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Environmental Protection Technology Series

DESIGN AND OPERATING PARAMETERS FOR EMISSION CONTROL STUDIES: Kennecott, McGill, Copper Smelter

Industrial Environmental Research Laboratory
Office of Research and Development
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

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DESIGN AND OPERATING PARAMETERS FOR EMISSION CONTROL STUDIES: KENNECOTT, McGILL, COPPER SMELTER

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

A. INTRODUCTION AND SUMMARY

The purpose of this report is to present background design data on the Kennecott Corporation, Nevada Mines Division, McGill, Nevada smelter in sufficient detail to allow air pollution control system engineering studies to be conducted. These studies will be primarily concerned with lean SO_2 streams that are currently not being captured.

Physical layout of the smelter and surrounding area along with existing smelter and control equipment is presented. Ductwork that would be considered for future system tie-in is defined. Emissions from operating equipment, gas flow rates, temperatures, sulfur balance and process flow sheets are included. Utilities, stack dimensions, footing requirements and solid waste handling are defined. Available area for new control equipment, gas characteristic variation and potential new control equipment installation problems are discussed.

The major uncontrolled sources of SO_2 at this smelter are the reverberatory furnaces and the converters. Plans have been completed and work initiated on the installation of a 500 TPD sulfuric acid plant to capture a major portion of the sulfur emitted by the converters. This system also includes new water cooled converter hoods and flues to minimize gas dilution. Work has been stopped on this installation, which has progressed through site clearance and receipt of some equipment, because of litigation with EPA.

Installation of new electrostatic precipitators to handle reverberatory furnace and converter exhaust gases is planned. Converter gases to be processed in the acid plant will be pretreated in wet scrubbers.

The present control equipment includes multiclones to control particulate from the converters and a precipitator to control particulate from the reverberatory furnaces. Approximately 200,000 TPY of SO_2 are emitted at the old high production rate. This has been reduced to 175,000 TPY to allow full converter offgas flow to the new sulfuric acid plant which will control up to 61% of the SO_2

at the lower production rate when it is completed. There is limited space available to install additional control equipment near the reverberatory furnaces.

B. PLANT LOCATION, ACCESS AND OVERALL GENERAL ARRANGEMENT

The Kennecott Copper Corporation, Nevada Mines Division smelter is located adjacent to the town of McGill, Nevada. A section of the USGS map showing land contours in the immediate area is presented in Figure 1. Design altitude of the plant is 6300 feet with a latitude of 39°10' and longitude of 114°50'.

The smelter portion of the plant consists of a receiving central dumper which dumps feed material such as converter flux, reverts, coal, limerock, filter concentrates and miscellaneous into specific hoppers for mixing by conveyor to feed the charge bins, two coal fired reverberatory furnaces, four converters and a casting area producing blister copper cakes. The pollution control equipment currently consists of precipitators for handling the reverberatory furnace gases and multiclones for handling the converter gases. There is presently no SO_2 stream control. A single contact 500 TPD sulfuric acid plant is currently planned for controlling SO_2 in the converter offgases.

Figure 2 shows the overall smelter plant layout. Space for new control equipment may be found west of the converter building or to the north of the acid plant installation.

C. PROCESS DESCRIPTION

The process flow sheet for the Kennecott McGill smelter is shown in Figure 3. Input material is placed in bedding bins consisting of converter flux, reverts, coal, lime (rock), miscellaneous and filter concentrates. Material from these bins is placed on a conveyor belt in proper proportions to make up the reverberatory furnace feed which is sent to the charge bins. A belt conveyor system is used to feed the coal fired reverberatory furnaces.

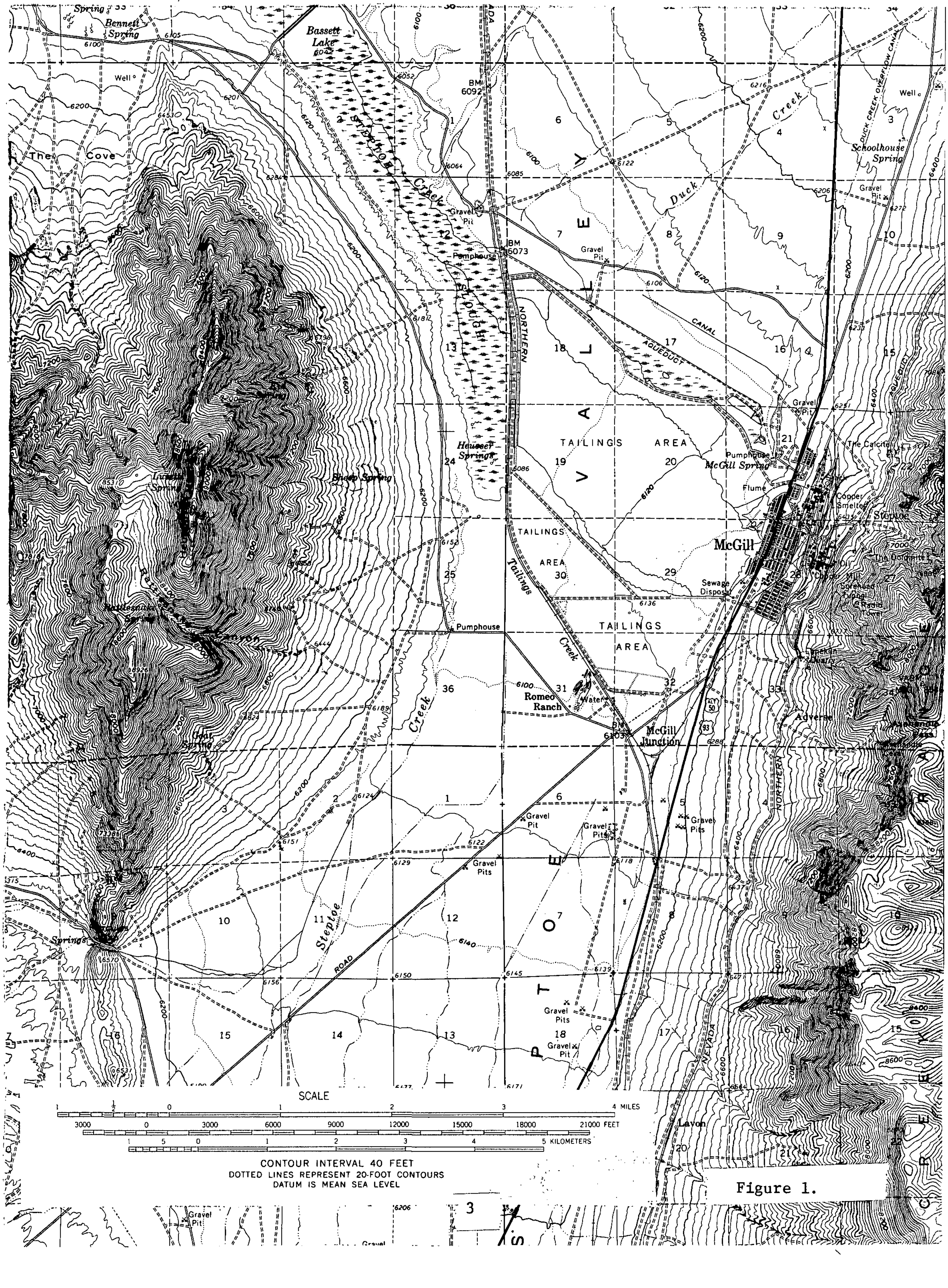
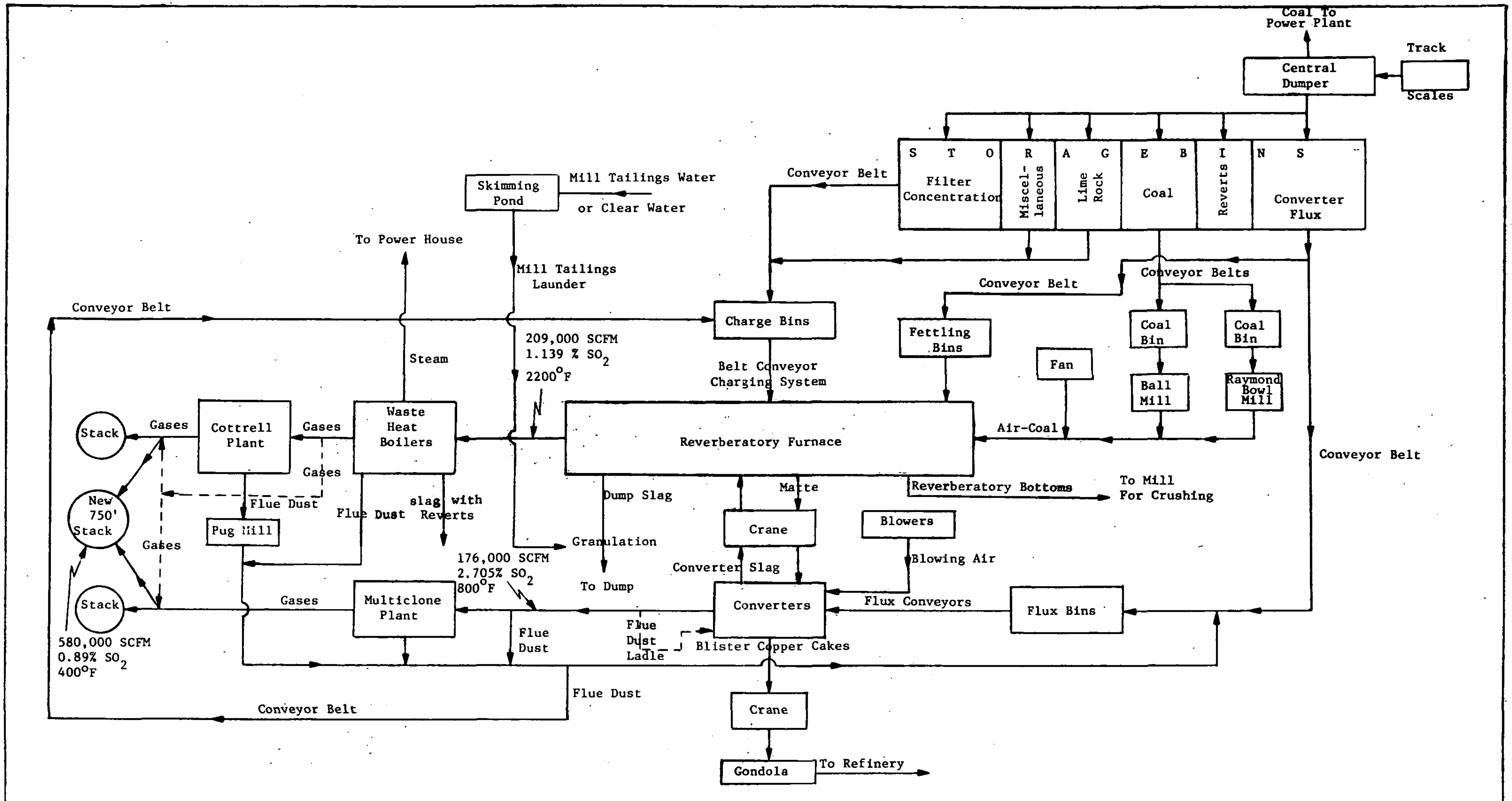

