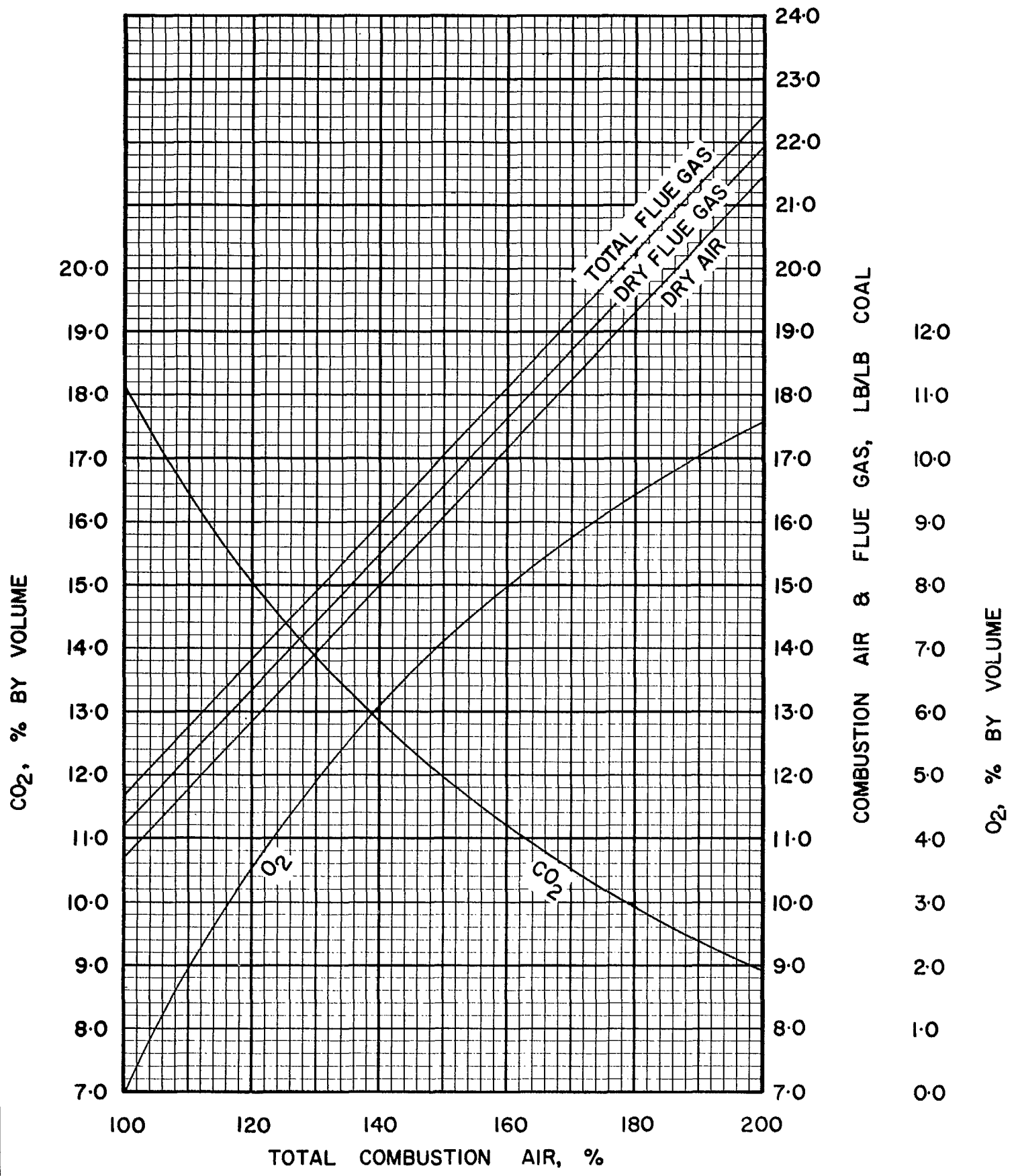


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·3

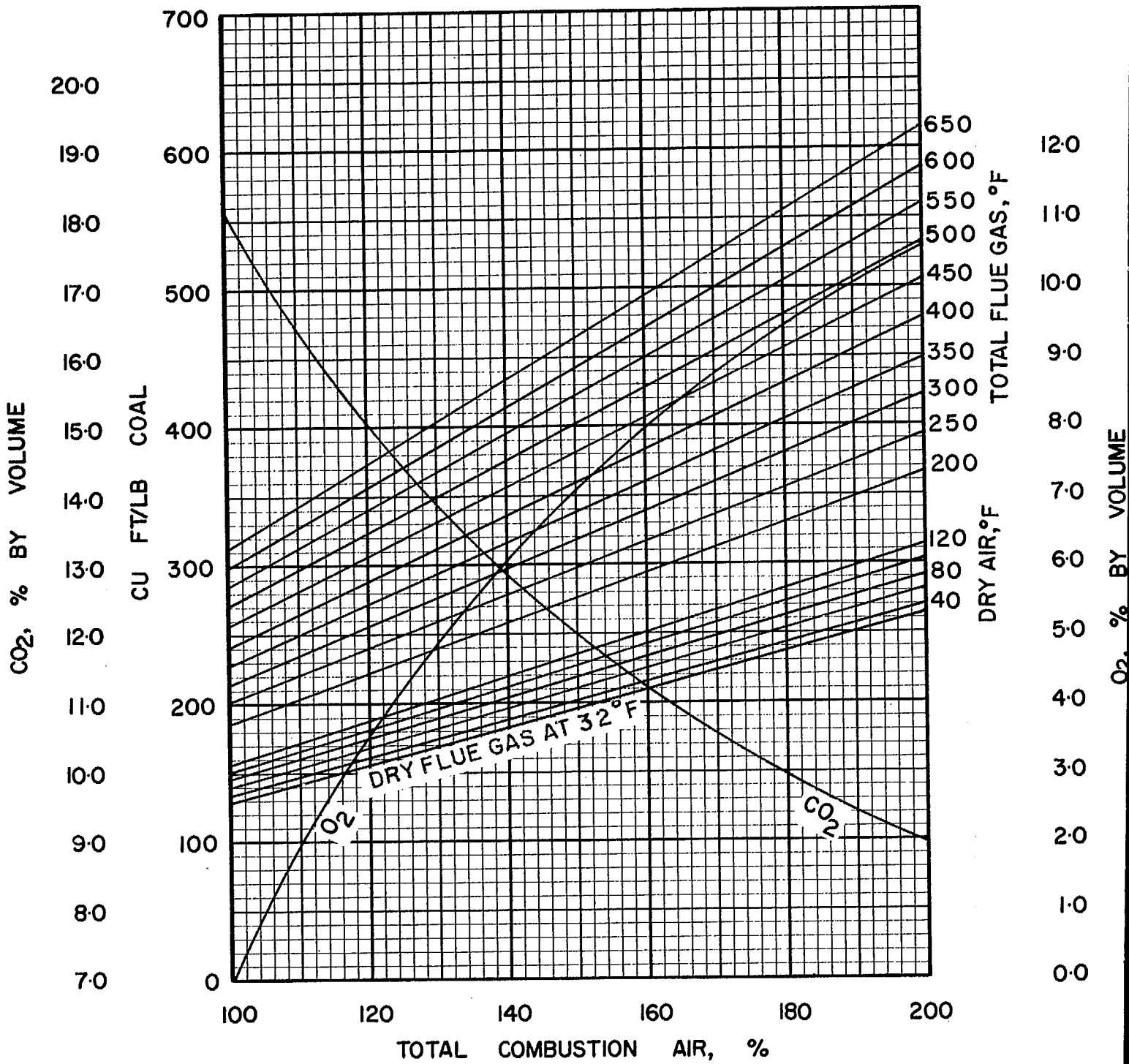


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·3

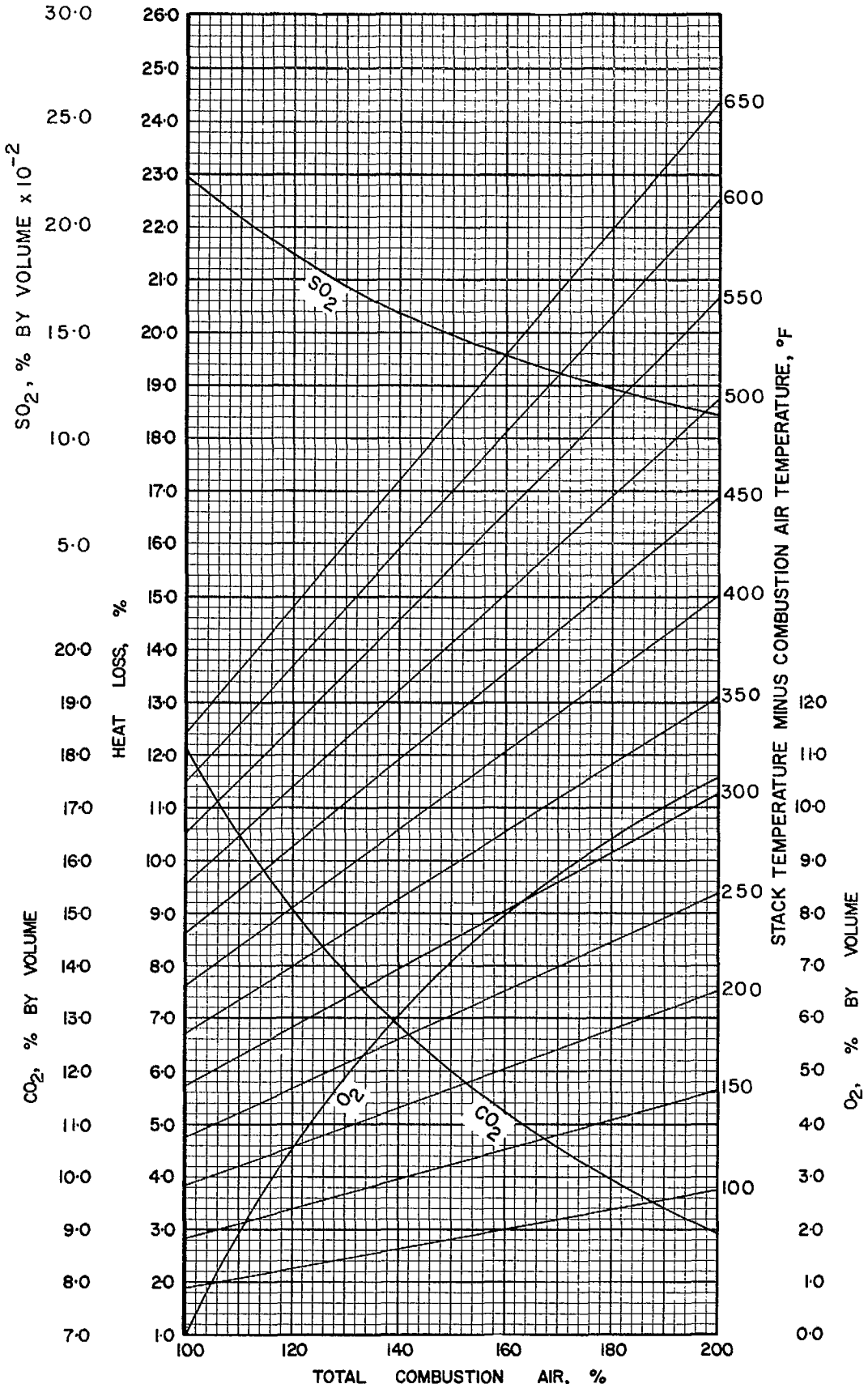


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·3

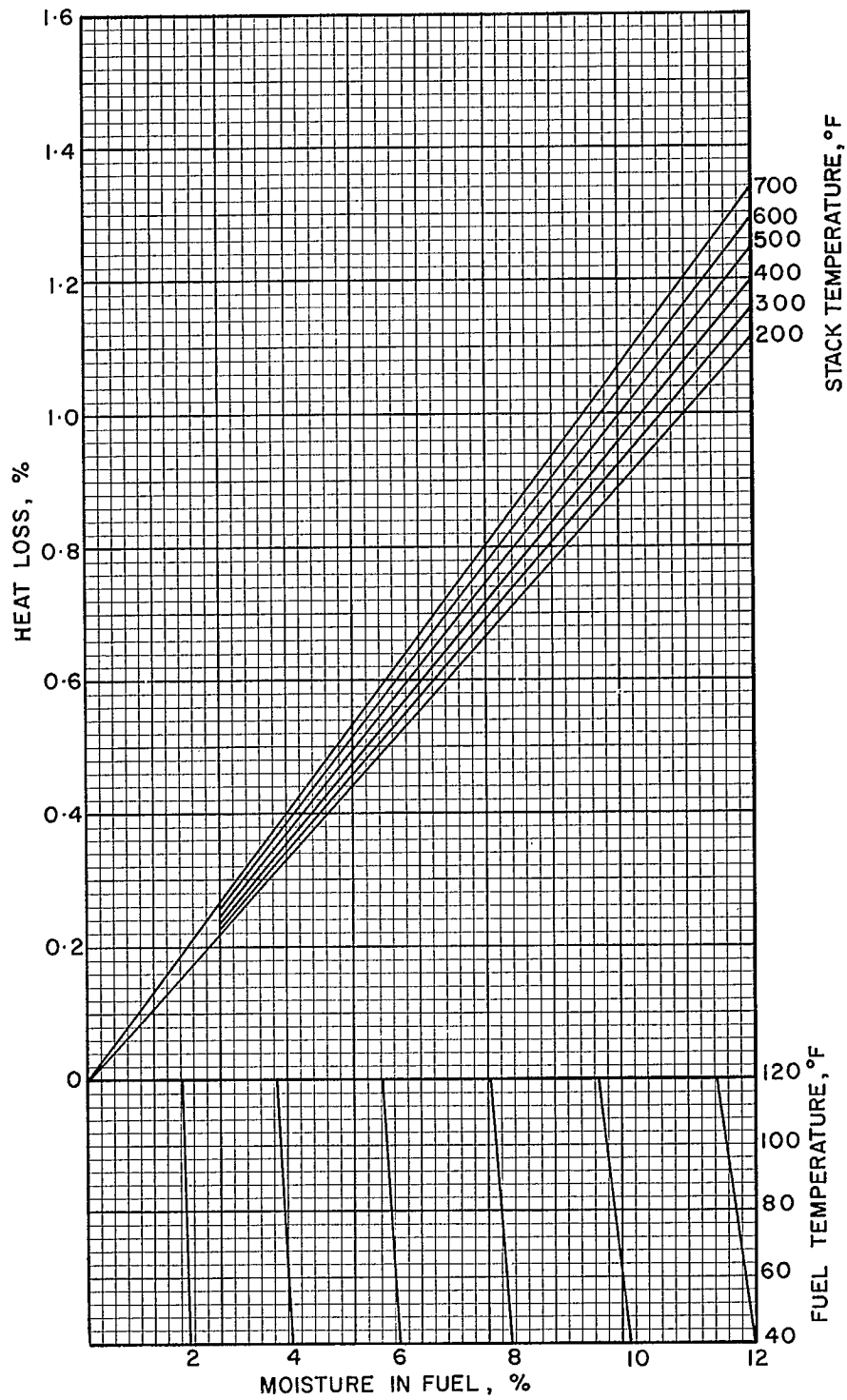


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·3

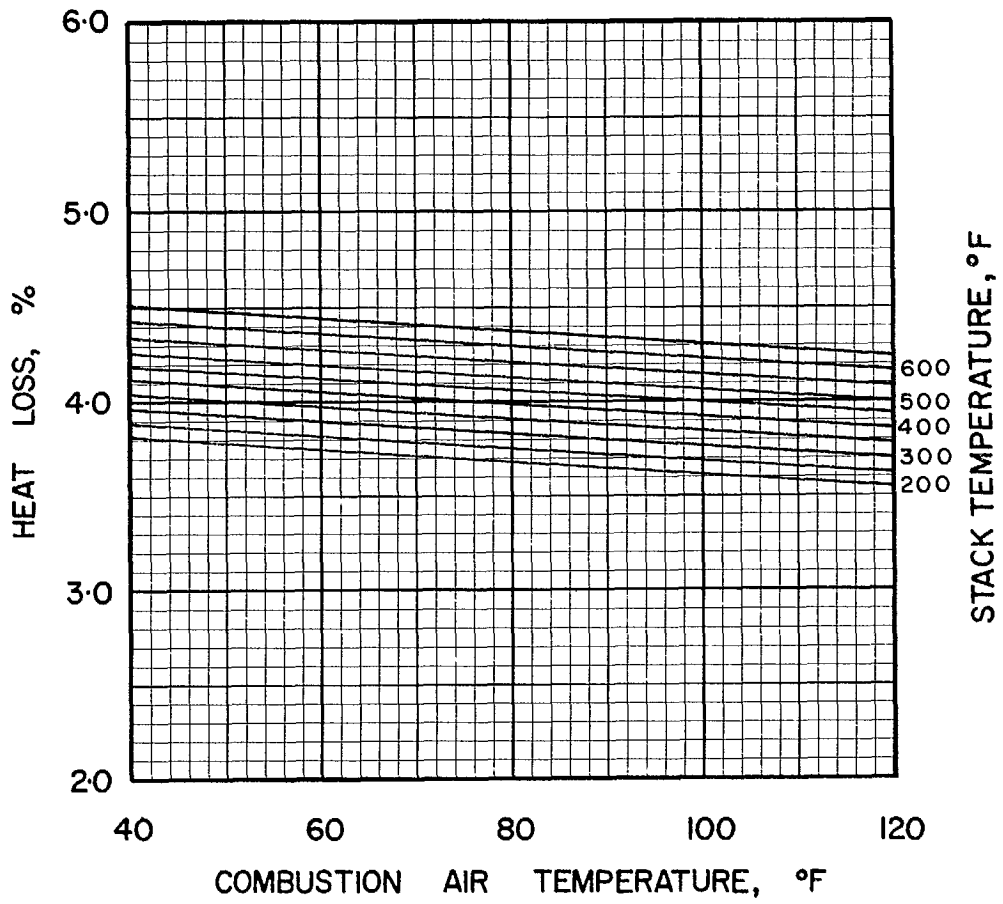


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·3

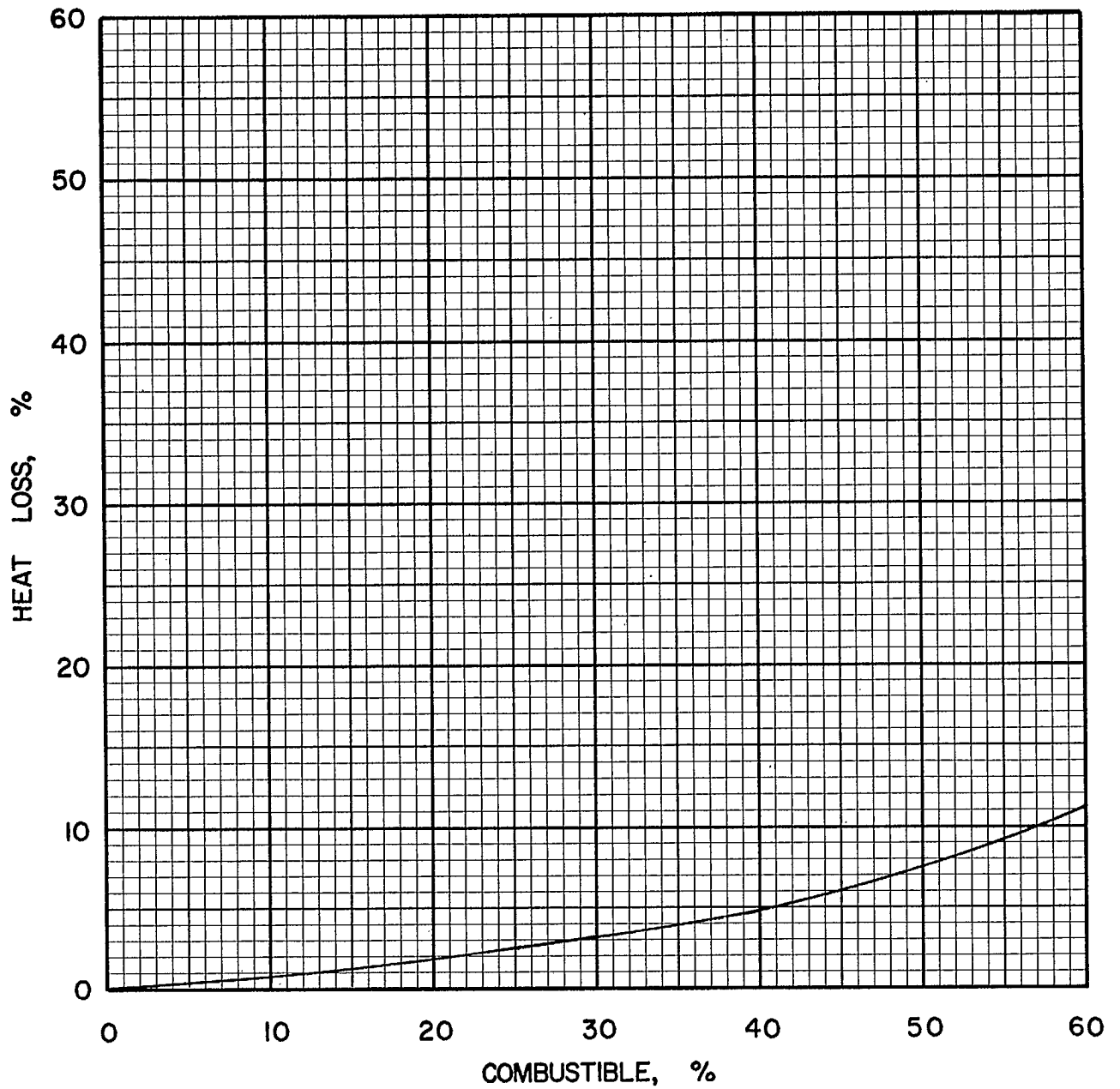


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·3

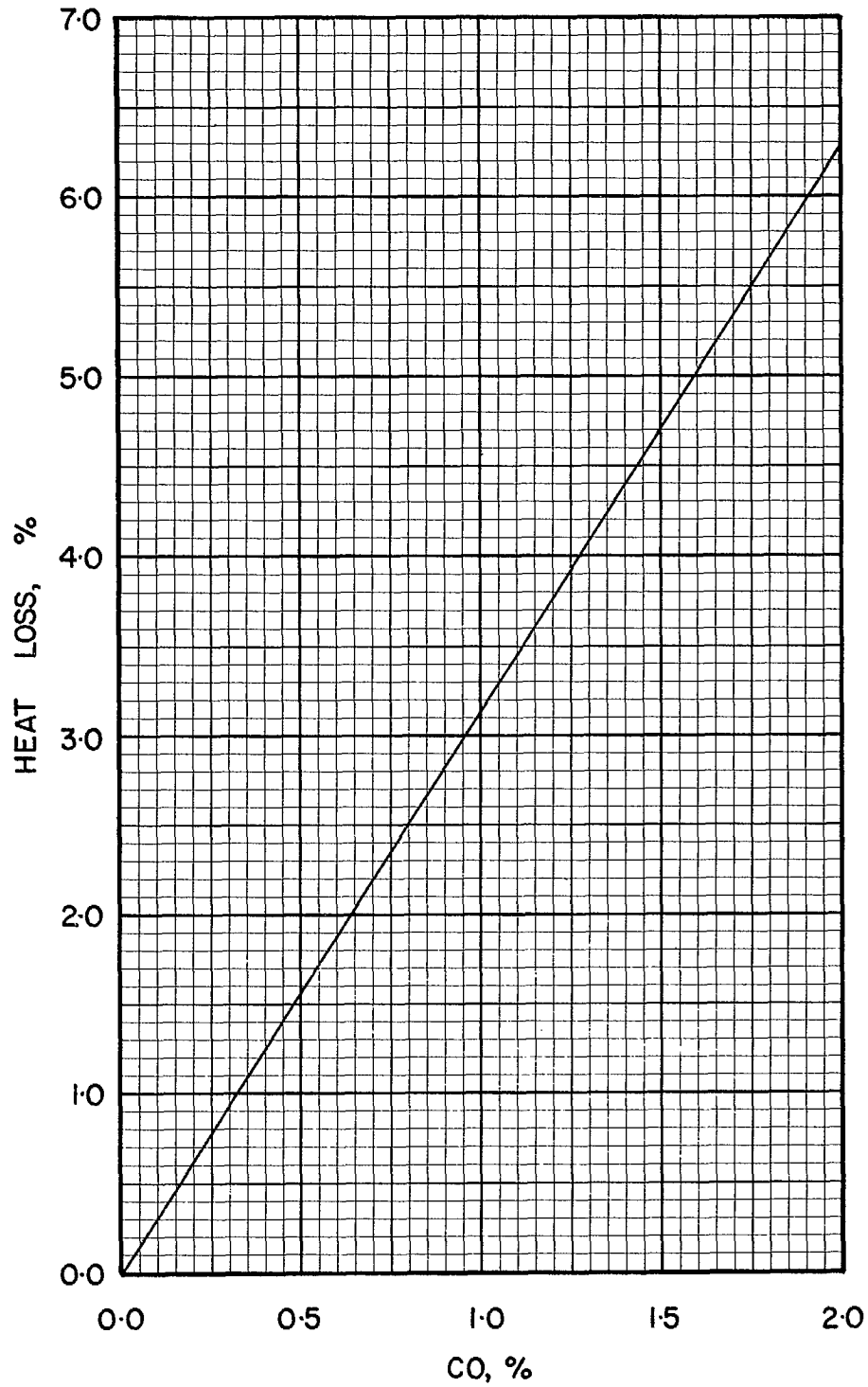


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·WV·3

COAL US WV-4, LUNDALE, MCGREGOR

Typical Moisture Range: 0–6%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.062
Volatile Matter	0.368
Fixed Carbon	<u>0.570</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.803
Hydrogen (H)	0.052
Sulphur (S)	0.008
Nitrogen (N)	0.015
Oxygen (O)	0.060
Ash	<u>0.062</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	14378
Btu/short ton:	$28.76 \times 10^6$
Btu/long ton:	$32.21 \times 10^6$
MJ/kg:	33.44

