

Air



Visible Emissions Converter Secondary Hooding

Emission
Test Report
Asarco
Hayden, Arizona

DCN 82-222-018-06-16

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VISIBLE EMISSIONS CONVERTER
SECONDARY HOODING

EMISSION TEST REPORT
ASARCO
HAYDEN, ARIZONA

by

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SECTION 1

INTRODUCTION AND CONCLUSIONS

The purpose of this project was to evaluate, using methods of visual detection, the performance of the converter hood capture system at the ASARCO copper smelter in Hayden, Arizona. Results from the visible emissions testing are to be used for revision of the New Source Performance Standards (NSPS) for the primary copper industry. A review of the data and conditions existing inside the converter building indicate that neither the data generated nor the methods employed are suitable for evaluating the performance of converter hood capture efficiency. A system using transmissometers may be utilized instead, and such a system is currently under development by the EPA.

The hood capture system consists of a proprietary combination of primary and secondary hoods. The testing was performed using visible emission observations of the particulate matter escaping capture by the hooding. The sulfur dioxide (SO_2) emissions were then taken to be proportional to the visible particulate fugitives. Representatives from Radian Corporation and the Environmental Protection Agency's Office of Air Quality Planning and Standards (EPA/OAQPS) visited the ASARCO copper smelter from September 28 through October 2, 1981 to gather the data included in this report. ASARCO also provided its own smoke readers during the test to duplicate the data gathered during the EPA test effort; however, none of the ASARCO data are included in this report. Data sheets from this work are reproduced in the Appendix.

1.1 Background

The ASARCO Copper Smelter at Hayden, Arizona began production in 1912. Since then, the plant has been enlarged repeatedly, with the most recent additions occurring during the 1970's. ASARCO's Hayden plant now has an annual charge capacity of 90,000 tons of raw materials. The smelter has 12

roasters, two reverberatory furnaces, five converters, two anode furnaces and casting facilities, and an acid plant. The plant also operates a power plant producing 50 percent of the plant's electricity from the waste heat of the reverberatory furnaces.

1.2 Process Description

The production of blister copper from ore concentrates at the ASARCO Hayden smelter follows the traditional pyrometallurgical practices of the copper smelting industry. There are three main operations:

- Roasting to remove a fraction of the sulfur content of the ore.
- Smelting of the ore concentrate to form the copper-bearing matte.
- Oxidizing the matte in a converter to form blister copper.

This final step in the production of blister copper is performed in Pierce-Smith converters, which consist of a cylindrical steel shell mounted on trunnions at either end and which is rotated about its major axis. An opening in one side of the converter functions as a mouth through which molten matte, siliceous flux, and scrap copper are charged to the converter and gaseous products are vented. Air or oxygen enriched air is blown through the molten metal; FeS is oxidized and the resulting oxide combines with the flux to form a slag, which floats on the surface.

After blowing, relatively pure Cu_2S is collected in the bottom of the converter. Slag is skimmed from the top and a renewed air blast oxidizes the sulfide sulfur to SO_2 leaving blister copper in the converter. Figure 1-1 shows the position of the primary hooding during charging, blowing, and skimming.

During the blowing phase, flue gases containing particulates and SO_2 are captured by the hooding system. The hooding system was evaluated during the entire blowing phase.

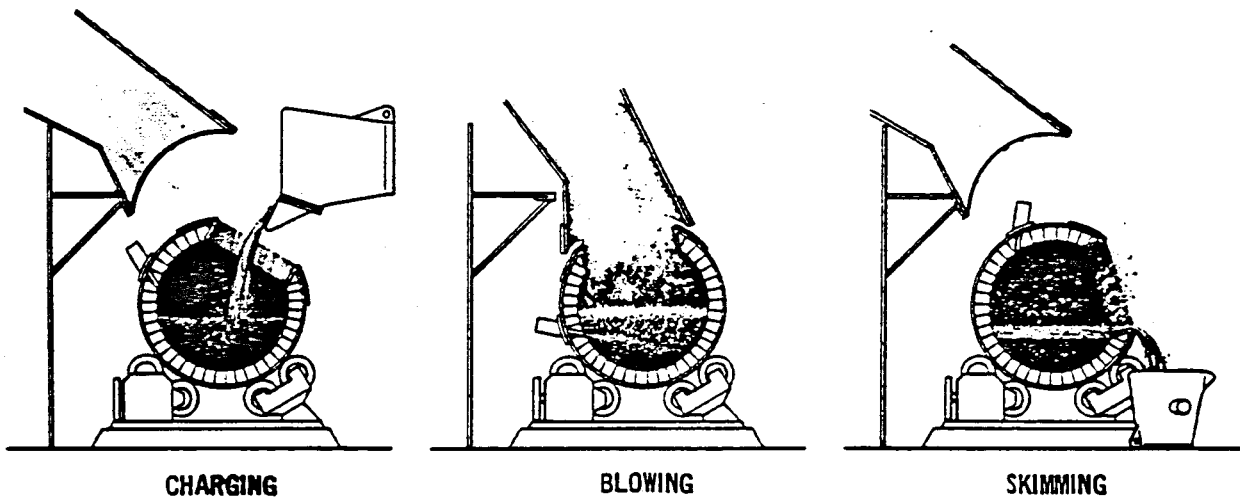


Figure 1-1. Copper Converting Operation

The primary hood covers the converter mouth opening. To prevent the hood from freezing to the converter due to splashing of molten metal, there is a gap between the hood and the vessel. Draft control devices maintain a negative pressure at the gap to draw air in for cooling and to prevent fugitive emissions.

Significant fugitive emissions occur during charging and pouring and when the primary hooding is retracted to allow crane access. The secondary hooding encloses the entire converter and is designed to remove emissions not captured by the primary hood, especially during charging and pouring operations. The primary and secondary hoods combine to increase the amount of fugitive emission captured.

Figure 1-2 gives a process flow diagram of a typical copper smelter, and identifies the contribution of each type of smelting unit operation to total SO₂ production.

ENTERING THE SYSTEM

LEAVING THE SYSTEM

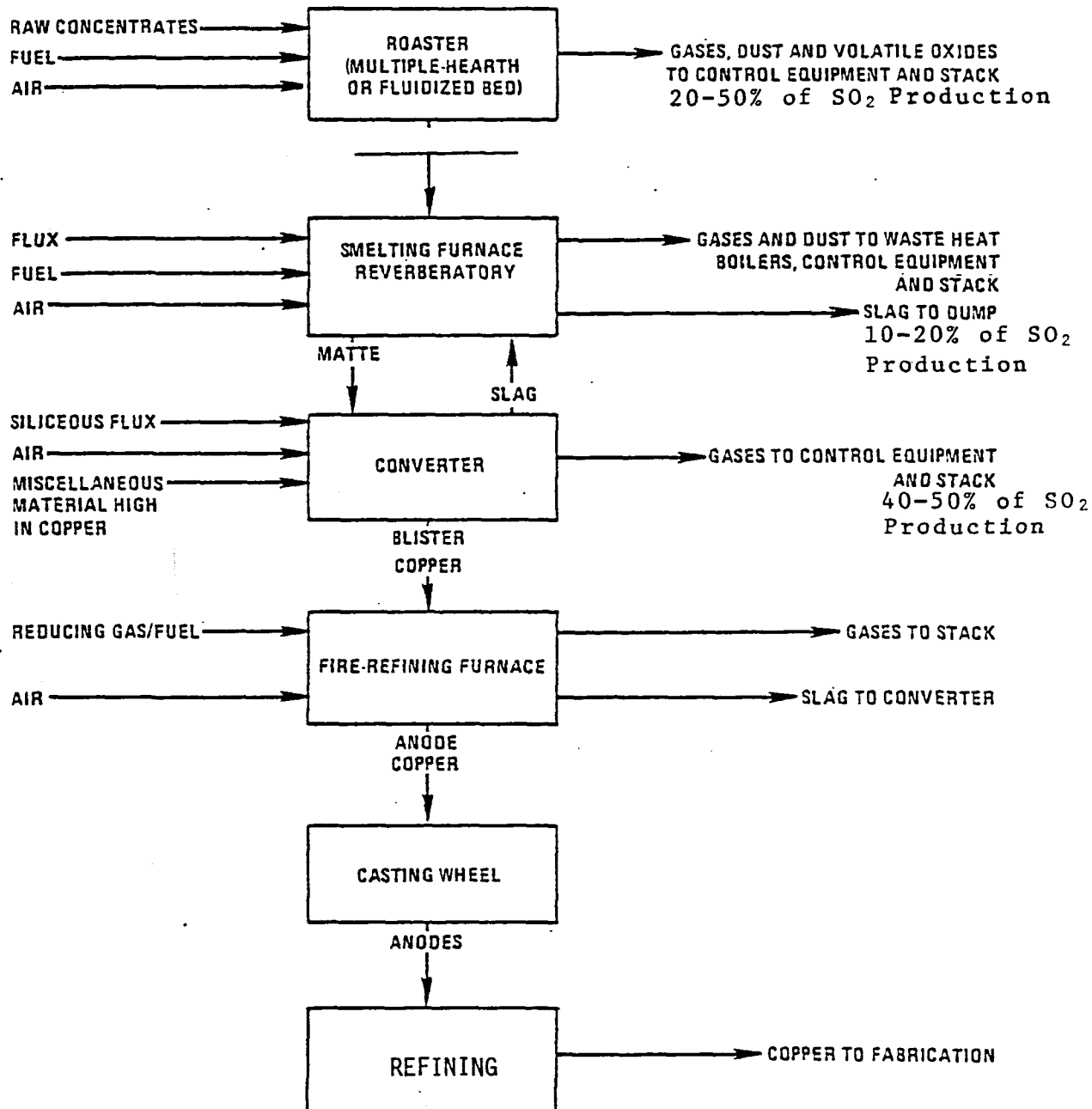


Figure 1-2. Typical primary copper smelter flowsheet.

SECTION 2

VISIBLE EMISSIONS OBSERVATIONS

2.1 Methodology

Two visible emissions methods were employed in the testing at the ASARCO Hayden copper smelter. The technique of EPA Method 9, "Visual Determination of the Opacity of Emissions from Stationary Sources" was used to determine the opacity of fugitive hood emissions. The technique of proposed EPA Method 22, "Visual Determination of Fugitive Emissions from Material Processing Sources" was used to determine the accumulated time that fugitive emissions were observed escaping the converter hood system.

During the blowing phase, each converter hooding system was evaluated by at least two observers from approximately the same position, using the technique of EPA Methods 9 and 22 simultaneously. Observations were not recorded during converter roll-out for charging, slag skimming, or pouring. All observations were made from a position approximately 40 feet directly across the converter aisle from each of the converters observed or the nearest obtainable position directly across the aisle. Methods 9 and 22 are discussed in detail below.

2.1.1 Method 9

A certified observer is generally used by control agencies to evaluate the opacity of an emission. The observers are instructed at opacity training schools. In order to become certified, observers must evaluate plume opacity with ± 7.5 percent accuracy relative to transmissometer measurement of plume opacity. Upon passing the course, they are certified by the school as capable of evaluating the plume opacity by visual inspection.

When observing a plume, Method 9 requires that the observer stand:

- at a distance from the plume sufficient to provide a clear view of the emissions,
- with the line of vision approximately perpendicular to the the plume direction, and
- with the sun oriented in the quadrant at the observer's back.

The method also requires that readings be made at 15 second intervals over a minimum six minute period at the point of greatest opacity in the plume. The average of these 24 readings is reported as the average visual opacity.

For the purpose of this study, modifications to Method 9 were necessary. First, Method 9 was performed indoors. This made a proper position relative to the emissions, the light source, and the background difficult to obtain. The emissions were read most often with light from behind the emissions as the emissions escaped the hooding system. All opacity observations were read consistently using a tank approximately ten feet above the converter hood system as background. Other modifications to Method 9 include:

- cable slot leak emissions opacities were not recorded, and
- observations were halted during crane passes, excessive visual interferences, and converter roll-out for charging or slag skimming.

2.1.2 Method 22

This method is used to determine the amount of time that any fugitive visible emissions occur during the observation period. Fugitive emissions include emissions that:

- escape capture by process equipment exhaust hoods,
- are emitted during material transfer, buildings housing material processing or handling equipment, and
- are emitted directly from process equipment.

Since this procedure does not require certification according to Method 9, a trained opacity observer is not required. However, it is necessary that the observers be educated in the general procedures for determining the opacity of emissions. Four Method 9 certified observers performed all the Method 22 testing. The modifications to Method 22 are identical to the modifications previously listed for the Method 9 observations.

2.2 Limitations of the Methods

Both Methods 9 and 22 were modified for conditions at the ASARCO Hayden copper smelter. The modifications to each method were made to minimize method limitations and to include process dependent effects on emissions, light deficiencies, and observer positions. The extent of these modifications were determined during the observations at the converter hoods. Effectively, the first two days of observations included a method modification phase. The modifications and limitations of the method, including their effect on the observations, is discussed below.

Method 9 Limitations

Visible emissions best evaluated by this method are from stack plumes. At the ASARCO copper smelter, fugitive emissions were observed.

The procedures for Method 9 specify outdoor observations. Observations at the ASARCO smelter were performed indoors. Indoor observations tend to decrease opacity readings due to a decrease in the amount of light and background contrast.

Method 9 procedures include provisions for a cyclic process such as a varying boiler load. However, sudden large changes to flow rates, such as during the blowing phase for the converters, are not part of the method. The flow rate changes at each converter hood caused short-term opacities to vary widely.

Other limitations to obtaining an accurate opacity assessment of the fugitive converter hood emissions are listed below.

- inability to obtain proper observer position relative to the light source,
- inconsistent amount of light, and
- visible emissions interferences due to hood leaks and other sources (increases observed opacity).

Method 22 Limitations

The most significant modifications and limitations to the Method 22 observations are listed below.

- visible emissions interferences due to hood leaks and other sources (increased recorded emission time),
- less than adequate amount of light (<100 lux, decreases visibility of emissions), and
- inability to attain proper observer position relative to light source (may increase or decrease visibility of emissions, highly dependent on position of light source).

2.3 Testing Personnel

The actual testing was conducted from September 29 through October 1, 1981. All testing was performed by certified visible emissions observers supplied by Radian Corporation and EMB. Table 2-1 lists observers' qualifications.

