Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

CE

PRIMARY COPPER SMELTING 12.3
AP-42 Section ~~7.3~~
Reference Number
~~17~~ 18

AP-42
5th ed.
12.3
#18

Tacoma Plant

A. L. Labbe
Manager

C. H. Randt
Assistant Manager

M. C. Teats
General Superintendent

R. D. Gallagher
Accounting Manager

November 20, 1978

Mr. Stanley T. Cuffe, Chief
Industrial Studies Branch, ESED
Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park
North Carolina 27711

Dear Mr. Cuffe:

ASARCO - TACOMA PLANT
ARSENIC EMISSIONS SAMPLING-SEPT 12-25, 1978

Enclosed you will find the operating data you requested of Mr. K. W. Nelson in your letter of October 30, 1978.

Please contact Mr. Nelson directly concerning Research Report Number 4855.

Yours truly,

A. L. Labbe (LWL

A. L. LABBE

LWL:L
cc w/attachment
KWNelson
LCTravis
CCounts

cc wo/attachment
WTSweat
MOVarner

ASARCO Incorporated P.O. Box 1677 Tacoma, Wa 98401 (206) 759-3551

IV.

Roaster Baghouse

1.) Manufacturer, type and date of installation

It is a Fuller - Dracco, model 6300, suction type with a shaker cleaning dust collector. The baghouse was started up on June 12, 1970.

2.) Number of compartments

There are 17 individual modules or compartments.

3.) Number of Bags

There are 120 bags per module.

4.) Bag dimensions and fabric

The bags are 8 inches in diameter and 25 feet 1 5/8 inches long. Module 9 is equipped with Snow acrylic bags. The remainning 16 modules have Globe Albany homopolymer acrylic bags.

5.) Total filter area in square feet

(6300 Ft^2/MODULE)(17 MODULES) = 107,100 Ft^2

6.) Gas flow treated

The baghouse is sized to handle 200,000 ACFM @ 250°F or

$273°C/273 + 5/9(250-32)(200,000) = 138,000$ SCFM

7.) Operating temperature

The operating temperature varies from 120°F to 260°F.

8.) Designed air-to-cloth ratio.

200,000 ACFM / 107,100 FT² = 1.87 AIR TO CLOTH RATIO

9.) Fan data

It is a GE Custom 8000 fan with a fan speed of 713 RPM. It is powered by a 700 HP induction motor @ 1775 RPM.

10.) List all emission source gas volumes controlled by the baghouse

A.) Heresshoff roasters	126,040 ACFM
B.) Fairy car tunnel fan	38,000 ACFM
C.) Roaster silo vent	960 ACFM
D.) Arsenic rerun vent	5,000 ACFM

11.) Sources and volume of tempering air introduced

E.) Tempering air damper	30,000 ACFM
TOTAL VOL. TO THE BAGHOUSE	200,000* ACFM

* The total volume is dependent on the smelting rate, baghouse temperature and the plant operations.

12) Method, frequency and duration of cleaning cycle.

The differential pressure across the entire baghouse is monitored constantly. Should the differential pressure exceed 4 inches of water, an automatic control sequence is initiated where by each module is sequentially shut down, shaken and put back "on-line" until the differential pressure has dropped below the set point value of 4 inches of water. If the set point is exceeded, the outlet valve next to the last module shaken will be automatically shut. After a 5 second delay, to allow all bags within the module to be depressurized, the bags are shaken for 30 seconds allowing dust to fall through the thimble floor to the lower dust hopper. After shaking, the module is left "off-line" for ≥5 seconds, allowing all the dust to settle out. Thus after a total time of 60 seconds, the module is automatically put "on-line". If the

differential pressure at this time is still above the set point of 4 inches of water, then the control sequence will continue to sequentially shut down and shake modules until sufficient dust is removed to allow the differential pressure to fall.

III 11 A B

ROASTER FEED CHARGED

SEPT.	TONS CHARGED
15	1135
16	1163
17	954
18	726
19	1034
20	1256
21	1076
22	882

CALCINE CHARGED TO THE REVERB

SEPT	SHIFT			TOTAL TONS
	7-3	3-11	11-7	
15	273	432	408	1113
16	324	445	371	1140
17	208	376	351	935
18	101	291	320	712
19	273	379	362	1014
20	425	417	390	1232
21	326	331	398	1055
22	394	234	237	865

II - C - E

REVERB SLAG TAPPED

	SHIFT						TOTAL	
	7-3		3-11		11-7			
SEPT.	#POTS	TONS	#POTS	TONS	#POTS	TONS	#POTS	TONS
19	36	227	42	265	42	265	120	757
20	48	302	48	302	42	265	138	869
21	42	265	42	265	36	227	120	757

ONE POT CONTAINS 6.3 TONS OF SLAG.

REVERB MATTE TAPPED

	SHIFT						TOTAL	
	7-3		3-11		11-7			
SEPT.	#LADLES	TONS	#LADLES	TONS	#LADLES	TONS	#LADLES	TONS
19	14	220	7	110	15	236	36	565
20	11½	181	10½	165	16	251	38	597
21	10	157	11½	181	13	204	34½	542

ONE LADLE CONTAINS 15.7 TONS OF MATTE.

CONVERTER SLAG RETURNED

	SHIFT						TOTAL	
	7-3		3-11		11-7			
SEPT.	#LADLES	TONS	#LADLES	TONS	#LADLES	TONS	#LADLES	TONS
19	10	133	11½	153	9	120	30½	406
20	5½	73	12½	166	7¼	96	25¼	335
21	8¾	116	11½	153	5	67	25¼	336

ONE LADLE CONTAINS 13.3 TONS OF SLAG

I-D III F-J IV & VII

II - A & B

11-15-78

E.P.A. DATA

I - Arsenic PLANT Log 9/24/78-9/25/78
- 2 Godfrey roasters ran the entire time.