*Conversion Factors*

1 short ton = 0.8929	long tons = 2000 lb
$10^6$ Btu = 69.55	lb
$10^6$ Btu = 0.03478	short tons
$10^6$ Btu = 0.03105	long tons



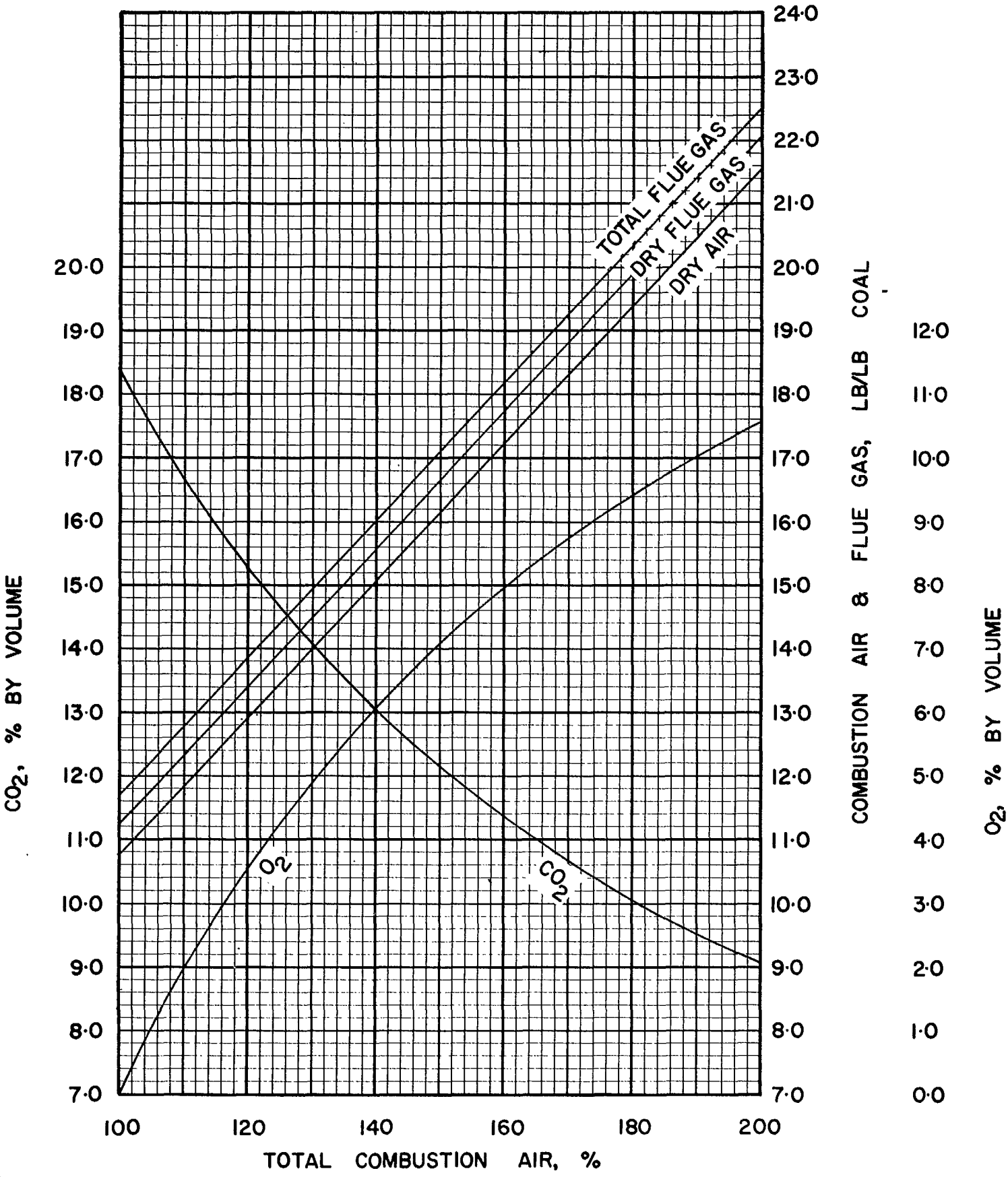


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·4

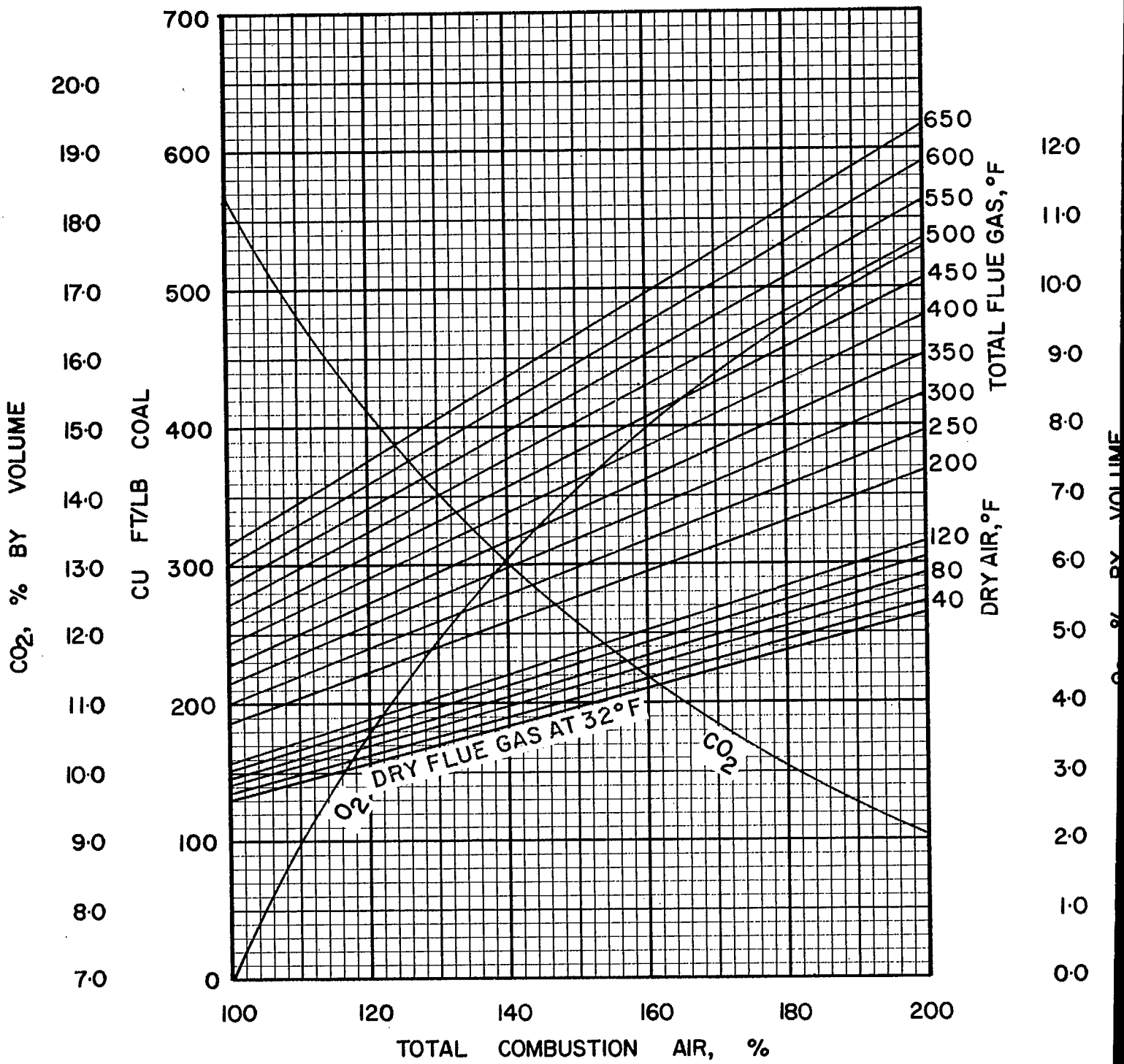


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·4

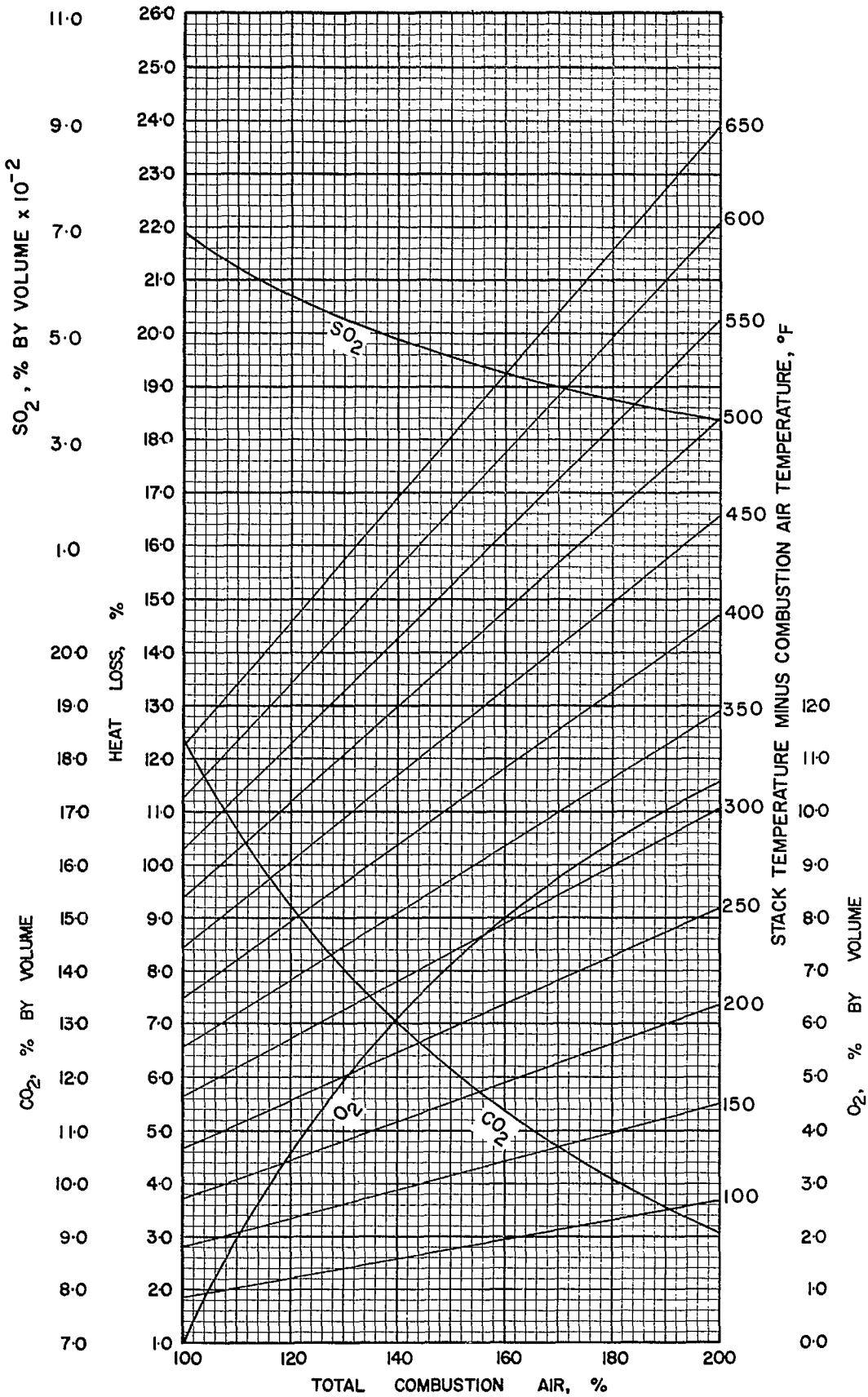


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·4

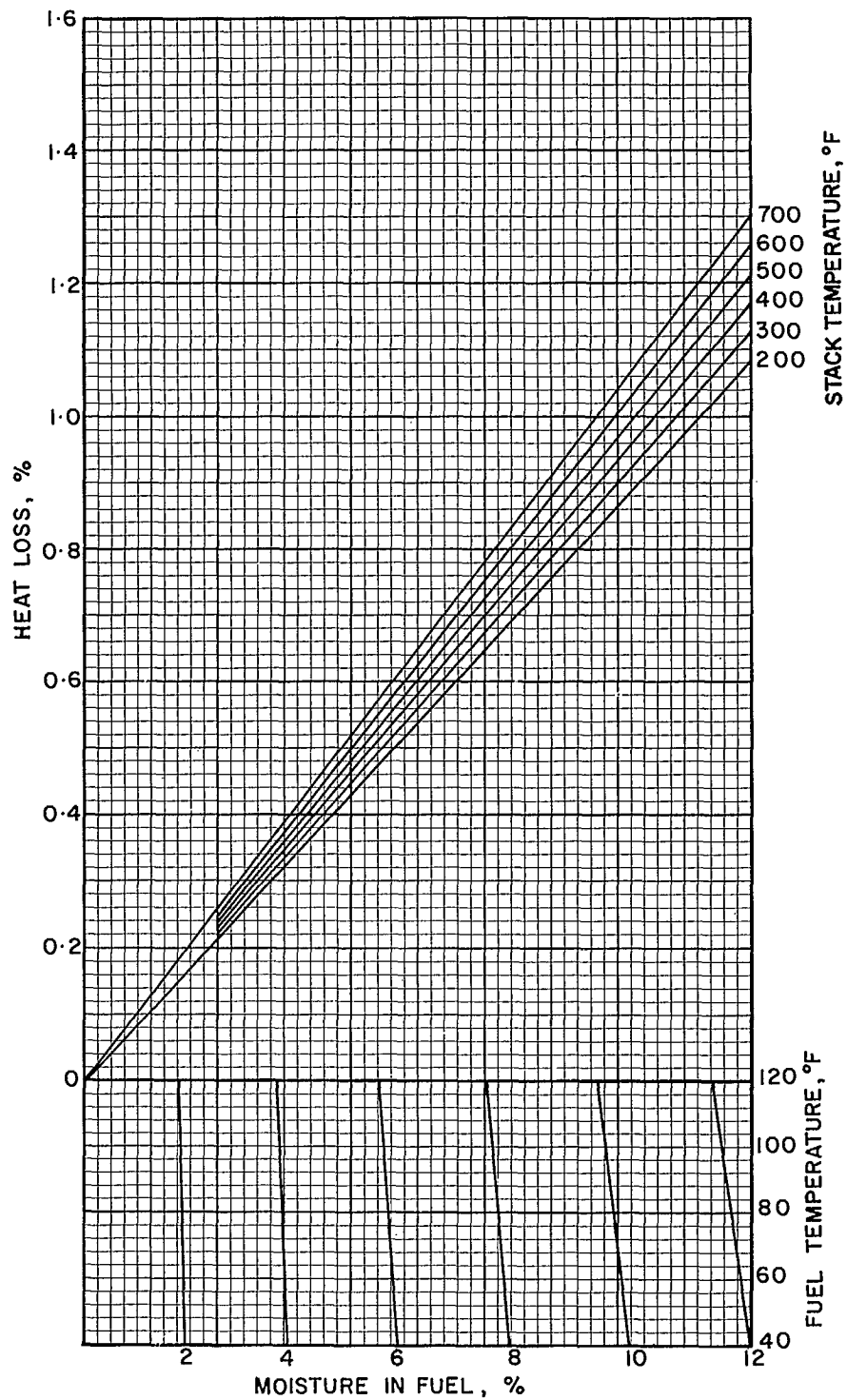


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·4

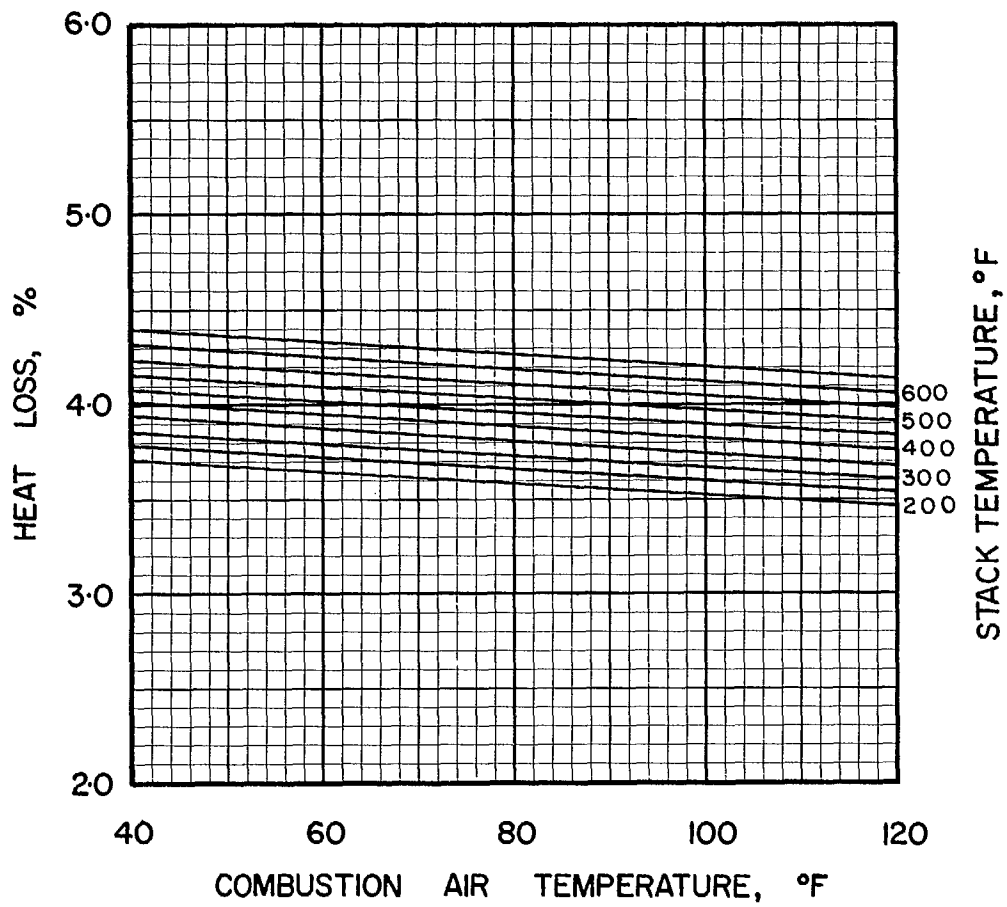


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·4

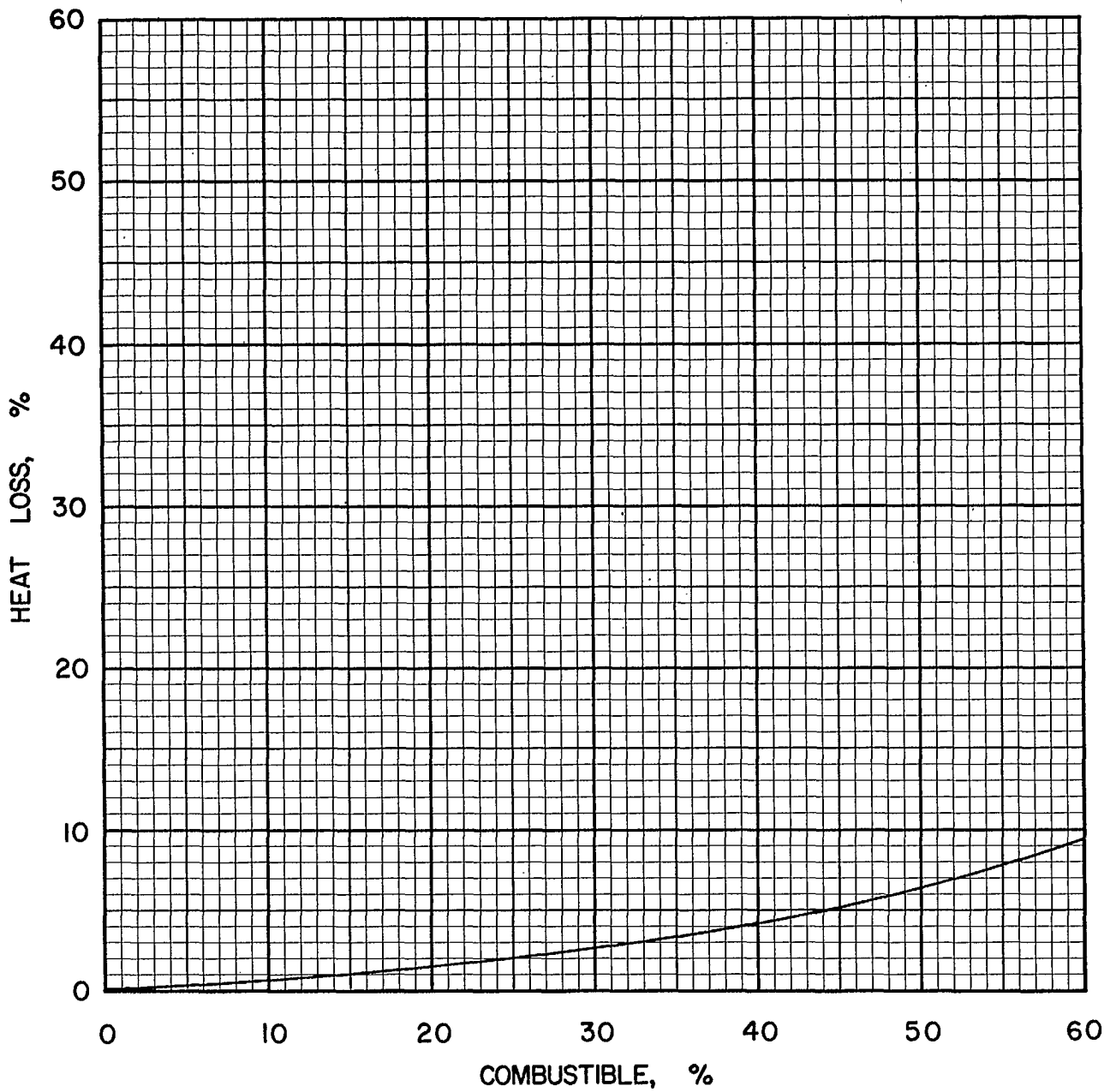


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·4

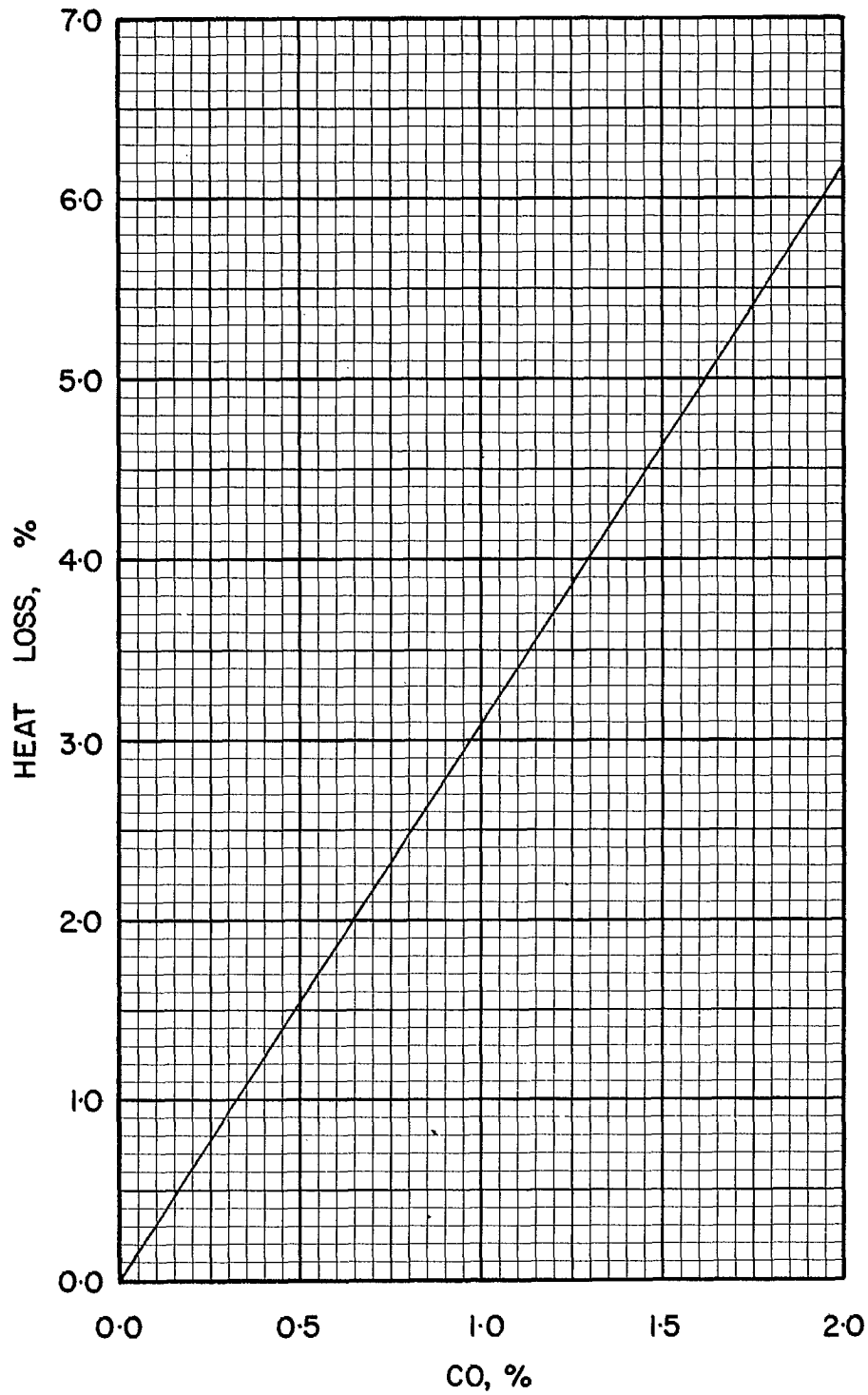


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US · WV · 4

COAL US WV-5, O'DONNELL, MARION COUNTY

Typical Moisture Range: 0-8%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.072
Volatile Matter	0.409
Fixed Carbon	0.519
Total	<u>1.000</u>

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.775
Hydrogen (H)	0.052
Sulphur (S)	0.026
Nitrogen (N)	0.015
Oxygen (O)	0.060
Ash	<u>0.072</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	14080
Btu/short ton:	$28.16 \times 10^6$
Btu/long ton:	$31.54 \times 10^6$
MJ/kg:	32.74

*Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 71.02 lb	
$10^6$ Btu	= 0.03551 short tons	
$10^6$ Btu	= 0.03171 long tons	