TABLE 2-1. VISIBLE EMISSIONS OBSERVERS

Name	Title	Initials	Affiliation	Cert. Date
Mike A. Palazzolo	Engineer	MAP	Radian Corp.	9-16-81
Gary W. Brooks	Engineer	GWB	Radian Corp.	9-16-81
Craig S. Beskid	Engineer	CSB	Radian Corp.	9-23-81
Frank R. Clay	Task Mgr.	FRC	EPA	7-23-81

SECTION 3

RESULTS AND DISCUSSION

The converter hood visible emissions testing program focused on three converters at the ASARCO copper smelter. Converters 3, 4, and 5 were evaluated using the techniques of Method 9 and 22. Data collected by all four observers on each of the three converter hoods was compared, first looking for differences between similar sources (converter hoods) and again to look for differences between observers.

The observational data are collected into four tables, Tables 3-1 through 3-4. The data are also displayed on a summary chart for each day, Figures 3-1 through 3-3. The charts show the time of day, which observations were made, the observer, the Method (9 or 22), the converter number, and the average value of the data generated.

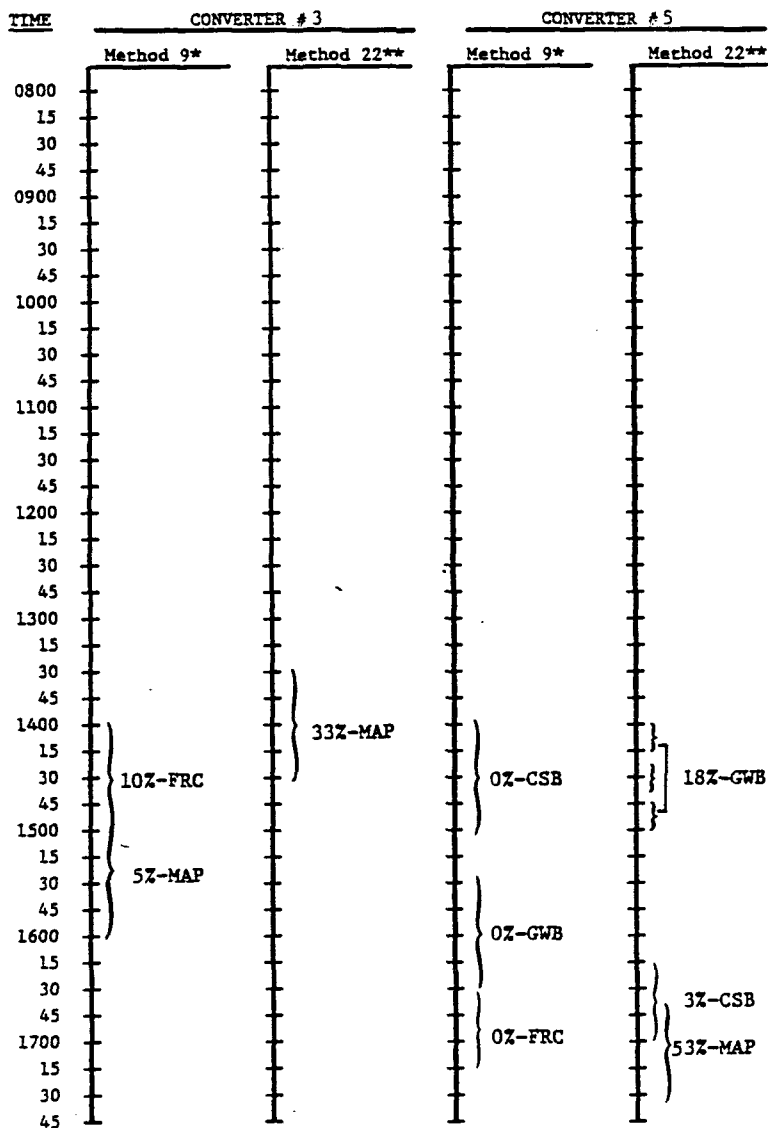
The results in the tables and charts are different presentations of the same sampling efforts. Although the sampling duration appears to be longer on the charts (than in the tables), the tables represent only the time during which the observations were made. The time on the charts represents the total duration that the observer was on station. Averages in the tables are based upon number of valid observations (not on total time).

3.1 Comparison of Similar Sources

3.1.1 Method 9 (Table 3-1)

Converter Hood Number 3

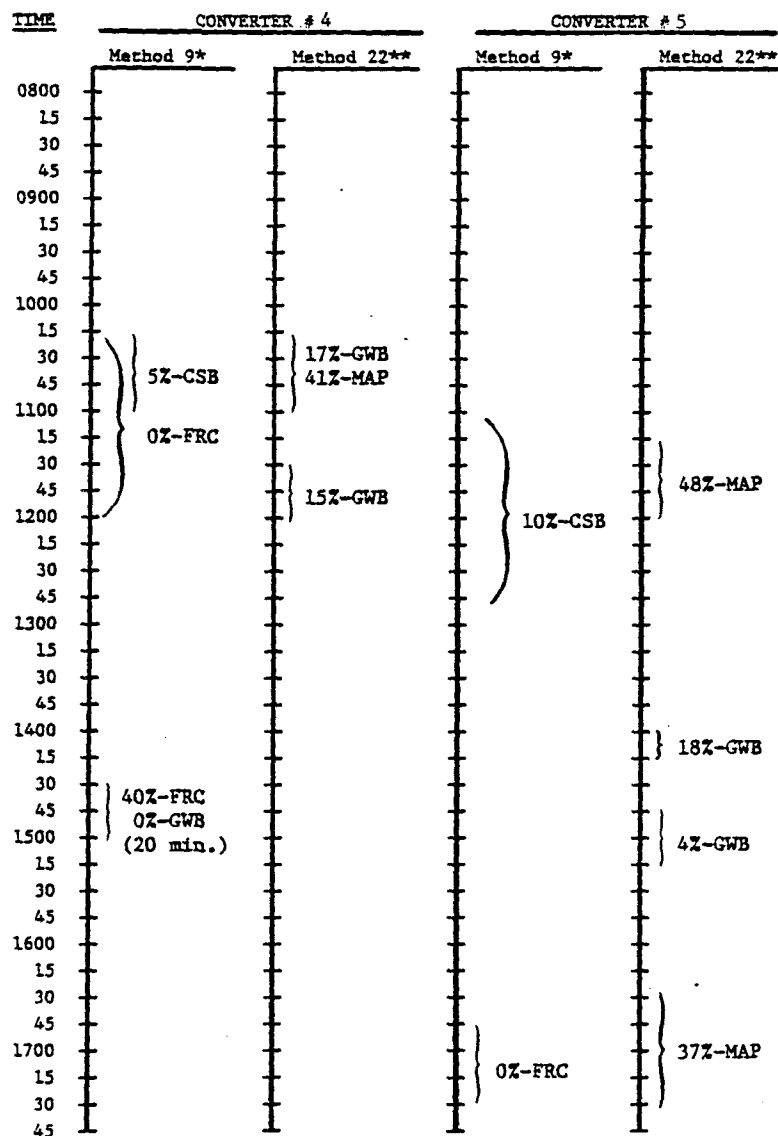
Based on 96 readings by Frank R. Clay of EPA, the average opacity of converter hood number 3 was ten percent. Based on a lesser number of readings,



*Percent opacity - initials of reader.

**Percent of time fugitive emissions occurred - readers initials.

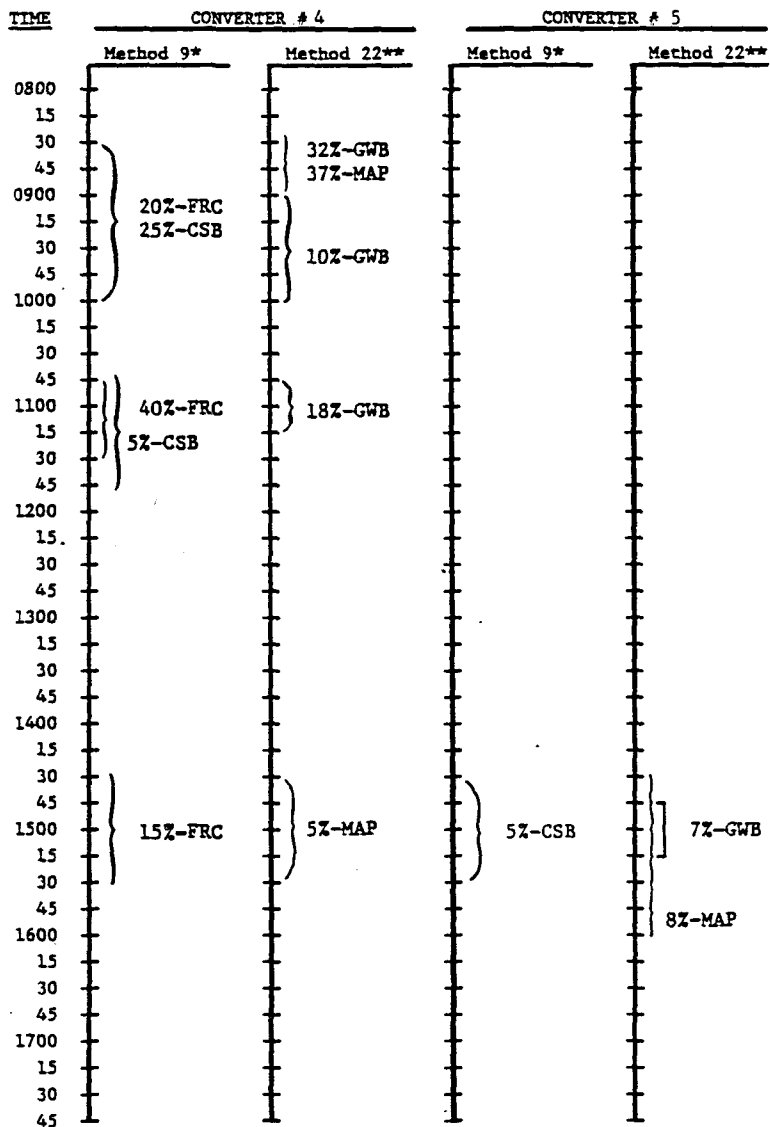
Figure 3-1. Daily Method 9 and 22 reading charts for Wednesday, September 29, 1981



*Percent opacity - initials of reader.

**Percent of time fugitive emissions occurred - readers initials.

Figure 3-2. Daily Method 9 and 22 reading charts for Thursday, September 30, 1981



*Percent opacity - initials of reader.

**Percent of time fugitive emissions occurred - readers initials.

Figure 3-3. Daily Method 9 and 22 reading charts for Friday, October 1, 1981

the average opacity of converter hood number 3 reported by Mr. Palazzolo was five percent.

Converter Hood Number 4

The most observations (408 readings) were made by Frank R. Clay of EPA; he reported an average opacity of converter hood number 4 of ten percent. The average opacity reported by Mr. Beskid and Mr. Brooks was ten percent and zero percent, respectively.

Converter Hood Number 5

The most observations (168 readings) were again made by Frank R. Clay of EPA, and his average opacity of converter hood number 5 was zero percent. Mr. Brooks reported an average opacity of zero percent. Mr. Beskid reported a five percent average opacity.

TABLE 3-1. METHOD 9 OBSERVER SPECIFIC CONVERTER HOOD COMPARISON

Observer	Converter Hood Number	Observation Time (minutes)	Average* Opacity %
FRC	3	24	10
FRC	4	102	10
FRC	5	42	0
MAP	3	24	5
MAP	4	--	--
MAP	5	--	--
GWB	3	--	--
GWB	4	24	0
GWB	5	36	0
CSB	3	--	--
CSB	4	42	10
CSB	5	20	5

*Opacities are reported in 5% increments consistent with Method 9 procedures.

Table 3-1 shows that converter hood number 5 had the lowest average opacity. The average opacity based on 42 minutes of observation by Frank R. Clay of EPA for converter hood number 5 was zero percent. For the same observer the average opacity for converter hoods numbers 3 and 4 was ten percent. These observations indicate that converter hood number 5 captures more fugitive PM than either hood 3 or hood 4.

3.1.2 Method 22 (Table 3-2)

Converter Number 3

Based on about 27 minutes of observations by Mike A. Palazzolo of Radian Corporation, visible emissions were observed escaping the hood capture system 33 percent of the time (9 minutes). No other observations were made on converter no. 3.

Converter Number 4

For comparison, based on about 57 minutes of observation by Mike A. Palazzolo of Radian Corporation, visible emissions were observed escaping the hood capture system 41 percent of the time (23.5 minutes).

Converter Number 5

For comparison, based on about 2 hours of observation by Mike A. Palazzolo of Radian Corporation, visible emissions were observed escaping the hood capture system 33 percent of the time (38.5 minutes).

Table 3-2 summarizes the Method 22 converter hood observations for each observer. Based upon the observations of Mr. Palazzolo (who made the most Method 22 observations), hoods number 3 and 5 allow fugitive emissions to escape at approximately the same frequency. Converter hood number 4 allows fugitive emissions to escape more frequently.

TABLE 3-2. METHOD 22 OBSERVER SPECIFIC CONVERTER HOOD COMPARISON

Observer	Converter Hood Number	Emission Time (min:sec)	Observation Time (min:sec)	Percent Time of Visible Emissions
MAP	3	9:00	26:40	33
MAP	4	23:30	57:11	41
MAP	5	38:30	118:24	33
GWB	3	---	---	--
GWB	4	13:47	74:52	18
GWB	5	8:23	85:03	10
CSB	3	---	---	--
CSB	4	---	---	--
CSB	5	1:11	45:00	3

3.2 Comparison of Observers

Method 9 (Table 3-3)

Converter hood number 4 was the capture system evaluated by the most observers. Mr. Clay, Mr. Brooks, and Mr. Beskid made approximately three hours of observations on converter hood number 4. The average opacity for these observers varied from zero percent to ten percent opacity; individual incidents ranged from 0 to 40%. The average opacity and observation time for each observer are shown in Table 3-3. While both Mr. Clay and Mr. Beskid observed average opacities of 10 percent, Mr. Brooks, whose observation time was only 24 minutes, observed zero percent.