II - Instrumentation Recorder Charts
- Charts are no longer available
- Pipe treater inlet temp

9/15/78	MAX - 155°C	9/16/78	MAX - 143°C
	MIN - 132°C		MIN - 123°C
	AVE - 142°C		AVE - 134°C
9/17/78	MAX - 135°C	9/18/78	MAX - 130°C
	MIN - 122°C		MIN - 118°C
	AVE - 128°C		AVE - 124°C

- plate treater inlet temp

9/15/78	MAX - 125°C	9/16/78	MAX - [illegible]°C
	MIN - 102°C		MIN - [illegible]°C
	AVE - 112°C		AVE - 95°C
9/17/78	MAX - 110°C	9/18/78	MAX - 102°C
	MIN - 90°C		MIN - 90°C
	AVE - 98°C		AVE - 96°C

III - Production DATA
- Tons of feed to As_2O_3
  9/24/78 - 75
  9/25/78 - 103

- Tons of calcine produced
  8/24/78 – 67
  8/25/78 – 93
- Tons of As_2O_3 produced
  8/24/78 – 8
  8/25/78 – 10
- Tons of feed to Metallic As plant
  8/24/78 – 2.1
  8/25/78 – 4.2
- Tons of Metallic As produced
  8/24/78 – 1.3
  8/25/78 – 2.6

V A Pipe Treater

1) Dimensions (l x w x h)
   104' x 36' x 15'
   Total collection area 71250 Sq Ft from A.V. 7/26/79
2) No. of sections and # units/section
   18 sections 1 treater/section
3) No. of transformer/rectifier sets
   6
4) Primary voltage and current
   190 volts , 70 amps
5) Secondary voltage and current
   45,000 volts 35 milliamps
6) Rapping (frequency + duration)
   Every 2 hours for about 2 minutes

7) Operating Temp °F
265° — 275°.
8) Collection area (FT²)
540 FT²
9) Gas Flow rate (SCFM)
160,000 — 175,000
10) Pressure drop
0.25 (IN H_2O)

B. Plate Treater
Total collection area
56700 sq ft
from AV — 7/26/79
1) Dimensions (l x w x h)
34' x 68.8' x 16.6'
2) No. of sections and # units/section
7 sections 4 treaters/section
3) No. of transformer/rectifier sets
7
4) Primary voltage + current
380 volts, 25 amps
5) Secondary voltage + current
32,000 volts, 30 miliamps
6) Rapping (frequency)
Every 2 hours for 2 minutes
7) Operating Temp °F
220° — 230°
8) Collection Area (FT²)
1142 FT²

9) Gas Flow Rate (SCFM)
200,000 - 220,000

10) Pressure Drop
0.07 (in H_2O)

VI Arsenic Baghouse

1) Manufacturer, type and Date of Installation
American Wheelabrator, modular shaker installed May 14, 1977.

2) No of compartments
5

3) No. of bags per compartment
288

4) Bag dimensions and fabric
126" in length 5 1/4" in Diameter
Homo polymer acrylic fabric

5) Total net filtering area
15,586 FT^2

6) Gas flow rate treated
25,000 - 30,000 SCFM

7) Operating temperature
150° - 200° F

8) Design air → cloth ratio
2.06

9) Fan Data (No, type + hp)
A single 350 hp, direct drive Clarage fan.

10) List all emission source gas volumes controlled by baghouse
Two Godfrey roasters - 15,000 scfm
Two metal furnaces - 10,000 scfm
Metal Furnace hood ventilation - 5,000 scfm

11) Sources and volume of tempering air
- None -

12) Method, frequency and duration of cleaning cycle
- Timed shaking cycle, each cell shakes every 70 min for 20 seconds.

TACOMA SMELTER

ROASTER REPORT

Date 9-16-78

SHIFT	1-6 OIL GALLONS	7-10 GALLONS	GODFREYS O/C	TOTAL ~~OIL~~ GAS GALLONS
7 - 3			NO OIL USED	310
3 - 11			No oil used	315
11 - 7			NO O.I USED	292
TOTAL			TOTAL	917

ROASTERS OPERATING				RABBLES USED				
	7	3	11	DECKS PLOWED	NO.	DECK	PATTERN NO.	REMARKS
1	OK	OK	OK					7-3-5-Deck Rot.
2	OK	OK	OK					3-11-5- " "
3	X 3	X 3	X 4					11-75-Deck RS
4	OK	OK	OK					
5	X 7	X	X 5					
6	X 3	OK	X 4					
7	X 2	X	X 4					
8	X 2	X	X 6					
9	D	D	D					
10	X 2	X	X 6					

Form #184

9/120

TACOMA SMELTER

ROASTER REPORT

Date 9-17-78

SHIFT	1-6 OIL GALLONS	7-10 GALLONS	GODFREYS ~~OIL~~	TOTAL ~~OIL~~ GALLONS GAS
7 - 3			No oil used	235
3 - 11			No oil used	301
11 - 7			NO OIL USED	319
TOTAL			TOTAL	855

ROASTERS OPERATING				RABBLES USED				
	7	3	11	DECKS PLOWED	NO.	DECK	PATTERN NO.	REMARKS
1	OK	OK	OK					7-3-5 Decks PS
2	OK	OK	OK					3-11-5 " "
3	X2	X2	X4					11-7-5 " "
4	OK	OK	OK					
5	X4	X6	X8					
6	X2	X1	X6					
7	X4	X6	X4					
8	X4	X	X8					
9	D	D	D					
10	X5	X	X6					

#9 RSTR 8TH DECK = 2 # 6537 RABBLES

2ND DECK = 1 # 6106 RABBLES

1st " = 4 # 6106 RABBLES

5TH " = 7 # 6537 RABBLES.

Form #184

9/96

TACOMA SMELTER

ROASTER REPORT

Date 9-15-78

SHIFT	1-6 OIL GALLONS	7-10 GALLONS	GODFREYS ok	TOTAL ~~OIL~~ GALLONS
7 - 3			NO OIL USED	241
3 - 11			No oil used	266
11 - 7			No oil used	295
TOTAL				802

ROASTERS OPERATING				RABBLES USED				
	7	3	11	DECKS PLOWED	NO.	DECK	PATTERN NO.	REMARKS
1	OK	OK	OK					7-3-5-Dark Rot.
2	OK	OK	OK					3-11-5. " "
3	OK	X2	X3					11-7-5 " "
4	OK	OK	OK					
5	X6	X	X6					
6	X1	OK	OK					
7	X6	X	X					
8	X6	X	X					
9	D	D	D					
10	X6	X	X					