Bassett Lake
Bennett Spring
The Cove
Well
Duck Creek
Schoolhouse Spring
Gravel Pit
Pumphouse
NORTHERN
CANAL
AQUEDUCT
TAILINGS AREA
McGill Spring
Flume
Copper Smelter
Steptoe
McGill
Sewage Dispos
Heusser Springs
Sheep Spring
Rattlesnake Spring
Canyon
Goat Spring
Tailings Creek
Romeo Ranch
Water
McGill Junction
Adverse
Steptoe Creek
ROAD
Gravel Pits
STEPTOE VALLEY
NEVADA
Lavon
SCALE
4 MILES
21000 FEET
5 KILOMETERS
CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

Figure 1.

Figure 2.

MAP - MC GILL PLANT

(Located in Pocket Inside of Back Cover)



PROCESS FLOW & SULFUR BALANCE

KENNECOTT COPPER CORP./Mc GILL | Prepared Sept. 1975

PACIFIC ENVIRONMENTAL SERVICES, INC.

Figure 3.

Matte from the reverberatory furnace is taken in ladles by crane and charged to the converters. From the converters the blister copper is poured into molds forming blister copper cakes. The cakes, the major product from this smelter, are sent to the Kennecott Refining Corporation, Baltimore, Maryland.

The smelter has a charge capacity of approximately 400,000 TPY of concentrates. The daily charge rate generally varies from 750 to 1,300 TPD depending primarily upon availability of charge materials.

Gases from the reverberatory furnaces pass through waste heat boilers and precipitators for particulate cleaning then out the new 750 ft. stack. Gases from the converters are picked up by hoods and passed to a multiclones plant for particulate control and then out the new 750 ft. stack. The gases leave the reverberatory furnace at 2200^{o}F and enter the waste heat boilers where they are reduced to a temperature of approximately 750^{o}F. Gases from the converters leave at 800^{o}F.

Dust from the precipitators is processed in a pug mill and then returned to the charging bins. Likewise, dust from the multiclone plant and flues is transported by conveyor to the charge bins. Slag from the converters is returned to the reverberatory furnace. Slag from the reverberatory furnace is sent to the slag dump.

Temperatures, flow rates, and SO_2 concentrations are shown on the process flow sheet, Figure 3. It should be noted that there is considerable dilution air entering the system from the large gap in the converter hoods and other leakage points. The total volume of gases leaving the reverberatory furnaces and converters is 380,000 SCFM and this is then diluted by sufficient air to reach a volume as high as 580,000 SCFM leaving the stack.

D. EMITTING EQUIPMENT

a. Reverberatory Furnaces

There are two coal fired reverberatory furnaces each with two waste heat boilers shown in Figure 4 and Figure 5. Furnace #2 is 31' x 132' and furnace #3 is 32' x 132'. The furnaces were built and installed by Kennecott Copper.

Waste heat boilers #3 and #4 for the #2 furnace are rated at 40,000 lbs/hr steam. Waste heat boilers #5 and #6 are rated at 70,000 lbs/hr and are fed by gases from the #3 furnace. The two reverberatory furnaces process an average of 46 tons per hour of concentrate, 3 tons per hour residue, 14 tons per hour of coal, and 30 tons per hour converter slag.

b. Converters

The following describes the four Peirce-Smith converters shown in Figure 6:

No.	Dimensions	Blower Capacity
1	12'-0" x 30'-0"	25,000 CFM at 18 psi
2	13'-0" x 30'-0"	25,000 CFM at 18 psi
3	12'-0" x 30'-0"	50,000 CFM at 17 psi
4	15'-0" x 35'-0"	40,000 CFM at 18 psi

The charge to the four converters averages 34 tons per hour of copper matte, 1 ton per hour of residue and 12 tons per hour of flux.

As seen in Figure 6 the converter mouth design has a cylindrical portion raised above the surface of the converter. This requires that the hoods be considerably higher than conventional "tight" fitting converter hoods resulting in increased amounts of dilution air entering the system.

Figure 4. REVERBERATORY FURNACE PLAN

(Located in Pocket Inside Back Cover)