Method 22 (Table 3-4)

Converter hood number 5 was evaluated over the greatest amount of time. The amount of time visible emissions were recorded, the observation time, and the percent of observation time visible emissions occurred are shown in Table 3-4.

TABLE 3-3. METHOD 9 CONVERTER HOOD SPECIFIC OBSERVER COMPARISON

Observer	Converter Hood Number	Observation Time (minutes)	Average Opacity (%)
FRC	3	24	10
MAP	3	24	5
FRC	4	102	10
GWB	4	24	0
CSB	4	42	10
FRC	5	42	0
GWB	5	36	0
CSB	5	20	5

TABLE 3-4. METHOD 22 CONVERTER HOOD SPECIFIC COMPARISON

Observer	Converter Hood Number	Emission Time (min:sec)	Observation Time (min:sec)	Percent Time of Emission
GWB	4	13:47	74:52	18
MAP	4	23:33	57:11	41
GWB	5	7:43	85:03	9
MAP	5	28:30	138:24	21
CSB	5	1:11	45:00	3

Approximately four hours of observations were made (for converter hood number 5). This method showed the most variation between observers. Based on 45 minutes of observations, Mr. Beskid's data showed visible emission escaping from converter hood number 5 only three percent of the time. Mr. Brooks observed fugitive emissions escaping nine percent of the time. The majority of observations were made by Mike A. Palazzolo and spanned over two hours of accumulated time. He observed visible emissions 21 percent of

the time. Because of such variation in the results (a 3 to 21 percent range), it is difficult to make any meaningful conclusion.

REFERENCES

- U.S. Environmental Protection Agency, Background Information for New Source Performance Standards: Primary Copper, Zinc, and Lead Smelters, 1974, Office of Air Quality Planning and Standards.
- U.S. Environmental Protection Agency, "Visual Determination of the Opacity of Emissions from Stationary Sources," 1979, Office of Air Quality Planning and Standards.
- U.S. Environmental Protection Agency, Proposed Method 22, "Visual Determination of Fugitive Emissions from Material Processing Sources," 1980, Office of Air Quality Planning and Standards.

APPENDIX A
VISIBLE EMISSION OBSERVATION FORMS

HOURS OF OBSERVATION _____
OBSERVER. F. Clay
OBSERVER CERTIFICATION DATE _____
OBSERVER AFFILIATION _____
POINT OF EMISSIONS _____
HEIGHT OF DISCHARGE POINT _____

Calca

[illegible][illegible]

The source was/was not in compliance with _____ at the time evaluation was made.

FIGURE 9-2 OBSERVATION RECORD

PAGE 1 OF 2

COMPANY ASARCO
 LOCATION Hayden Ariz
 TEST NUMBER 12
 DATE 29 Sept. 01

OBSERVER F. Clay
 TYPE FACILITY Cu Smelter
 POINT OF EMISSIONS Hooding Converter
#3

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
150	0	0	0	0	X			Crane passed by
	1	45	25	25	30			Roller out Converter
	2	25	15	5	0			Roller Converter IN
	3	0	0	0	0			slag Ladle below (emissions)
	4	0	5	5	0			
	5	0	0	0	55			Converter ROLL OUT
	6	55	45	40	25			(slag)
	7	X	X	X	X			CRANE Blocking view (rounding corner)
	8	15	15	20	20			
	9	20	X	X	15			Crane back for more slag (Converter)
	10	15	20	30	X			Pouring slag, Crane blocked view
	11	35	20	20	20			
	12	25	15	5	5			
	13	5	X	0	0			Ladle tilted - Crane trying to lift
	14	0	25	0	0			Converter OUT
	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	20	35	45			Pouring slag
	20	5	15	15	30			Changing ladle
	21	50	40	40	40	X		Crane rolled back in
	22	30	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	5	5	0			

Emissions from other source blocking view.

Time = 9:45

garage
ID fan

FIGURE 9-2 OBSERVATION RECORD
(Continued)

PAGE 2 OF 2

COMPANY ASARCO Hayden
LOCATION Hayden Ariz
TEST NUMBER 2
DATE 29 Sept 81

OBSERVER F. Clay
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS Converter Hooding
#3 Converter

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
	30	0	0	0	0			
	31	10	15	25	30			
	32	25	30	25	15	RT Hd. Corner of Hx		
	33	5	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	5			
	37	0	30	40	35			
	38	50	50	40	50	Roll Out Con. @ 50 - Poor slag		
	39	45	10	10	10	Roll in at 10 but not all way		
	40	X	10	0	0	crane blocked view		
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0	pouring in matte		
	46	0	0	0	30			
	47	30	45	50	15	converter back U		
	48	30	35	45	20			
	49	0	0	5	5			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0	(27)		
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	5	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			

Handwritten notes:
f10 = 22.5
48
46

1/4

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant Copper Smelter Date 9/29/81
Company Name ASARCO Hours of Observation 1 hour
Plant Address Hayden, AZ Observer MAP
Type of Discharge STACK OTHER 2^o Converter hood
Discharge Location #3 converter hood
Height of Point of Discharge 60'
Observer's Location:
Distance to Discharge Point 120'
Height of Observation Point 60'
Direction from Discharge Point in front of converter hood
Background Description Black metal tank at top of hood
Weather: Clear Overcast Partly Cloudy Other Indoors Sky Color _____
Wind Direction ~~SW~~ left to right Wind Velocity slight breeze
across hood
Plume Description:
Detached: Yes No N/A
Color Black White Other _____
Plume Dispersion Behavior: Looping Coning Fanning
Lofting Fumigating Other Fugitive em.
Estimated Distance Plume Visible _____

RECORD OF VISIBLE EMISSIONS

2/4

Company Name ASARCO
 Plant Address Hayden, AZ
 Stack Location #3 Hood
 Weather Conditions Indoors

Date 9/29/81
 Observer MAP
 Observer's Location In front of converter

Light coming from behind emissions

HR	MIN	TIME				COMMENTS
		00	15	30	45	
	00					
	01					
	02					
	03					
	04					
	05					
	06					
15	07	5	5	10	10	Hood up
	08	5	5	15	15	
	09	15	20	*	*	* Readings obstructed by crane
	10	*	15	25	30	
✓	11	20	5	5	30	Closed Converter
	12	0	0	5	0	
	13	0	0	0	0	
5%	14	0	0	0	5	
	15	0	5	5	10	
↑	16	5	*	5	0	
	17	20	60	20	15	Converter opened
	18	30	20	20	25	
	19	35	30	70	35	Slag poured
	20	35	50	25	30	
	21	50	25	25	35	
	22	*	50	60	25	
	23	20	15	15	20	
	24	15	15	15	15	
	25	10	15	*	*	
	26	15	10	10	15	
	27	10	15	15	25	
	28	*	*	80	*	Reverts added
	29	*	*	60	80	

RECORD OF VISIBLE EMISSIONS

314

Company Name ASARCO
 Plant Address _____
 Stack Location #3 Hood
 Weather Conditions Indoors

Date 9/29/81
 Observer MAP
 Observer's Location In front of converter

TIME						COMMENTS
HR	MIN	SECONDS				
		00	15	30	45	
15	30	60	70	60	50	Finished pouring reverts
	31	45	35	30	—	
	32	—	—	—	—	observer moved for safety as
	33	—	—	30	15	converter closed
	34	15	15	10	*	* view obstructed by crane
	35	10	5	0	0	
	36	5	0	5	0	
	37	0	5	0	X	X → emissions from #2
	38	X	X	X	X	converter obstructed view
	39	15	10	0	5	
	40	5	50	70	90	converter opened
	41	35	65	35	*	
	42	* * * *				→ charge of reverts - moved
	43	—	—	—	—	for safety - converter
	44	40	20	20	0	closed
	45	5	5	10	10	
	46	5	5	10	5	
	47	5	5	5	10	
	48	15	*	5	10	} some emissions blowing across from #2 converter
	49	10	10	15	10	
	50	0	0	10	—	light on crane interfered
	51	—	—	—	—	with readings
	52	—	—	—	—	
	53	0	0	5	0	
	54	0	0	0	0	
	55	0	0	5	5	
	56	5	0	0	0	
	57	0	5	0	5	
	58	5	5	0	0	
15	59	0	0	0	5	

26

RECORD OF VISIBLE EMISSIONS

4/4

Company Name ASAACO
 Plant Address _____
 Stack Location #3 hood
 Weather Conditions Endoors

Date 9/29/81
 Observer MAP
 Observer's Location In front of converter

		TIME				COMMENTS
HR	MIN	SECONDS				
		00	15	30	45	
16	00	0	0	5	0	
	01	0	0	0	0	
	02	0	0	5	10	
	03	10	5	5	5	
	04	5	10	*	*	* Emissions from #2 converted
	05	0	0	*	*	blocking #3
	06	*	15	*	*	Stop
	07					
	08					
	09					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					Time = 5:40
	19					100 193
	20					Avg = 14.5 15.5
	21					Enough
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					

27

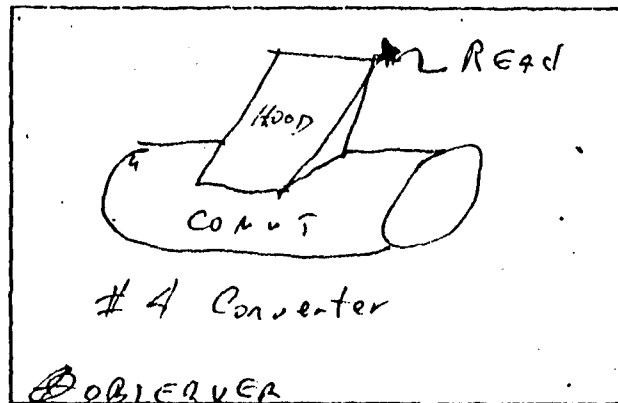
#4

#4

FIGURE 9-1
RECORD OF VISUAL DETERMINATION OF OPACITY

PAGE ____ of ____

COMPANY SARCO Hayden
LOCATION Hayden Ariz
TEST NUMBER 5
DATE 30 Sept 81
TYPE FACILITY Copper Smelter
CONTROL DEVICE Hooding Converter
IN PLACE



HOURS OF OBSERVATION _____
OBSERVER F. C. Lay
OBSERVER CERTIFICATION DATE _____
OBSERVER AFFILIATION _____
POINT OF EMISSIONS _____
HEIGHT OF DISCHARGE POINT _____

CLOCK TIME

OBSERVER LOCATION

Distance to Discharge

28

Direction from Discharge

Height of Observation Point

BACKGROUND DESCRIPTION

WEATHER CONDITIONS

Wind Direction

Wind Speed

Ambient Temperature

SKY CONDITIONS (clear,
overcast, % clouds, etc.)

PLUME DESCRIPTION

Initial			Final
40'			
STRAIGHT ON			
20'			

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with ____ at

FIGURE 9-2 OBSERVATION RECORD

PAGE 1 OF 2

COMPANY ASARCO, Hayden
 LOCATION Hayden, Ariz
 TEST NUMBER 5
 DATE 30 Sept 81

OBSERVER F. Clay
 TYPE FACILITY Copper Smelter
 POINT OF EMISSIONS Converter Hooding
IN PLACE

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
1019	0	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	5			
	3	0	0	0	0			
	4	0	5	0	0			
1046.75	5	0	0	0	0			Hooding down
	6	0	0	0	0			
	7	0	10	0	0			
	8	0	5	0	0			
	9	0	0	0	5			
	10	0						
1102	11		0	5	0			
	12							
1104	13	0	5					
	14							
1110	15	0	0	0	0			
	16	0	0	0	0			
	17	0	0	0	0			
	18	0	0	0	0			
	19	0	0					
1121	20		0	0	0			
↓	21	0	0	0	0			
	22	0	0	0	0			
	23	0	0	0	0			
	24	0	0	0	0			
↑	25	0	0	0	0			
	26	0	0	0	0			
	27	0	0	0	0			
	28	0	0	0	0			
	29	0	0	0	0			

cable slots about 30 % opacity. Not read on sheets. Emissions continuous in nature but did not occur for duration of observations

FIGURE 9-2 OBSERVATION RECORD
(Continued)

PAGE 2 OF 3

COMPANY ASARCO Hayden
LOCATION Hayden, Ariz
TEST NUMBER 5
DATE 30 Sep 91

OBSERVER R. Clay
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS Top of Converter
Hooding in place
CONVERTER # 4

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
11/31	30	0	0	0	0			
	31	0	0	0	0			
	32	0	0	0	0			
	33	0	0	0	0			
	34	0	0	0	0			
	35	0	0	0	0			
	36	0	0	0	0			
	37	0	0	0	0			
	38	0	0	0	0			
	39	0	0	0	0			
	40	0	0	0	0			
	41	0	0	0	0			
	42	0	0	0	0			
	43	0	0	0	0			
	44	0	0	0	0			
	45	0	0	0	0			
	46	0	0	0	0			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			
	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			
	53	0	0	0	0			
	54	0	0	0	0			
	55	0	0	0	0			
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			
	59	0	0	0	0			
	1	0	0	0	0			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			

FIGURE 9-2 OBSERVATION RECORD

PAGE ____ OF ____

COMPANY ASARCO Hayden
 LOCATION Hayden Ariz
 TEST NUMBER 6
 DATE 30 Sept 1981

OBSERVER F. Clay
 TYPE FACILITY Copper Smelter
 POINT OF EMISSIONS Converter #4
 Roll-out, skim, change - Hoods may
 or may not be in place