Form #184

9/92

I-B C C

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-22-78

REVERB OPERATING LOG

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	42	36	—		78
Cold Pots	—	—	—		
Ladles Matte Tapped	13	8 1/2	8		29 1/2
Lbs. Calcine	188100	467000	474500		865
Lbs. Roaster F. Dust					
Ladles Conv. Slag	7 3/4	6 1/2	—		14 1/4
FUEL					
Preheater	119	93	80		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	8016	7220	6906		
Gal (s) Oil - N. Side Burner	337	350	230		
Gal (s) Oil - S. Side Burner	306	270	168		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	32	26	27	28	
Inches Arch	87	66	90	88	
Inches Matte	32	39	34	35	
TOTAL	151	151	151	151	

CONVERTERS	DATE	TIME	#4	#1	#2	#3
	9 22 78	7 AM	7 MATTE	CU	)	FIN
	"	3 PM	FIN 12:15	8 MATTE	(	CU
	"	11 PM	4 1/2 LINING	FINISH	(	CU
	9 23 78	7 AM	6 1/2 MATTE	6 MATTE	(	MT

REMARKS: Slag Cut - Ended cast from 8:00 PM — Slag pit still flooded 05:30 PM. Cuts to 4 loads 6 PM Furnace getting full

Form # 173-Px

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-21-78

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	42	42	36		120
Cold Pots	—	—	—		
Ladles Matte Tapped	10	11½	13		34½
Lbs. Calcine	652500	662700	796900		1056
Lbs. Roaster F. Dust					
Ladles Conv. Slag	8¾	11½	5		25¼
FUEL					
Preheater	123	120	128		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	8131	7174	8694		
Gal (s) Oil - N. Side Burner	349	285	366		
Gal (s) Oil - S. Side Burner	444	311	333		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	24	25	30	32	
Inches Arch	89	90	91	87	
Inches Matte	38	36	30	32	
TOTAL	151	151	151	151	

CONVERTERS	DATE	TIME	#4	#1	#2	#3
	9-21-78	7 AM	6 MATTE	Clean up		MT
	"	3 PM	12 MATTE	Finish		4 MATTE
	"	11 PM	C.U.	11½ MATTE		3½ MATTE
	9-22-78	7 AM	7 MATTE	CU		FIN

REMARKS: 1 mix without silica at 8:30 AM
No Silica on 5:00 PM belt run.
" " " 8:30 PM belt run

Form # 173-Px

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-20-78

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	48	48	42		138
Cold Pots	—	—			
Ladles Matte Tapped	11½	10½	16		38
Lbs. Calcine	850600	833000	780700		1232 tons VK
Lbs. Roaster F. Dust					
Ladles Conv. Slag	5½	12½	7¼		25¼
FUEL					
Preheater	247	146	122		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	8823	8,016	8181		
Gal (s) Oil - N. Side Burner	313	289	276		
Gal (s) Oil - S. Side Burner	284	178	338		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	34	25	31	24	
Inches Arch	85	88	86	89	
Inches Matte	32	38	34	38	
TOTAL	151	151	151	151	

CONVERTERS	DATE	TIME	#4	#1	#2	#3
	9-20-78	7 AM	FIN.	4 LIN		MT
		3 PM	4½ LIN	11 MATTE		MT
		11 PM	FINISH	FINISH 8:43		MT
	9-21-78	7 AM	6 MATTE	Clean up		MT

REMARKS: 1 mix without silica at 8:30AM, 11AM, 1PM
No Silica on 5:00 & 8:30 Mixes
No Silica on 11 PM mix.
two shell of silica off the mix at 1:23 AM.

Form # 173-Px

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-19-78

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	36	42	42		120
Cold Pots	—	—			
Ladles Matte Tapped	14	7	15		36
Lbs. Calcine	545800	757700	724000		1014
Lbs. Roaster F. Dust					
Ladles Conv. Slag	10	11½	9		30½
FUEL					
Preheater	147	96	176		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	7616	8182	8064		
Gal (s) Oil - N. Side Burner	278	282	284		
Gal (s) Oil - S. Side Burner	345	341	353		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	34	31	33	34	
Inches Arch	85	87	84	85	
Inches Matte	32	33	34	32	
TOTAL	151	151	151	151	

	DATE	TIME	#4	#1	#2	#3
CONVERTERS	9-19-78	7 AM	3 MATTE	FIN		MT
		3 PM	11 MATTE	6 MATTE		MT
		11 PM	C.U	FINISH		MT
	9-20-78	7 AM	FIN.	4. FIN		MT

REMARKS: Two shell of silica off the mix at 11 PM & 1 & 3 AM.

Form # 173-Px

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-18-78

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	36	12	30		78
Cold Pots	—	—			
Ladles Matte Tapped	6	5½	11½		23
Lbs. Calcine	202700	582800	639100		712
Lbs. Roaster F. Dust					
Ladles Conv. Slag	9½	—	12		21½
FUEL					
Preheater	65	40	138		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	5589	6336	8444		
Gal (s) Oil - N. Side Burner	300	267	271		
Gal (s) Oil - S. Side Burner	303	247	265		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	25	24	26	34	
Inches Arch	89	92	88	85	
Inches Matte	31	36	37	32	
TOTAL	151	151	151	151	

CONVERTERS	DATE	TIME	#4	#1	#2	#3
	9-18-78	7 AM	T MATTE	CU		MT
		3 PM	FINISH	MT		MT
		11 PM	Cu	5½		M.T.
	9-19-78	7 AM	3 MATTE	FIN		MT

REMARKS: Tuyere shell of section off the west at 1 & 3 PM.