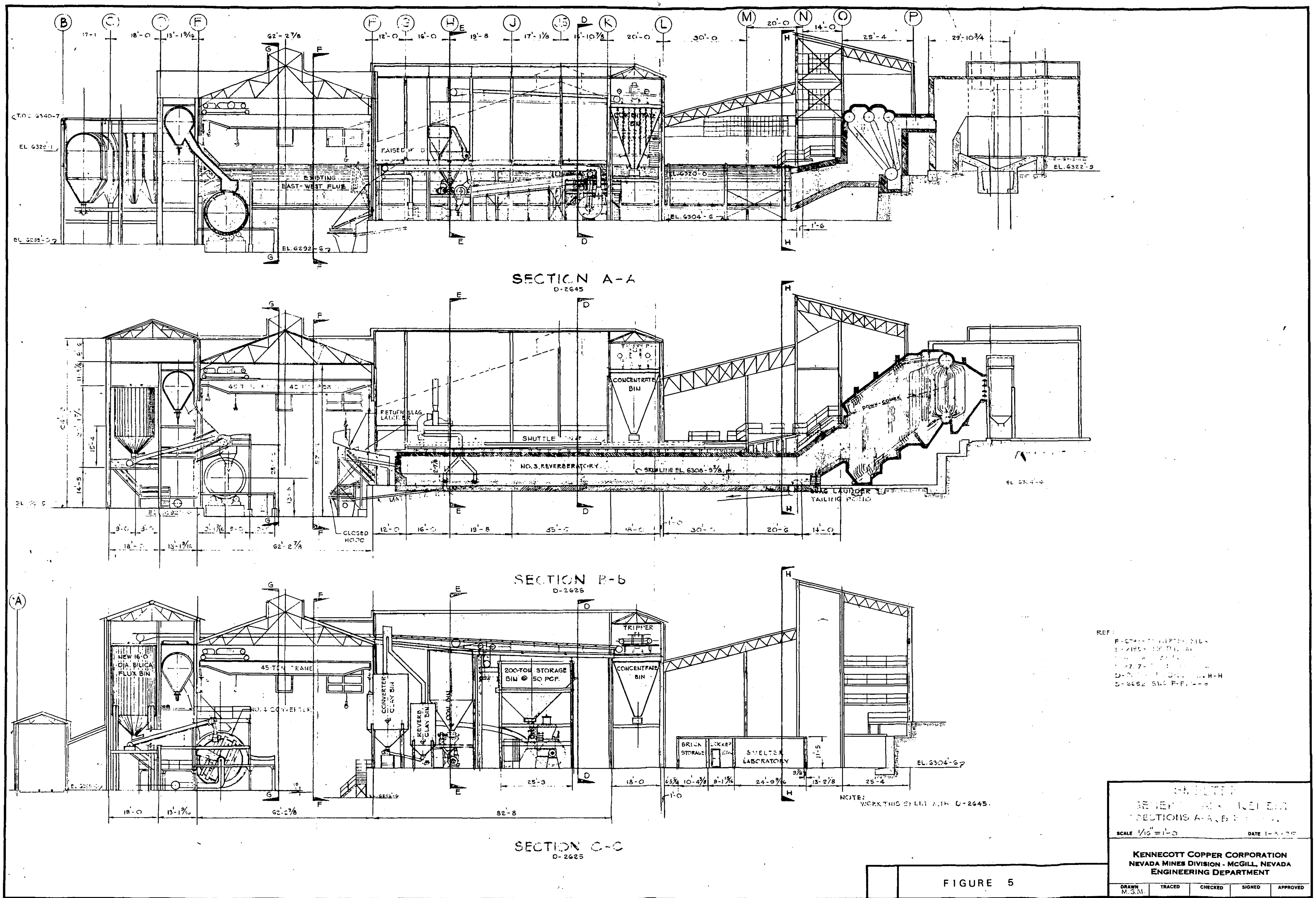
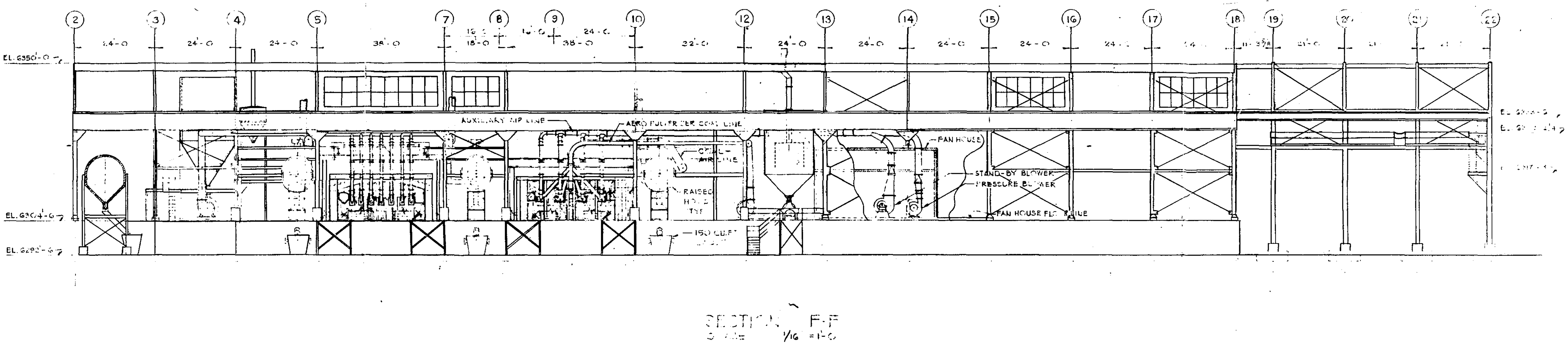
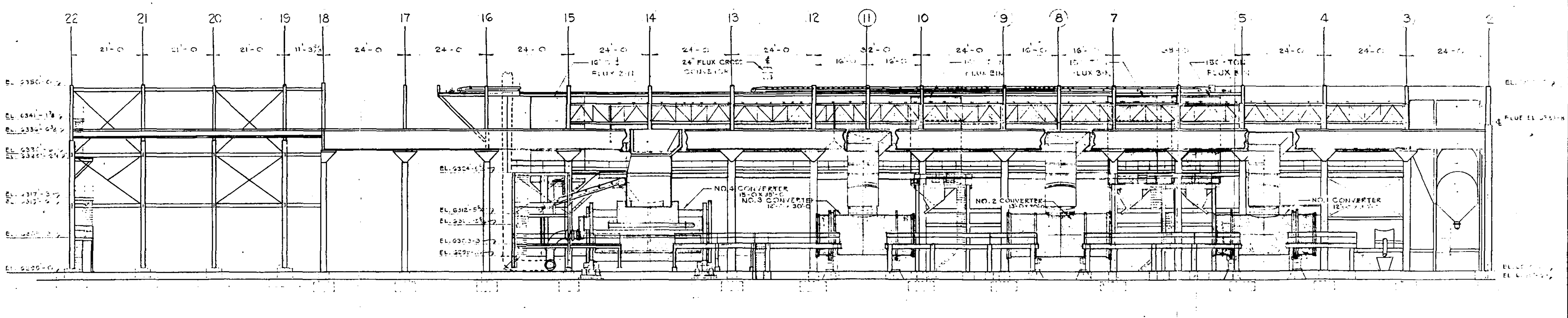

SECTION A-A
D-2645
EXISTING EAST-WEST FLUE
SECTION B-B
D-2625
CONCENTRATE BIN
RETURN SLAG LAUNDER
SHUTTLE
NO. 3 REVERBERATORY
CLOSED HOOD
TAILING POND
SECTION C-C
D-2625
NEW 16'-0 DIA. SILICA FLUX BIN
45-TON CRANE
CONVERTER CLAY BIN
REVERB CLAY BIN
200-TON STORAGE BIN @ 50 PCF.
TRIPPER
CONCENTRATE BIN
BRICK STORAGE
SMELTER LABORATORY
NOTE: WORK THIS SHEET WITH D-2645.
SCALE 1/16" = 1'-0
KENNECOTT COPPER CORPORATION
NEVADA MINES DIVISION - MCGILL, NEVADA
ENGINEERING DEPARTMENT
DRAWN M.S.M.
TRACED
CHECKED
SIGNED
APPROVED
D-2650

FIGURE 5





NOTE:
WORK THIS SHEET WITH D-2645.

REF:

SMELTER
GENERAL ARRANGEMENT
SECTION F-F & G-G

SCALE AS NOTED

KENNECOTT COPPER CORPORATION
NEVADA MINES DIVISION - MCGILL, NEVADA
ENGINEERING DEPARTMENT

DRAWN	TRACED	CHECKED	SIGNED	APPROVED
M.G.14.				

FIGURE 6

D-2652

With two converters operating (handling matte from one reverberatory furnace) typical converter offgas volume flows are:

Volumetric Gas Flow in SCFM (14.7 psia and 32°F)

	Wet	Dry
Maximum	103,000	100,000
Average	70,040	68,000
Minimum	30,900	30,000

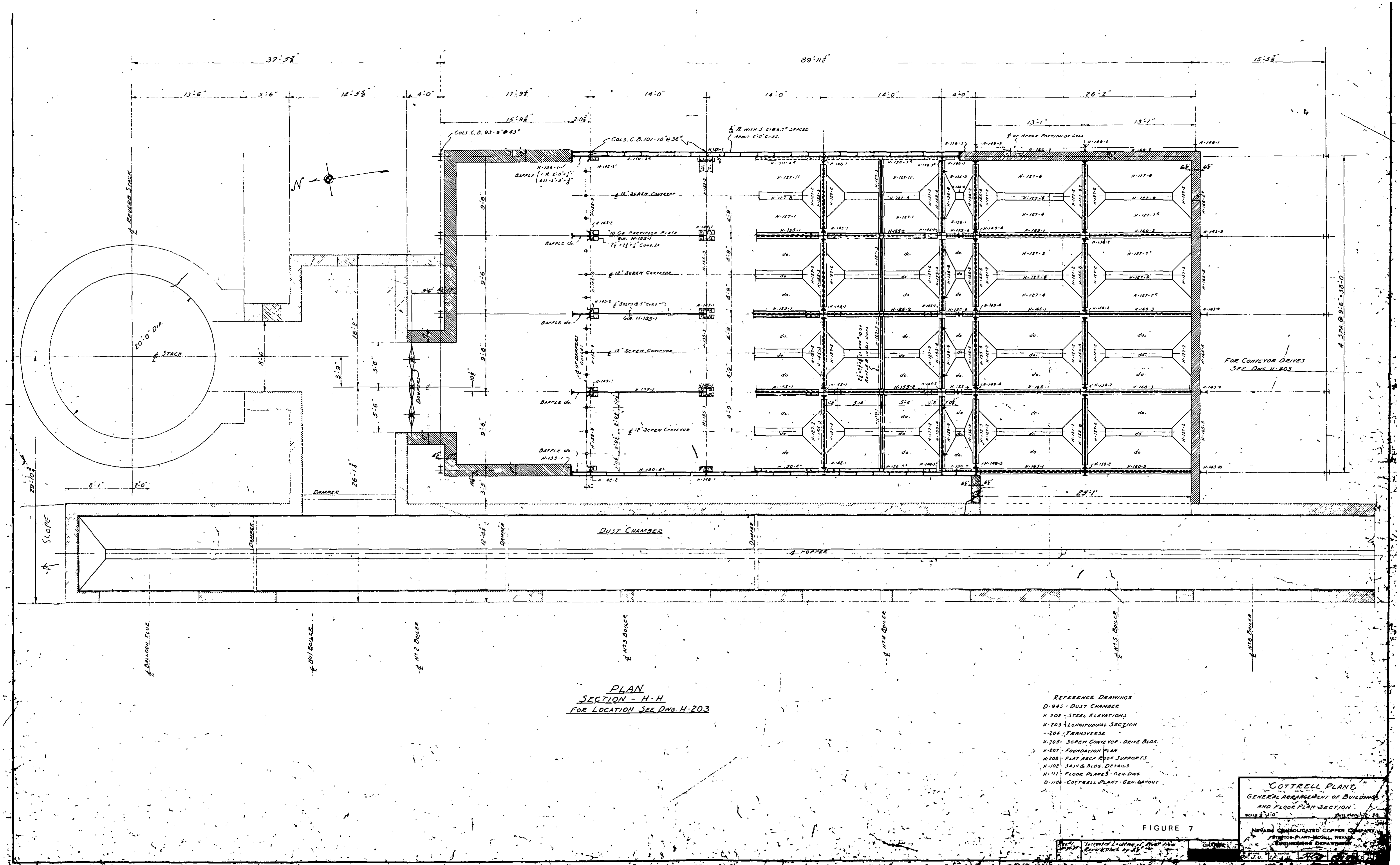
These values were used to define the requirements for the sulfuric acid plant. The gas temperature downstream of the precipitator was assumed to be in the range of 450°F to 750°F. The SO_2 concentration typically ranges from 3.0% to 3.9% with a maximum range of 6% to zero percent. Zero percent may occur for 2 hour durations requiring acid plant recycling.