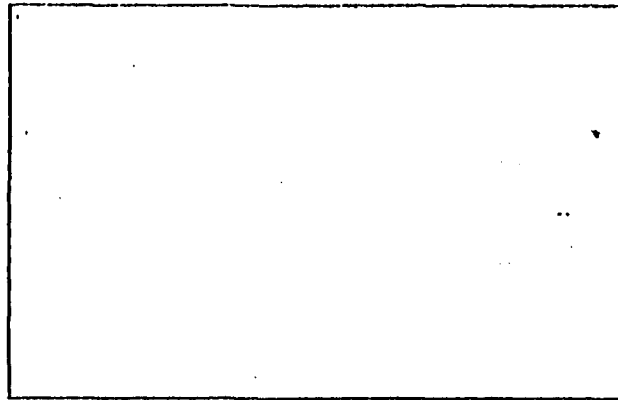
Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
	0	40	40	40	35	3/4	Skim	Hood in place
	1	40	40	40	30	←	Hood going up	
	2	30	40	45	50			
	3	60	50	40	35			Hood down
	4	30	40	10	0	←	Hood up	replace ladle
	5	0	20	0	0			Hood down
	6	35	35	15	45	Roll out	for 3/4	skim
	7	40	50	50	40			
	8	55	40	20	60	✓	Hood up to new	ladle
	9	65	55	40	40			Hood down
	10	35	25	20	30			
	11	20	25	20	35			Hood up
	12	20	20	30	30			
	13	10	100	100	85	Changing	Clean up	
	14	30	50	40	30			Hood Down
	15	35	40	50	0	Roll	Back in	
246	16	0	0					
	17							
	18							
	19							
	20							
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							

1/2 = 40%

FIGURE 9-1
RECORD OF VISUAL DETERMINATION OF OPACITY

PAGE ____ of ____

COMPANY ASARCO, Hayden
LOCATION Hayden Arizona
TEST NUMBER _____
DATE 1 Oct 81
TYPE FACILITY Copper Smelter
CONTROL DEVICE Converter Hooding
#4 Converter



HOURS OF OBSERVATION _____
OBSERVER F. Clay
OBSERVER CERTIFICATION DATE _____
OBSERVER AFFILIATION U.S.E.P.A.
POINT OF EMISSIONS Top of Converter Hooding
HEIGHT OF DISCHARGE POINT _____

CLOCK TIME _____
OBSERVER LOCATION _____
Distance to Discharge _____
Direction from Discharge _____
Height of Observation Point _____
BACKGROUND DESCRIPTION _____
WEATHER CONDITIONS
Wind Direction _____
Wind Speed _____
Ambient Temperature _____
SKY CONDITIONS (clear,
overcast, % clouds, etc.) _____
PLUME DESCRIPTION _____

Initial			Final

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with _____

ATYPICAL METH 9

FIGURE 9-2 OBSERVATION RECORD

PAGE 1 OF 2

COMPANY ASARCO, Hayden
 LOCATION Hayden, Ariz
 TEST NUMBER _____
 DATE 1 Oct 81

OBSERVER F. Clay
 TYPE FACILITY Smelter
 POINT OF EMISSIONS Converter Hooding
ACROSS TOP

EMISSIONS OBSERVED #4 Converter
 CONTINUOUSLY. MAX EMISSION RECORDED

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
1044	0	0	0	0	0		Slot 1915	
45	1	0	0	0	0			
46	2	0	10	20	25			
47	3	20	15	0	0			
48	4	0	10	0	←	STOP		
1057	5	0	0	10	5			
58	6	20	25	30	30			
59	7	30	35	35	40			
1100	8	45	←			STOP		
1108	9	35	35	X	X	OBSCURED BY CRANE		
09	10	X	X	0	5			
10	11	15	20	15	20			
11	12	20	20	25	25			
12	13	20	20	20	25			
13	14	30	30	35	35			
14	15	40	50	40	35			
15	16	40	40	35	45			
16	17	45	40	40	40			
17	18	45	40	50	50			
18	19	45	40	40	45			
19	20	45	50	50	45			
1120	21	60	50	50	50			
21	22	50	50	60	50			
22	23	55	65	50	←	STOP		
1124	24	65	55	50	50	TALK TO AL		
30	25	45	55	X	X	OBSCURED BY CRANE		
31	26	60	60	50	50			
32	27	60	65	55	55	←	STOP	
1144	28	5	10	15	5			
	29	0	5	5	10			

30% ↑
 50% ↑

ATYPICAL METH 9
FIGURE 9-2 OBSERVATION RECORD
(Continued)

PAGE 2 OF 2

COMPANY ASARCO HAYDEN
LOCATION HAYDEN ARIZ
TEST NUMBER _____
DATE 1 Oct 1981

OBSERVER F. Clay
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS ACROSS TOP OF
#4 Converter Hooding

EMISSIONS READ CONTINUOUSLY & HIGHEST READING
RECORDED

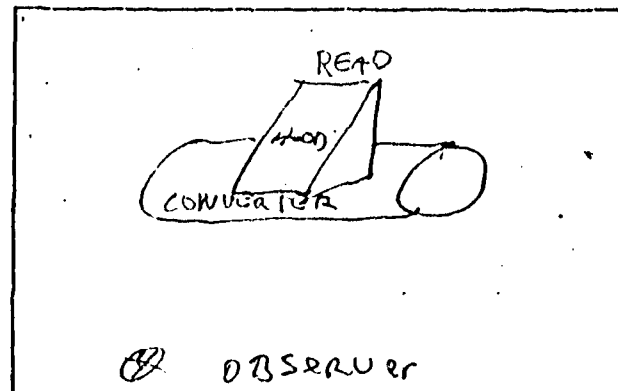
Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
1151	30	5	0	0	10			All cable slot leaks
52	31	5	0	10	5			except as noted below
53	32	0	0	0	0			
54	33	0	0	0	0			
55	34	0	0	0	0			
56	35	0	0	0	0			
57	36	0	0	0	0			
58	37	0	0	0	0			
59	38	0	0	0	0			
1200	39	0	X	X	X			BACK GROUND EMISSIONS OBSCURED
01	40	X	10	10	10			
02	41	10	5	10	15			
03	42	10	10	10	5			
04	43	10	5	10	5			
05	44	15	15	20	15			
06	45	20	20	25	20			
07	46	15	20	25	20			
08	47	20	20	20	20			
09	48	25	25	20	25			
1210	49	25	25	30	30			
11	50	25	35	35	30			
12	51	35	30	35	35			
13	52	35	30	30	X			OBSCURED BY #5 SLAG SKIN
14	53	35	40	40	X			
15	54	X	40	40	45			
16	55	35	35	35	80			80, 75, 65 leak from hood
17	56	75	65	X	X			BACKGROUND
18	57	40	X	50	40			CRANE
19	58	35	40	45	50			
20	59	50	45	50	55			

Readings at 1216 & 1217 from under hood
" 80, 75, & 65. All others were slot leaks

FIGURE 9-1
RECORD OF VISUAL DETERMINATION OF OPACITY

PAGE ____ of ____

COMPANY ASARCO, Hayden
LOCATION Hayden, Ariz
TEST NUMBER _____
DATE 1 Oct 81
TYPE FACILITY Copper Smelter
CONTROL DEVICE Hooding, Converter
#4 Converter



HOURS OF OBSERVATION _____
OBSERVER F. Clay
OBSERVER CERTIFICATION DATE _____
OBSERVER AFFILIATION _____
POINT OF EMISSIONS _____
HEIGHT OF DISCHARGE POINT _____

CLOCK TIME _____
OBSERVER LOCATION _____
Distance to Discharge _____
Direction from Discharge _____
Height of Observation Point _____
BACKGROUND DESCRIPTION _____
WEATHER CONDITIONS _____
Wind Direction _____
Wind Speed _____
Ambient Temperature _____
SKY CONDITIONS (clear, overcast, % clouds, etc.) _____
PLUME DESCRIPTION _____
Color _____

Initial			Final
40'			
30'			

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with ____ at the time evaluation was made.

ATYPICAL METH 9

FIGURE 9-2 OBSERVATION RECORD

PAGE 1 OF 2

COMPANY ASARCO Hayden
LOCATION Hayden Ariz
TEST NUMBER
DATE 1 Oct 81

OBSERVER F. Clark
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS Any Emissions across
MAX EMISSIONS per 15 sec
Converter #4

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
8:25	0	10	10	15	10		All slots	
	1	15	10	10	15		All slot Emissions	
	2	15	15	20	15		All Cable slot Emission	
	3	10	←			STOP		
8:34	4	10	15	10	10		All slot Emissions	
35	5	15	10	5	5			
36	6	15	10	10	10			
37	7	20	20	5	5			
38	8	10	5	10	5			
39	9	10	10	10	0			
40	10	0	15	20	20			
41	11	15	15	20	10			
42	12	20	20	20	25			
43	13	20	20	15	15			
44	14	X	X	0	0	OBSCURED	X	
45	15	0	10	5	X	OBSCURED	X	
46	16	10	20	25	25			
47	17	20	25	25	20			
48	18	25	30	20	25			
49	19	20	10	20	20			
50	20	30	30	30	30			
51	21	30	30	30	25			
52	22	20	20	25	25			
53	23	30	30	35	35			
54	24	30	20	30	30			
55	25	30	25	30	30			
56	26	30	35	30	30			
57	27	25	30	30	30			
58	28	30	35	30	X	OBSCURED CRANE		
59	29	X	35	35	30	OBSCURED CRANE		

ALL EMISSIONS THIS PAGE

FROM CABLE SLOTS IN HOODING

OBSERVED EMISSIONS CONTINUOUSLY

→ Recorded Highest per 15 sec period

FIGURE 9-2 OBSERVATION RECORD
(Continued)

PAGE 2 OF 2

COMPANY ASARCO, Hayden
LOCATION Hayden #12
TEST NUMBER 1
DATE 1 Oct 81

OBSERVER F. C. L.
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS Top of Converter Hood
Converter #4

ATYPICAL METH 9 Maximum Emissions 2.15 sec Panicle

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
9:00	30	35	35	←	←	STOP		
9:09	31	0	5	10	25	All slot leaks		
10	32	30	25	25	35			
11	33	35	35	30	25			
12	34	35	35	40	40			
13	35	50	50	45	45			
14	36	50	40	←	←	STOP		
9:17	37	20	20	35	40			
18	38	40	50	X	X	OBSCURED BY CRANE		
19	39	60	50	50	45	Hood up 60%		
	40	←	←	←	←	STOP		
9:42	41	35	40	40	45			
42	42	X	X	25	35	OBSCURED BY CRANE		
44	43	30	35	25	30	All slot leaks		
45	44	20	20	20	25			
46	45	40	25	25	30			
47	46	35	35	40	40			
48	47	50	←	←	←	STOP		
9:55	48	10	15	20	30	All slot leaks		
50	49	25	30	30	30			
51	50	30	25	30	30			
52	51	30	25	25	30			
53	52	35	25	25	30			
10:00	53	35	35	25	X			
01	54	20	30	25	35			
02	55	40	35	30	X			
03	56	20	X	X	0	OBSCURED BY OTHER FUG. EMS.		
04	57	25	0	0	5	* Do not Count		
05	58	10	25	25	20			
06	59	25	20	10	5			

25%

slot & Fug Across top of Hood

(10)

EMISSIONS VIEWED CONTINUOUSLY

007	10	10	10	20
008	15	15	0	0
009	0	0	0	10
010	5	0	0	0

5000

= 200

= 200

#4

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COPPER SMELTER Date 9/30/81
Company Name ASARCO Hours of Observation 12/60
Plant Address HAYDEN, AZ Observer CRAIG BESKID
Type of Discharge STACK OTHER CONVERTER #4 HOOD
Discharge Location TOP MIDDLE
Height of Point of Discharge ~60'

Observer's Location:

Distance to Discharge Point ~75'

Height of Observation Point ~70'

Direction from Discharge Point front right

Background Description TANK ON TOP OF HOOD

Weather: Clear Overcast Partly Cloudy Other Sky Color

Wind Direction Wind Velocity

Plume Description:

Detached: Yes No

Color Black White Other

Plume Dispersion Behavior: Looping Coning Fanning
Lofting Fumigating Other Fugitives by

Estimated Distance Plume Visible missions

Sheet

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address HAYDEN, AZ
 Stack Location Hood #4
 Weather Conditions _____

Date 9/30/81
 Observer CRAIG BESHID
 Observer's Location FRONT OF #4

For all reading light is behind source.

TIME		1026				COMMENTS
HR	MIN	SECONDS	00	15	30	
	00	5	0	5	5	WORST CABLE LEAKS ONLY 30
	01	5	5	0	5	20
	02	5	0	5	0	30
	03	5	0	5	0	30
	04	10	10	5	0	30
	05	5	0	'	—	'OPEN CONVERTER 1025 —
	06	30	10	10	10	1037 Pouring 1047 begin 50
	07	10	20	10	25	² Emissions flowing from exp. 30
	08	5	0	0	3	³ Crane Obstruction 1049 30
	09	5	10	15	0	⁴ 1050 begin Crane Obstruction 75
	10	5	10	0	7	⁵ 1052 begin Converter roll out 10:50
	11	15	10	15	15	⁸ 1058 begin 50
	12	9				⁹ Crane Obstruction 1059
	13					Excessive interruptions of data
	14					on #4. Frank Perry suggested
	15					& approved Mike & CSB to begin
	16					bleaching #5. 1100 hrs
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					

#3

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COPPER SMELTER Date 10/1
Company Name ASARCO Hours of Observation 1
Plant Address HAYDEN, AZ Observer CRAIG BESKID
Type of Discharge STACK (OTHER) HOOD #4
Discharge Location TOP CENTER
Height of Point of Discharge ~60ft
Observer's Location:

Distance to Discharge Point ~75'

Height of Observation Point ~50'

Direction from Discharge Point front

Background Description TANK ON TOP OF HOOD

Weather: Clear Overcast Partly Cloudy Other --- Sky Color ---

Wind Direction INDOORS Wind Velocity ---

Plume Description:

Detached: Yes

No

Color Black

White

Other ---

Plume Dispersion Behavior: Looping Coning Fanning

Lofting

Fumigating

Other

ESCAPING

HOOD EMS.