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Form # 173-Px

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-17-78

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	36	24	36		96
Cold Pots	—	—			
Ladles Matte Tapped	8	11	5		24
Lbs. Calcine	416900	752600	701600		935
Lbs. Roaster F. Dust					
Ladles Conv. Slag	7 3/4	6 3/4	2 1/2		17
FUEL					
Preheater	87	87	118		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	6342	7680	8065		
Gal (s) Oil - N. Side Burner	312	341	319		
Gal (s) Oil - S. Side Burner	277	305	284		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	26	22	31	29	
Inches Arch	88	90	86	89	
Inches Matte	37	39	34	33	
TOTAL	151	151	151	151	

CONVERTERS	DATE	TIME	#4	#1	#2	#3
	9-17-78	7 AM	8 MATTE	FIN 6 AM		CU
	S	3 PM	Fin 2:15	3 MATTE		M.T.
		11 PM	Cu	11 MATTE (1 WASH OUT)		2 WASH OUT
	9-18-78	7 AM	7 MATTE	CU		MT

REMARKS: No silica 5:30 + 8:30 A.M. bettruns and 11 PM, 1 & 3 AM

Form # 173-Px

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-16-78

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	36	48	48		132
Cold Pots	—	—	—		
Ladles Matte Tapped	12½	13½	17		43
Lbs. Calcine	648500	890600	741100		1140
Lbs. Roaster F. Dust					
Ladles Conv. Slag	6½	10½	15¼		22¼
FUEL					
Preheater	120	120	137		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	8464	8363	8395		
Gal (s) Oil - N. Side Burner	323	333	316		
Gal (s) Oil - S. Side Burner	287	293	282		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	30	27	26	26	
Inches Arch	88	87	87	88	
Inches Matte	33	37	38	37	
TOTAL	151	151	151	151	

CONVERTERS	DATE	TIME	#4	#1	#2	#3
	9-16-78	7 AM	FIN. 5:30 AM	4 LIN		MT
	"	3 PM	LIN 12:30 am	12 matte		M.T
	"	11 PM	FINISH	5 MATTE		M.T.
	9-17-78	7 AM	8 MATTE	FIN 6 AM		CU

REMARKS: 11am mixes no silica
No Silica on 3 Pm belt run
" " " 7 Pm " "
" " " 8:30 Pm " "
11:00 PM
1:00 AM

two shell of silica off the mix at 3 AM

Form # 173-Px

TACOMA PLANT
ASARCO INCORPORATED

DAILY REVERBERATORY REPORT

DATE 9-15-78

REVERB OPERATING LOG

	7 - 3	3 - 11	11 - 7	7 - 3	TOTAL
FURNACE DATA					
Pots Slag Skimmed	42	42	30		114
Cold Pots	—	—			
Ladles Matte Tapped	7	16	16		39
Lbs. Calcine	546500	864800	816900		1114
Lbs. Roaster F. Dust					
Ladles Conv. Slag	7 1/4	11 1/4	12 3/4		31 1/4
FUEL					
Preheater	131	86	123		
Cubic Feet Gas	—	—	—		
Gal (s) Oil-Front Burners	7579	7860	8466		
Gal (s) Oil - N. Side Burner	278	330	339		
Gal (s) Oil - S. Side Burner	243	292	301		
Number of Gas Burners	—	—	—		
Number of Oil Burners	9	9	9		
MEASUREMENTS					
Inches Slag	30	24	26	30	
Inches Arch	87	90	91	88	
Inches Matte	34	37	34	33	
TOTAL	151	151	151	151	

	DATE	TIME	#4	#1	#2	#3
CONVERTERS	9.15.78	7 AM	6 MATTE	FIN		CU
	"	3 PM	15 MATTE	MT		MT
	"	11 PM	MT	10 M 2 WM		MT
	9.16.78	7 AM	FIN 5:30 AM	4M. LIN		MT

REMARKS: No Silica on 8:30 PM Belt run
" " " 11:00 PM Belt run 2 AM
Two shell silica off mix at 3 AM & 5 AM

Form # 173-Px

I-B

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: #2
Date: SEP 15 1978

REVERB OPERATING LOG

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
7 AM	04	06	14	17	30	33	45	47		8		
8	00	03	15	16	30	32	43	47		8		
9	00	03	14	17	30	33	45	49		8		
10	00	03	15	17	29	32	44	47		8		197 T.
11	00	03	15	17	30	45			2	6		Smoke
12NOON									8	0		
1 PM	15	30	45						5	3		
2	00	16	30	44					4	4		
3	0	3	15	18	28	29	42	45	19	8		
4	0	2	13	16	29	31	43	46	6½	8		
5	0	3	15	16	28	31	48	47	114	8		
6	0	3	13	16	30	33	43	45	10	8		215
7	0	3	13	16	30	33	43	46	124	8		
8	0	2	13	16	28	31	43	45		8		I coal load
9	0	3	14	17	28	31	45	47		8		
10	0	3	14	16	27	30	42	46		8		
11	2	8	16	20	30	36	44	48		8		
12 MID	1	4	15	17	30	33	44	47		8		
1 AM	1	3	15	18	30	34	45	50		8		
2	1	3	15	24	32	38	46	50		8		193 Tons
3	1	3	14	16	30	32	45	48		8		
4	1	4	14	16	30	34	44	47		8		
5	1	7	14	16	30	33	44	49		8		
6	1	6	15	19	30	34	44	46		8		

Please send this log up each morning with the Revert Pink Sheet

Form #52

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: #2
Date: SEP 16 1979

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
7 AM	3	5	14	16	30	31	44	45			8	
8	1	3	15	16	30	32	45	47			8	
9	1	2	15	16	31	33	45	46			8	
10	1	3	15	17	30	33	46	48			8	Piling up Dross
11	10	11	45	47							4	11
12NOON	15	45	47								3	11
1 PM	1	20	22	40	42						5	11
2	1	3	20	22	35	38					6	11
3	0	3	13	15	27	32	42	45			8	
4	0	3	15	18	27	31	43	46			8	
5	1	4	15	18	28	30	45	47			8	
6	0	3	14	17	28	31	43	45			8	
7	0	3	14	16	28	32	43	45			8	
8 #1	1	4	14	16	28	31	45	47			8	
9	1	3	15	17	28	30	43	47			8	
10	1	3	13	15	27	29	43	44			8	Piling Up
11	5	15	18	29	31	45					6	38" Crotte
12 MID	1	14	16	29	31	47	52				7	
1 AM	1	6	14	16	29	33	45	49			8	
2	1	3	15	19	29	31	45	47			8	184 tons
3	1	5	15	17	30	32	44	46			8	
4	1	3	15	17	29	31	45	50			8	
5	3	8	17	22	33	37	47	52			8	
6	1	3	14	16	29	31	44	46			8	