c. Other Emitting Equipment

Material handling in the unloading and bin loading areas can generate some particulate matter. Crushing and screening operations are performed but are not considered major sources of particulates. Ladles for handling slag and matte from the reverberatory furnaces do produce visible fugitive emissions, however, while the ladles are receiving molten material movable hoods, shown in Figure 4, are placed on top and evacuated through a separate duct and fan system. This minimizes fugitive emissions.

E. EXISTING CONTROL EQUIPMENT

An electrostatic precipitator is currently used to clean the gases coming from the reverberatory furnaces. Figure 7 is a general arrangement of the building and floor plan section of the precipitator handling the gases from the reverberatory furnaces. The overall



PLAN
SECTION - H-H
FOR LOCATION SEE DWG. H-203
DUST CHAMBER
DAMPER
SLOPE
20'-0" DIA.
℄ STACK
℄ REVERB STACK
N
FOR CONVEYOR DRIVES SEE DWG. H-205
℄ BALLOON FLUE
℄ No 1 BOILER
℄ No 2 BOILER
℄ No 3 BOILER
℄ No 4 BOILER
℄ No 5 BOILER
℄ No 6 BOILER
REFERENCE DRAWINGS
D-943 - DUST CHAMBER
H 202 - STEEL ELEVATIONS
H-203 - LONGITUDINAL SECTION
" -204 - TRANSVERSE
H-205 - SCREEN CONVEYOR - DRIVE BLDG.
H-207 - FOUNDATION PLAN
H-208 - FLAT ARCH ROOF SUPPORTS
H-102 - SASH & BLDG. DETAILS
H-111 - FLOOR PLATES - GEN. DWG.
D-1106 - COTTRELL PLANT - GEN. LAYOUT
COTTRELL PLANT
GENERAL ARRANGEMENT OF BUILDING AND FLOOR PLAN SECTION
NEVADA CONSOLIDATED COPPER COMPANY
ENGINEERING DEPARTMENT

FIGURE 7

dimensions of the multi-stage unit are 90' x 38'. Screw conveyors transport the dust collected in the precipitator hoppers to a pug mill. The precipitator inlet flue is also equipped with a hopper and screw conveyor. Gases from the waste heat boilers enter the inlet flue and are then passed through a 25' wide opening to the precipitator sections. After cleaning, the gases are passed to the new 750 ft. stack (not the one shown).

Figure 8 shows the multiclone arrangement for handling the gases from the converters. Converter gases, collected in the converter flue, are ducted to four 16 VD size 45-9 multiclone units. Each unit has a butterfly damper upstream for isolation and a louver damper downstream for control. In addition, a bypass damper is provided to allow direct flow of the gases to the stack. A 273,000 SCFM 2" S.P., 362 RPM Buffalo Fan located downstream of the multiclone units pulls the gases through the multiclone units. From the fan the gases travel through a brick flue and then out the stack.

F. NEW ACID PLANT

Figure 9 shows the general arrangements of the presently planned acid plant and gas handling facilities. This acid plant has been designed and installation initiated. The site has been graded and compacted and some equipment received. Because of Kennecott litigation with EPA, work has been halted on this new installation. The installation includes new precipitators for both the reverberatory furnaces and the converters along with a 500 TPD single contact sulfuric acid plant, and associated facilities. The new 750 ft. stack has been installed and is currently being used to handle all offgases from the smelter.

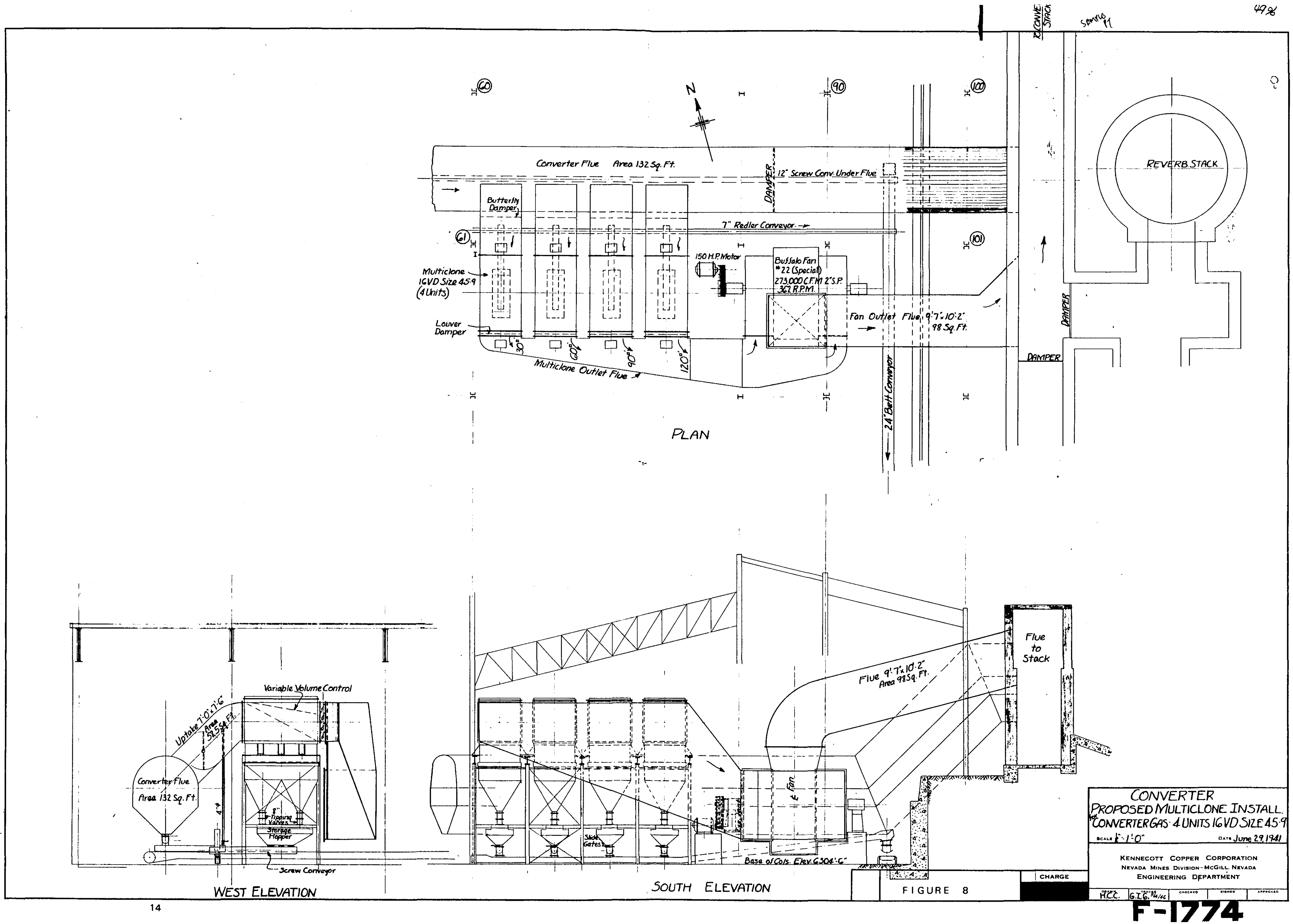

498
PLAN
Converter Flue Area 132 Sq. Ft.
12" Screw Conv. Under Flue
DAMPER
Butterfly Damper
7" Redler Conveyor
Multiclone 16VD Size 45-9 (4 Units)
Louver Damper
Multiclone Outlet Flue
30°
60°
90°
120°
150 H.P. Motor
Buffalo Fan #22 (Special) 273,000 C.F.M. 2" S.P. 362 R.P.M.
Fan Outlet Flue 9'-7" x 10'-2" 98 Sq. Ft.
24" Belt Conveyor
REVERB STACK
DAMPER
DAMPER
WEST ELEVATION
Variable Volume Control
Uptake 7'-0" x 7'-6" Area 52.5 Sq. Ft.
Converter Flue Area 132 Sq. Ft.
8" Tipping Valves
Storage Hopper
Screw Conveyor
SOUTH ELEVATION
Flue 9'-7" x 10'-2" Area 98 Sq. Ft.
Flue to Stack
Slide Gates
℄ Fan
Base of Cols. Elev. 6304'-6"
CONVERTER
PROPOSED MULTICLONE INSTALL. for CONVERTER GAS 4 UNITS 16VD SIZE 45-9
SCALE 1/8"=1'-0"
DATE June 29, 1941
KENNECOTT COPPER CORPORATION
NEVADA MINES DIVISION - McGILL, NEVADA
ENGINEERING DEPARTMENT
CHARGE
FIGURE 8
H.C.C.
G.I.G.
F-1774

Figure 9. ACID PLANT GENERAL ARRANGEMENT
(Located in Pocket Inside Back Cover)

G. GAS SYSTEM DUCTWORK

Ductwork details in plan view and elevations are shown in Figures 4, 5 and 6. Gases from each reverberatory furnace pass through an uptake to a pair of waste heat boilers. Following the boilers, the gases pass through a brick flue to the precipitator and are then discharged from the new 750 ft. stack.