Estimated Distance Plume Visible ---

$$\text{Sheet avg} = \frac{615}{72}$$

$$= \cancel{5.2} 10\%$$

RECORD OF VISIBLE EMISSIONS

Company Name _____
 Plant Address HAYDEN, AZ
 Stack Location HOOD #4
 Weather Conditions _____

Date _____
 Observer CRAIG BESKID
 Observer's Location FRONT OF #4

Sunlight behind emission source

HR	MIN	TIME 0825 SECONDS				COMMENTS	WORKST LEAKS
		00	15	30	45		
	00	0	0	0	5	Gauge @ 20K	25
	01	0	0	0	0		25
	02	10	5	5	0	Some interference from #3	25
	03	20	10	0	-	② Stopped for rollout 0828	-
	04	40	40	30	15	① Restart 0833	40
	05	30	40	30	10		40
	06	0	0	0	0		25
	07	5	0	0	5		15
	08	0	10	10	25	Gauge @ 20K	40
	09	40	40	-	-	④ Stopped due to excessive #3 interference	-
	10	15	15	15	0	⑤ Restart 0841	20
	11	0	15	20	20	Gauge @ 25K	20
	12	20	10	15	10	" " 20K	20
	13	10	20	25	0	Stopped @ 0845	-
	14	10	5	0	10	⑥ Restart 0847	30
	15	5	0	0	0		30
	16	5	10	10	15	335	20
	17	20	20	30	40		40
	18	20	20	15	20		30
	19	20	15	NR	15	Crane Passed	30
	20	30	40	20	20		30
	21	25	30	35	50		50
	22	20	20	30	50		40
	23	NR	20	30	5	Crane Passed	30
	24	10	10	15	10		50
	25	20	30	10	50		30
	26	20	20	NR	-	Crane	-
	27	-	5	5	10	Gauge @ 20K	-
	28	15	NR	-	-	Crane Stopped 0901 Rollout	-
	29	20	10	0	0	Restart 0907 Gauge @ OK	-

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address HAYDEN, AZ
 Stack Location #4 HOOD
 Weather Conditions INDOORS

Date 10/11/81
 Observer CRAIG BESKID
 Observer's Location FRONT OF #4

✓
 L5%
 ↑

HR	MIN	TIME				COMMENTS	
		00	15	30	45		
	30	0	0	0	0	Gauge @ 10K	—
	31	0	0	0	0		40
	32	0	0	0	0	Gauge @ 20K	40
	33	0	0	0	0	15	40
	34	0	0	0	0		40
	35	0	0	15	0	Gauge < 25K	—
	36	0	0	—	—	Roll out 0915	—
	37	10	15	0	0	Restart 0918	40
	38	0	0	5	0	Gauge @ 20K	50
	39	—	—	—	—	Stop for crane 0920	—
	40	0	5	0	—	Restart 0921	—
	41	10	10	10	0	Blowing in, stopped @ 0922	—
	42	—	—	—	—	Restart 0943	Crane stopped @
	43	0	0	0	0	Restart 0945	30
	44	0	0	0	0	Gauge @ 20K	40
	45	0	0	0	0	Gauge @ < 25K	40
	46	—	—	—	—	Crane @ 0948	—
	47	10	10	10	10	Restart @ 0953	—
	48	—	—	—	—	Crane @ 0954	—
	49	0	0	0	0	Start @ 0955	—
	50	0	5	10	10		30
	51	5	5	5	10	265	30
	52	10	10	10	10	Gauge @ 20K	30
	53	20	20	20	20		30
	54	20	20	30	30		30
	55	10	10	10	10		30
	56	10	20	10	20	Ladle emissions	30
	57	20	20	30	20		30
	58	20	20	20	20	← Interference from #5	30
	59	30	30	30	30	←	30

#4

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COPPER SMELTER Date 10/1/81
Company Name ASARCO Hours of Observation 1
Plant Address HAYDEN, AZ Observer CRAIG BESKID
Type of Discharge STACK OTHER HOOD EMISSIONS #4
Discharge Location TOP CENTER OF HOOD
Height of Point of Discharge ~ 60'

Observer's Location:

Distance to Discharge Point ~ 75'

Height of Observation Point ~ 50'

Direction from Discharge Point front

Background Description TANK ON TOP OF HOOD #4

Weather: Clear Overcast Partly Cloudy Other — Sky Color —

Wind Direction INDOORS Wind Velocity —

Plume Description:

Detached: Yes No

Color Black White Other —

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other HOOD EMISSIONS #4

Estimated Distance Plume Visible —

$$\text{Sheet avg} = \frac{625}{96}$$

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address HAYDEN, AZ
 Stack Location #4
 Weather Conditions INDOORS

Date 10/1/81
 Observer CRAIG BESHID
 Observer's Location front #4

sun behind emissions source

		TIME				COMMENTS	
HR	MIN	00	15	30	45		
							WORST LEAKS
	00	10	20	20	5	Interference from #5	15
	01	0	0	0	5	Gauge @ 10K	0
	02	0	10	10	10		0
<5%	03	10	5	5	5	Gauge @ <10K	0
	04	0	0	0	10	125 Gauge @ 15K	10
	05	0	0	0	NA	Crane @ 1048	10
	06	-	-	-	-		1
	07	0	0	0	0	Start 1049	-
	08	0	-	-	-	Roll out 1050	-
	09	0	5	5	5	Restart 1058	20
	10	0	5	5	0	Gauge @ 20K	20
	11	0	5	5	0		25
	12	5	5	5	-	1102 stop for roll out	-
	13	10	0	NA	NA	Restart 1109 Crane 1110	-
	14	5	-	-	-	Gauge @ 20K	-
	15	0	10	0	10	Restart 1111 hrs	30
	16	5	5	0	0	Gauge @ 25 K	30
<5%	17	0	0	0	0		30
	18	0	10	0	10	55	30
	19	0	0	0	5		30
	20	0	0	0	0		30
	21	5	5	5	10	Gauge @ 25 K	40
	22	5	5	10	5		30
10%	23	10	10	20	20	225	40
	24	10	5	5	5		30
	25	10	10	10	10		40
	26	20	10	10	10		50
	27	0	0	0	5	Roll out 1124 hrs	40
	28	0	0	5	10	Restart 1129	30
	29	0	10	NA	NA	Crane 1130	50

RECORD OF VISIBLE EMISSIONS

Company Name _____
 Plant Address _____
 Stack Location _____
 Weather Conditions _____

Date _____
 Observer _____
 Observer's Location _____

HR	MIN	TIME				COMMENTS	
		00	15	30	45		
	30	5	10	20	10	Restart 1132	
	31	20	NR	20	—	Crane	
	32	20	20	20	20	Roll out 1134	0
	33	20	20	20	20	Restart 1149	0
	34	20	20	20	20	Gauge @ 20K	0
	35	20	20	20	15	" " 15K	0
	36	20	20	20	20		0
	37	20	20	20	20		0
	38	15	—	—	—	Gauge @ 10K	—
	39	—	—	—	—	Excessive #5 interference	—
	40	—	—	—	—		—
	41	—	—	—	—		—
	42	—	—	—	—		—
	43	—	—	—	—		—
	44	20	20	20	20	Gauge @ 10K	—
	45	—	—	—	—	Crane & Suck interference	—
	46	—	—	—	—		—
	47	10	10	10	30	Restart 1202	30
	48	—	—	—	—	1203 Interference interference from	—
	49	—	—	—	—	spilled slag	—
	50	0	5	5	10	Restart 1204	20
	51	NR	20	20	20	Crane	20
	52	20	10	10	10		20
	53	10	10	10	20	120	30
	54	5	5	5	5		30
	55	10	15	5	5		20
	56	5	10	10	10		15
	57	10	10	10	10	Interference from #5	20
	58	20	20	10	20		30
	59	20	20	15	20	Stop 1214	30

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant ASARCO, Copper Smelter Date 9/30/81
 Company Name ASARCO Hours of Observation 2:25pm, stopped 3.
 Plant Address Hayden, Ariz. Observer GRB
 Type of Discharge STACK OTHER Converter Hood #4
 Discharge Location Converter #4
 Height of Point of Discharge 30 ft.

Observer's Location:

Distance to Discharge Point 45 ft.

Height of Observation Point 10 ft.

Direction from Discharge Point See →

Background Description GRAYISH - black wall

Weather: Clear Overcast Partly Cloudy Other Indoors Sky Color 9

Wind Direction _____ Wind Velocity _____

Plume Description:

Detached: Yes No

Color Black White Other _____

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible _____

Problems

Emissions from cable holes not counted as hood emissions. Emissions were being blown over from #5 Converter. Not possible to read through these to see hood emissions. Due to outside overcast, lighting inside was low. Difficult to see emissions.

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address Hayden, Ariz
 Stack Location Inside Bldg.
 Weather Conditions Indoors

Date 9/30/81
 Observer GWB
 Observer's Location Indoors in front of Converter #4

TIME		Start 2:25pm Stop 3:10				COMMENTS
HR	MIN	SECONDS				
		00	15	30	45	
	00	0	a	a	a	(Questionable lighting)
	01	a	a	a	a	
	02	a	a	a	a	
	03	a	a	ap	5	Started at 2:29, readings stopped
	04	a	a	a	a	Readings restarted at 2:34
	05	5	b	ap	5	Readings stopped at 2:36, restarted at 2:46
	06	10	5	5	5	Copper added at 2:44
✓	07	5	a	0	5	Some emission carry over from #5 converter
	08	0	5	5	0	
	09	0	5	5	5	
	10	10	0	0	0	
	11	0	0	0	0	Some emissions from cable holes
	12	0	0	0	0	
	13	0	5	5	5	
	14	0	0	0	0	Cable hole emissions carryover
	15	0	5	0	0	
	16	0	a	0	0	
	17	0	0	0	0	
	18	0	0	5	0	
	19	0	0	0	5	
	20	0	a	0	0	Cable hole emissions
	21	0	0	5	a	
	22	5	5	5	5	Carryover from #5 converter, interference
	23	5	0	0	a	
	24	5	5	0	5	Bad lighting
	25	5	5	0	5	Carryover from #5
	26	5	10	10	5	Lot of carry over emissions
	27	0	0	0	0	
	28	0	0	0	0	
	29	0	a	0	0	

Footnotes: a: Camera in way viewing disrupted
 b: Rollout, slag into ladle
 c: Rollout, copper pouring

#3

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COPPER SMELTER Date 9/29
Company Name ASARCO Hours of Observation 1
Plant Address HAYDEN, AZ Observer CRAIG BESKID
Type of Discharge STACK OTHER CONVERTER #5 HOOD
Discharge Location TOP MIDDLE OF HOOD
Height of Point of Discharge ~ 60'

Observer's Location:

Distance to Discharge Point ~ 50'
Height of Observation Point ~ 60'
Direction from Discharge Point direct front
Background Description Tank on top of converter
Weather: Clear Overcast Partly Cloudy Other Indoors Sky Color
Wind Direction Wind Velocity

Plume Description:

Detached: Yes No
Color Black White Other
Plume Dispersion Behavior: Looping Coning Fanning
Lofting Fumigating Other straight up
Estimated Distance Plume Visible

~~Sheet avg~~
Sheet avg = $\frac{115}{144}$
= 0%

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address HAYDEN, AZ
 Stack Location _____
 Weather Conditions INDOORS

Date 9/29/81
 Observer CRAIG BESKID
 Observer's Location IN FRONT OF CONVERTER #5

		TIME 1358				COMMENTS
HR	MIN	SECONDS				
		00	15	30	45	
	00	0	0	5	0	Crane blocked view.
	01	10	5	5	5	
	02	0	0	0	*	
	03	-	-	-	-	
	04	0	0	5	15	
	05	15	10	0	0	
	06	0	0	0	0	Emissions are above and behind tank used for bleed.
	07	0	0	0	0	
	08	0	0	0	0	$\frac{70}{900} = 8\%$
	09	0	0	0	0	
	10	0	5	5	5	
	11	5	0	0	0	
	12	0	0	0	0	reading is out at 5s.
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	5	0	0	
	16	0	5	5	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	0	0	0	0	
	23	0	0	0	0	
	24	0	0	0	0	
	25	0	0	0	0	
	26	0	0	0	0	
	27	0	0	0	0	
	28	0	0	5	0	
	29	0	10	0	0	

49

RECORD OF VISIBLE EMISSIONS

Company Name _____

Date _____

Plant Address _____

Observer _____

Stack Location _____

Observer's Location _____

Weather Conditions _____

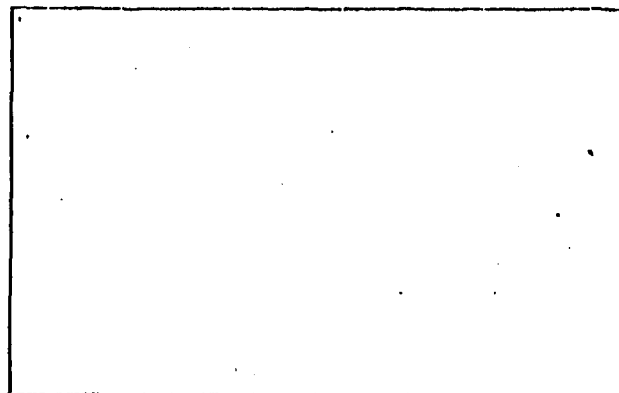
HR	MIN	TIME SECONDS				COMMENTS
		00	15	30	45	
	30	0	0	0	0	
	31	0	0	0	0	
	32	0	0	0	0	
↖	33	0	0	0	0	
	34	0	0	0	0	
	35	0	5	0	0	
	36	5	0	0	0	
	37	5	0	5	0	
	38	10	5	5	-	Emissions from front blocked view
	39	-	-	-	-	¹ Pouring
	40	10	0	0	-	² 1740 Begin ³ Crane obstruction
	41	-	0	0	0	
	42	0	0	0	0	
	43	-	-	-	-	⁴ Converter opening 1443
	44	-	-	5	0	
	45	0	0	-	-	
↘	46	0	0	0	0	
	47	0	0	0	0	
	48	0	0	0	0	
45°	49	0	0	5	0	
	50	0	0	0	0	
↖	51	0	5	5	5	
	52	0	5	0	0	
	53	0	0	0	0	
	54	0	0	0	0	
	55	0	0	0	0	
	56	0	5	-	-	⁵ Pouring
	57	0	0	0	0	
	58	0	0	0	0	
15°	59	0	0	0	0	

#7

FIGURE 9-1
RECORD OF VISUAL DETERMINATION OF OPACITY

PAGE ___ of ___

COMPANY ASARCO Hayden
 LOCATION Hayden Ariz
 TEST NUMBER 4
 DATE 29 Sep 81
 TYPE FACILITY Copper Smelter
 CONTROL DEVICE Hooding #5



HOURS OF OBSERVATION _____
 OBSERVER F. Clay
 OBSERVER CERTIFICATION DATE _____
 OBSERVER AFFILIATION _____
 POINT OF EMISSIONS _____
 HEIGHT OF DISCHARGE POINT _____

CLOCK TIME _____
 OBSERVER LOCATION _____
 Distance to Discharge _____
 Direction from Discharge _____
 Height of Observation Point _____
 BACKGROUND DESCRIPTION _____
 WEATHER CONDITIONS _____
 Wind Direction _____
 Wind Speed _____
 Ambient Temperature _____
 SKY CONDITIONS (clear, overcast, % clouds, etc.) _____
 PLUME DESCRIPTION _____
 Color _____

Initial			Final

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ___ to ___ % opacity

The source was/was not in compliance with ___ at the time evaluation was made.