Please send this log up each morning with the Reverb Pink Sheet

Form #52

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: #2
Date: SEP 17 1978

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
											Loads	
7 AM	6	7	15	17	32	35	45	47			8	
8	1	3	15	16	30	33	45	—		1	7	Smoke 4 Loads hr. @ 8:40
9	1	15	30	45						4	4	
10	0	15	30	46						3	4	
11	1	—	—	—						7	1	No Loads 11:14
12NOON	2	30								5	2	2 Load hr 12:00
1 PM	0	30	45							4	3	1 " " 13:40
2	0	15	30	45						4	4	
3	04	15	30	45						3	4	
4	1	16	31	46						4	4	
5	1	16	18	30	32	44	46				7	
6	001		15	16	30	31	45	46			8	
7	001		15	18	29	30	48	50			8	
8	001		16	18	29	30	44	46			8	
9	001		14	16	30	31	47	49			8	
10	001		14	15	29	30	43	45			8	
11	3	6	14	16	30	31	44	46			8	
12 MID	0	2	14	16	30	32	45	47			8	
1 AM	0	2	13	15	29	31	44	46			8	
2	0	2	15	17	30	32	45	47			8	
3	2	4	15	31	34	44	47				7	Heavy
4	4	6	20	33	40	42					6	
5	0	3	19	35	42	45					6	
6	0	15	30	45						4		Smoke 6:00

Please send this log up each morning with the Reverb Pink Sheet

Form #52

234
20
254

394

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: 9

Date: ~~SEP 18 1978~~

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
7 AM	07	16	30	46						4		SMoKe
8	00	15	29	45						4		
9	00	16	30							3		
10	00	30								2		
11	00	30				60 6½				2		
12NOON	*15									1*		
1 PM						360				0		
2						30				0		
3	0					390				0		
4	1½	3¼								1		
5	1	16	32	34	43	45				6		
6	1	2	12	15	28	30	45	47		8		
7	3	5	15	17	30	33	46	48		8		
8	00	1	16	18	29	31	42	44		8		
9	00	1	15	16	32	34	45	46		8		
10	00	1	14	15	29	30	42	44		8		
11	4	8	17	30	35	45	56			7		Heavy ~~loads~~
12 MID	1	4	30	35	45					5		
1 AM	5 0	3	20	22	42	45				6		
2	4	6	20	24	40	44				6		
3	0	5	20	23	40	44				6		
4	1	5	19	22	41	44				6		
5	5 0	4	20	24	45	50				6		
6	2	9	17	23	31	35	45			7		

Please send this log up each morning with the Reverb Pink Sheet

Form #52

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: 2
Date: SEP 19 1970

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
7 AM	04	07	16	19	30	33	45	47		8		
8	00	03	16	17	26	28	44	46		8		
9	00	02	12	14	20	30	46			7		SMoKe
10	00	15	30							3		"
11	00	30					22			2		"
12NOON	00	30	45				6½ 132			3		"
1 PM	00	20	27	40	43		11 143			5		"
2	00	19	23	39	43					5		"
3	02	20	23	40	42					5		
4	00	1	12	15	29	30	43	45		8		
5	00	1	14	16	32	34	42	45		8		
6	00	1	14	15	29	30	44	46		8		
7	00	1	15	16	28	32	43	45		8		
8	1	2	12	15	29	30	44	45		8		
9	1	2	15	17	30	31				6		
10	00	1	15	16	30	31	43	45		8		
11	5	9	17	29	36	45	53			7		
12 MID	1	3	15	30	47	50				6		
1 AM	1	3	15	29	33	44	48			7		
2	1	4	14	18	30	45	48			7		172
3	1	5	15	30	33	45	51			7		
4	1	7	17	30	36	43	51			7		
5	1	5	19	25	31	36	44	53		8		
6	2	9	16	20	29	34	46	50		8		

Please send this log up each morning with the Reverb Pink Sheet

Form #52

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: #2

Date: ~~SEP 20 1978~~

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
7 AM	04	06	15	17	29	30	36	46	48	9		
8	01	03	16	19	30	32	38	46	49	9		
9	02	04	16	18	31	33	45	47		8		
10	00	03	15	17	30	32	45	47		8		207 T.
11	02	04	15	17	29	32	46	48		8		
12NOON	00	02	14	16	29	32	45	47		8		
1 PM	00	03	14	16	29	31	37	47	49	9		
2	00	02	11	13	18	30	32	40	44	9		
3	1	2	12	15	29	31	44	45		8		
4	00	1	14	15	31	33	45	47		8		
5	00	1	17	20	31	34				6		HEAVY
6	1	3	15	17	32	34	45	46		8		
7	00	1	13	16	31	32	45			7		
8	1	5	14	15	32	34	45	47		8		
9	1	2	15	17	32	34	46	49		8		
10	1	3	15	16	30	31	43	45		8		
11	4	8	16	20	30	34	45	48		8		
12 MID	1	4	15	19	32	34	47	50		8		
1 AM	1	3	17	20	29	31	45	48		8		
2	1	4	15	17	30	33	44	47		8		201 tons
3	1	3	15	30	47	50				6		HEAVY
4	1	3	16	21	29	32	45	48		8		
5	1	5	15	30	29	31	45	50		8		
6	1	3	17	25	33	35	44	47		8		

Please send this log up each morning with the Revert Pink Sheet

Form #52

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: #2
Date: SEP 21 1978

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
7 AM	1	3	15	17	30	33	45	47				
8	1	2	16	19	31	33	45	48				
9	0	1	17	19	32	34	47	49				
10	1	3	15	16	30	32	45	47				
11	0	2	15	17	31	34	45	47				
12NOON	1	3	14	16	29	31	45	49				
1 PM	1	3	15	30	–	–	–	–		4		38" matte
2	3	30								6		2 loads [illegible]
3	14	29	31	41	45					3	5	Plugged Gun
4	1	4	12	14	30	31	43	45			8	
5	1	2	14	15	30	31	45	47			8	
6	1	2	14	15	30	31	43	45			8	
7	1	30	46							4	3	39" Matte [illegible]
8	1	15	30	45						4	4	" "
9	00	1	14	15	30	31	44	45		21	8	
10	00	1	14	15	27	29	42	44		6½	8	
11	3	5	15	18	29	31	44	46		126	8	
12 MID	1	4	15	19	29	31	44	46		10	8	
1 AM	1	3	14	16	29	31	44	46		136	8	
2	1	3	14	16	29	31	44	46			8	212 tons
3	1	3	14	16	29	31	44	46			8	
4	1	3	14	16	29	31	56				7	
5	5	15	20	33	38	45					6	
6	3	7	22	30	32	44	46				7	