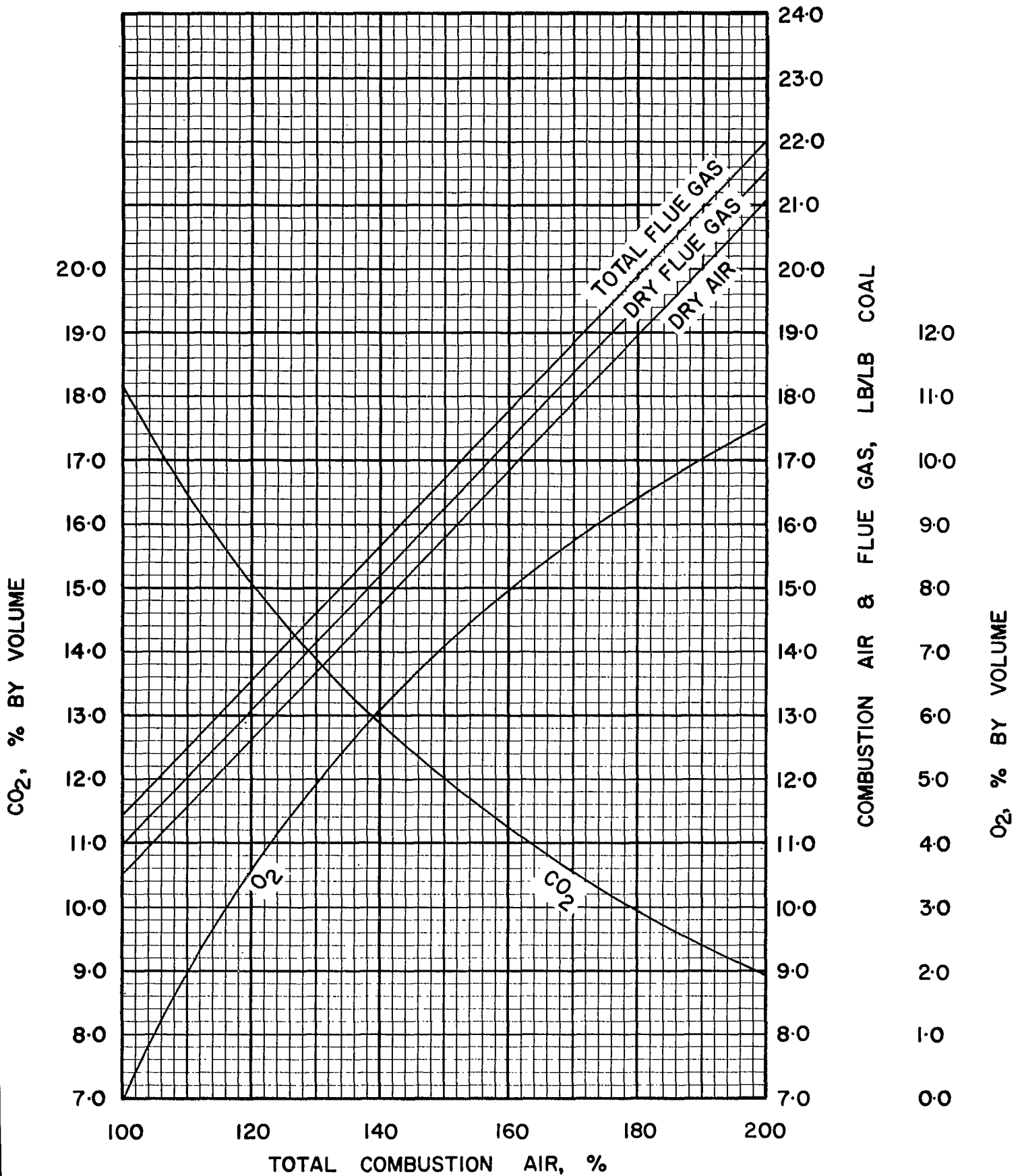


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·5

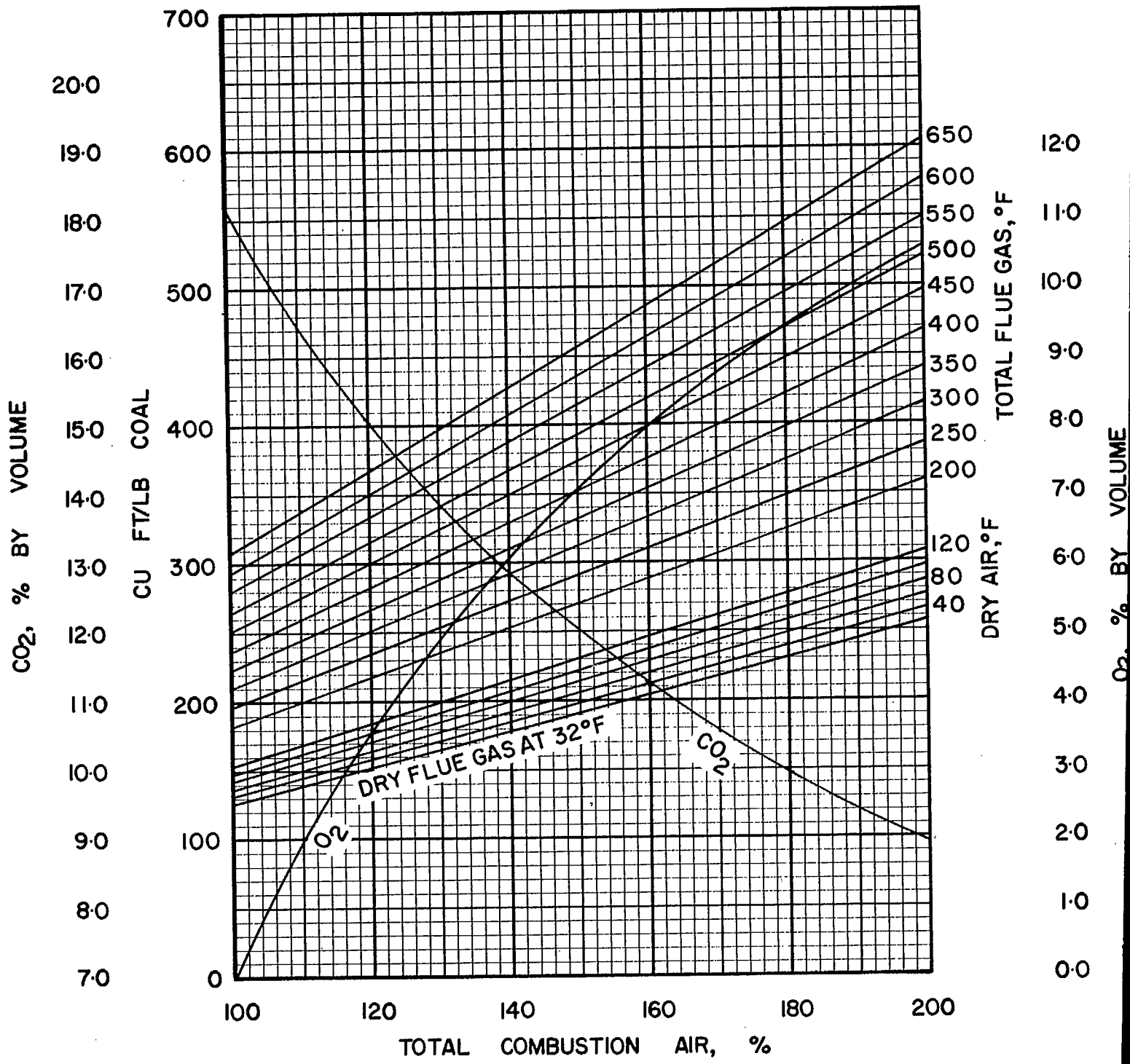


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·5

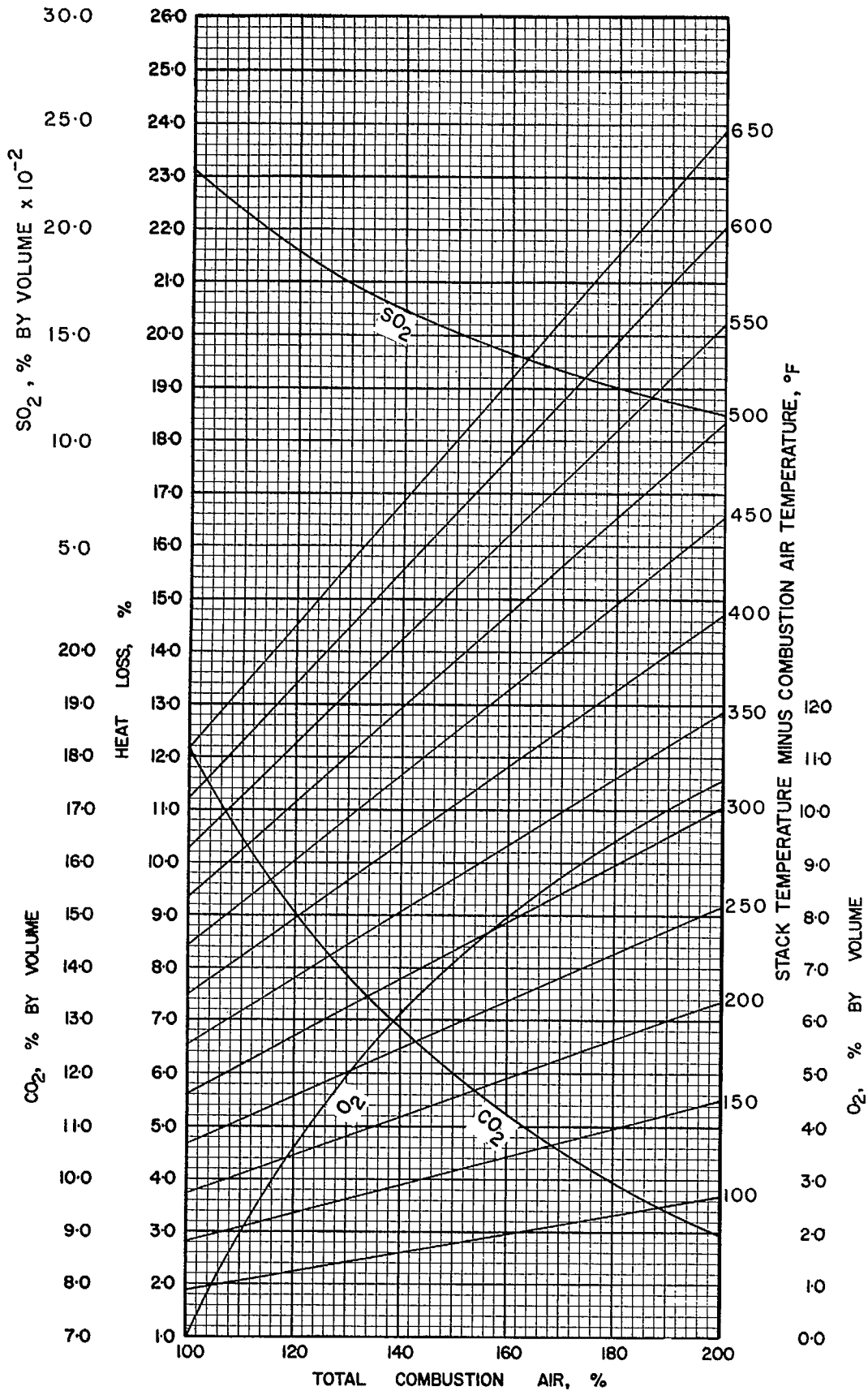


FIGURE 3- DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·5

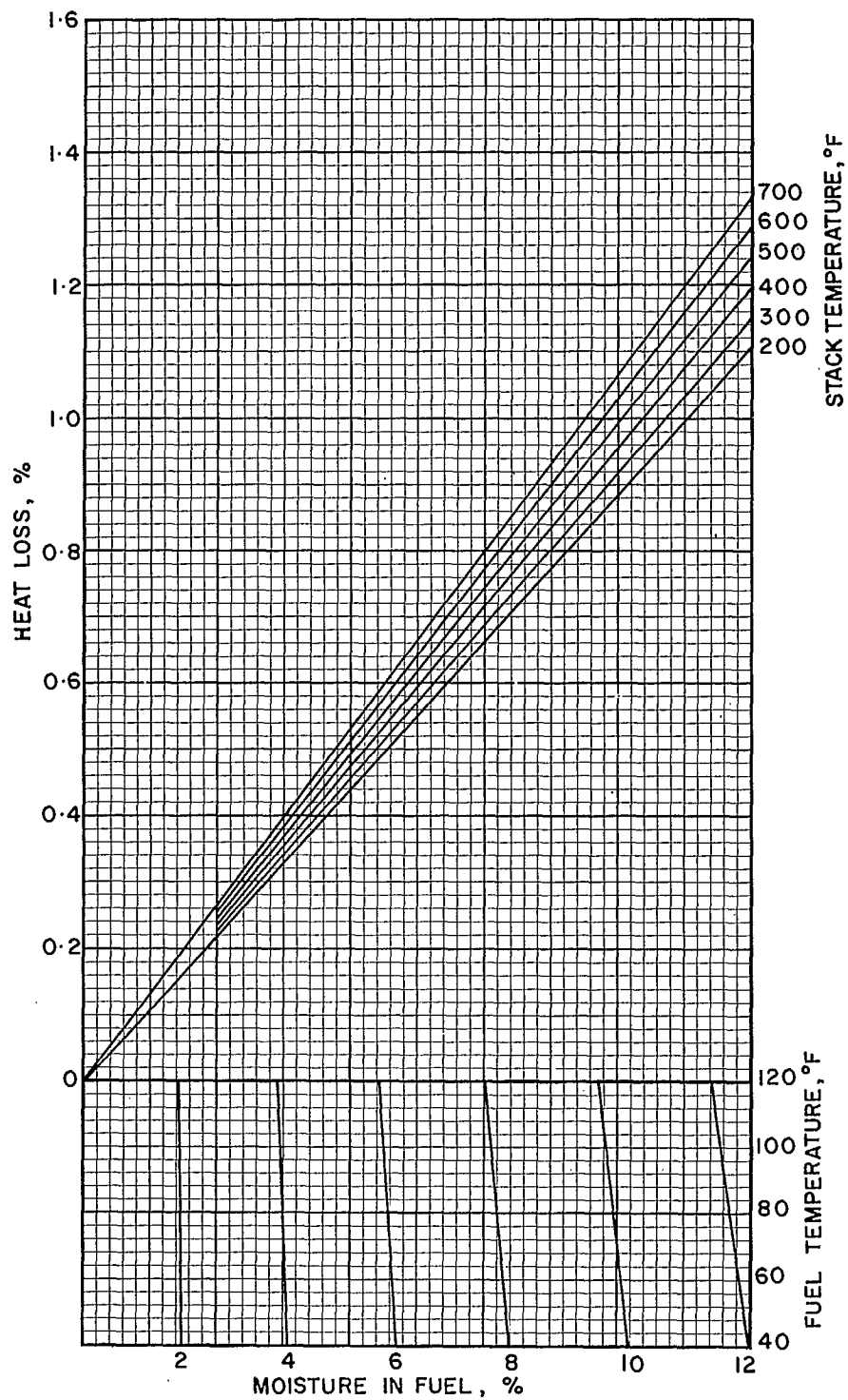


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·5

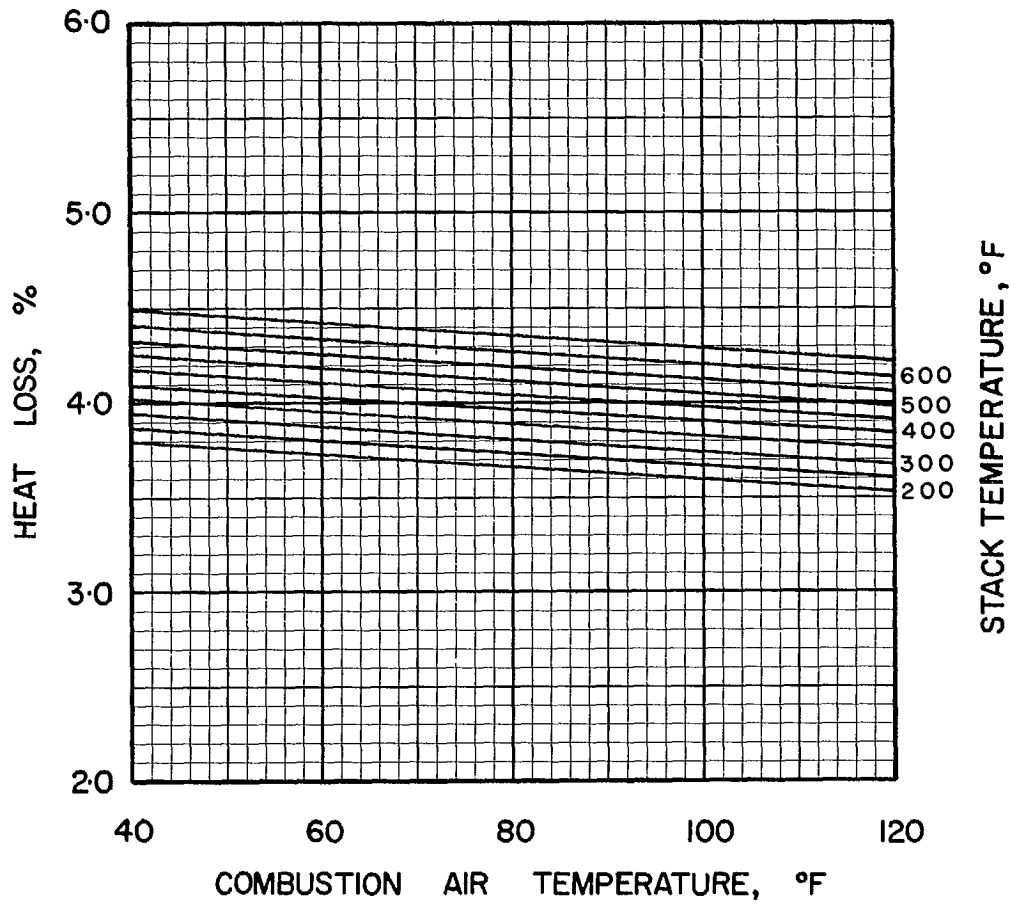


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·5

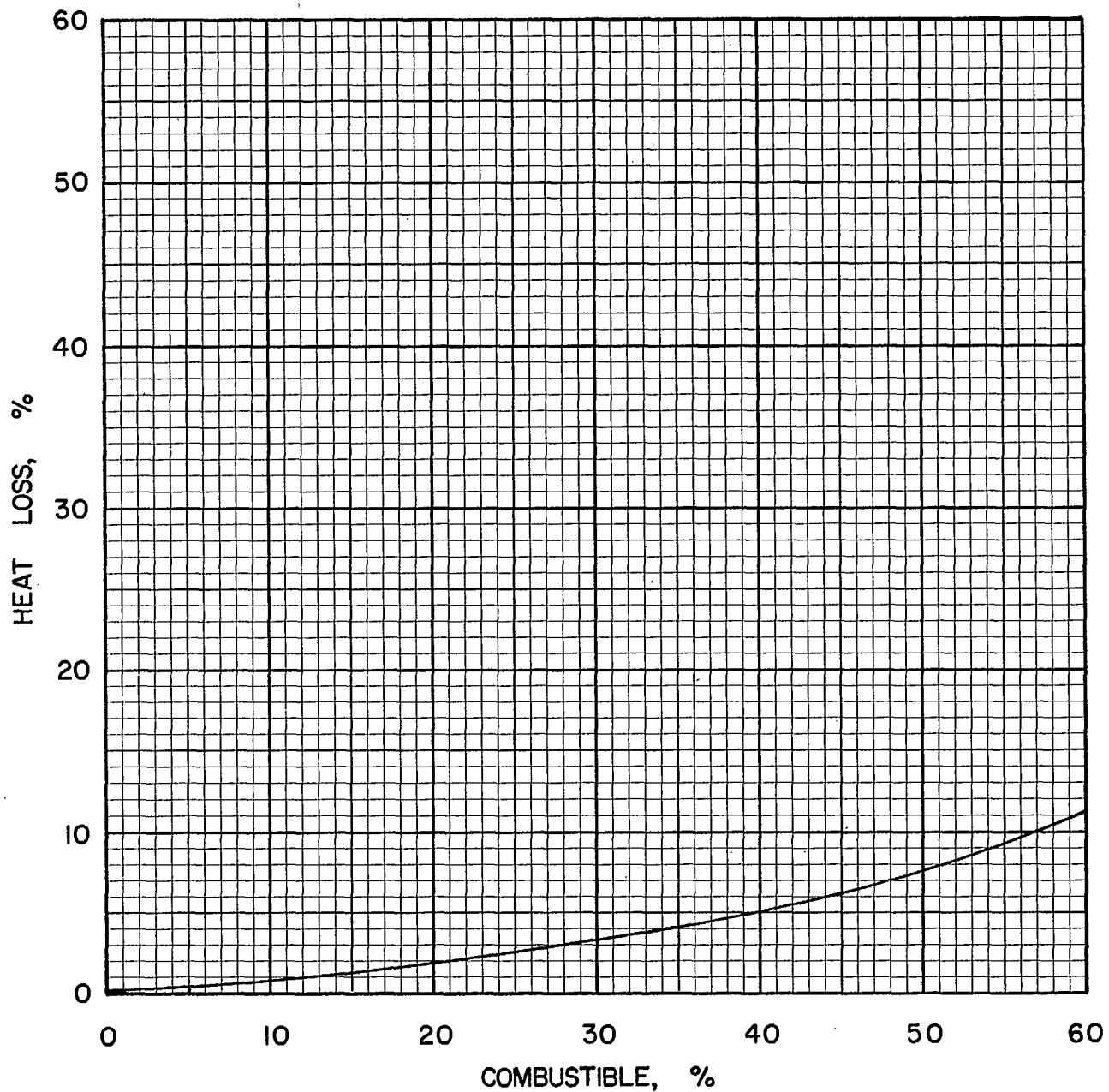


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·5

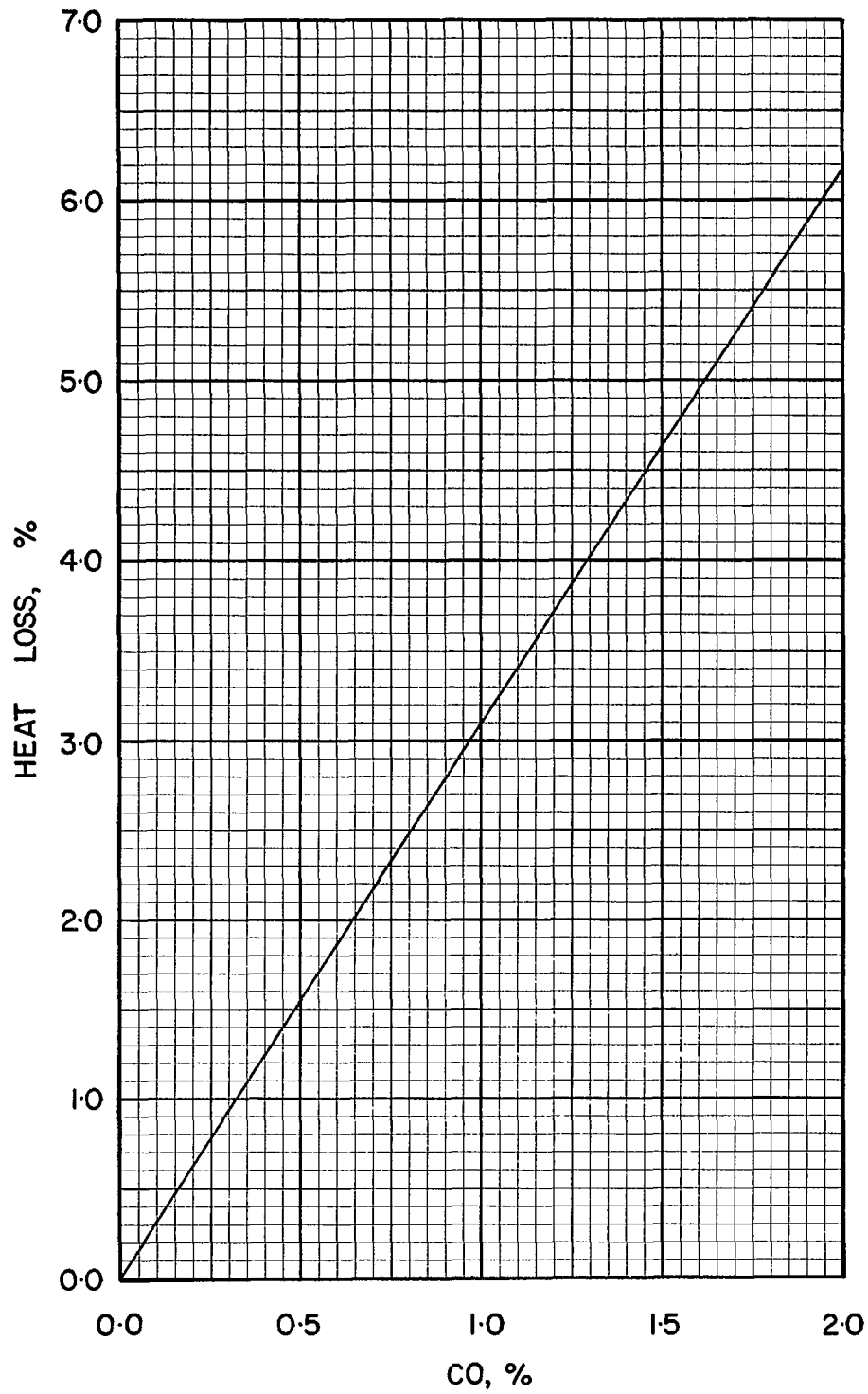


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·WV·5

### COAL US WV-6, OMAR, LOGAN COUNTY

Typical Moisture Range: 0-6%

#### *Proximate Analysis (lb/lb dry coal)*

Ash	0.050
Volatile Matter	0.370
Fixed Carbon	<u>0.580</u>
Total	1.000

#### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.818
Hydrogen (H)	0.052
Sulphur (S)	0.008
Nitrogen (N)	0.015
Oxygen (O)	0.057
Ash	<u>0.050</u>
Total	1.000

#### *Gross Calorific Value*

Btu/lb:	14550
Btu/short ton:	$29.10 \times 10^6$
Btu/long ton:	$32.59 \times 10^6$
MJ/kg:	33.84

#### *Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
$10^6$ Btu	= 68.73 lb	
$10^6$ Btu	= 0.03436 short tons	
$10^6$ Btu	= 0.03068 long tons	