FIGURE 9-2 OBSERVATION RECORD

PAGE 1 OF 2

COMPANY ASARCO, Hayden
 LOCATION Hayden, Ariz
 TEST NUMBER 4
 DATE 29 Sep 81

OBSERVER F. Clay
 TYPE FACILITY Copper Smelter
 POINT OF EMISSIONS Conv Hood
5.

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
(12)	424	0	0	0	0			
		1	0	0	0			
		2	0	0	0	0%		
(20)	427	3	0	0	0			
		4	0	0	0			
		5	0	0	0			
(19)		6	0	0	0			
		7	0	0	0			
		8	0	0	0	0%		
(16)		9	0	0	0			
		10	0	0	0			
		11	0	0	0			
(21)		12	0	0	5			
		13	0	0	0			
		14	5	0	0	0%		
(21)		15	0	0	0			
		16	0	0	0			
		17	0	0	0			
(21)		18	0	0	0			
		19	0	0	0			
		20	0	0	0	0%		
(21)		21	0	0	0			
		22	5	0	0			
		23	0	0	5			
(21)	444	24	0	0	0			
		25	5	0	0			
		26	5	0	0			
(21)		27	0	0	0			
		28	0	0	5			
		29	0	0	0			

4:27 - 4:48

FIGURE 9-2 OBSERVATION RECORD
(Continued)

PAGE 2 OF 2

COMPANY ASARCO HAYDEN
LOCATION Hayden - Ariz
TEST NUMBER 4
DATE 29 Sep 81

OBSERVER F. Clay
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS #5 converter
standing

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
(21)	30	0	0	0	5			
	31	0	0	0	0			
	32	0	0	0	0			
	33	5	0	0	5			6%
	34	0	0	0	0			
(20)	35	5	0	0	0			↑
	36	0	0	0	5			
	37	0	0	5	10			← These emissions from bottom of can not from Area 1
	38	0	0	0	0			
	39	0	0	0	0			
(29)	40	0	0	25	35			Can Roll out @ 25
	41	50	20	80	85			loads chunk of black copper
	42	45	45	95	60			loads mat in place of the tin
	43	65	80	80	95			
	44	75	45	95	45			
(16)	45	75	50	45	45			← Hood dropped back into place
	46	25	15	30	20			
	47	0	0	0	0			
	48	0	0	0	0			
	49	0	0	0	0			5%
(15)	50	0	0	0	0			
	51	0	0	0	0			
	52	0	0	0	0			↑
	53	0	0	0	0			
	54	0	0	0	0			
(14)	55	0	0	0	0			5%
	56	0	0	0	0			
	57	0	0	0	0			
	58	0	0	0	0			↑
	59	0	0	0	0			

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COPPER SMELTER Date 9/30/81
Company Name ASARCO Hours of Observation 1
Plant Address HAYDEN, AZ Observer CRAIG BESKID
Type of Discharge STACK OTHER CONVERTER #5 HOOD
Discharge Location TOP CENTER
Height of Point of Discharge ~ 60'
Observer's Location:
Distance to Discharge Point ~ 75'
Height of Observation Point ~ 70'
Direction from Discharge Point _____
Background Description TANK ON TOP OF HOOD #5
Weather: Clear Overcast Partly Cloudy Other _____ Sky Color _____
Wind Direction _____ Wind Velocity _____
Plume Description:
Detached: Yes No
Color Black White Other _____
Plume Dispersion Behavior: Looping Coning Fanning
Lofting Fumigating Other HOOD LEAKAGE
Estimated Distance Plume Visible ✓

$$\text{Short avg} = \frac{1545 \text{ total } \gamma}{168 \text{ readings}} = 10\%$$

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address HAYDEN, AZ
 Stack Location Heed #3
 Weather Conditions

Date 9/30/81
 Observer CRAIG BESHID
 Observer's Location 75 ft front right

Light is behind plume

HR	MIN	TIME				COMMENTS
		00	15	30	45	
	00	10	15	15	25	Worst leakage only 50
	01	30	30	20	30	60
15%	02	40	25	30	40	50
	03	20	20	10	10	40
	04	10	5	5	5	20
↑	05	0	0	0	0	5
	06	0	0	0	0	42 reading x 5 sec = 210 2
	07	0	0	0	0	210 2 = 71 %
25%	08	15	35	30	35	870 2
	09	20	30	15	30	14 min 30 2 = 870 2
	10	20	30	30	60	60
↑	11	60	60	70	75	50
	12	60	70	80	80	80
	13	60	70	80	80	80
1122	14	70	80	80	70	70
	15	60	-	-	-	Converter roll out pouring stop 112
	16	30	30	40	50	Start 1125
1125	17	40	30	40	50	50
	18	30	30	50	60	60
	19	40	30	3	-	Crane Obstruction 1129
	20	60	60	70	80	Begin 1130
	21	70	60	70	80	50
	22	60	60	80	0	Converter roll out 1134 skin 1136
	23	20	10	10	15	Start 1209
	24	5	0	0	0	5
1211	25	0	0	0	0	7x4
	26	5	0	5	10	4 x 5 = 20
45%	27	5	0	0	0	20
	28	0	0	0	0	0
↑	29	0	0	0	0	55

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address HAYDEN, AZ
 Stack Location _____
 Weather Conditions _____

Date 9/30/81
 Observer CRAIG BESKID
 Observer's Location _____

	TIME					COMMENTS	LEAK
	HR	MIN	00	15	30	45	
		30	0	0	0	0	0
1219		31	0	0	-	-	-
		31	0	0	-	-	-
1222		32	10	40	30	30	30
		33	20	20	20	30	30
		34	20	30	10	10	10
15%		35	10	10	10	10	10
		36	10	10	10	10	10
		37	0	0	0	0	0
		38	0	0	5	0	5
		39	0	0	0	0	0
45%		40	0	0	0	0	0
		41	0	0	0	5	5
		42	0	5	0	0	10
		43	10	0	0	0	5
		44	0	0	0	0	0
		45	0	0	0	0	0
45%		46	0	0	0	0	5
		47	0	0	5	0	5
		48	0	0	0	0	0
		49	0	0	0	0	0
		50	0	0	0	0	0
1242		51	0	5	5	5	5
5%		52	5	5	10	20	10
		53	10	20	20	10	10
		54	10	0	0	0	10
		55	0	0	0	0	0
		56	0	0	0	0	0
		57	0	0	0	0	0
		58	5	0	0	5	5
		59	0	0	0	0	0

Crane obstruction 1219

Start 1222 told to note gauge by alv.

28 readings x 5 = spreading = 140

$\frac{140 \text{ oz}}{1200 \text{ oz}} = 12\%$ $\frac{20 \text{ min} \times 60 \text{ sec}}{\text{min}} = 1200 \text{ sec}$

Gauge @ 15K 1227

Gauge @ 20K 1237

Gauge @ 15K 1240

Gauge @ 20K 1242

" " 25K

15 K

20 K

Stop 1250

HOURS OF OBSERVATION _____
OBSERVER E. Clay
OBSERVER CERTIFICATION DATE _____
OBSERVER AFFILIATION _____
POINT OF EMISSIONS _____
HEIGHT OF DISCHARGE POINT _____

'Color'

[illegible][illegible]

Readings ranged from _____ to _____ % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

ATYPICAL METH9

FIGURE 9-2 OBSERVATION RECORD

PAGE 1 OF 2

COMPANY ASARCO Hayden
LOCATION Hayden Ariz
TEST NUMBER _____
DATE 1 Oct 81

OBSERVER F. Clay
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS Converter Hooding
##Conv-155

Maximum Opacity for 15 sec interval recorded
Continuous Observation of Source

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
	0	20	35	35	25			
	1	10	0	15	45	H&S		
	2	50	65	45	55	S		
	3	50	45	50	40	S		
	4	5	25	20	30	S		
	5	40	40	40	50	H&S		
	6	55	55	50	40	S		
235	7	25	15	10	5	S		
	8	5	0	5	25	S		
	9	30	5	5	0	S		
	10	0	0	0	0	None		
	11	5	0	0	0	S		
	12	0	0	15	5	S		
	13	0	0	0	0	None		
	14	0	0	0	5	S		
	15	0	0	0	0	None		
	16	0	0	0	0	None		
	17	0	0	15	20	S		
	18	20	0	0	0	S		
	19	0	0	0	0	None		
	20	0	0	0	0	None		
	21	0	25	20	15	S		
	22	10	0	0	0	S		
	23	0	0	0	0	None		
	24	0	50	40	25	S&H	controlled stack, out of	
	25	20	10	10	5	S		
	26	5	5	0	5	S		
	27	0	0	0	0	None		
	28	10	25	25	20	S		
	29	20	25	20	15	S		

S = Cable Slots

H = Other Hood leaks

None = Neither

ATYPICAL METH 9
FIGURE 9-2 OBSERVATION RECORD
 (Continued)

PAGE 2 OF 2

COMPANY ASARCO, Hayden
 LOCATION Hayden Ariz
 TEST NUMBER _____
 DATE 1 Oct 81

OBSERVER F. Cky
 TYPE FACILITY Copper Smelter
 POINT OF EMISSIONS Converter Hood

Highest opacity during 15 sec interval recorded.
Source observed continuously

Converter #5

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
25	30	15	15	20	15	S		
	31	10	10	0	5	S		
(16)	32	0	0	5	X	Obscured by Crane		
	33	0	0	0	0	None		
	34	0	0	0	0	None		
	35	0	0	0	0	None		
	36	0	0	5	0	H Hood up		
(16)	37	0	0	0	0	None		
	38	0	0	0	0	None		
	39	0	5	30	30	S & H		
	40	35	35	0	0	S		
	41	0	0	X	0	Obscured by Crane		
	42	5	5	0	0	H & S		
	43	0	0	0	5	S		
↓	44	0	0	0	0	None		
↓	45	0	0	0	0	None		
(16)	46	0	0	0	0	None		
	47	0	0	0	0	None		
↑	48	0	0	0	0	None		
↑	49	0	0	0	0	None		
(14)	50	0	0	0	0	None		
	51	0	0	0	5	S		
↓	52	0	0	0	0	None		
↓	53	0	0	0	0	None		
	54	0	0	0	0	None		
	55	0	0	0	0	None		
(16)	56	0	0	0	0	None		
↑	57	0	0	0	0	None		
↑	58	0	0	0	0	None		
	59	0	0	0	0	None		

S = Cable slots
 H = Hood leaks
 None = Neither

#5

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COPPER SMELTER Date 12/1
Company Name ASARCO Hours of Observation _____
Plant Address HAYDEN, AZ Observer CRAIG BESKID
Type of Discharge STACK OTHER HOOD #5
Discharge Location TOP CENTER
Height of Point of Discharge ~60'

Observer's Location:

Distance to Discharge Point ~70'

Height of Observation Point ~20'

Direction from Discharge Point front

Background Description TANK ON TOP of HOOD #5

Weather: Clear Overcast Partly Cloudy Other INDOORS Sky Color —

Wind Direction _____ Wind Velocity _____

Plume Description:

Detached: Yes No

Color Black White Other _____

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other HOOD EMISSION #5

Estimated Distance Plume Visible _____

$$\frac{850}{168} = 5\%$$

RECORD OF VISIBLE EMISSIONS

Company Name ASARCO
 Plant Address HAYDEN, AZ
 Stack Location #5
 Weather Conditions INDOORS.

Date 10/11/81
 Observer CRAIG BESKID
 Observer's Location front right of #5

Sunlight is not at observer's

HR	MIN	TIME 1428				COMMENTS	
		00	15	30	45		
	00	0	5	5	5	Gauge @ 20 K	30
	01	0	0	20	20		30
10%	02	10	15	20	10		40
	03	20	15	5	0	Inner slide hand not	10
	04	0	0	0	0	down fully.	5
↑	05	0	10	10	20		40
	06	10	5	10	10		30
	07	0	—	—	—	① Stopped 1435 Crane	—
	08	0	0	0	0	② Restart 1438	0
	09	0	0	0	0	Gauge @ 20 K ③ Stop 1439 -	—
↓	10	5	5	5	5	④ Restart 1440	5
	11	0	0	5	0		5
	12	0	0	5	5	Gauge @ 15 K	0
5%	13	5	0	0	5	80	0
	14	5	5	5	5		0
↑	15	0	5	5	5		0
	16	5	5	10	10		5
	17	0	0	5	10		10
10%	18	10	10	10	10	180	10
10%	19	10	5	5	10		10
	20	10	10	10	10		5
↑	21	10	5	0	10	Portial roll-out 2-5 sec	40
	22	5	5	10	5		10
	23	5	5	5	10		5
5%	24	10	5	0	0		5
	25	0	0	5	10	120 Portial Roll-out	20
	26	5	5	10	5		10
↑	27	5	5	5	0		5
	28	0	0	5	5	Stop 1439 Crane	—
	29	—	—	—	—		—

RECORD OF VISIBLE EMISSIONS

Company Name _____
 Plant Address _____
 Stack Location #5
 Weather Conditions _____