Please send this log up each morning with the Reverb Pink Sheet

Form #52

TACOMA PLANT

REVERB CHARGING TIMES

Furnace: #2
Date: SEP 22 1978

Hour	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	
7 AM	1	4	15	16	30	31	45	47				
8	1	3	17	19	35	37	50	52				
9	1	3	18	20	30	31	45	47				
10	3	5	15	18	33	35	46	48				
11	1	5	15	17	30	32	45	46				
12NOON	1	3	15	17	30	33	45	47				
1 PM	2	4	18	20	31	31	46	50				
2	1	3	20	22	31	44	46					
3	0	3	16	17	30	32	45				7	
4	6	12	17	22	28	32	X				6	LARRY CAR DERAILED
5	57										1	11 11 1 1
6	1	4	15	16	30	34	45	47			8	
7	0	1	13	14	30	34	43	48			8	
8	2	30									2	Matte 36" Qtr Ends out of #4 Counter on Inlet
9	1	30									2	
10	1	30									2	
11	18	35									2	
12 MID	5	29	31								3	
1 AM	1	7	22	26	39	43					6	
2	1	5	19	21	39	41					6	168 tons
3	1	3	19	23	41	44					6	
4	1	3	19	21	39	41					6	
5	1	3	19	21	39	41					6	
6	1	3	29	31							4	

Please send this log up each morning with the Reverb Pink Sheet

Form #52

CONVERTER OPERATING LOG

I-C

CONVERTER NO #3 CHARGE NO 25 DATE 9-21-78 CONVERTER REPORT 60/ TONS BLISTER TO 2 ANODE AT 1400 O'CLOCK

LADLES MATTE	AIR ON	AIR OFF	LADLES CU SLAG	LADLES ANODE SLAG	TONS SILICA	COLD ADDITIONS TIME	COLD ADDITIONS TONS	COLD ADDITIONS TYPE	REMARKS	LADLE SLAG #1 REVERB	LADLE SLAG #2 REV	LADLE SLAG CONV	SKIMMER
2½	21:20	2200	½		8		4	SHELL			1¾		BARNETT
2	0020	0055		½	6						1¼		[illegible]
2	0120	0145			6						1½		
1	0200	0225			4						½		
cleanup	0230	0250			3						½		
Finish	0305	0715					3	refscrap					
							3	" "					N. Frasch
							3	" "					
TOTAL 7½			½	½	27						5½		

long finish due to conv. being used to store matte.

½ ld in slag

AFTER LINING

AFTER FINISH

19-21

9-22 NN 11

FOREMAN #55

271

55 ton to # 3 Conv - Mueller Clerk

30 TON # 1 Anode AT 0515

CONVERTER NO. 1 CHARGE NO ~~272~~ DATE 9-21-78 TONS BLISTER TO _____ ANODE AT _____ O'CLOCK A Finchum

Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type/piece	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv.	Temp	Skinner
5 1/2	X		1820	1915	3/4		14		1 5	Shell			3 1/2		2090	D-Bruce
3	X		2005	2055		1/2	12		4 5	Shell			3 1/2		2100	
1	X		2130	2155			4		—	—			3/4		2110	
2	X		2215	2305			9		5	Shell	Hyd Heavy		1		2150	L-Larson
1	X		2325	2335			—		23 Total				1 3/4		2230	"
1		X	2355	0010									3/4		2240	"
clean Out		X	0015	0035			✓						—		2215	"
finish	X		0055	0440					5	wire					2180	"
			0450	0458					3	"						"
									8							
TOTALS 13 1/2					3/4	1/2	39		31	3/4 LADLES COPPER SLAG			11 1/4			

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
After Finish																																																		
After Lining	11	10	X	10	8	12	9	9	5	10	10	X	X	X	X	X	X	10	9	X	8	8	8	X	11	13	X	12	13	11	X	11	10	10	X	X	X	X	X	X	15										

Form #EE

9-22

CONVERTER NO. #1 CHARGE NO. ~~#271~~ 270 DATE 9-20-78/100 TONS BLISTER TO 2 ANODE AT ____ O'CLOCK

4 1/4
1 1/2
1 3/4

Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skimmer
5	✓		02:55	03:40	1	1/4	15		8	Shell	50 lbs Arsenic Lids		3 1/4		2050	C. Schenk
3	✓		04:05	04:50		1	12		5	Shell			2		2100	
2	✓		05:15	06:10			8		5	Cleanup	High		1 1/2		2130	
		✓		06:20 -		1	Rotate	with	18	#4 Conv						
Cleanup	X		0710	0730			2						1		2120	[illegible]
Finish	X		0755	0810					3	REF SCRAP						
				0810 - 0825		SMOKE	1 CONV		3	WIRE						
	X		0825	0855					3	REF SCRAP						
				0855 - 0930		ROTATE	W	#4 CONV								
	X		0930	0945												
				0945 - 1130		DOWN	FOR	SO2								
	X		1130	1300												
				1300 - 1355		Down	For	SO2								"
	X		1355	1625												
									4	Ref Scrap						Bruce
									4							
TOTALS 10					1	1 1/4	37		22	3/4	LADLES COPPER SLAG		7 3/4			Sam

	After Lining	After Finish	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
###			10	11	X	10	9	10	8	8	8	7	9	X	X	X	X	X	12	11	X	10	10	13	X	13	10	X	11	10	12	10	10	11	X	X	1	X	X	X	13										

Form 455

9-21

3½

CONVERTER NO. 1 CHARGE NO ~~270~~ 269 DATE 8-19-78 105 TONS BLISTER TO # 2 ANODE AT 01:20 O'CLOCK R. Lindstrom
Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv.	Temp	Skinner
4		X	0550	0630	—	—	—	—	3	Matte Shell		—	—	—	—	S. Olson
				0630	0705	out for #4 to Blow										" "
		X	0705	1050												
3	X		1120	1215	¾		15		6	SHELL			3			D. Franck
2	X		1250	1340		½	12		6	"			2½			
2	X		1720	1810			10		4	"			2 ✓		2110	B. Bruce
2	X		1902	1945			8		5	"			1¾		2012	
									(24)							
	X		1955	2020			2						½		2100	
	X		2045	0041					5	Ref Scraps						
									4	" "						
									3	Wire						
									5	Red Scraps						
								2325	6	Wire O2 off at 2350						C. Sedank, 230
									(23)							
TOTALS	13				¾	½	47		47	½ LADLES COPPER SLAG			9¾			