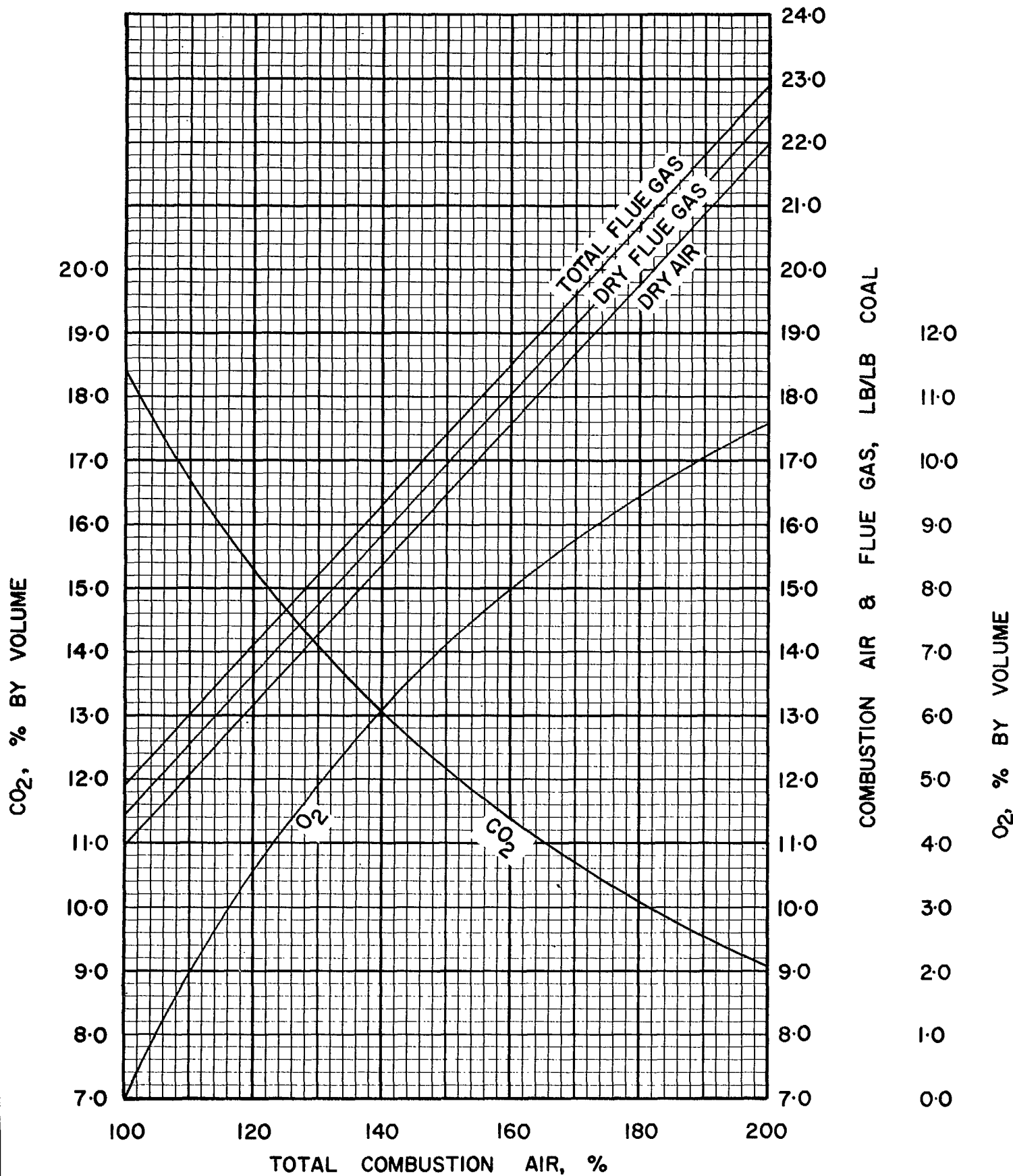


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·6

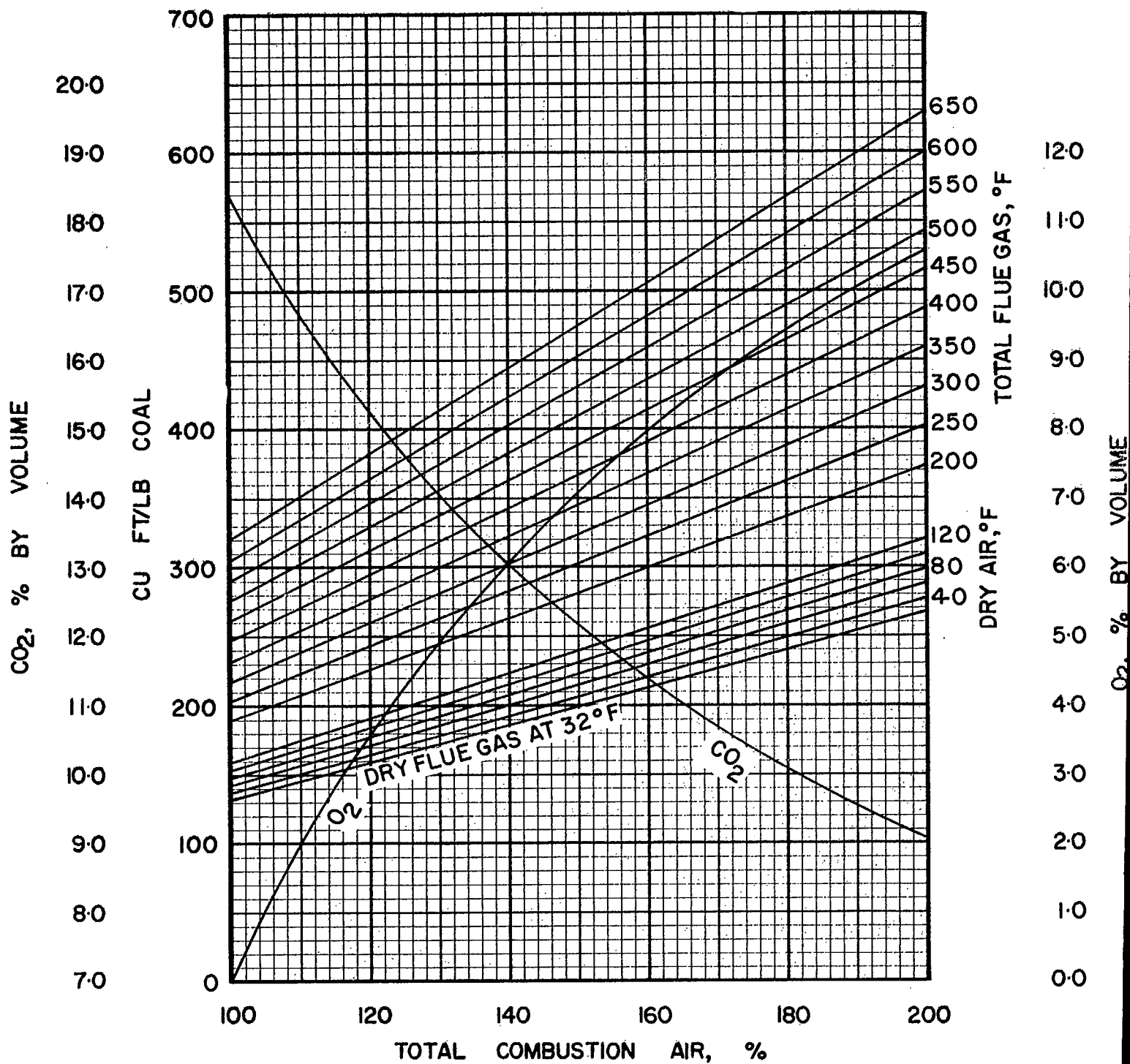


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·6

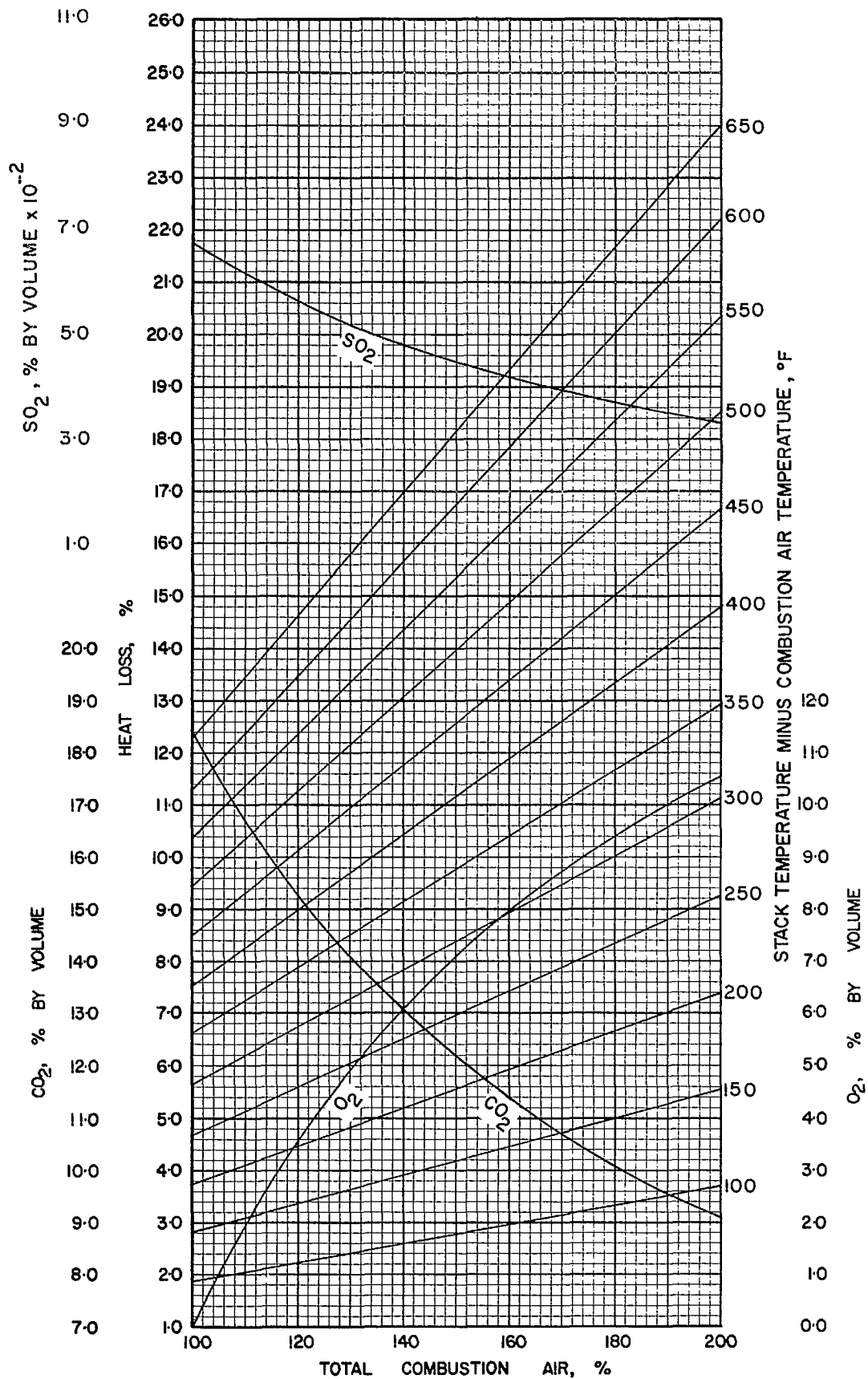


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·6

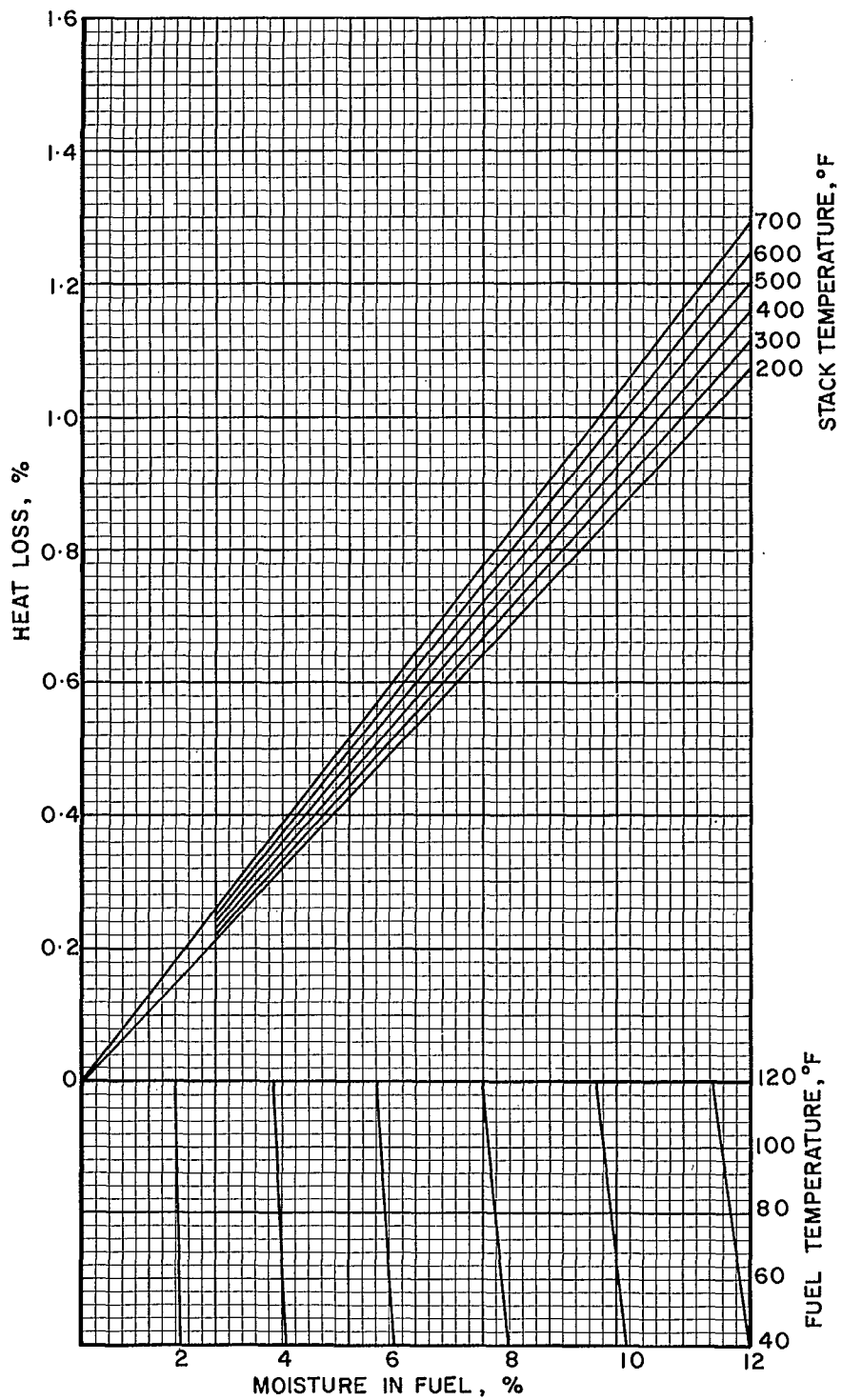


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·6

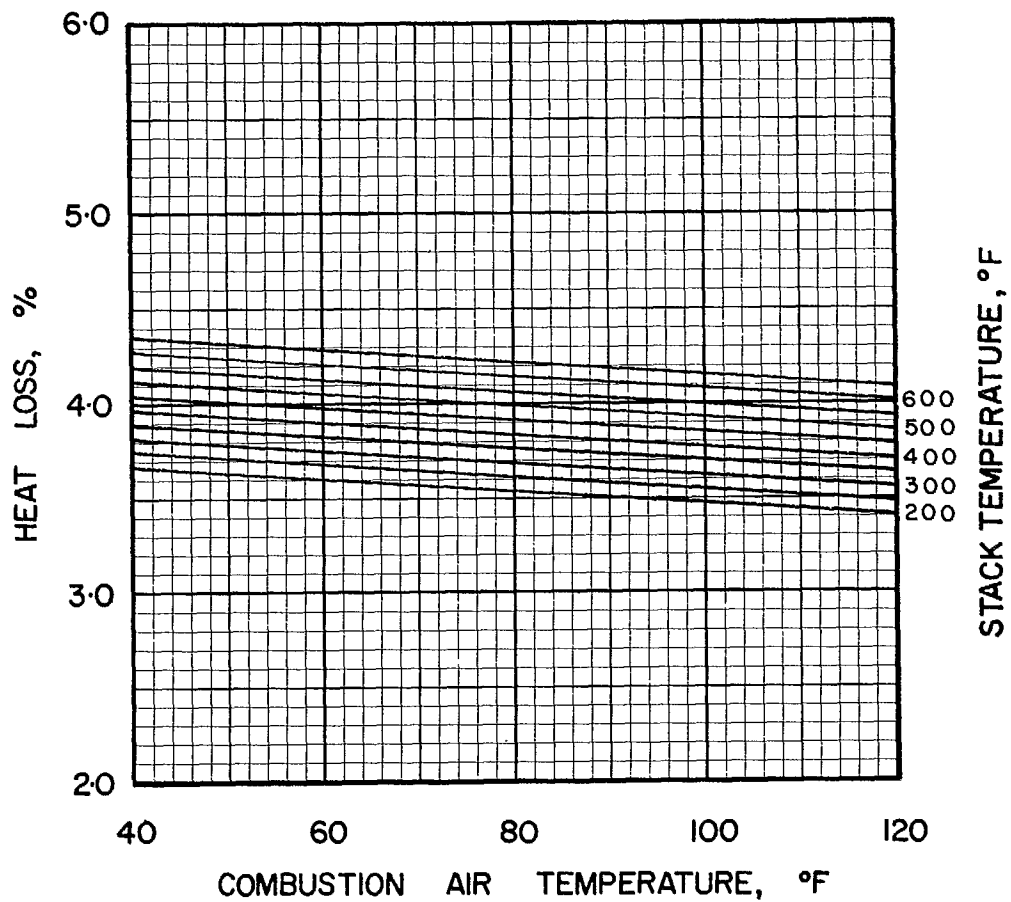


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·6

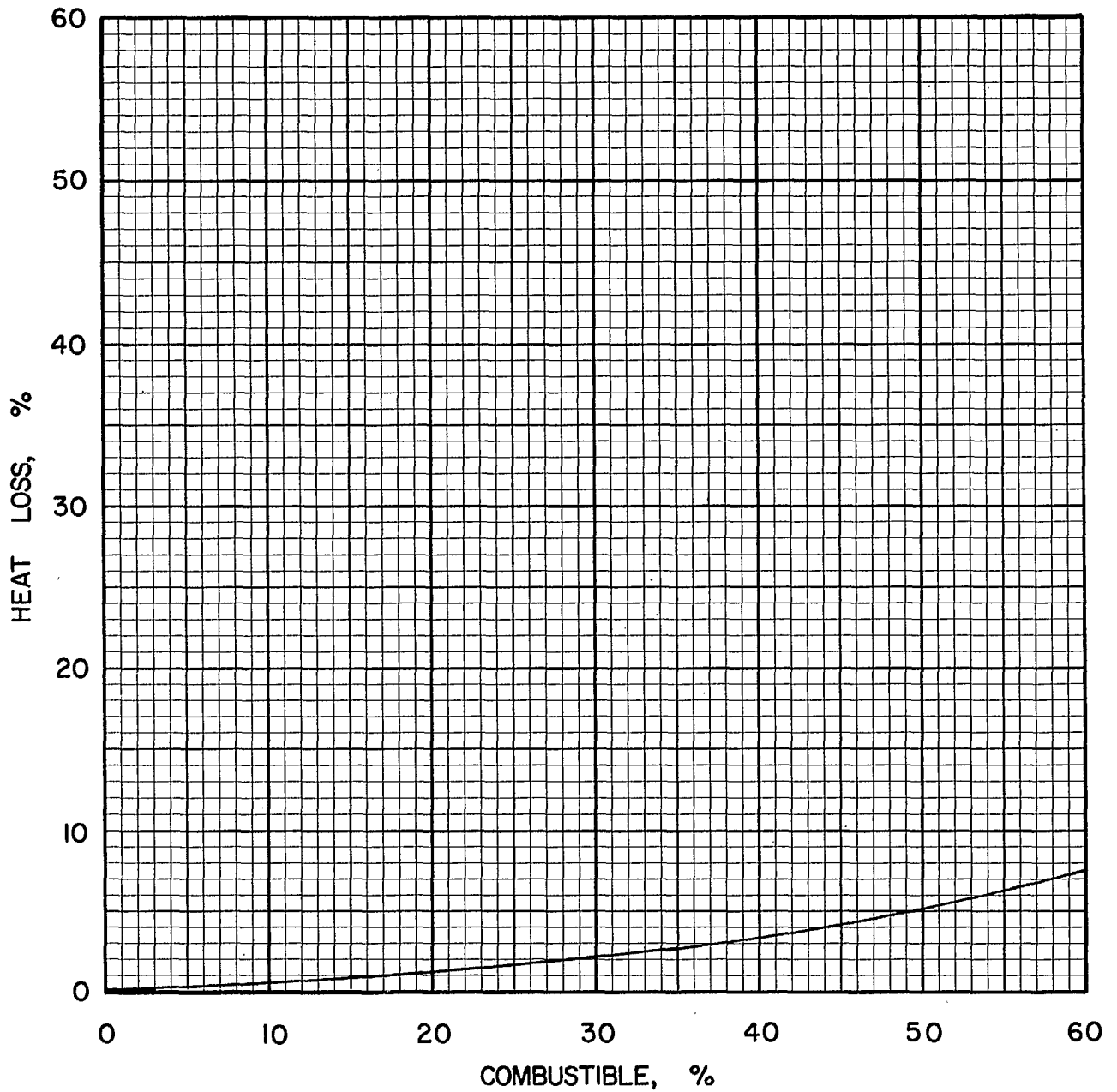


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·6

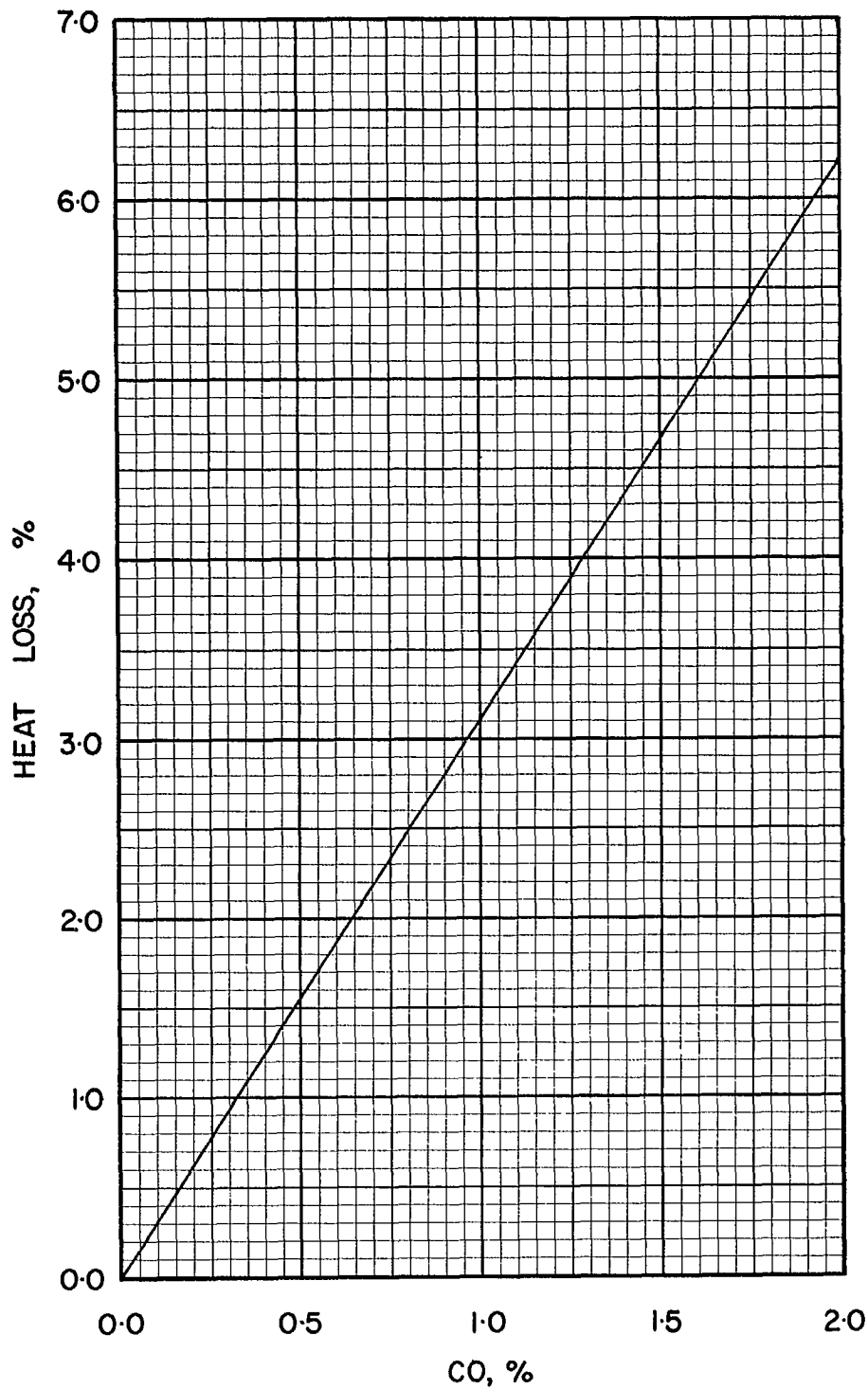


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US · WV · 6

**COAL US WV-7, PEERLESS EAGLE, A.T. MASSEY**

Typical Moisture Range: 0-6%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.091
Volatile Matter	0.327
Fixed Carbon	0.582
Total	<u>1.000</u>

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.797
Hydrogen (H)	0.048
Sulphur (S)	0.008
Nitrogen (N)	0.014
Oxygen (O)	0.042
Ash	0.091
Total	<u>1.000</u>

*Gross Calorific Value*

Btu/lb:	13889
Btu/short ton:	27.78 x 10 <sup>6</sup>
Btu/long ton:	31.11 x 10 <sup>6</sup>
MJ/kg:	32.30

*Conversion Factors*

1 short ton	= 0.8929 long tons	= 2000 lb
10 <sup>6</sup> Btu	= 72.00 lb	
10 <sup>6</sup> Btu	= 0.03600 short tons	
10 <sup>6</sup> Btu	= 0.03214 long tons	