Date _____
 Observer _____
 Observer's Location _____

Sunlight parallel to emissions source

HR	MIN	TIME				COMMENTS	
		00	15	30	45		
	30	-	-	-	-	Crane	-
	31	-	-	-	-		-
	32	-	-	-	-	Restart	-
	33	0	0	0	0	Restart 1504 First haul	0
	34	0	0	0	0	Gauge @ 15K	0
	35	0	0	0	0		0
	36	5	5	20	30		30
1508	37	20	20	-	-	Crane obstruction 1508	-
	38	-	-	-	-		-
	39	-	-	-	-		-
	40	-	-	-	-		-
	41	-	-	-	-		-
	42	5	5	5	0	Restart 1512	0
1513	43	0	0	0	0		0
	44	0	0	0	5		0
< 5%	45	0	0	0	0	Gauge @ 15K	0
	46	0	0	0	0		10
↑	47	0	5	5	5		20
	48	5	5	5	5		10
	49	10	10	10	5		5
5%	50	10	10	5	5		5
	51	10	10	10	5	135	5
	52	0	0	0	5		0
↑	53	0	5	5	0		0
	54	0	5	5	0		5
	55	0	5	5	5		5
	56	10	0	10	10	110	5
45%	57	5	10	10	10		5
	58	5	5	5	5		5
↑ 1529	59	0	0	0	0	Stop 1528 1527	0

SUMMARY
RECORD OF VISIBLE EMISSIONS

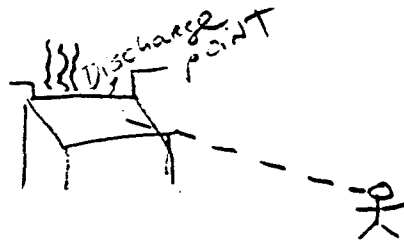
Type of Plant Copper Smelter Date 9/29/81
 Company Name ASARCO Hours of Observation 3:30 pm - 4:30 pm
 Plant Address Hayden, Ariz Observer 6WB
 Type of Discharge STACK ~~OTHER~~ Indoor Hood, Secondary Hood #5 Converter
 Discharge Location Top of secondary converter hood
 Height of Point of Discharge 50 feet

Observer's Location:

Distance to Discharge Point 40 feet

Height of Observation Point 10 feet

Direction from Discharge Point →



Background Description GRAYISH-black Metal Wall

Weather: Clear Overcast Partly Cloudy Other _____ Sky Color _____

Wind Direction _____ Wind Velocity _____

Plume Description: POOR Lighting, difficult to see emissions

Detached: Yes No

Color Black White ~~Other~~ GRAYISH-white

Plume Dispersion Behavior: Looping Coning Fanning

Lofting Fumigating Other _____

Estimated Distance Plume Visible _____

problems

Some emissions were leaking from right side of converter. No way to distinguish from hood emissions. No readings done during roll-outs. Emissions from cable holes not counted as hood emissions.

RECORD OF VISIBLE EMISSIONS

Company Name A-ACCO
 Plant Address Hendon, ALIZ
 Stack Location NA
 Weather Conditions INDOORS

Date 9/29/81
 Observer GNS
 Observer's Location To the right of #5 Converter

TIME $\approx$ 3:30 - 4:30pm						COMMENTS
HR	MIN	SECONDS				
		00	15	30	45	
	00	0	0	0	0	Some emissions were leaking from crack in right side of converter, EPA said to ignore these as hood emissions.
	01	0	0	0	0	
	02	0	0	0	0	
	03	0	0	0	0	
	04	0	0	0	0	Poor lighting this late in the day, difficult to actually see the emissions.
	05	0	0	0	0	
	06	0	0	0	0	
	07	0	0	0	0	
	08	0	0	0	a	Crane in the way, emission point obscured
	09	a	a	a	a	
	10	a	a	a	a	
	11	0	0	0	0	
	12	0	0	0	0	
	13	0	0	0	0	
	14	0	0	0	0	
	15	0	0	0	0	
	16	0	0	0	0	
	17	0	0	0	0	
	18	0	0	0	0	
	19	0	0	0	0	
	20	0	0	0	0	
	21	0	0	0	0	
	22	5	0	0	0	
	23	0	5	0	5	
	24	0	5	5	0	
	25	5	0	0	0	
	26	0	10	5	0	
	27	0	0	0	0	
	28	0	5	0	0	
	29	0	0	5	0	

64

RECORD OF VISIBLE EMISSIONS

Company Name _____
 Plant Address _____
 Stack Location _____
 Weather Conditions _____

Date _____
 Observer _____
 Observer's Location _____

HR	MIN	TIME				COMMENTS
		00	15	30	45	
	30	5	5	5	0	
	31	0	5	0	5	
	32	0	0	0	5	
	33	5	5	0	0	
↑	34	0	5	0	0	
	35	5	5	0	5	
	36	5	0	0	0	
25%	37	5	0	0	5	
	38	0	0	0	0	
	39	0	0	0	0	
↑	40	5	0	0	0	
	41	0	0	0	0	
	42	0	0	0	0	
	43	5	0	0	5	
	44	0	0	0	0	Crane in way, emission point obscured
	45	0	5	0	5	
	46	0	0	0	0	
	47	5	5	10	5	
	48	5	5	5	5	
	49	10	0	5	0	CRANE IN way material added to converter at 5:05, restarted 5:11
↓	50	0	0	0	5	
	51	5	0	5	5	
	52	5	0	5	0	
5%	53	0	5	0	5	
	54	10	0	0	0	
↑	55	5	5	5	0	
	56	0	0	5	5	
	57	5	5	5	0	
	58	0	5	0	5	
	59	5	5	5	10	

APPENDIX B
DATA OBSERVATIONS NOT INCLUDED IN SUMMARY
(Data invalidated)

#3 x

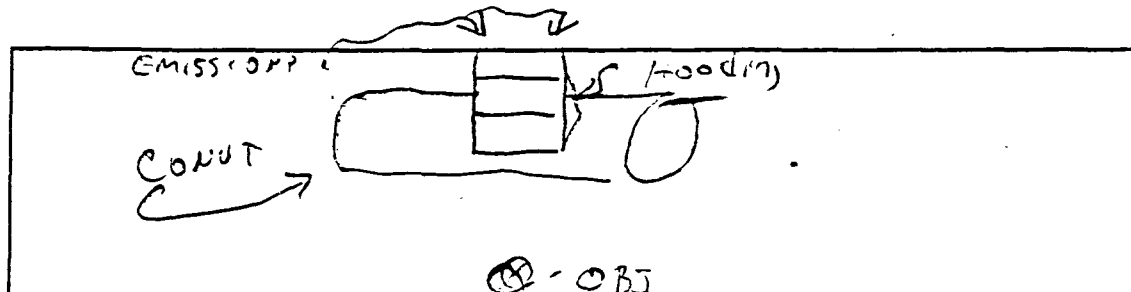
VISIBLE EMISSIONS
INSPECTION

date

Meth 22

Company <u>ASARCO Hayden</u>	Inspector <u>F. Clay</u>
Location <u>Hayden Ariz</u>	Affiliation <u>U.S. E.P.A</u>
Sky Conditions <u>N/A</u>	Wind Direction _____
Precipitation <u>N/A</u>	Wind Speed _____
Facility Type <u>Copper Smelter</u>	Emission Source <u>Converter Hooding</u> <u>#3 Converter</u>

Sketch emission source, indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

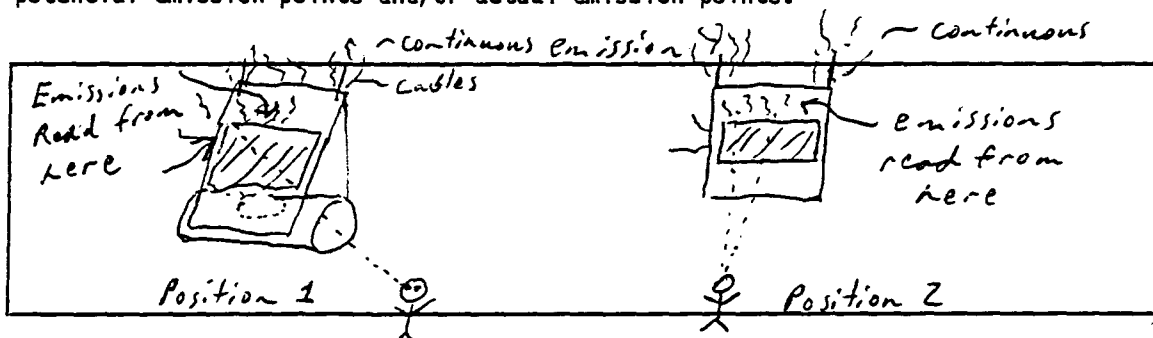
	Time	Accumulated Observation Period (Min: Sec)	Accumulated Emission Time (Min: Sec)
Begin Observation	3:00 3:15	4 min 55 sec	245 sec
	3:35	5 min 55 sec	6.7 sec
	3:47	6 min 10 sec	11.0 sec
	3:58	12 min 7.4 sec	21.5 sec

#2

VISIBLE EMISSIONS INSPECTION

Company <u>ASARCO</u>	Inspector <u>MAP</u>
Location <u>Converter Hood (2°)</u> <u>9/29/81 #2 Converter</u>	Affiliation <u>Radian Corp</u>
NA Sky Conditions _____ Precipitation <u>Indoor</u>	Wind Direction <u>perpendicular to road</u> <u>left to right</u> Wind Speed <u>Slight breeze</u>
Facility Type <u>Copper Smelter</u>	Emission Source <u>2° Hood #2</u> <u>Converter</u>

Sketch emission source, indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

Location across from #3	Time	Accumulated Observation Period (Min: Sec)	Accumulated Emission Time (Min: Sec)
Begin Observation	10:54 Start	14:20	1:41
10:40 Add Cold Metal	11:08 End		
Moved over to across #2	11:19 Start		
Continuous emission	11:26		
End	11:33	14:03	5:31
ADD MAT	11:33		
Finish copper	Start		
	End		

Blowing Rate 9,000

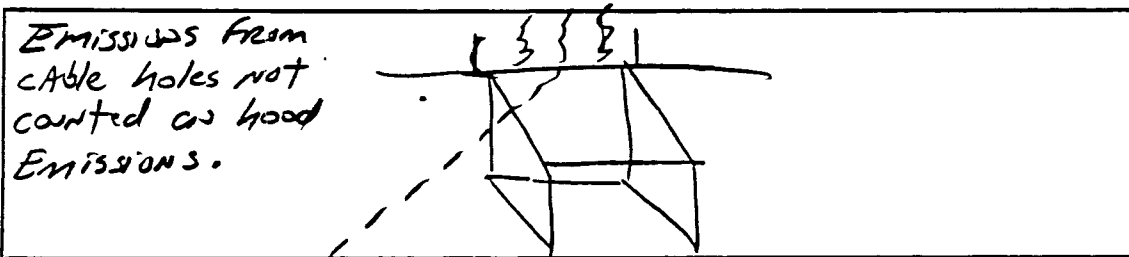
Note: emissions from top of hood were continuous - emissions noted during observation were from around the lower part of the hood

VISIBLE EMISSIONS
INSPECTION

9/29/81

Company <u>ASARCO</u>	Inspector <u>GWB</u>
Location <u>Chayden, Ariz.</u>	Affiliation <u>RADIAN CORP.</u>
Sky Conditions <u>NA</u>	Wind Direction <u>NA</u>
Precipitation <u>NA</u> (Readings Done Indoors)	Wind Speed <u>Slight breeze through Bldg.</u>
Facility Type <u>Copper Smelter</u>	Emission Source <u>Converter #2</u> <u>Secondary Hoods</u>

Sketch emission source, indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS



Time

Accumulated
Observation
Period
(Min: Sec)

Accumulated
Emission
Time
(Min: Sec)

Begin Observation

11:13 ^{and} (11:28)

15:00

15:00

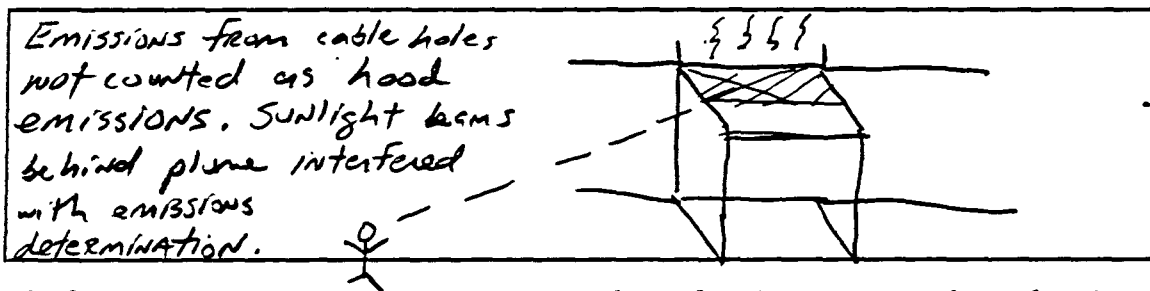
at 11:30 converter
d/out began.

VISIBLE EMISSIONS INSPECTION

9/29/81

Company <u>ASARCO</u>	Inspector <u>GWB</u>
Location <u>Hayden, Ariz.</u>	Affiliation <u>RADIAN</u>
Sky Conditions <u>NA</u>	Wind Direction <u>NA</u>
Precipitation <u>NA</u> (Readings Done Indoors)	Wind Speed <u>NA</u>
Facility Type <u>Copper Smelter</u>	Emission Source <u>Converter # 2</u> <u>Secondary Hoods</u>

Sketch emission source, indicate observer position relative to source; indicate potential emission points and/or actual emission points.