Gases from the converters are collected in the hoods, travel through the converter balloon flue to the parallel multiclone plant, and are then discharged to the stack. A bypass exhaust dust collection flue from the converter flue aids in the distribution of the gases. The converter flue and the exhaust dust collection flue meet at the junction box and then the single balloon flue carries the gases from this point.

H. SULFUR BALANCE AND GAS COMPOSITION AT SYSTEM EXIT

Figure 10 and Figure 11 show the particulate balance throughout the smelter.

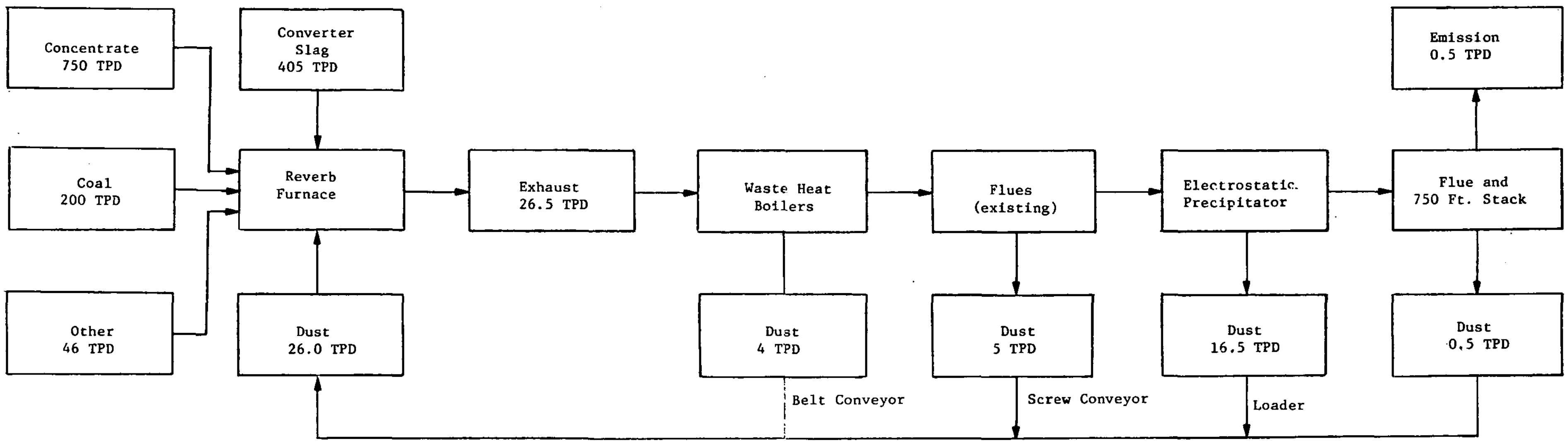
Analysis of particulate emission from the combined reverberatory furnace and converter gas systems is shown in Table 1. Listed are constituents that could cause pollution problems. The data were taken from stack dust lost test number 241 conducted on May 13, 1971.

Typical data for gases leaving the stack are as follows:

SO_2	0.89% (b.v.)
SO_3	0.027% (b.v.)
H_2O	0.20% (b.v.)
O_2	not available

Pollutant gases such as Cl, NO_x - no data available.

Particle size distribution data measured upstream from the dust collection devices by Research Cottrell personnel are shown in Figures 12, 13, and 14.



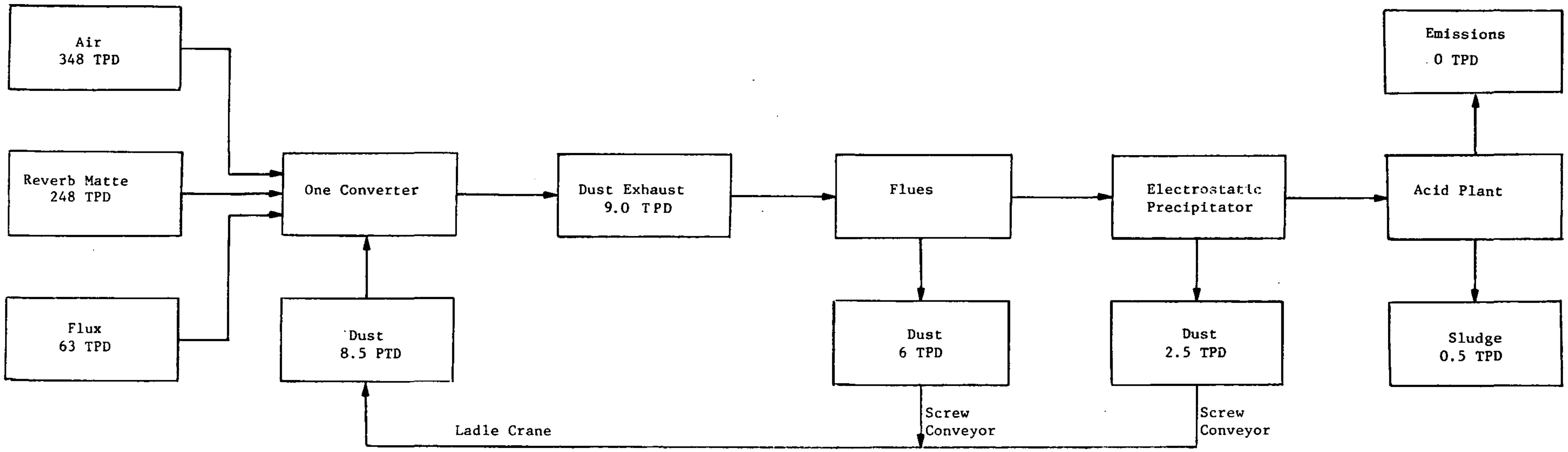
Reverb Furnace Input

	TPD
Other:	
Lime Rock	45
Flux	1
Coal	200
Dust	26
Concentrate	750
Converter Slag	405
Total	1,427
Average	59.2 tons/hr
Allowable Particulate Emission	46.2 lb/hr

Projected Particulate Emission

	TPD	
Reverb Exhaust		26.5
Collection:		
Waste Heat Boilers	4	
Flue	5	
Precipitator (New)	16.5	
Flue Extension & Base of Stack	0.5	
Subtotal		26.5
Projected Emission		0.5 = 42 lb/hr
Contingency		3
Particulate Emission		45 lb/hr

Figure 10. REVERBERATORY FURNACE PARTICULATE BALANCE
750 TPD (one reverberatory furnace)



Converter Input

	TPD	
Flux	63	
Air*		
Dust	8.5	
Reverb Matte	248	
Total	319.5	
Average	13.3	tons/hr
Allowable Particulate Emission:		
(One converter)	23.2	lb/hr
(Two converters)	46.4	lb/hr

*Process air excluded by definition

Projected Particulate Emission

		TPD	
Converter Exhaust		9.0	
Collection:			
Flues	6		
Electrostatic Precipitator	2.5		
Acid Plant Sludge	0.5		
Subtotal		9.0	
Projected Emission		0	= 0 lb/hr
Contingency			5
Particulate Emission:			
(One converter)			5 lb/hr
(Two converters)			10 lb/hr

Figure 11. COPPER CONVERTERS PARTICULATE BALANCE 750 TPD (two converters)

Table 1. PARTICULATE EMISSIONS ANALYSIS AT STACK OUTLET

Metal		%
Arsenic		0.038
Cadmium		0.008
Copper		5.6
Selenium		0.014
Zinc		1.1
Chromium		0.006
Manganese		0.023
Nickel		0.0045
Vanadium		0.0023
Boron		0.12
Barium		0.03
Mercury		0.0007
Lead		0.065
	Total	7.0115

Stack Dust Lost Test No. 241 (5/13/71)