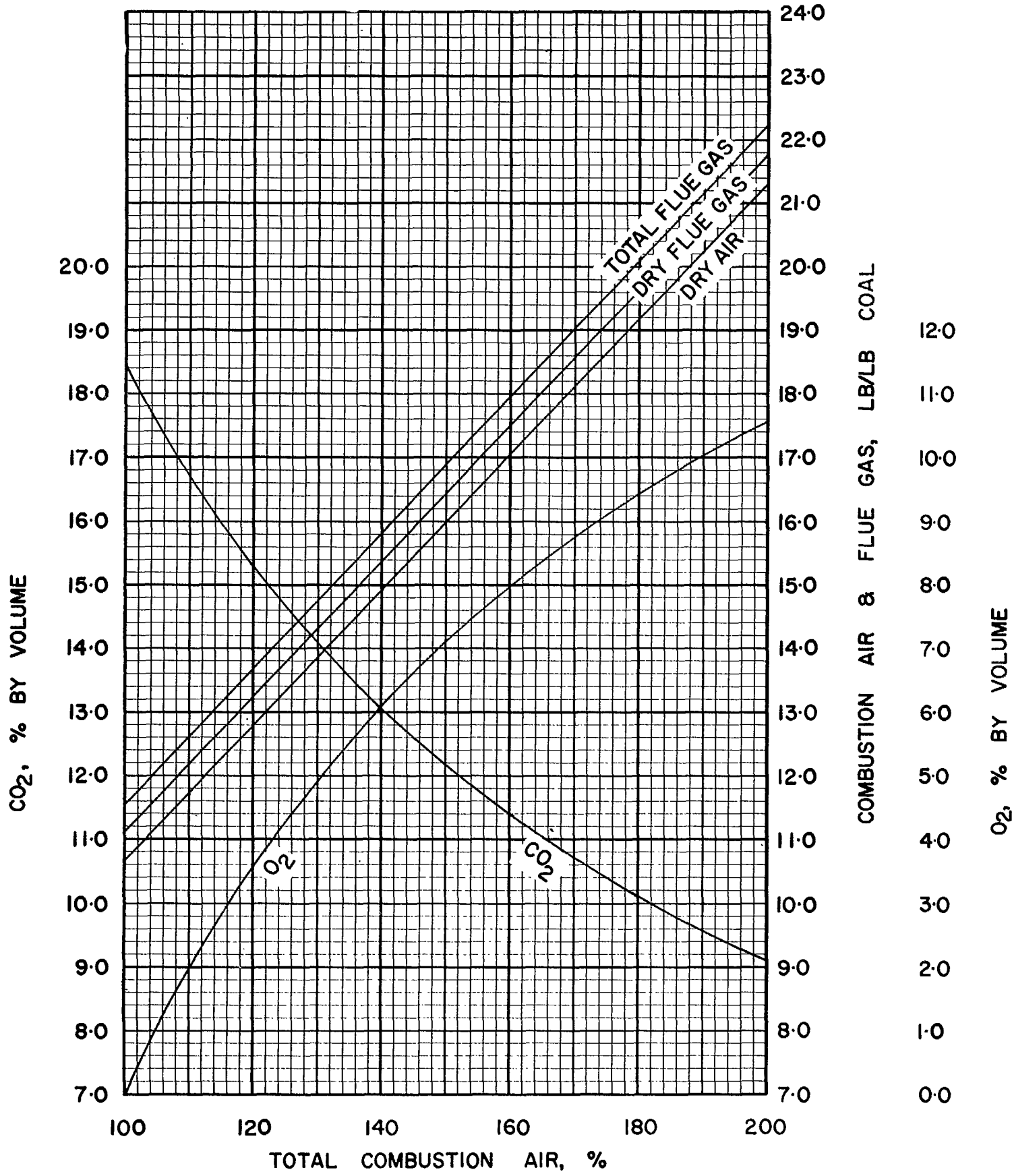


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US-WV-7

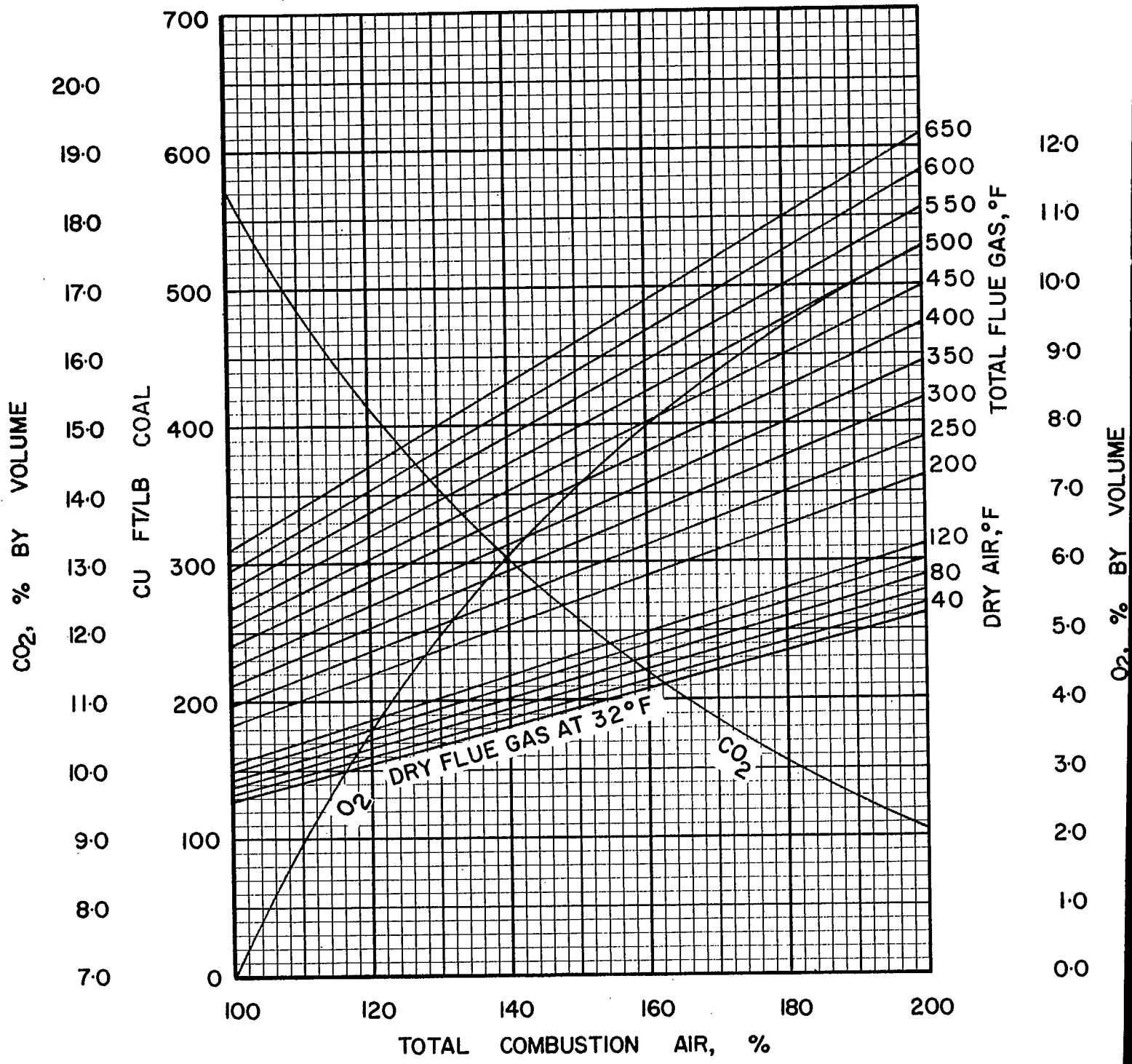


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·7

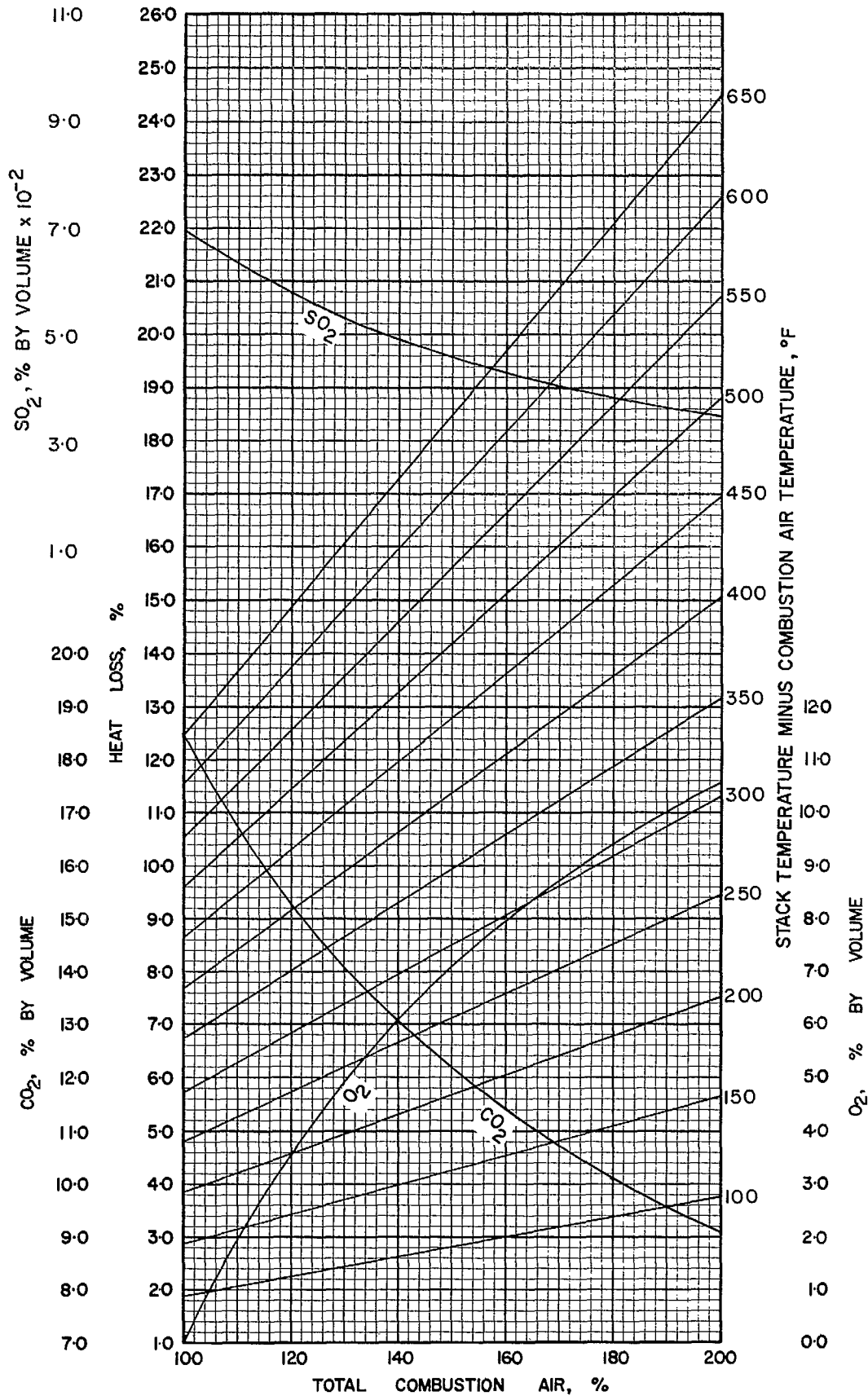


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·7

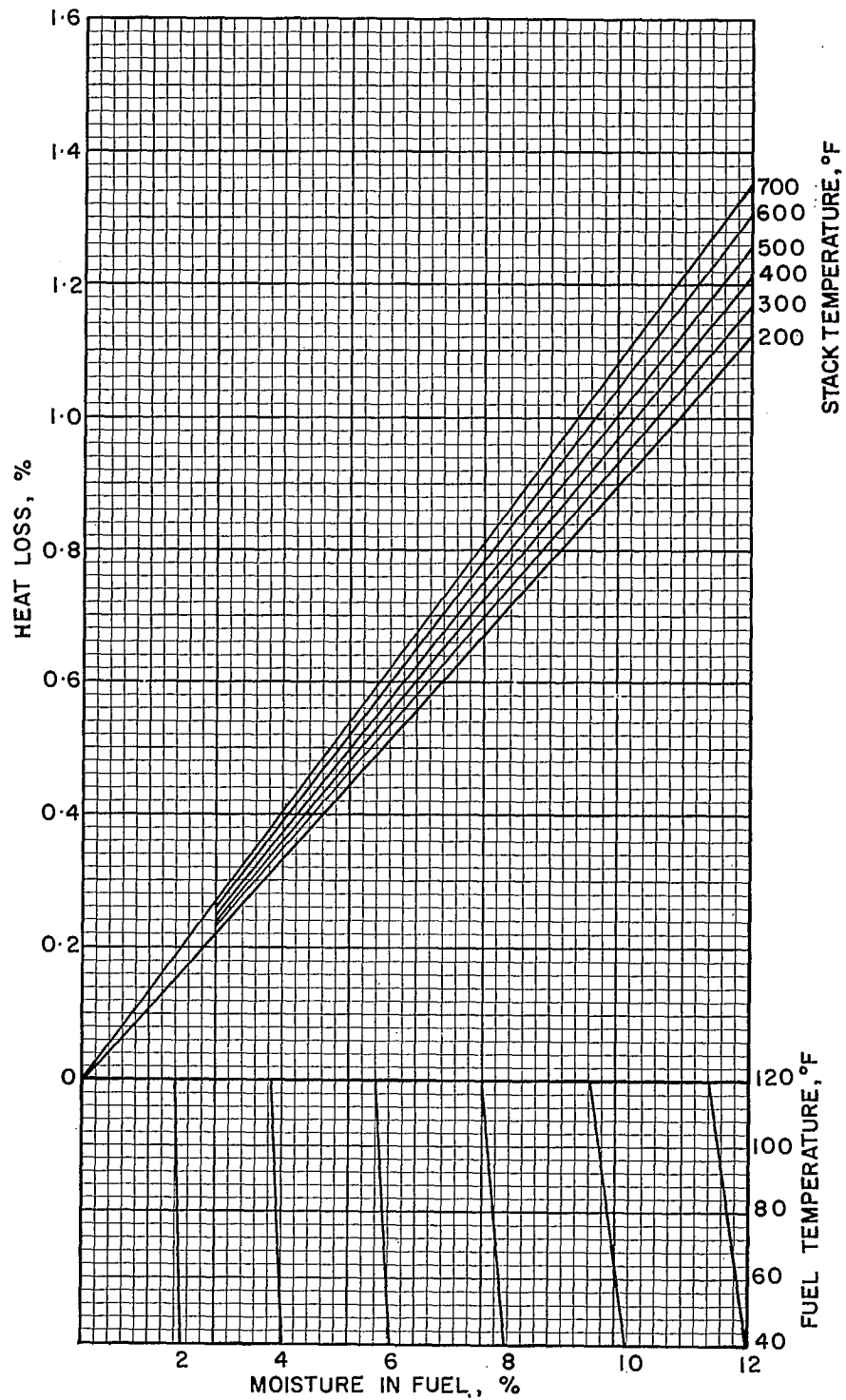


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·7

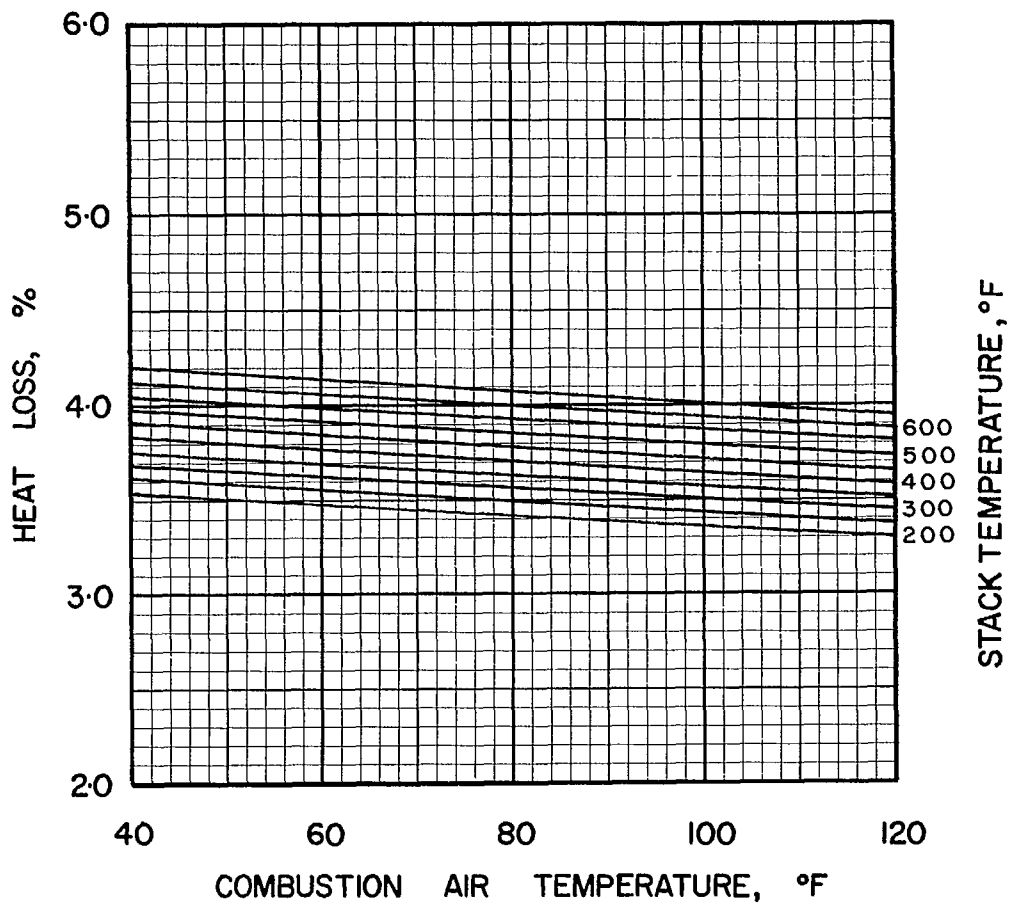


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·7

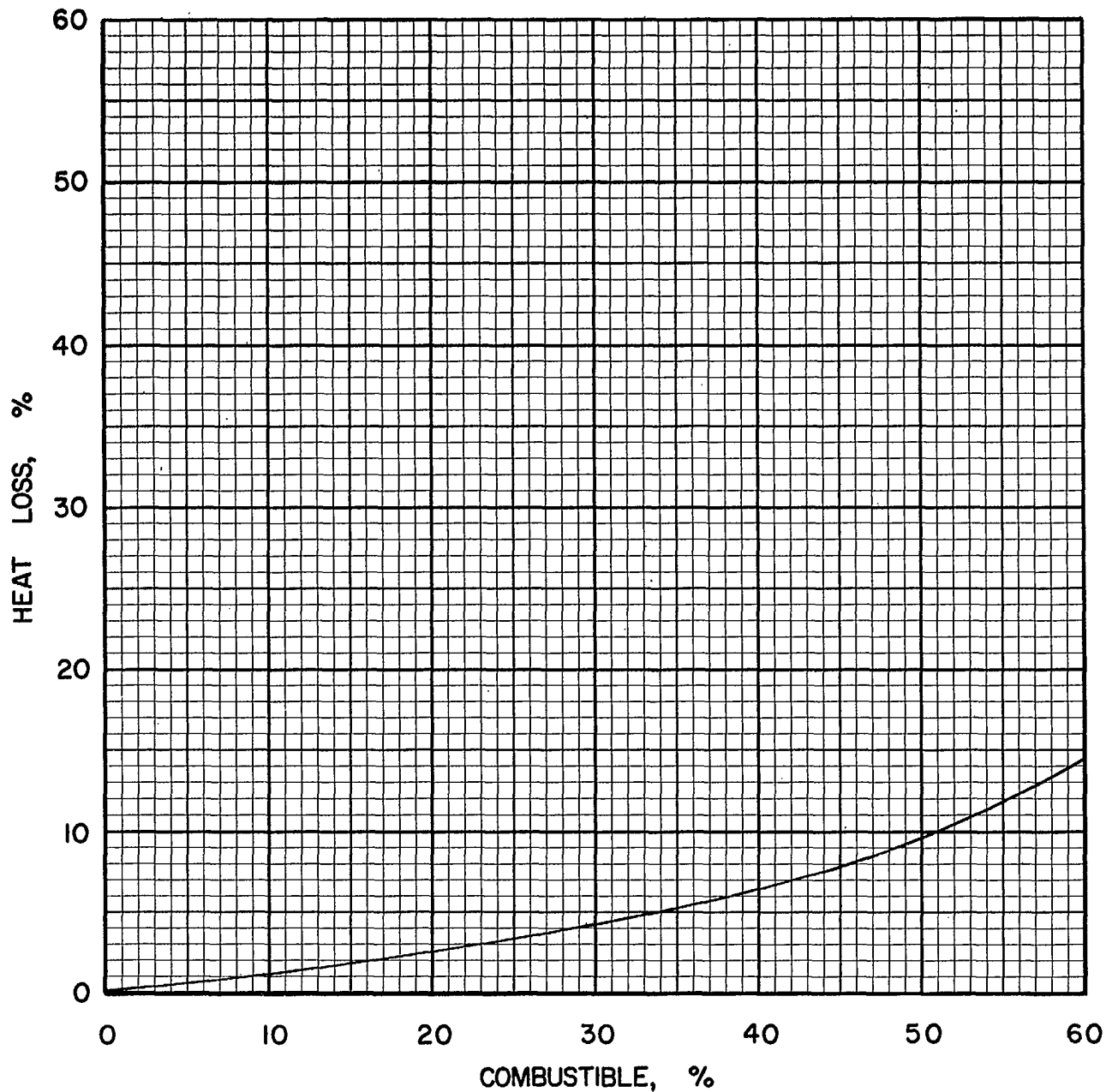


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·7

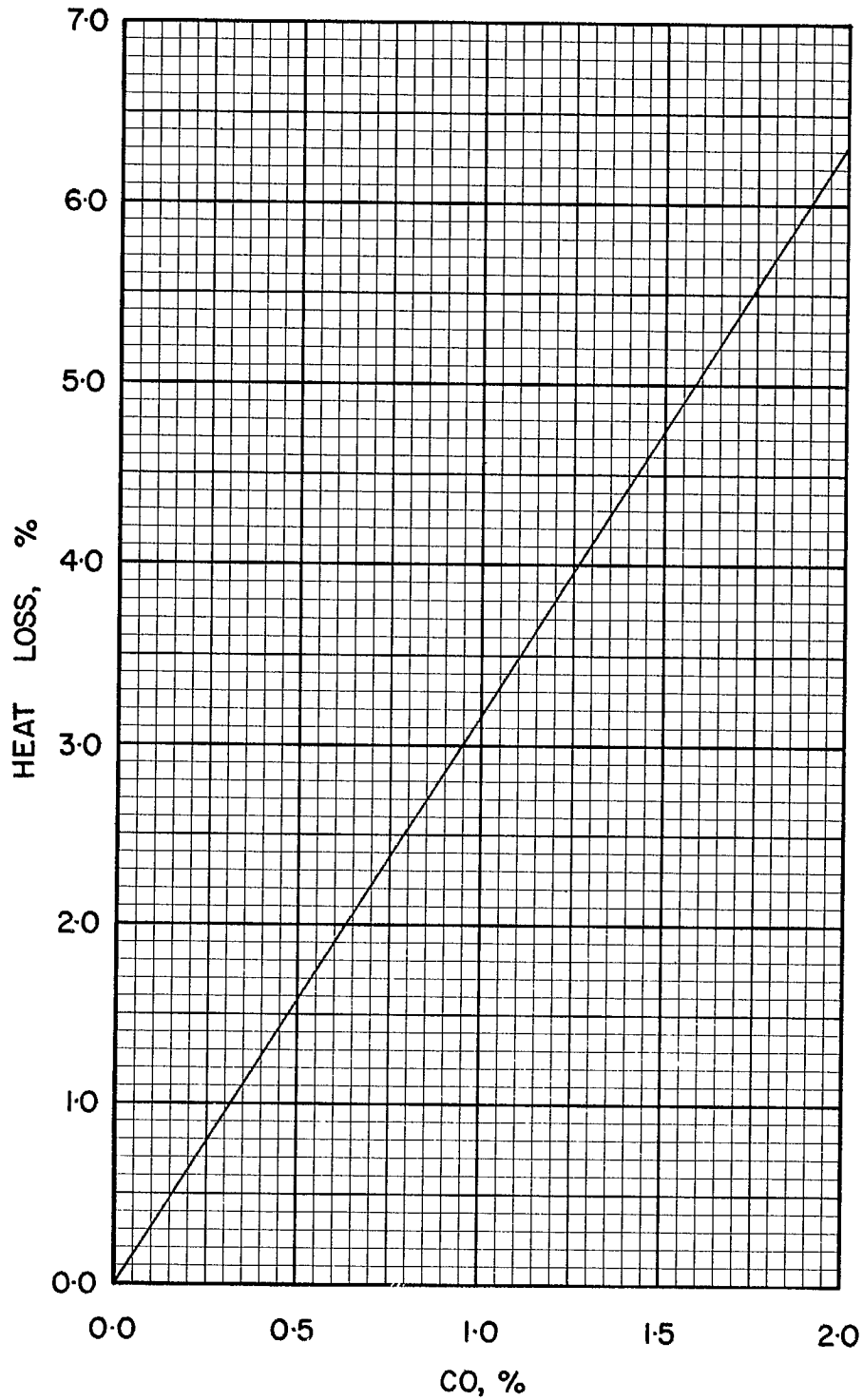


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·WV·7

### COAL US WV-8, POND FORK

Typical Moisture Range: 0-6%

#### *Proximate Analysis (lb/lb dry coal)*

Ash	0.075
Volatile Matter	0.353
Fixed Carbon	<u>0.572</u>
Total	1.000

#### *Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.783
Hydrogen (H)	0.051
Sulphur (S)	0.008
Nitrogen (N)	0.015
Oxygen (O)	0.068
Ash	<u>0.075</u>
Total	1.000

#### *Gross Calorific Value*

Btu/lb:	13850
Btu/short ton:	$27.70 \times 10^6$
Btu/long ton:	$31.02 \times 10^6$
MJ/kg:	32.21

#### *Conversion Factors*

1 short ton	= 0.8929	long tons	= 2000 lb
$10^6$ Btu	= 72.20	lb	
$10^6$ Btu	= 0.03610	short tons	
$10^6$ Btu	= 0.03223	long tons	