OBSERVATIONS

	Time	Accumulated Observation Period (Min: Sec)	Accumulated Emission Time (Min: Sec)
Begin Observation	^{end} 10:53 (11:08)	15:01	15:01

FUGITIVE EMISSION INSPECTION OUTDOOR LOCATION																																																							
Company <u>ASARCO</u>	Observer <u>F. Clay</u>																																																						
Location <u>HAYDEN</u>	Affiliation <u>U.S.-E. A</u>																																																						
Company representative <u>R. Hardman</u>	Date <u>20 Sept 71</u>																																																						
Sky conditions _____	Wind direction _____																																																						
Precipitation _____	Wind speed _____																																																						
Industry _____	Process unit _____																																																						
Sketch process unit; indicate observer position relative to source and sun; indicate potential emission points and/or actual emission points.																																																							
OBSERVATIONS <u>44 Lux</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 35%;"></th> <th style="width: 20%;">Clock time</th> <th style="width: 20%;">Observation period duration, min:sec</th> <th style="width: 25%;">Accumulated emission time, min:sec</th> </tr> </thead> <tbody> <tr> <td>Begin observation</td> <td><u>2:28</u></td> <td><u>15 min 6 sec</u></td> <td><u>0 min 0 sec</u></td> </tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td> </td><td>_____</td><td>_____</td><td>_____</td></tr> <tr> <td>End observation</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table>					Clock time	Observation period duration, min:sec	Accumulated emission time, min:sec	Begin observation	<u>2:28</u>	<u>15 min 6 sec</u>	<u>0 min 0 sec</u>		_____	_____	_____		_____	_____	_____		_____	_____	_____		_____	_____	_____		_____	_____	_____		_____	_____	_____		_____	_____	_____		_____	_____	_____		_____	_____	_____		_____	_____	_____	End observation	_____	_____	_____
	Clock time	Observation period duration, min:sec	Accumulated emission time, min:sec																																																				
Begin observation	<u>2:28</u>	<u>15 min 6 sec</u>	<u>0 min 0 sec</u>																																																				
	_____	_____	_____																																																				
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	_____	_____	_____																																																				
	_____	_____	_____																																																				
	_____	_____	_____																																																				
End observation	_____	_____	_____																																																				

Figure 22-1

ILLUSTRATION CODE 1558-25-C

#

Company <u>ASARCO</u>	Inspector <u>SEAN BOWEN GWS</u>
Location <u>HAYDEN, AZ</u>	Affiliation <u>RADIAN CORP.</u>
Sky Conditions <u>NA</u>	Wind Direction <u>NA</u>
Precipitation <u>NA</u>	Wind Speed <u>Slight breeze through building</u>
Facility Type <u>COPPER SMELTER</u>	Emission Source <u>CONVEYER HOOD #4</u>



Accumulated
Emission
Time
(Min: Sec)

11:50

Stop Watches knocked to the ground. Both went to 0 time. Run Invalidated. Time lost on both elapsed and emission time. 72

#2

SUMMARY
RECORD OF VISIBLE EMISSIONS

Type of Plant COPPER SMELTER Date 9/29
Company Name ASARCO Hours of Observation _____
Plant Address HAYDEN, AZ Observer CRAIG BESKID
Type of Discharge STACK OTHER CONVERTER HOOD
Discharge Location TOP OF CONVERTER #2
Height of Point of Discharge 260'
Observer's Location:
Distance to Discharge Point 275'
Height of Observation Point 270'
Direction from Discharge Point W
Background Description IN DOOR
Weather: Clear Overcast Partly Cloudy Other _____ Sky Color _____
Wind Direction _____ Wind Velocity _____
Plume Description:
Detached: Yes No
Color Black White Other _____
Plume Dispersion Behavior: Looping Coning Fanning
Lofting Fumigating Other FUGITIVE
Estimated Distance Plume Visible _____

RECORD OF VISIBLE EMISSIONS

ASARCO

Company Name ~~ASARCO~~

Date 9/29

Plant Address HAYDEN, AZ

Observer CRAIG BESHID

Stack Location TOP CENTER

Observer's Location 275' W

Weather Conditions INDOOR

10:50 CONVERTER #2

HR	MIN	TIME				COMMENTS
		00	15	30	45	
	00	20	15	15	15	SUN BEHIND EMISSIONS AL
	01	10	10	15	25	VERAVER TOLD TO CONTINUE (USEP)
	02	10	15	25	10	READING.
	03	10	5	5	15	
	04	15	5	15	5	
	05	15	5	10	10	
	06	15	20	25	35	
	07	35	35	35	30	
	08	35	35	45	40	
	09	40	30	40	45	
	10	30	25	40	50	
	11	30	30	40	30	
	12	40	40	40	50	
	13	40	30	35	40	
	14	20	30	30	45	
	15	50	40	35	60	* low amt of emissions from cable shop
	16	40	40	60	40	All Verravert said to continue observation
	17	60	50	30	30	* Crane obstruction
	18	35	40	30	30	
	19	30	20	50	50	
	20	50	60	60	50	
	21	60	60	30	50	
	22	60	60	50	50	
	23	50	30	50	60	
	24	70	60	60	70	
	25	70	60	60	70	
	26	60	60	60	60	
	27	50	60	60	70	
	28	40	40	40	50	
	29	50	50	60	60	

RECORD OF VISIBLE EMISSIONS

Company Name _____
 Plant Address _____
 Stack Location _____
 Weather Conditions _____

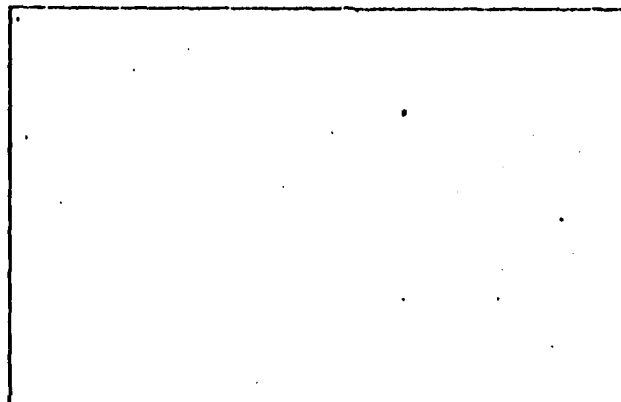
Date _____
 Observer _____
 Observer's Location _____

HR	MIN	TIME				COMMENTS
		00	15	30	45	
	30	10	70	70	50	
	31	40	10	10	20	
	32	20	20	30	30	
	33	15	70*	70*	50*	blowing thru sides & top
	34	40	40	40	40	
	35	20	20	30	20	
	36	30	30	30	30	
	37	20	20	5	5	
	38	20	10	10	10	
	39	10	10	5	*	converter out
	40	3	-*	0	↑	Stop 11:35 by request from Al Verbeert.
	41					
	42					
	43					
	44					
	45					
	46					
	47					
	48					
	49					
	50					
	51					
	52					
	53					
	54					
	55					
	56					
	57					
	58					
	59					

FIGURE 9-1
RECORD OF VISUAL DETERMINATION OF OPACITY

PAGE ____ of ____

COMPANY ASARCO Hayden
 LOCATION Hayden Ariz
 TEST NUMBER 5 Hooding not in place
 DATE 30 Sept 81
 TYPE FACILITY Copper Smelter
 CONTROL DEVICE Hooding (Converter)
Roll out for Skinning Etc.



HOURS OF OBSERVATION _____
 OBSERVER F. C. Lay
 OBSERVER CERTIFICATION DATE _____
 OBSERVER AFFILIATION _____
 POINT OF EMISSIONS _____
 HEIGHT OF DISCHARGE POINT _____

CLOCK TIME _____
 OBSERVER LOCATION _____
 Distance to Discharge _____
 Direction from Discharge _____
 Height of Observation Point _____
 BACKGROUND DESCRIPTION _____
 WEATHER CONDITIONS _____
 Wind Direction _____
 Wind Speed _____
 Ambient Temperature _____
 SKY CONDITIONS (clear, overcast, % clouds, etc.) _____
 PLUME DESCRIPTION _____
Color

Initial			Final

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with ____ at the time evaluation was made.

FIGURE 9-2 OBSERVATION RECORD

PAGE 1 OF 2

COMPANY ASARCO Hayden

OBSERVER E. Clay

LOCATION

TYPE FACILITY Copper Smelter

TEST NUMBER 5 Hooding Not Operating

POINT OF EMISSION Converter

DATE 30 Sept 81 or Converter rolled out
with hooding in place

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
1024	0	30	70	20	20			Cover Roll Out
	1	10	10	5	5			Hood down in place
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	0	0	0	0			
	6	0	0	0	10			
	7	0	0	0	0			
	8	0	0	0	0			
	9	0	0	0	0			
	10	0	0	0	5			
	11	0	0	0	0			
1046	12	0	0	30	50			Pouring Slag Upper right corner
	13	70	50	50	50			of hood point at highest emission
	14	50	90	30	15			
	15	10	5	0	0			
	16	0	0	0	0			Hooding retracted
	17	0	0	0	0			Hooding lowered
	18	0	0	0	0			
	19	0	0	0	0			Hood Retracted, cable in place
	20	0	5	25	25			Lower Hooding
	21	35	30	35	20			Roll in
	22	40	25	0				
	23							Cover Roll out
1053	24	60	60	75	50			Hood down
	25	50	50	40	35			
	26	35	15	0	0			
	27	0	0	95	65			Pour Magma
	28	30	20	20	20			Hood down
	29	25	25	15	10			

Roll in

FIGURE 9-2 OBSERVATION RECORD
(Continued)

PAGE ____ OF ____

COMPANY _____
LOCATION _____
TEST NUMBER _____
DATE _____

OBSERVER _____
TYPE FACILITY _____
POINT OF EMISSIONS _____

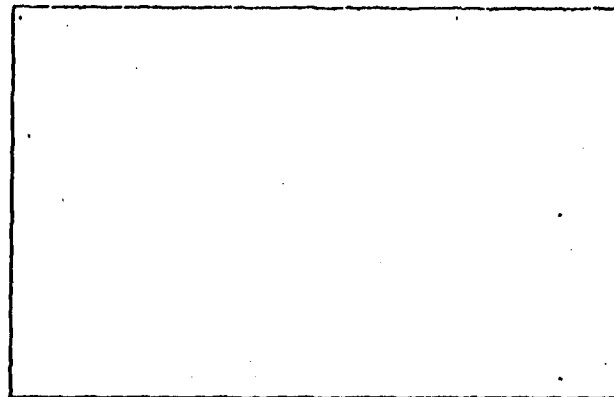
Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
1058	30	5	0	10	0	Hood opening		
	31	0	0	0	0			
	32	10	10	0	5	Hood down		
	33	0	0	10	0			
	34							
1103	35	0	0	0	5	Hood going up for rot		
	36							
1105	37			45	40	Roll rot		
	38	15	20	15	0			
	39	0	0	0	0	Hood up		
	40	50	65	40	30			
	41	15	15	30	0	Roll in		
1110	42	0	0	0	0			
1110	43							
	44							
1115	45			95	70	Roll out		
	46	50	30	25	15	Hood up		
	47	20	20	65	30			
	48	20	20	10	0	Clean up from floor		
	49	0	20	20	25			
	50	20	10	15	10	Hood down		
	51	50	10	0	0	Roll in		
	52	0						
	53							
	54							
	55							
	56							
	57							
	58							
	59							

#2

FIGURE 9-1
RECORD OF VISUAL DETERMINATION OF OPACITY

PAGE ___ of ___

COMPANY ASARCO HAYDEN
 LOCATION #2 Converter Hooding
 TEST NUMBER 1
 DATE 29 Sept 1981
 TYPE FACILITY Copper Smelter
 CONTROL DEVICE Hooding
#2 Converter



HOURS OF OBSERVATION _____
 OBSERVER F. Clay
 OBSERVER CERTIFICATION DATE _____
 OBSERVER AFFILIATION _____
 POINT OF EMISSIONS _____
 HEIGHT OF DISCHARGE POINT _____

CLOCK TIME

OBSERVER LOCATION

Distance to Discharge

Direction from Discharge

Height of Observation Point

BACKGROUND DESCRIPTION

WEATHER CONDITIONS

Wind Direction

Wind Speed

Ambient Temperature

SKY CONDITIONS (clear,
 overcast, % clouds, etc.)

PLUME DESCRIPTION

Color

Initial			Final

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ___ to ___ % opacity

The source was/was not in compliance with ___ at
 the time evaluation was made.

FIGURE 9-2 OBSERVATION RECORD

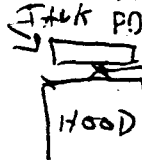
PAGE 1 OF 2

COMPANY ASARCO Hayden
 LOCATION Hayden Ariz
 TEST NUMBER 1
 DATE 29 Sept 81

OBSERVER F. Clay

TYPE FACILITY Copper Smelter

POINT OF EMISSIONS Converter Hooding
#2 Converter



→ WIND

READ

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
1051	0	0	0	0	10			
	1	0	0	10	5			
	2	0	0	0	0			
	3	0	0	0	0			
	4	0	0	0	0			
	5	5	0	0	0			
	6	0	0	0	0			
	7	0	0	0	15			
	8	10	0	0	15			
	9	10	15	20	35			
	10	20	25	35	20			
	11	15	20	25	20			
	12	15	10	5	5			
	13	10	0	5	5			
	14	5	5	15	5			
	15	5	0	10	0			
	16	5	5	5	15			
	17	5	10	15	15			
	18	5	5	15	✓	Crank	PASSED BY	
	19	5	10	10	5			
	20	10	5	5	10			
	21	5	10	5	10			
	22	5	0	0	0			
	23	5	0	10	0			
	24	0	5	0	0			
	25	10	10	15	25			
	26	10	10	0	5			
	27	10	10	10	X	Dropped C.B.		
	28	15	5	25	15			
	29	10	10	15	15			

(5,000

13,000

19,000

20,000

19,000

15

(14)

(14)

(16)

(19)

(20)

(20)

(20)

(19) →

(X) = Black Dial

FIGURE 9-2 OBSERVATION RECORD
(Continued)

PAGE 4 OF 5

COMPANY ASARCO
LOCATION HARDEE, ARIZ
TEST NUMBER 1
DATE 29 Sept 81

OBSERVER E. Clay
TYPE FACILITY Copper Smelter
POINT OF EMISSIONS Converter Hood
#2 Converter

Hr.	Min.	Seconds				STEAM PLUME (check if applicable)		COMMENTS
		0	15	30	45	Attached	Detached	
	30	20	15	15	35			
	31	15	10	15	10			
	32	5	10	5	0			
	33	5	5	10	10			
	34	5	5	50	65			#3 Rolled in, starting 11:25
	35	50	25	20	15			
	36	10	5	5	10			
	37	20	10	0	0			
	38	0	0	0	0			
	39	5	0	0	0			
	40	0	0	5	50	← Converter Rolled OUT		11:32
	41	80	85	85	80			
	42	70	30	10	10	← Converter Rolled Back IN		
	43	5	5	0	15	← Converter Rolled OUT		
	44	55	50	105	160			
	45	70	60	50	45			
	46	40	X	40	50	CHANGE WENT BY		
	47	50	40	40	40	STOP TO POUR COPPER		
	48							
	49							
	50							
	51							
	52							
	53							
	54							
	55							
	56							
	57							
	58							
	59							

21,000
22,000

22,000
24,000

23,000

20,000

0
0
0