CONVERTER

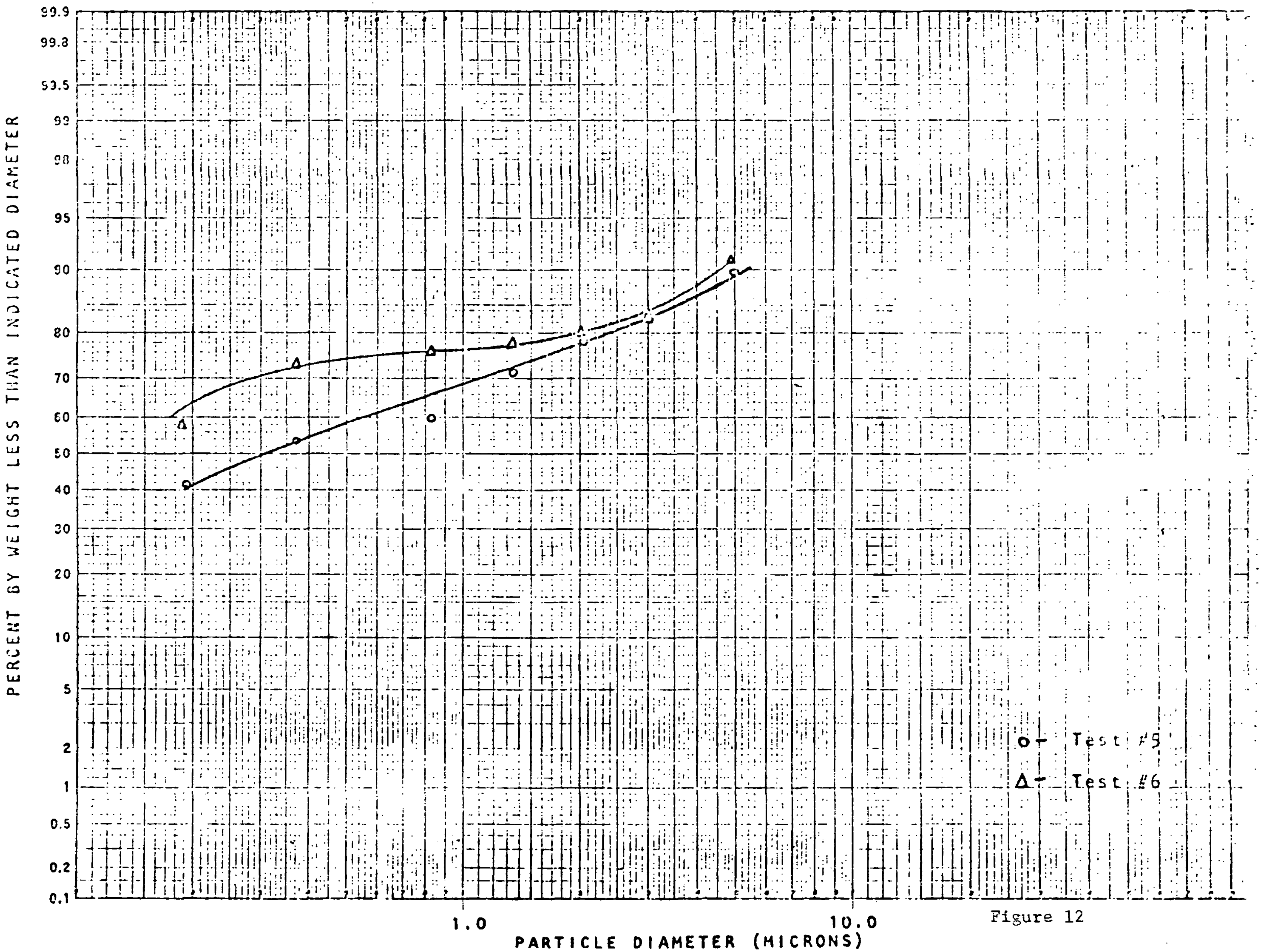


Figure 12

REVERBERATORY FURNACE

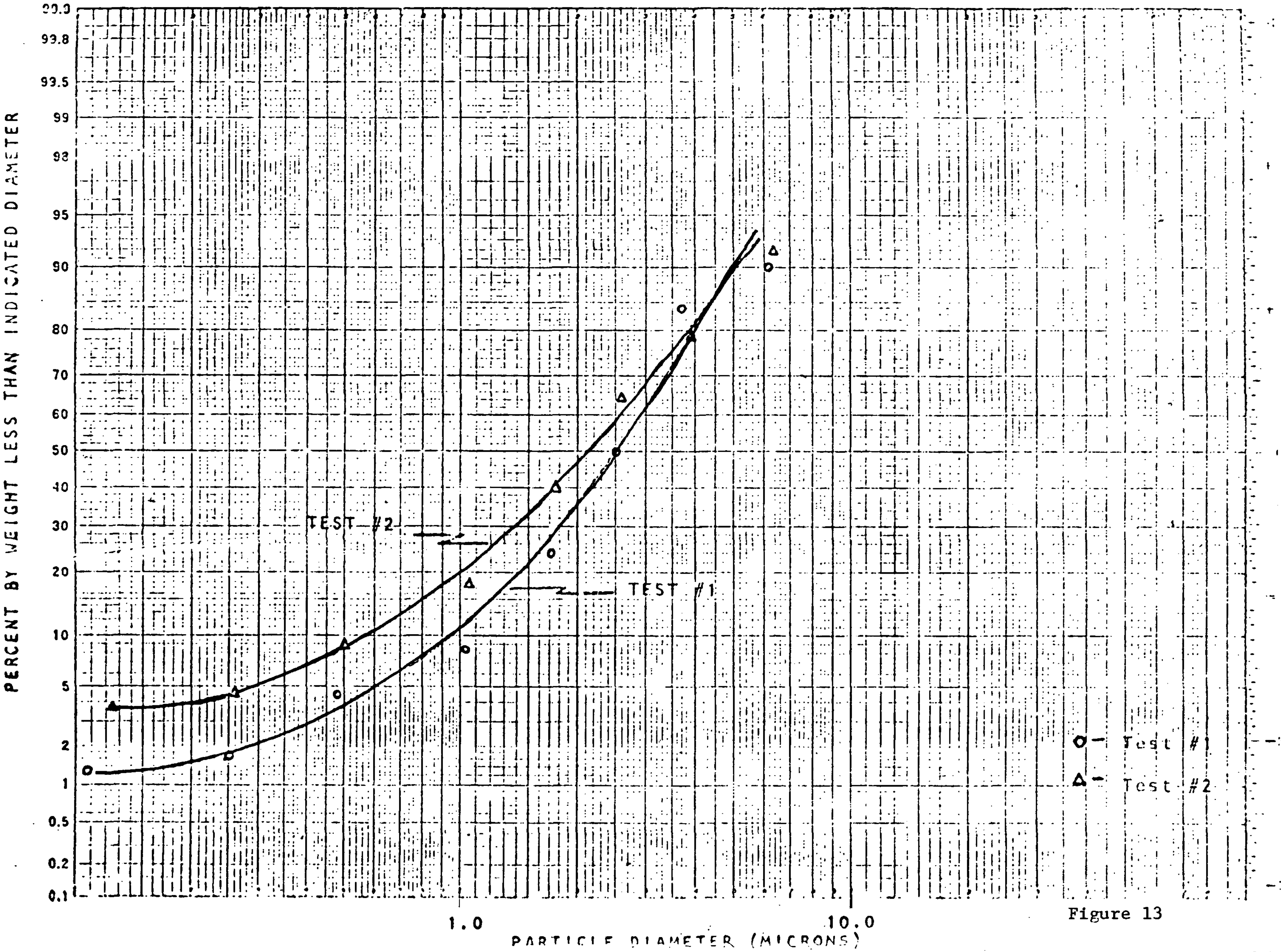


Figure 13

REVERBERATORY FURNACE

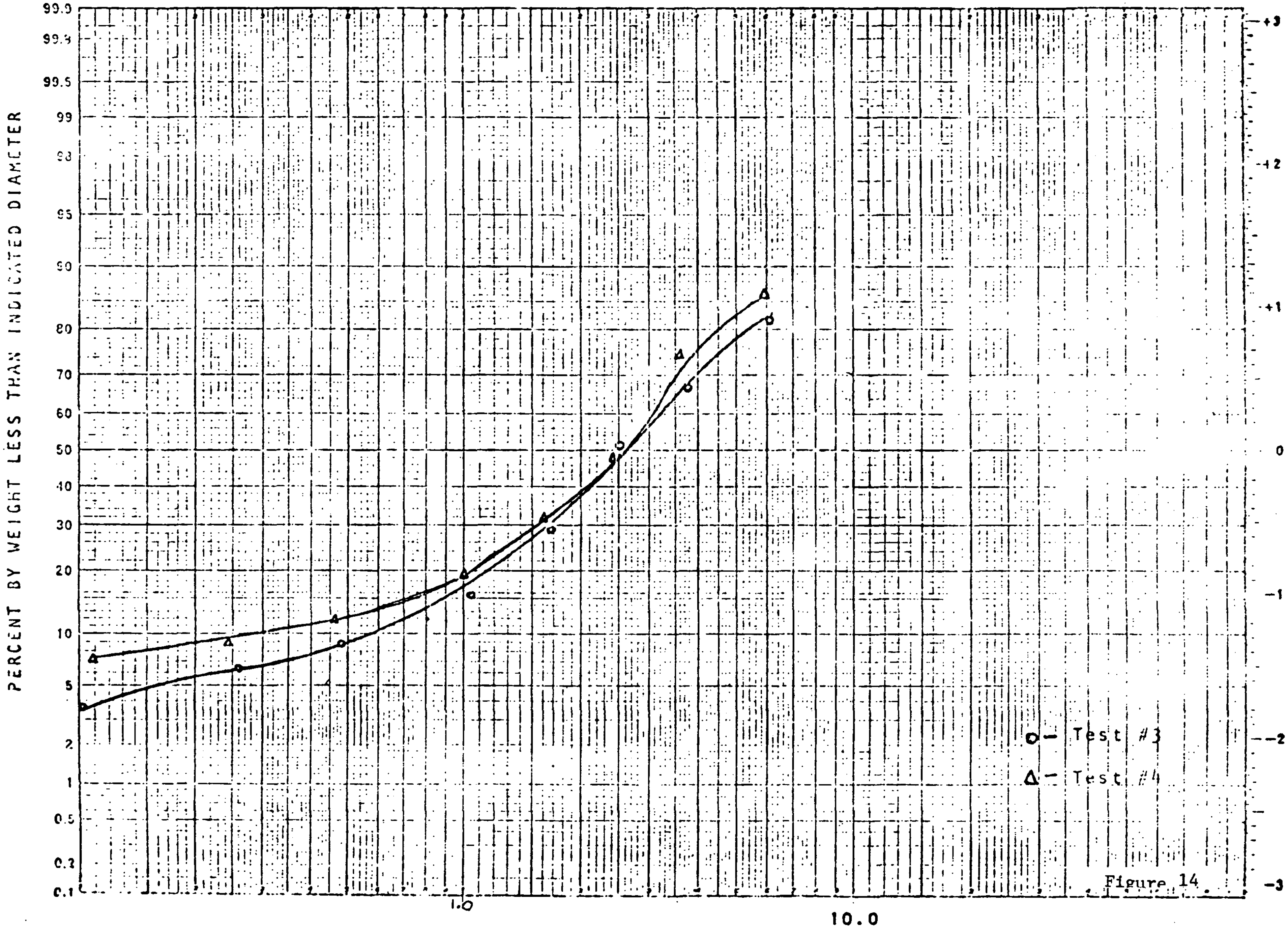


Figure 14

Typical sulfur balance data for two charge rates are shown in Table 2. Fugitive emissions are reported as "Process Loss" in the "Sulfur Emitted" column. The 1,300 TPD concentrate assumes an average of the maximum feed to the reverberatory furnaces which has been encountered in the past. Currently operation is closer to the 750 TPD rate.

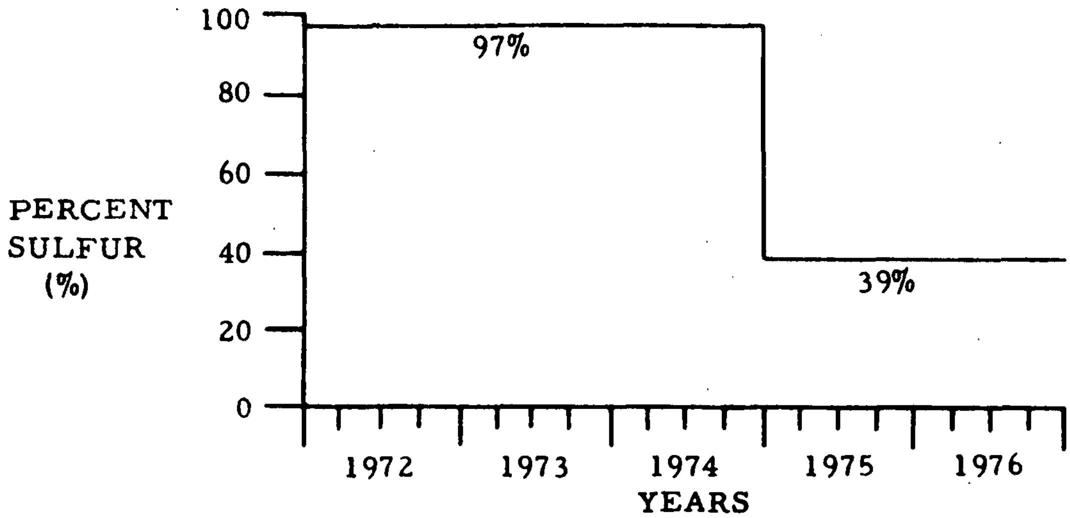
I. GAS CHARACTERISTIC VARIATION

There are no data available on gas characteristic variation from the smelter, but it can be expected that SO_2 concentration in the offgas from the reverberatory furnaces will vary significantly with time. This results from the variation in time required for decomposition reaction of the various sulfide ores charged. This variation in SO_2 content has been known to vary as much as 10 to 1 within a given charging time cycle.

SO_2 concentration in the converter offgas will also vary considerably for an entirely different reason. The operation of the converter includes several, usually three, slag blows and one copper blow. Between these blows the converter may be rolled out for slag pouring or material charging. When the converter is not blowing the hood above the converter is closed off by dampers so that the gases do not pass through the collection system. An attempt is always made to maintain at least one converter blowing gases into the system at any given time. The requirements for the acid plant design were set to cover an SO_2 range from 3.5% to 10.0%. It is expected that an average of 4.5% SO_2 will be encountered in the gases going to the acid plant from the converters. Gas volume flow to the acid plant will vary from 30,000 to 68,000 SCFM.