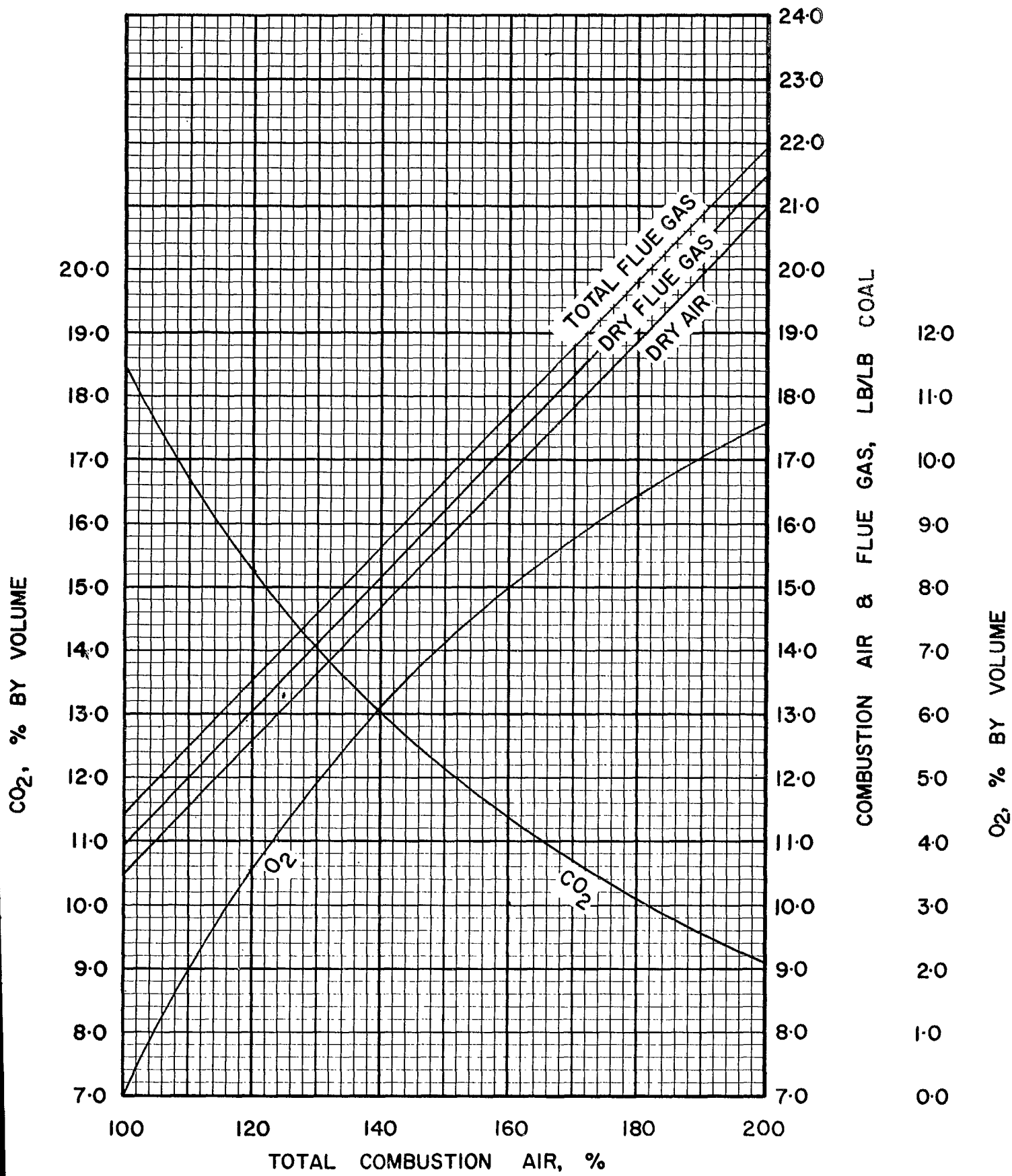


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·8

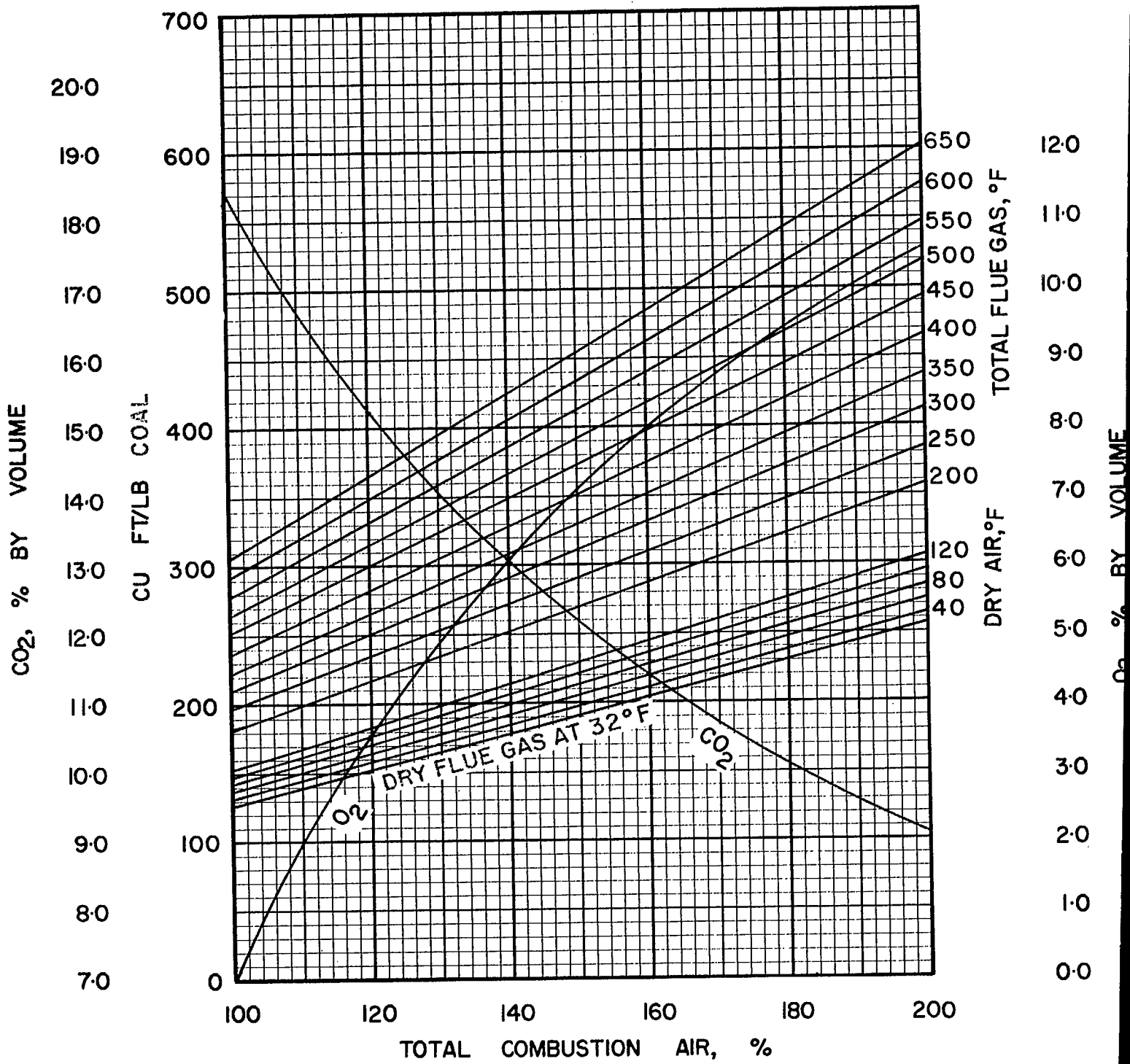


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·8

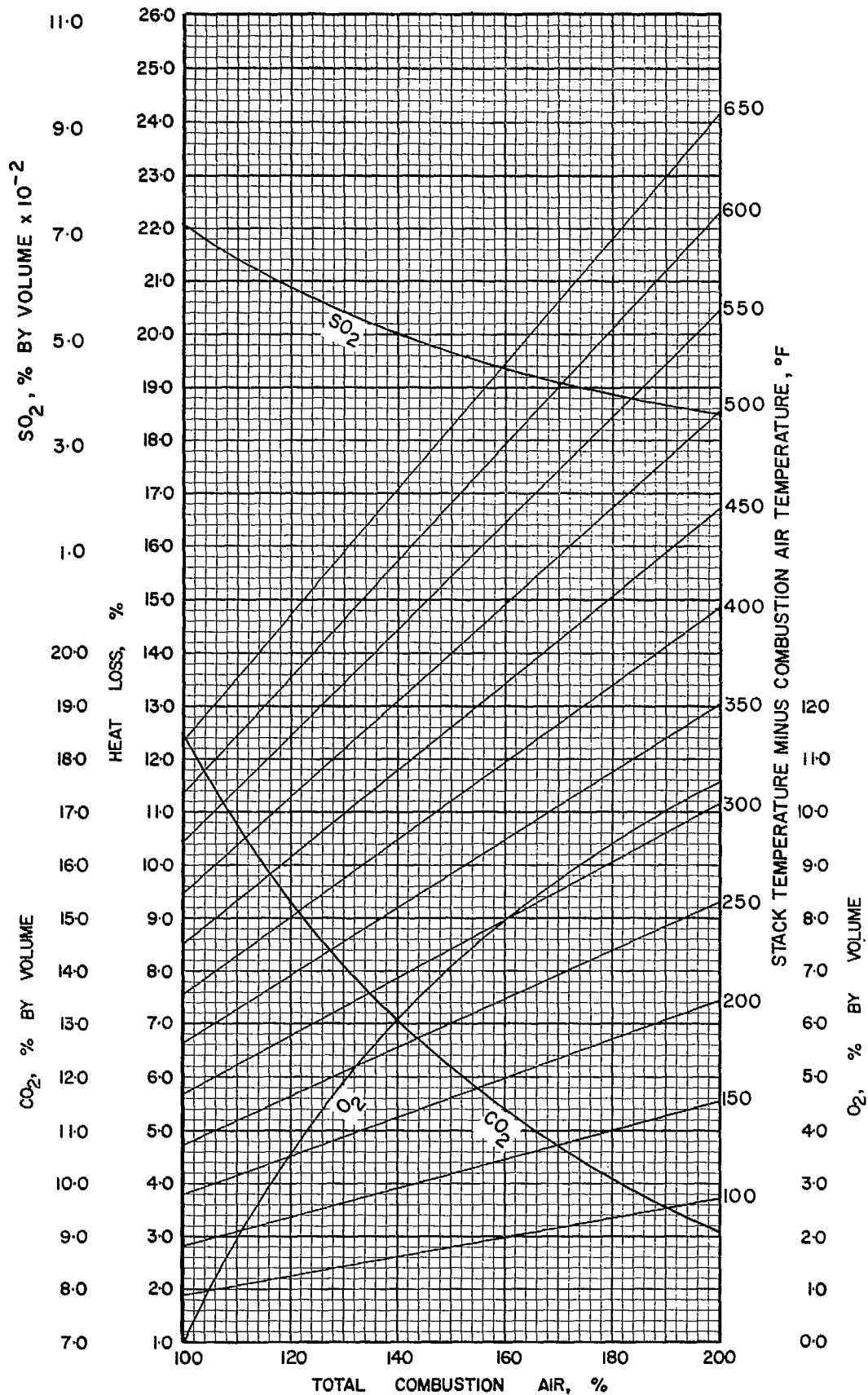


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·8

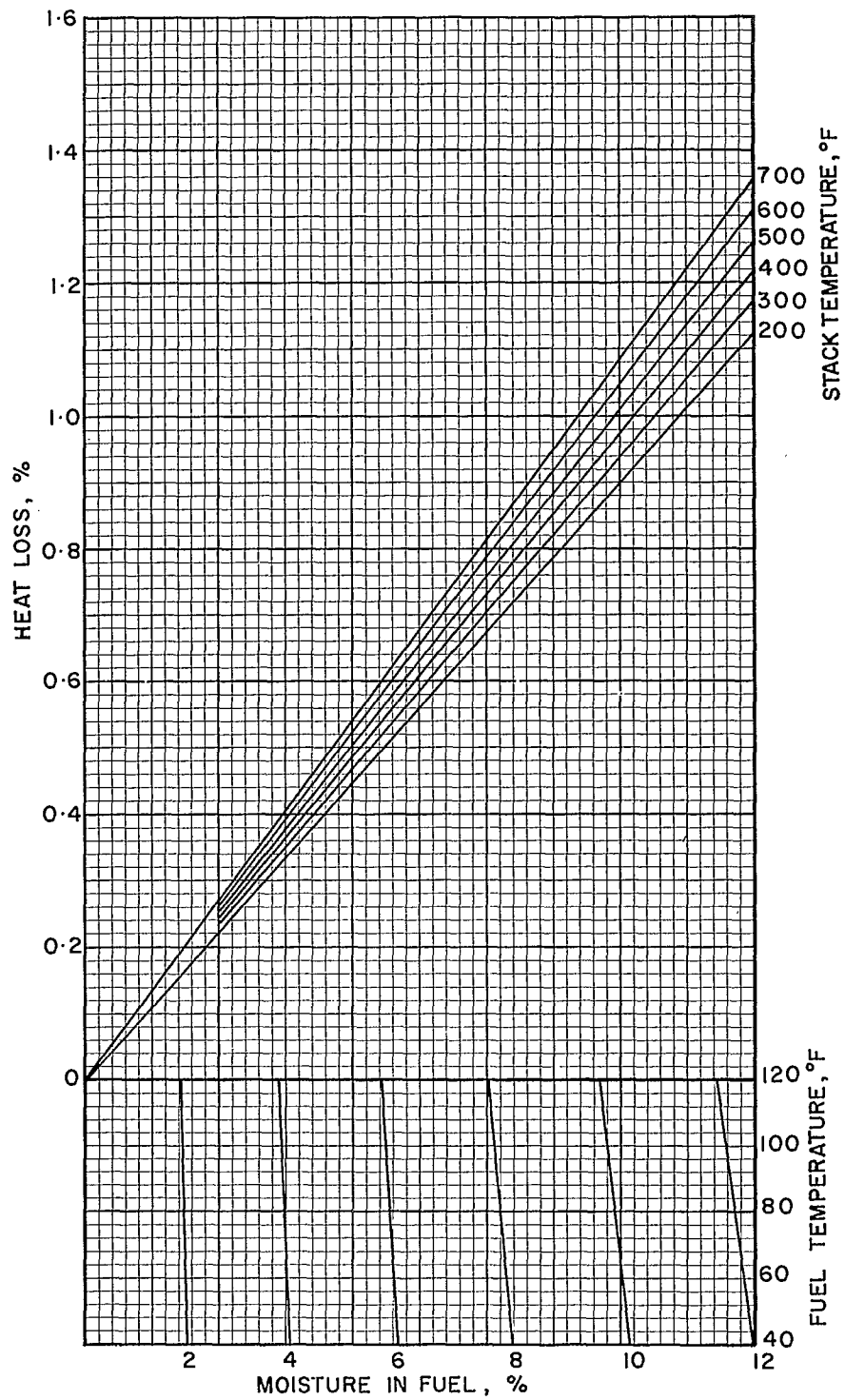


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·8

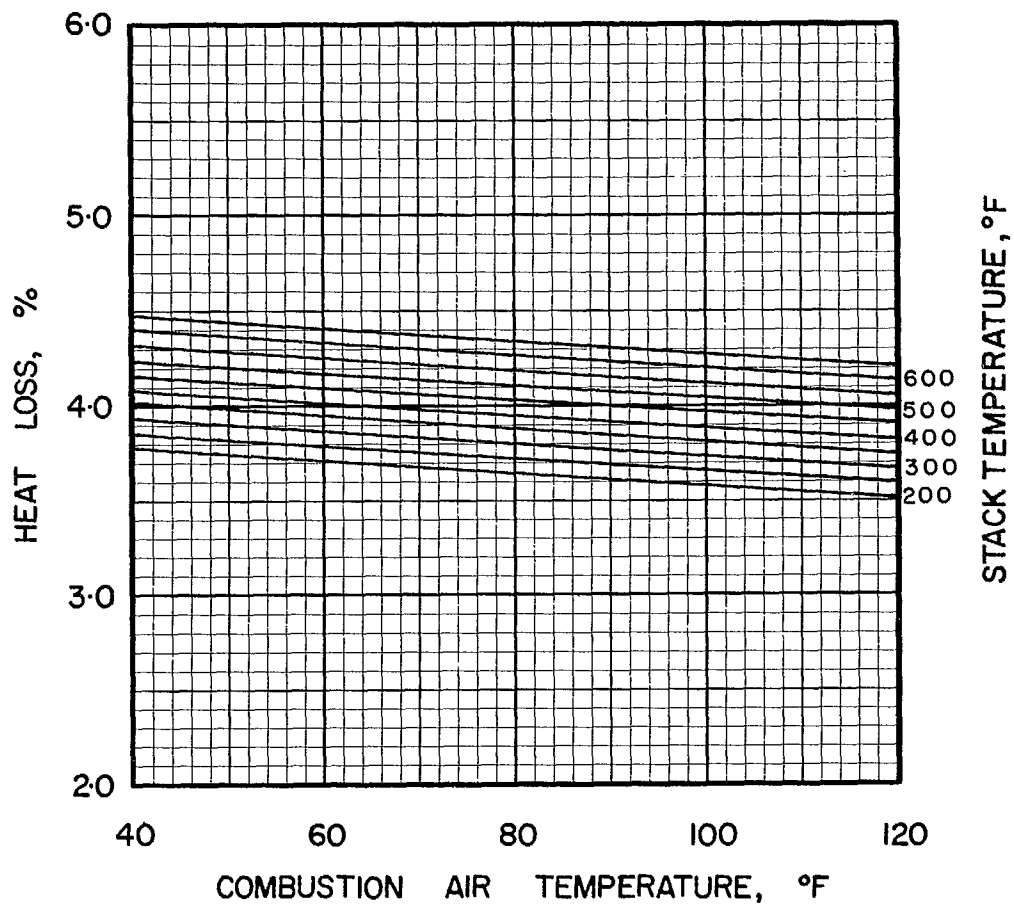


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·8

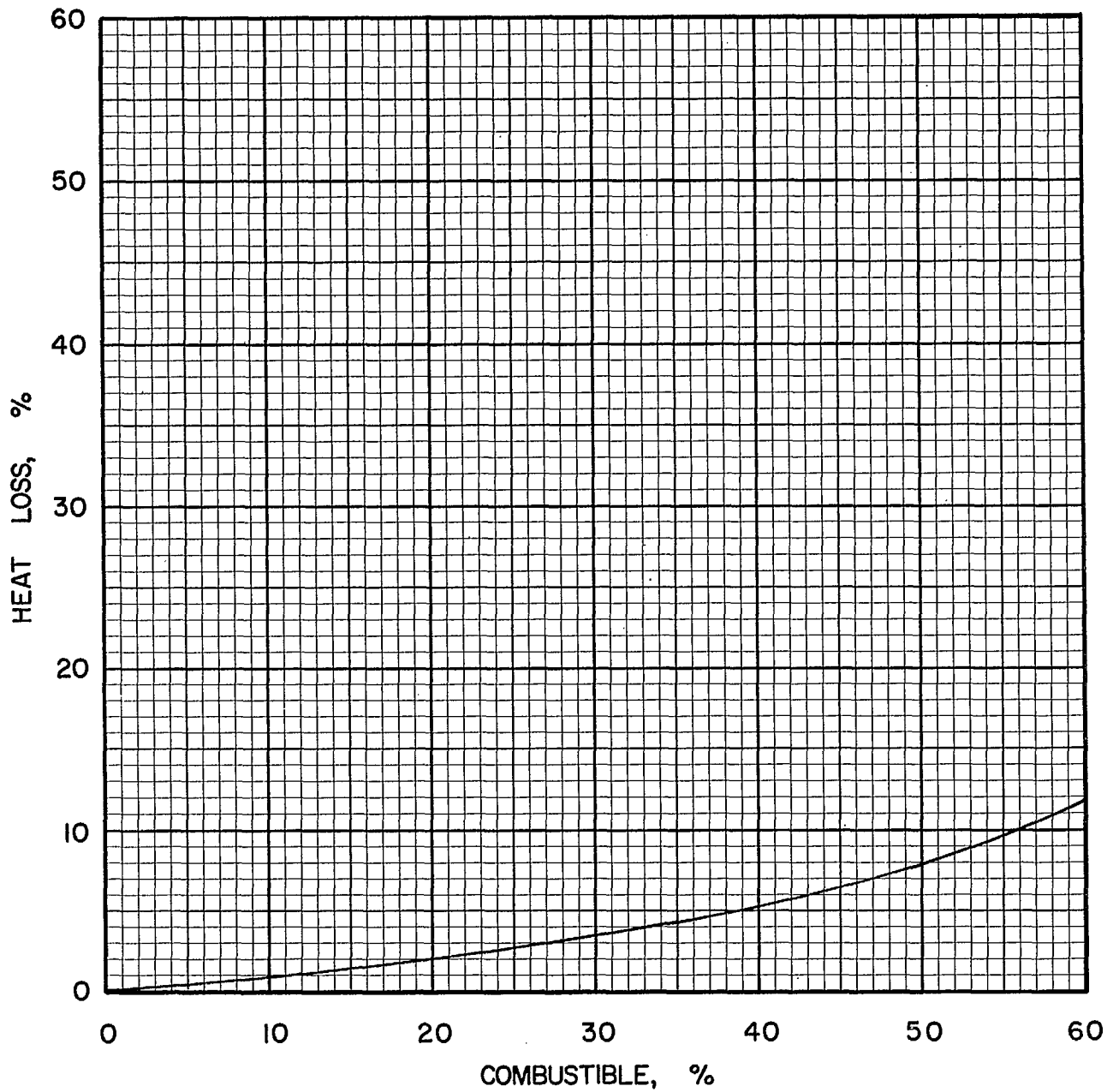


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·8

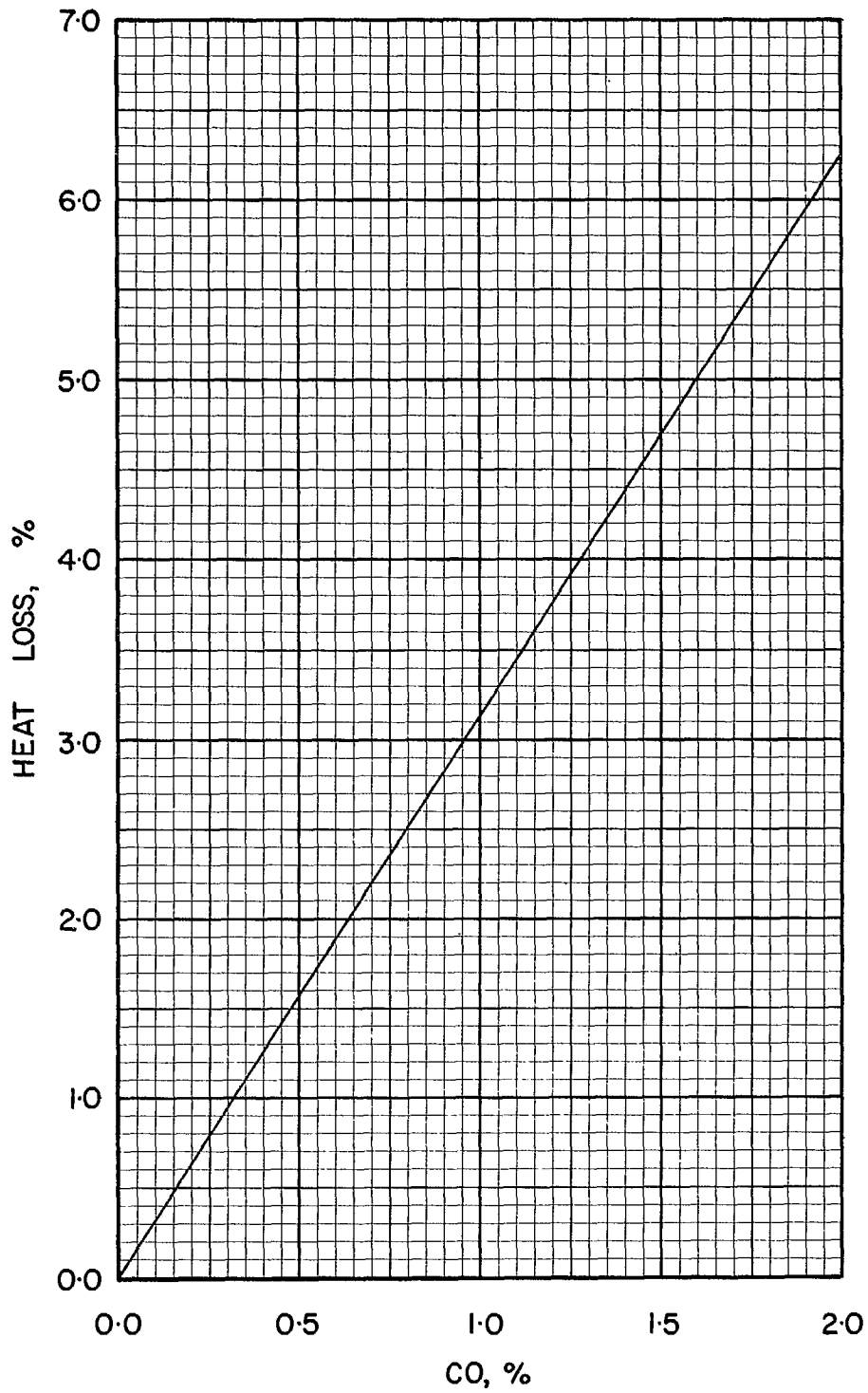


FIGURE 7 · HEAT LOSS FOR A RANGE OF  
CO CONCENTRATIONS, ASSUMING  
NEGLECTIBLE EXCESS AIR

US · WV · 8

**COAL US WV-9, RED JACKET, LOWER CEDARGROVE SEAM**

Typical Moisture Range: 0-6%

*Proximate Analysis (lb/lb dry coal)*

Ash	0.063
Volatile Matter	0.371
Fixed Carbon	<u>0.566</u>
Total	1.000

*Ultimate Analysis (lb/lb dry coal)*

Carbon (C)	0.798
Hydrogen (H)	0.051
Sulphur (S)	0.006
Nitrogen (N)	0.016
Oxygen (O)	0.066
Ash	<u>0.063</u>
Total	1.000

*Gross Calorific Value*

Btu/lb:	14110
Btu/short ton:	$28.22 \times 10^6$
Btu/long ton:	$31.61 \times 10^6$
MJ/kg:	32.81

*Conversion Factors*

1 short ton	= 0.8929	long tons	= 2000 lb
$10^6$ Btu	= 70.87	lb	
$10^6$ Btu	= 0.03544	short tons	
$10^6$ Btu	= 0.03164	long tons	