After Finish / After Lining

1 1/0 2 1/1 3 X/0 4 1/0 5 1/1 6 1/0 7 1/0 8 1/0 9 1/0 10 1/1 11 1/0 12 X 13 X/2 14 X/3 15 X/4 16 X/4 17 15 18 12 19 X/2 20 12 21 12 22 13 23 X/3 24 13/3 25 13/3 26 X/3 27 13/3 28 13/3 29 14/3 30 10/3 31 11/3 32 12/3 33 X/3 34 X/3 35 X/3 36 X/3 37 X/3 38 12/3 39 40 41 42 43 44 45 46 47 48 49 50

Form #EE

9-20 KS

CONVERTER NO. #1 CHARGE NO. ~~279~~ 268 DATE 9-19-78 TONS BLISTER TO 1100 ANODE AT 0305 O'CLOCK R. Middleton
Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skinner
									3	Sulfur						
HH 6	X		1420	1515			12		10	Shell			3		2080	Meiers
2	X		1750	1835	½		10		5	Shell			2½		2100	Greene
2	X		1915	2015			10		5	Shell			3		2110	
2	X		2045	2145			10		5	Shell			2		2100	
									(32)							
	X		2155	2210			2						½		2110	
	X		2225	0220					3	Blue						
		X	0230	0233					3	Bottoms						
									4	Refr. Scrap						B. Olmos
									4	" "						" "
									4	" "						" "
									4	" "						" "
									(23)							
TOTALS 12					½	1	44		54	1	LADLES COPPER SLAG		11			

After Finish: 1 8 2 8 3 X 4 8 5 7 5 8 7 7 8 7 9 8 10 7 11 7 12 X 13 X 14 X 15 X 16 X 17 X 18 9 19 10 20 X 21 11 22 9 23 10 24 X 25 10 26 8 27 X 28 11 29 11 30 11 31 X 32 9 33 8 34 8 35 X 36 X 37 X 38 X 39 X 40 X 41 11 42 43 44 45 46 47 48 49 50

After Lining

9-19 KB

Form #EC

Smelter Clerk

267

CONVERTER NO. #1 CHARGE NO ~~268~~ DATE 9-18-78 100 TONS BLISTER TO #2 ANODE AT 1130 O'CLOCK [signature]

Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skinner
5 1/2	X		2400	0055	1		12		6	shell			2 3/4		2135	L. Larson
3	X		0145	0230		1/2	12		10	"			2 3/4		2140	"
2	X		0345	0435			12		10	"			2		2130	"
1/2	X		0510	0540			5		3	dirty wire	1 1/2 ld w.m from #4 con		1 1/2		2150	"
Clean Out	X		0555	0610			—		2	dirty wire			1/2			"
									31	TOTAL						
Finish	X		0615	1000					3	Ref scrap						"
			1015	1017					3	" "						Walter
									3	" "						
									3	" "						
									3	" "						
									15	Total						
TOTALS 1					1	1/2	41		46	3/4	LADLES COPPER SLAG		9 1/2			

After Lining

After Finish

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
10	12	X	12	13	12	12	13	12	12	11	X	X	X	X	X	11	11	X	10	11	12	X	11	11	X	11	11	11	12	12	12	X	X	X	X	X	X	13											

9-19

KB

IIIT III

9-25-78

CONVERTER NO. # 4 CHARGE NO # 27 DATE 9-22-78 / 105 TONS BLISTER TO 1 & 2 ANODE AT 1700 O'CLOCK A. Lindstrom

Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skinner
4 1/2		X	2210	0130	—	—	—	—	1	matte	—	—	—	—	—	J.C.J.
				0130		Smoke 0 conv.										
2			1600	1650			15			High and Heavy			—			Shibley
				1650	1750	Rotate with #1 conv.										
2	X		1750	1820			3						2 1/4		2110	
				1820	1925	Rotate with #1 conv.										
2	X		1925	2015			9		3 5	clean up SHELL			2 1/4		2110	
				2015	2115	Rotate with #1 conv.										
2	X		2115	2150			8		5	SHELL			2		2120	
1	X		2305	2305			3						3/4		2130	Meyer
									14							
Clean up	X		2330	2330			—						1/4			"
				2330		Smoke call										
9-26-78	X		1005	1045									1/4			Brewer
			1100	1355					4	Buttons						
			1510	1520					4	B.J. Scrap						J.C.J.
									4	" "						
									4	" "						
TOTALS 13 1/2							38		5	" 3/4	LADLES COPPER SLAG		7 3/4		2100	

After Lining

After Finish

37

9-26

K5

5 LD cu to #3 conv

CONVERTER NO. 4 CHARGE NO 26 DATE 9-21-78 70 - TONS BLISTER TO 102 ANODE AT 1920 O'CLOCK Bruce

Foreman Signature

Ladles Ladle	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skinner
1	/		0535	0610	3/4	1/2	15		10 3	shell spar			3			L Larson
2	X		0840	0915	1/2	1	10		8	SHELL			2 1/2			M Finrod
2	X		0940	1015			7		6	Shell			1 3/4			
2	X		1050	1125			6		4	"						
									31				1/2			
Clean up	X		1135	1155			2									
Finish		X	1225	1400					4	REF SCRAP						
				1400	-1510	Over	to #1	Conv	3	WIRE						Tecle
			1510	1750					5	Ref Scrap						-"-
									7	-"-						-"-
									4	-"-						-"-
									4	-"-						
									4	-"-						
TOTALS	12				1 3/4	1 1/2	40		31	3/4 LADLES COPPER SLAG			7 3/4			

After Finish 1 2 2 3 3 4 2 5 2 5 1 3 7 1 3 8 2 9 1 9 10 1 9 11 1 9 12 2 0 13 1 5 14 1 7 15 1 7 16 1 7 17 1 7 18 1 9 19 2 0 20 2 0 21 2 0 22 1 7 23 1 9 24 1 8 25 2 0 26 1 8 27 1 8 28 2 0 29 1 8 30 1 9 31 1 9 32 1 9 33 2 0 34 2 0 35 2 0 36 2 0 37 2 0 38 2 1 39 2 1 40 2 1 41 2 1 42 2 0 43 2 1 44 2 0 45 2 0 46 2 0 47 X 48 2 1 49 50