Table 2. **SULFUR BALANCE - 750 TPD** (Concentrate)
(Illustration No. 1)

Percent of Sulfur in Feed Emitted



Sulfur Input

	TPD	(%)
Concentrates 750 tpd @35% S	263	100
	263*	100%

Sulfur Captured

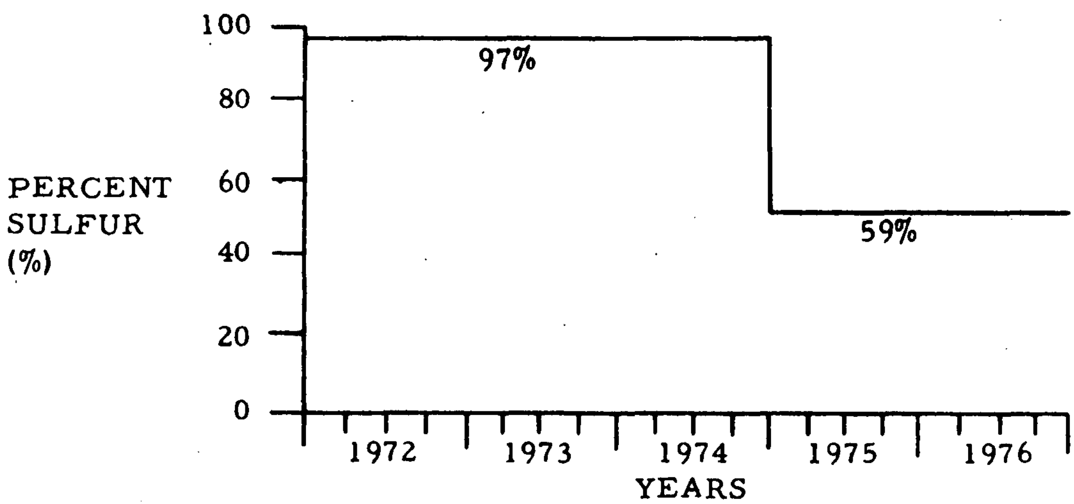
	TPD	(%)
Slag	8	3
Blister Copper	1	0
Sulfuric Acid	146	56
Acid Plant Sludge	6	2
	161	61%

Sulfur Emitted

	TPD	(%)
Reverb Furnace	83	32
Emergency Bypass	0	0
New 750-Ft. Stack	83	32
Process Loss (Fugitive)	11	4
Acid Plant Tail Gas	8	3
	102	39%

SULFUR BALANCE - 1,300 TPD (Concentrate)
(Illustration No. 2)

Percent of Sulfur in Feed Emitted



Sulfur Input

	TPD	(%)
Concentrates 1,300 tpd @ 35% S	455	100
	455	100%

Sulfur Captured

	TPD	(%)
Slag	14	3
Blister Copper	1	0
Sulfuric Acid	163	36
Acid Plant Sludge	7	2
	185	41%

Sulfur Emitted

	TPD	(%)
Reverb Furnaces	144	31
Acid Plant (Bypass)	99	22
New 750-Ft. Stack	243	53
Process Loss (Fugitive)	18	4
Acid Plant Tail Gas	9	2
	270	59%

J. STACK DESCRIPTION

Figure 15 contains data and a sketch of the new 750 ft. stack. This figure also shows location of the new stack. Stack has a concrete shell with a 1/4" carbon steel liner. Inlet temperature averages 410°F with a range of 350°F to 700°F.

K. SOLID WASTE HANDLING

Slag is granulated as it leaves the reverberatory furnace by passing it into a slag launder tailing pond which causes the slag to granulate. The slurry thus formed is pumped to the slag dump. Converter slag is returned by ladle to the reverberatory furnace with a crane dumping into the return slag launder.

Reverberatory bottoms are sent to the mill for crushing and returned directly to the reverberatory furnaces for charging. Flue dust from the multiclone and precipitator plants is returned to the charge bins by conveyor belt.