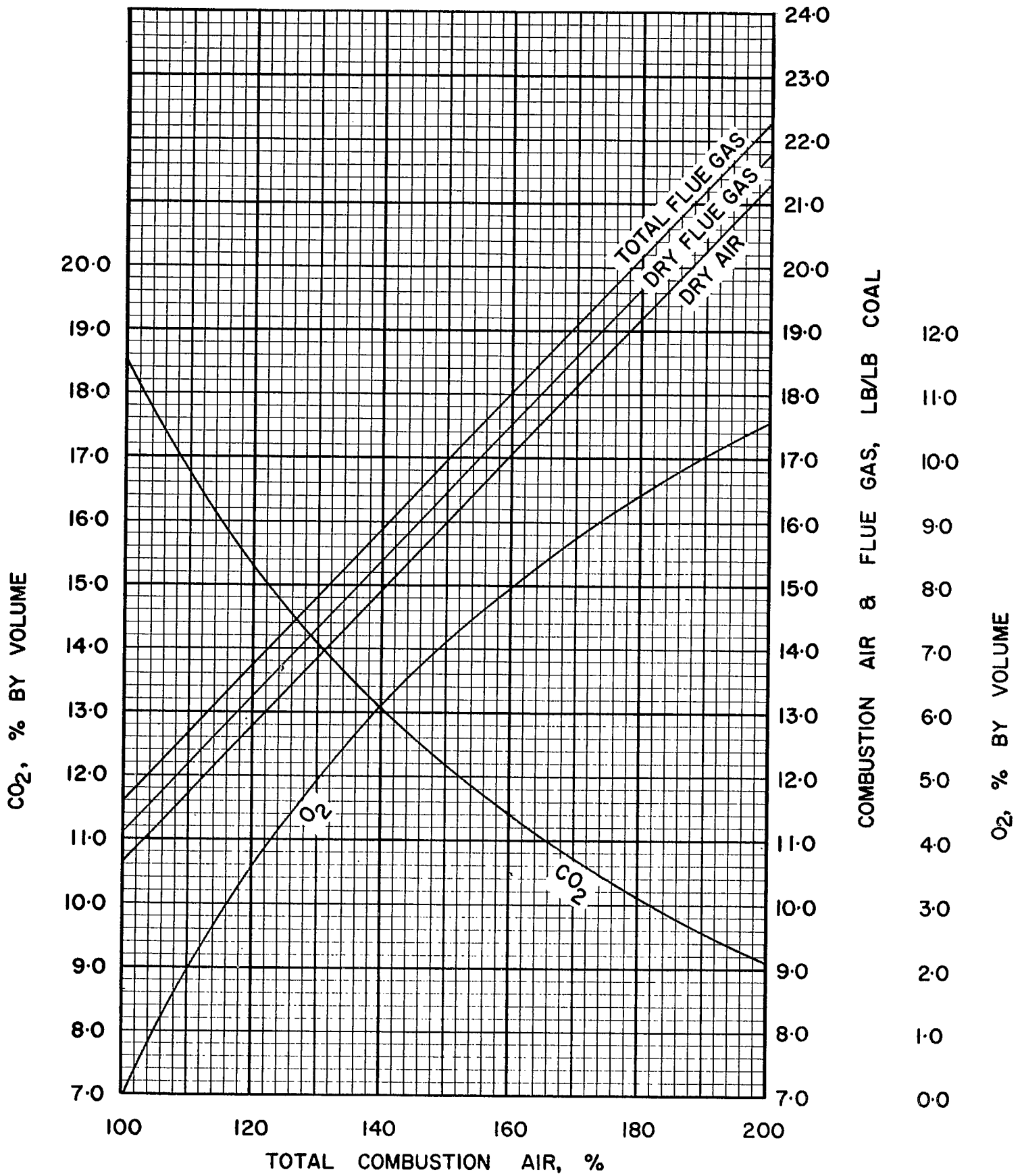


FIGURE 1. COMBUSTION DATA, WEIGHT BASIS

US·WV·9

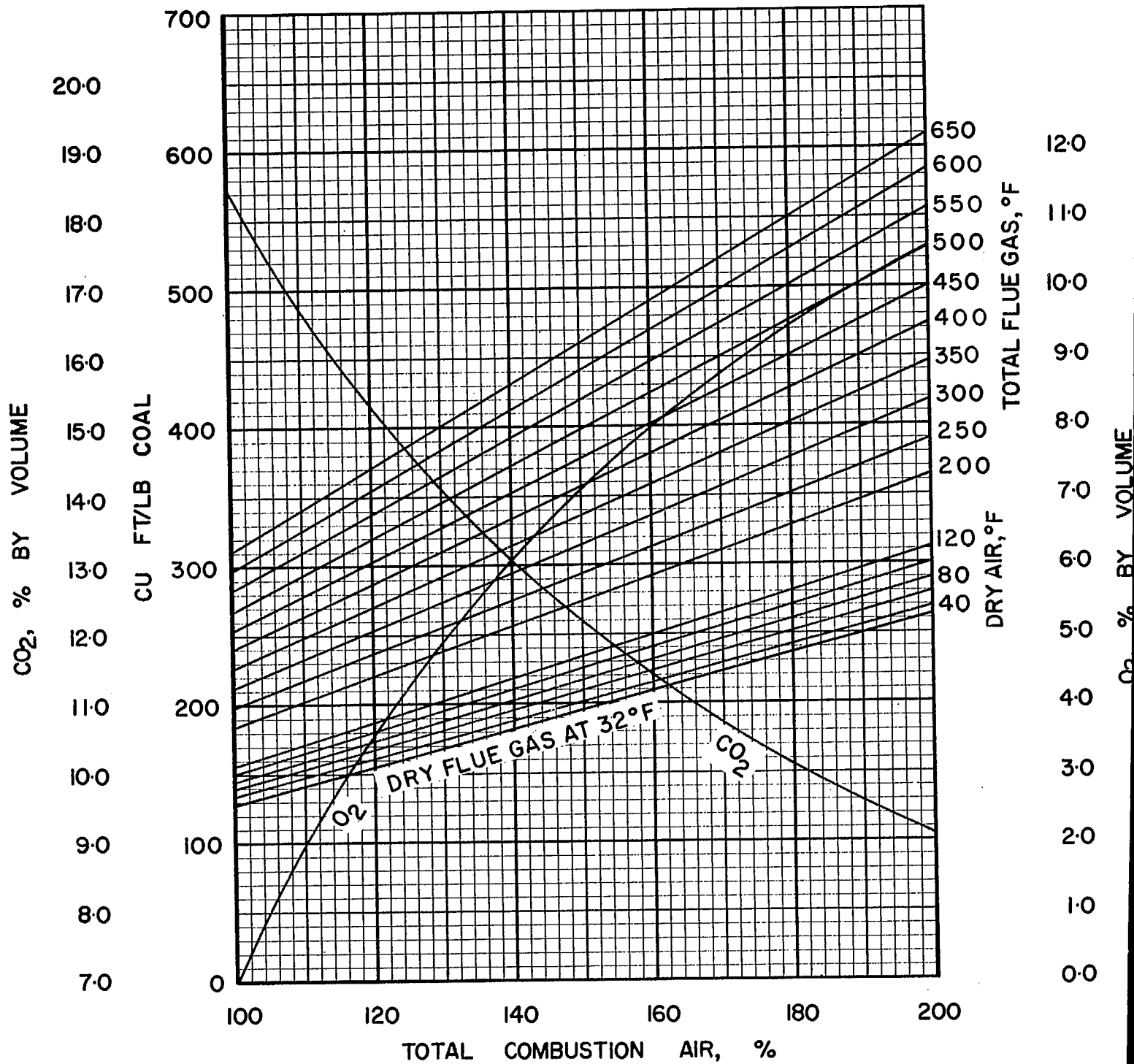


FIGURE 2 · COMBUSTION DATA, VOLUME BASIS

US·WV·9

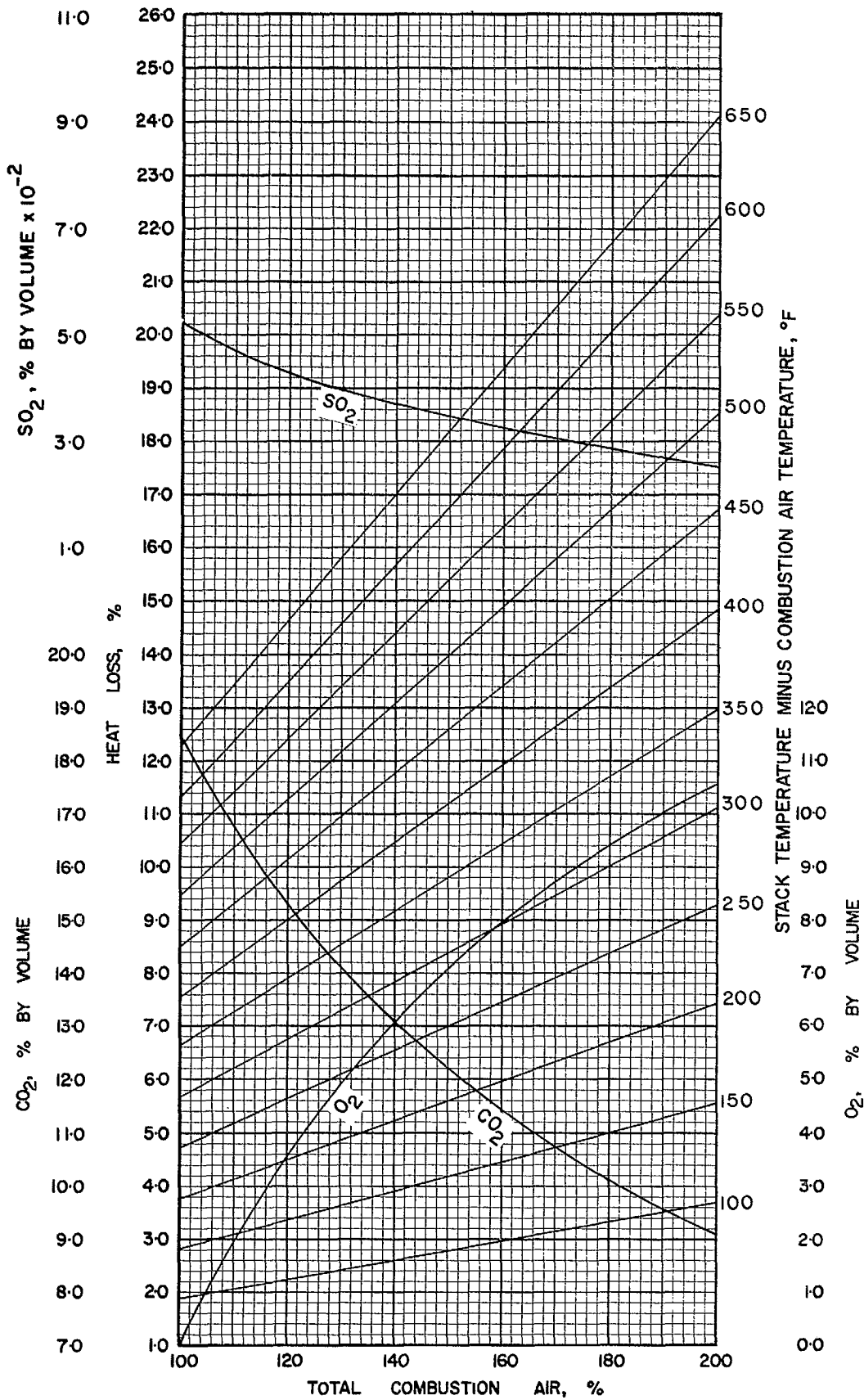


FIGURE 3. DRY FLUE GAS LOSS FOR A RANGE OF TEMPERATURE DIFFERENTIALS

US·WV·9

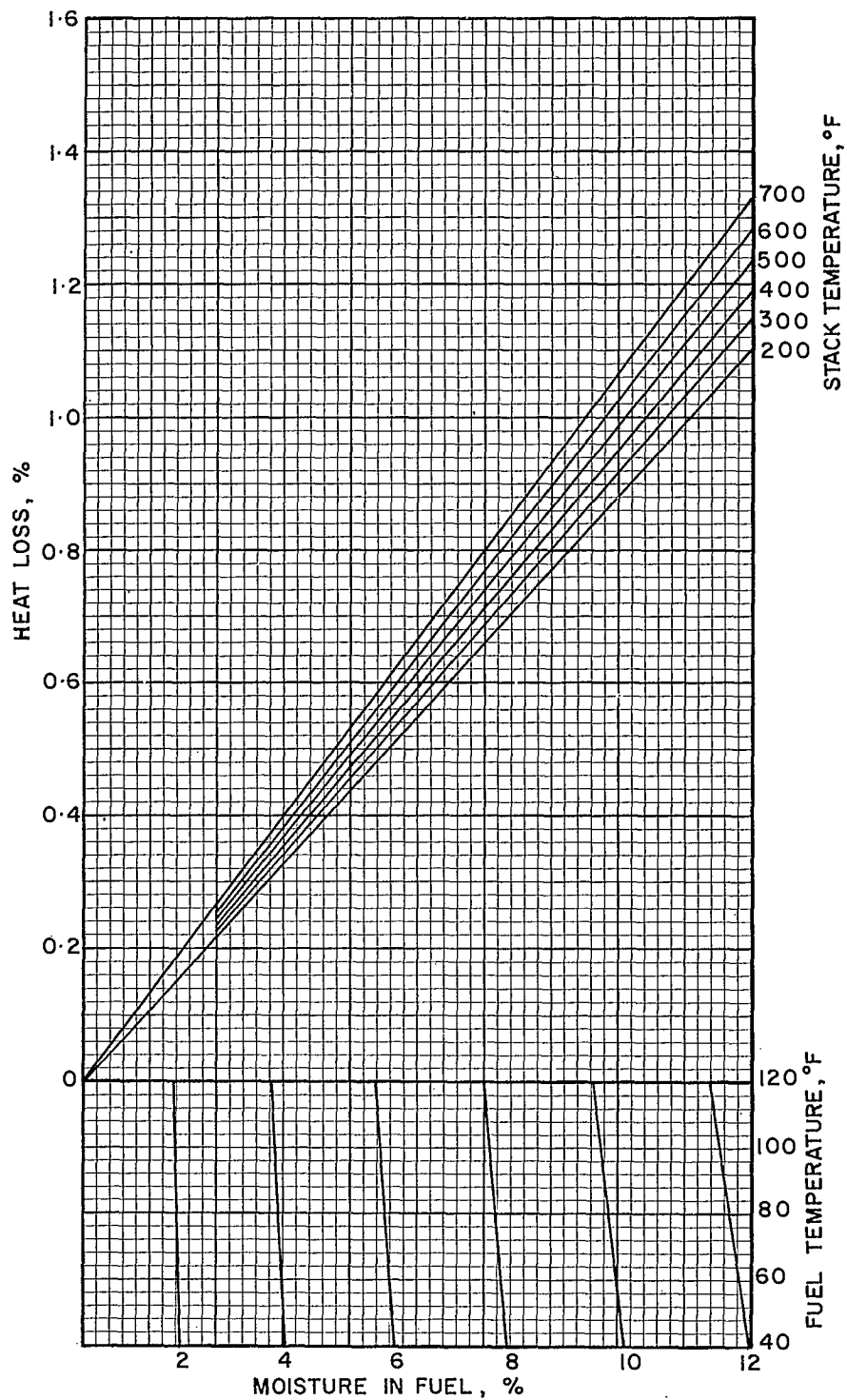


FIGURE 4 · HEAT LOSS DUE TO MOISTURE IN COAL

US·WV·9

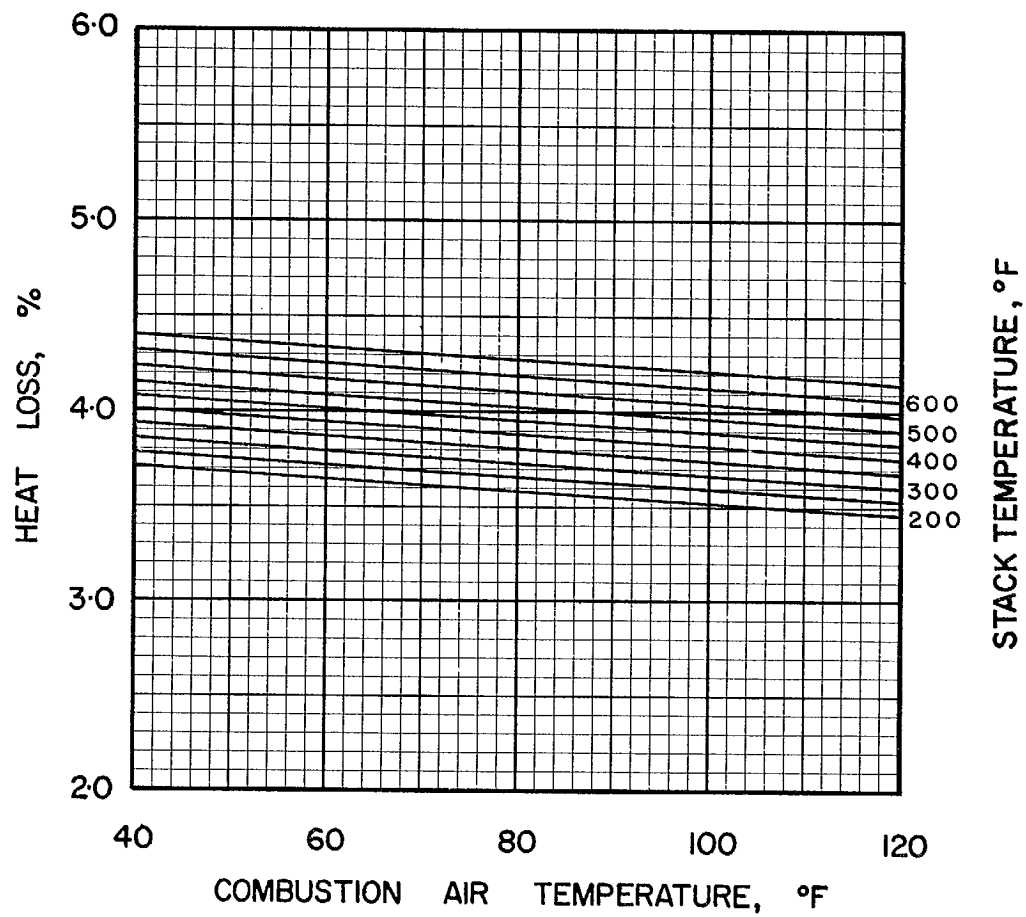


FIGURE 5. HYDROGEN LOSS FOR A RANGE OF STACK TEMPERATURES

US·WV·9

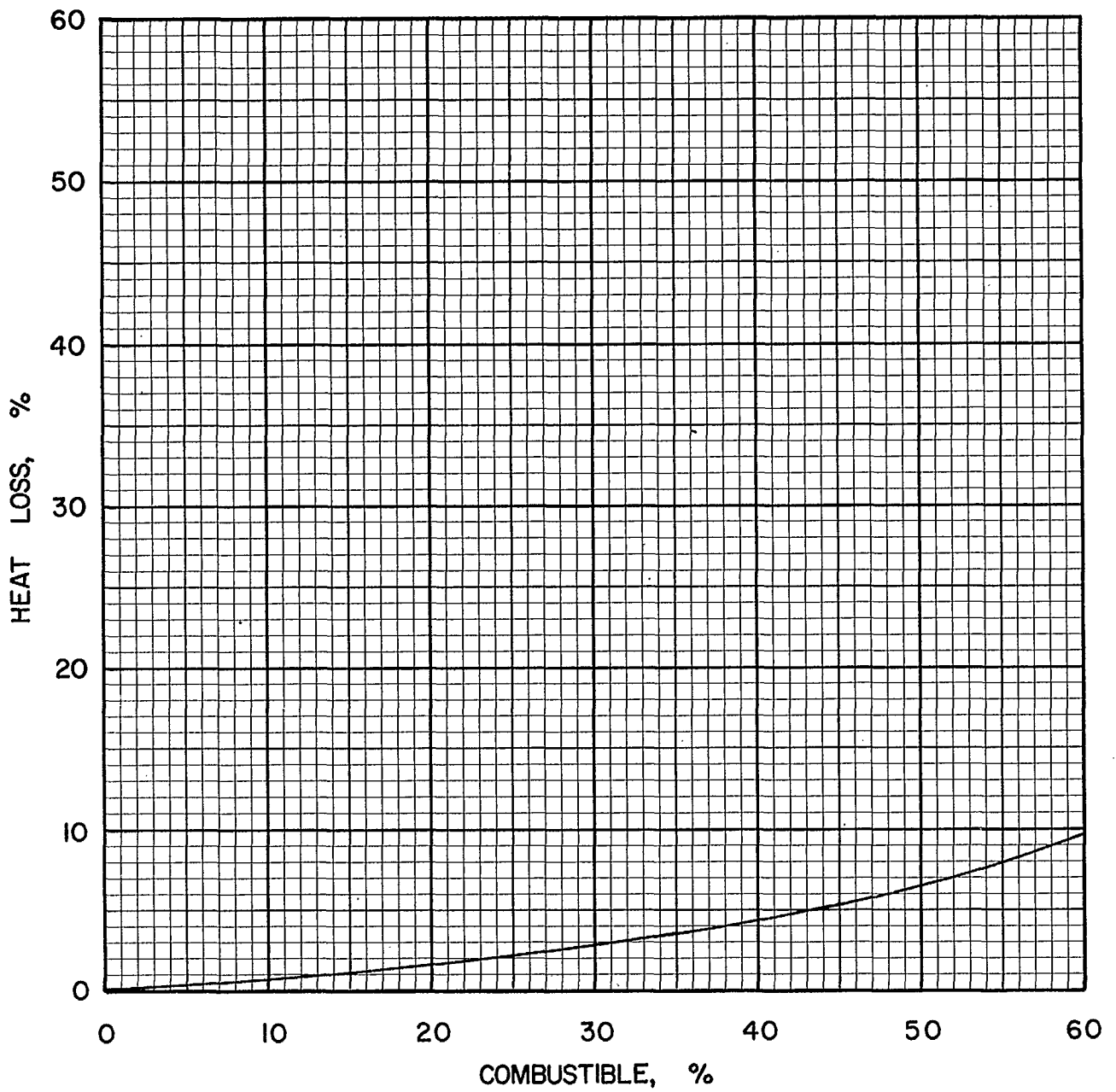


FIGURE 6 HEAT LOSS FOR A RANGE OF COMBUSTIBLE CONCENTRATIONS IN REFUSE

US·WV·9

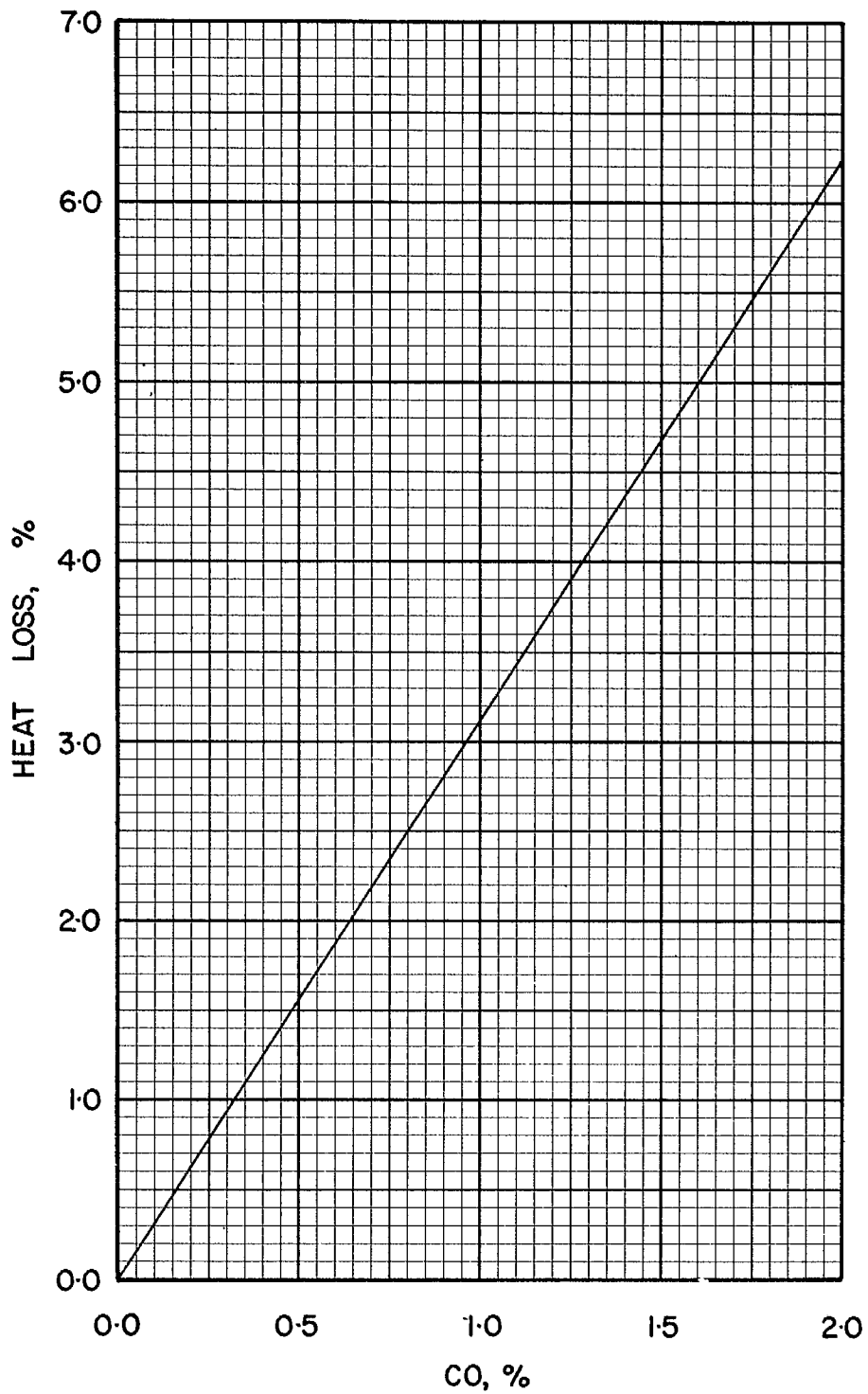


FIGURE 7 · HEAT LOSS FOR A RANGE OF CO CONCENTRATIONS, ASSUMING NEGLIGIBLE EXCESS AIR

US·WV·9