Form #55

9-22

UM111

3½
2
3
3

CONVERTER NO. #4 CHARGE NO 25 DATE 9-20-78 120 TONS BLISTER TO 3 & 1 ANODE AT 2:00 O'CLOCK

Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skimmer
6	X		0625	0710	1/4		15		12 4	shell			3		2100	[illegible]
2	X		0745	0825			9		10½	Blimo house slag	shell		2¾		2070	Meyers
2	X		0900	0930			6		6	shell			2		2080	"
				0935	1300	Zero conv - Smoke & SO2 plant										"
2	X		1300	1305												"
	"			1305	1505	SO2 Plant			32½							"
	X		1505	1535			6						1½		2100	Barnett
Clean up	X		1550	1605			2						½		2110	"
Finish		X	1625	2000					6	Wire					2100	"
									7	Ref Scrap						
									3	Wire						
									4	Ref Scrap						
									4	" "						
									3	" "						
									3	Wire						
									30							
TOTALS 12					1/4		38		60½	1	LADLES COPPER SLAG		9¾			

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
After Lining																																																		
After Finish	20	20	20	20	19	19	19	19	18	18	19	20	19	20	19	18	18	18	18	19	19	18	18	19	20	19	18	20	20	20	20	18	18	18	19	18	19	19	19	19	19	19	19	19	18	18	18	18	19	

Form #55

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4A1 Smelter Clerk

2
1
1
4

CONVERTER NO. 4 CHARGE NO 24 DATE 9-20-78 80 TONS BLISTER TO 1 ANODE AT 2235 O'CLOCK O. Lindstrom
Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Tons	Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skinner
4 1/2	X		1325	16:10			—		Lining 3	shell						Malone
				16:15	17:05	Shop	Working on Damper & Hood									C. Reynolds
1/2	X		17:05	18:10												" "
3	X		18:35	19:25			15		6 4	Shell M. Shell & spruce			3		2100	" "
				19:40	20:00	Waiting for matte			"							" "
3	X		20:00	20:50			12		6 4	Shell matte	Shell & spruce		2 3/4		2110	" "
2	X		21:10	21:50			10		10	Shell			2		2120	" "
Clean up	X		22:00	22:20			2						1/2		2120	" "
Finish	X		2310	0140					33							
	X		0147	0149					3	wire						
									6	car bottoms						
									6	" "						
									6	" "						
									6	" "						
									3	wire						
									30							
TOTALS 13							39		63	1 LADLES COPPER SLAG			8 1/4		2140	

After Lining

After Finish: 1 20, 2 20, 3 20, 4 20, 5 20, 5 20, 7 20, 8 19, 9 19, 10 20, 11 20, 12 20, 13 20, 14 20, 15 21, 16 20, 17 20, 18 20, 19 19, 20 20, 21 20, 22 20, 23 19, 24 20, 25 20, 26 19, 27 20, 28 20, 29 20, 30 20, 31 20, 32 20, 33 19, 34 19, 35 20, 36 19, 37 19, 38 19, 39 20, 40 19, 41 19, 42 19, 43 20, 44 19, 45 19, 46 19, 47 [illegible], 48 [illegible], 49, 50

9-20 [illegible]

CONVERTER NO. 4 CHARGE NO 23 DATE 9-19-78 / 110 TONS BLISTER TO 2 ANODE AT 1030 O'CLOCK Gould

Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skinner
6	X		0300	0345	1	1	15		12	shell	O2 not working for 15 min		3		2110	[illegible]
2	X		[illegible]	0455			14		12	"			1		2080	
1	X		0500	0510			1						2½		2100	
2	X		0535	0605					5	"			2		2120	
cleanup	X		0615	0625			1		29				1		2130	
7 wrist		X	0630	0950					6	cu bottoms					2150	
									6	scrap						Meyers
									6	scrap						"
									6	scrap						"
									6	scrap						"
									28							
TOTALS 11					1	1	31		5	3/4 LADLES COPPER SLAG			9½			

After Lining

After Finish

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INJ 11113

CONVERTER NO. 4 CHARGE NO 22 DATE 9-18-78/130 TONS BLISTER TO 2 ANODE AT 2235 O'CLOCK R. MacGillivray
Foreman Signature

Ladles Matte	O2 On	O2 Off	Air On	Air Off	Ladles Cu Slag	Ladles Anode Slag	Tons Silica	Cold Additions Time	Cold Additions Tons	Cold Additions Type	Remarks	Ladle Slag #1 Rev	Ladle Slag #2 Rev	Ladle Slag Conv	Temp	Skinner
6	X		0300	0340			15		14	shell			3		2130	J.C.F
				0355	1005	no matte				1½ ladles to #1						
4	X		1005	1255			12		6 6	shell & spear			2¾		2110	Maynard
2	X		1230	1215			9		10	shell			2½		2090	"
2	X		1245	1300			8		6	shell						"
				1300	1450	Zero conv. Smoke (36)										"
—	X		1450	1400									1¾		2110	"
				1400	1540	to #1 conv.										"
1	X		1540	1610			5		—	—			1		2130	Brown
																"
	X		1615	1705			2									"
				1640	1700	Down on crane							½		2130	"
	X		1715	2050				17:45	8	Rel Scrap						
				1750	1805	Out to load Scrap			8	" "						C. Reynolds
				1840	1850	Skimmer to restroom										" "
				1935	1955	Out for lunch			6	" "						" "
									6	"						"
									28							"
TOTALS 15							41		64	(1) LADLES COPPER SLAG			11½			

After Finish Lining: 1 20 | 2 19 | 3 18 | 4 22 | 5 15 | 5 10 | 7 18 | 8 19 | 9 12 | 10 16 | 11 17 | 12 15 | 13 17 | 14 20 | 15 19 | 16 20 | 17 18 | 13 20 | 19 17 | 20 19 | 21 18 | 22 17 | 23 19 | 24 18 | 25 16 | 26 19 | 27 19 | 28 19 | 29 19 | 30 19 | 31 17 | 32 18 | 33 18 | 34 20 | 35 18 | 36 19 | 37 18 | 38 18 | 39 12 | 40 12 | 41 18 | 42 18 | 43 12 | 44 — | 45 17 | 46 13 | 47 XO | 48 18 | 49 | 50

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KG