L. FOOTING AND CONSTRUCTION REQUIREMENTS

The original ground density for the acid plant foundation was 110 lbs per cubic foot. To meet specifications the area was excavated, backfilled and then compacted to give a density of 128 lbs per cubic foot.

The following environmental conditions are used for design:

Temperature	-28°F to +128°F
Design Wet Bulb Temperatures	58°F
Design Dry Bulb Temperature	85°F
Average annual rainfall	8.33 inches
Average wind velocity	11 miles per hour
Maximum wind velocity	100 miles per hour
Direction of wind	80% SSW to NNE
Average annual snow fall	56 inches

Design snow load	20 inches
Frost line design	30 inches
Thunderstorms, number per year	9
Dust storms	moderate
Earthquake	Uniform Building Code Zone 2

M. EXISTING AND POTENTIALLY AVAILABLE UTILITIES

1. Electric

   Existing 40,500 kva produced by Kennecott.

   44,000 kva produced by Mount Wheeler Power Inc.

   Potential: Operating with all available power now. Additional transformer equipment required. Pickup at power house, switch house or transformer building.

2. Water

   Existing 14,586 gallons per minute

   Potential: Operating with all available water. Main lines run approximately east-west direction and pass between boiler room and cooling tower. Additional lines feed reverberatory and converter buildings.

3. Steam

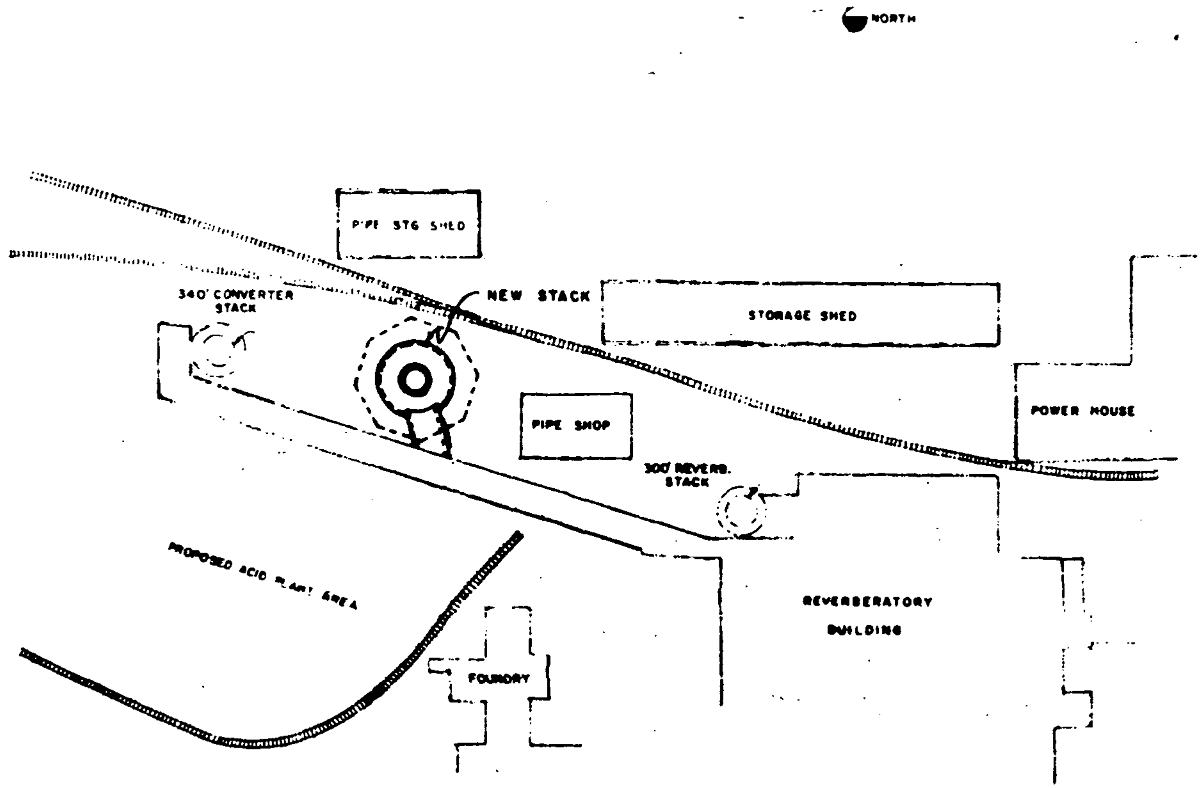
   Existing 753,900 lbs/hr maximum total

   Potential: Operating with all available steam

   In addition to the waste heat boilers, there are 4 coal fired boilers used at the present time.

4. Gas

   Usage is very limited throughout the general plant.

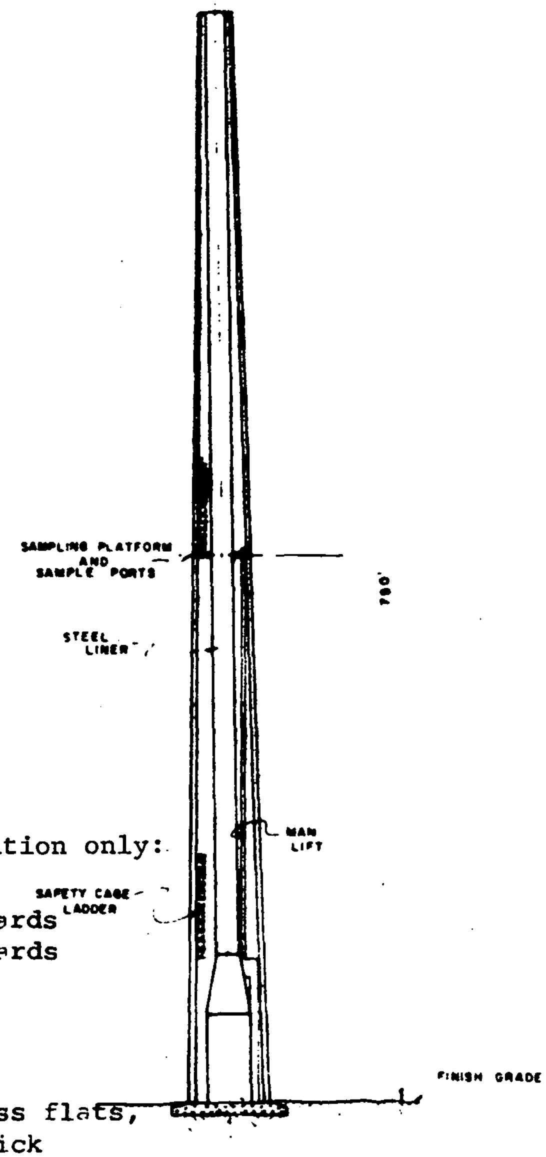


SITE PLAN

STATISTICAL DATA FOR 750-FOOT SMELTER STACK

The following figures are approximate and are provided for general information only:

Concrete in column	4500 cubic yards
Concrete in foundation	1310 cubic yards
Thickness of concrete column at thickest point	48 inches
Thickness of concrete column at narrowest point	8 inches
Octagonal foundation dimensions	78 feet across flats, 8 feet thick
Weight of reinforced concrete column	9,150 tons
Diameter of column at base	54 feet 7 inches
Diameter of column at top	23 feet 4 inches
Diameter of steel liner at bottom	30 feet
Diameter of steel liner at top	15 feet 6 inches



SECTIONAL ELEV.

Figure 15

N. POTENTIAL NEW CONTROL EQUIPMENT INSTALLATION PROBLEMS

There are four basic installation problems which Nevada Mines Division, Kennecott Copper Corporation considers existing for the installation of new control equipment. They are as follows:

1. Lack of surplus energy - due to the isolated area in which the plant is located the energy resources and potential are very limited.

2. Confined plant area - the existing plant area has very little capacity for expansion within, due to the limited area created by the complexity of the processes now in use. (It is believed that there is additional space available if ductwork is extended - PES comment.)

3. Continued operation while installation is taking place - the operations performed at Nevada Mines Division are all linked to each other in producing a finished product. Any loss of one of these steps produces a domino effect throughout the plant.

4. Economics - The status of the copper economy combined with the rise in the cost of material has produced economic hardship on copper producers.

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

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7. AUTHOR(S) I.J. Weisenberg and J.C. Serne		8. PERFORMING ORGANIZATION REPORT NO.
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15. SUPPLEMENTARY NOTES

EPA Task Officer for this report is R. Rovang, 919/549-8411, Ext 2557.

16. ABSTRACT

The report gives background design data for a specific copper smelter. The data is sufficiently detailed to allow air pollution control system engineering studies to be conducted. These studies will be concerned primarily with lean SO2 streams that currently are not being captured. Physical layout of the smelter and the surrounding area is presented, along with existing control equipment. Ductwork that would be considered for future system tie-in is defined. Emissions from operating equipment, gas flow rates, temperatures, sulfur balance, and a process flow sheet are included. Utilities, stack dimensions, footing requirements, and solid waste handling are defined. Available area for new control equipment, gas characteristic variation, and potential new control equipment installation problems are discussed.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
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