ENVIRONMENTAL SURVEY

EL PASO PLANT

February 9-23, 1976

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EXECUTIVE SUMMARY

Tape sampler and personal monitoring data continue to show airborne lead concentrations in Dross Reverb, Sinter Plant, Blast Furnace, Zinc Fuming, Zinc Kiln, and Cadmium Areas in excess of the OSHA standard.

Sulfur dioxide concentrations were above permissible limits on the Reverb charge deck, and are attributed to larry car activity.

Noise dosimeter data for tuyere punchers and rail car unloaders reinforce the finding of the previous survey that noise exposures to these individuals exceed the OSHA standard.

Recommendations include: enclosing Dross Reverb and Cadmium crane cabs; providing supplied air respirators to those workers who samples exceeded OSHA heavy metal standards by a factor greater than ten (Dross Reverb furnaceman, Sinter Plant fireman and two beltmen, High Grade Sample cutters and Cadmium firemen); modifying rail car unloading facilities (reduce noise and dust levels); sampling semi-annually for determination of asbestos exposure and eligibility for medical examination; and requesting Material Safety Data Sheets for masonry and welding products.

ENVIRONMENTAL SURVEY REPORT
EL PASO PLANT

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I. OPERATING CONDITIONS

On February 9, 1976, No. 2 Blast Furnace went down. On February 16, 1976, No. 1 and No. 3 Blast Furnaces were shut down and No. 2 Furnace brought in. Because of the drop in furnace slag production, the Zinc Fuming Furnace went down on February 16, 1976, and remained out of operation until February 19, 1976. No. 1 Blast Furnace came back on line about noon of February 20, 1976. The Dross Reverb Furnace ceased operating on February 11, 1976. S.C.S. curtailment was instituted as necessary. Otherwise, all other processes were normal.

II. SAMPLING PROCEDURES

A. Air:

1. One-hour sequential samples of fugitive emissions were collected with RAC Model G-2 tape samplers at the following locations:

Date Feb.1976	General Area	Specific Area
10-11	Dross Reverb	Charge Deck - south wall
12-13	Reverb	" " - southeast corner
13-15	"	Near Matte Tapping Area
11-12	Converters	Between No.2, No.3 Converters
12-13	"	Between No.1, No.2 Converter control panels
13-14	"	Between No.1, No.2 Converters
14-15	"	Rear of No.2 Converter
15-16	Zinc Fuming	Between Main and Holding Furnaces
15-17	" "	Fuming Furnace Charge Deck - north side
19-20	" "	Holding Furnace - south side
19-20	" "	Fuming Furnace Charge Deck - south side
20-21	Cadmium	Northwest corner of Godfrey Roaster
20-21	"	Godfrey Roaster Feed Floor

The above samples were analyzed for lead, cadmium, copper, and zinc by atomic absorption spectrophotometry.

Selected samples were also analyzed for arsenic using the silver diethyldithiocarbamate (SDDC) colorimetric method.

2. Individual dust and fume samples were collected with M.S.A. personal monitoring devices equipped with closed-face (plastic cover in place and inlet plug removed) Millipore filters (0.8 micron pore size). These samples were analyzed for lead, cadmium, zinc, and copper by atomic absorption spectrophotometry and for arsenic by the SDDC method.

   Total particulate weight was determined by weighing filters before and after sampling.

3. General areas samples were collected with M.S.A. personal monitors equipped with closed-face Millipore filters (0.8 micron pore size), and analyzed for lead, zinc, cadmium, arsenic, and total particulate as described above.

4. Individual asbestos fiber samples were collected with M.S.A. personal monitoring pumps equipped with open-face Millipore filters (0.8 micron pore size). The asbestos fibers were counted using a Zeiss phase-contrast microscope, according to methods specified in the NIOSH criteria document.

5. Sulfur dioxide concentrations were determined at stationary locations using M.S.A. personal monitors equipped with midget impingers. The absorbing solution was 3% hydrogen peroxide. Analysis was by the titrimetric method cited in the NIOSH Criteria Document for Sulfur Dioxide.

6. Personal and general area sulfur dioxide measurements were taken by employing ® gas adsorbing dosimeters. These samples were analyzed by the manufacturer.

7. A composite sample of settled dust was collected in the mill. The sample was analyzed for percent free silica by using the modified Talvitie method, as recommended by NIOSH.

B. Noise:

Individual noise exposure data were collected using DuPont Permissible Audio Dosimeters, Model D-100, which measure noise exposures in terms of the present 90 dBA OSHA standard. A DuPont Audio Dosimeter Readout Model R150 was utilized to decode each dosimeter memory cell and produce a reading as a percentage of the current 90 dBA standard.

III. SAMPLING RESULTS

A. Air:

1. Tape Samplers

Department	Location	Starting Time (1976)	Analysis	Conc'n. (mg/m^3) Mean	Max.	Min.	Percent Exceeding OSHA Limit	No. of Hourly Samples	Graph No.
Lead Dross Reverb	Charge Deck-south wall	2/10 3:02pm	Pb	.98 (1)	4.35	.10	91	22	1
			As	.43	1.30	.08	20	5	1
Copper Converters	Between Converter Nos. 2 & 3	2/11 2:01pm	Pb	.41 (1)	1.57	.05	57	23	2
			Cu	.20 (2)	.71	.05	65 (Fume) 0 (Dust)	23	--
	Between Converter Control Panel Nos. 2 & 3	2/12 1:22pm	Pb	.15	--	--	0	*	--
			Cu	.16 (2)	--	--	100 (Fume) 0 (Dust)	*	--
	Between Converter Nos. 1 & 2	2/13 5:41pm	Pb	.14	.43	.04	22	23	3
			Cu	.14 (2)	.63	.02	48 (Fume) 0 (Dust)	23	--
			As	.054	.055	.051	0	3	--
	Rear of No.2 Converter	2/14 4:26pm	Pb	.15	.70	.03	26	23	4
			Cu	.11 (2)	.53	.02	30 (Fume) 0 (Dust)	23	--
Copper Reverb-	Charge Deck-southeast corner	2/12 12:46pm	Pb	.15	.38	.06	13	24	--
			Cu	1.24 (1)	4.14	.16	100 (Fume) 46 (Dust)	24	--
			As	.06	.14	.02	0 (Dust)		
	Near Matte Tapping Launder	2/13 12:48pm	Pb	.11	5.0	.02	42	43	5
			Cu	.59 (2)	2.10	.06	81 (Fume) 19 (Dust)	43	--
			As	1.40 (1)	5.70	.14	50	8	5
Zinc Fuming Furnace	Between Main and Holding Furnaces	2/15 7:45am	Pb	.12	1.69	.02	3	34	--
			Zn	.02	.23	.002	0	34	--
			As	.06	.19	.02	0	7	--

Tape Samplers (cont.)

Department	Location	Starting Time (1976)	Analysis	Conc'n. (mg/m^3) Mean	Max.	Min.	Percent Exceeding OSHA Limit	No. of Hourly Samples	Graph No.
Zinc Fuming Furnace (cont.)	Fuming Furnace Charge Deck-north side	2/15 4:14pm	Pb	.26 (1)	1.72	.04	29	24	6
			Zn	.87	3.91	.16	0	24	--
			As	.14	.48	.007	0	4	--
	Holding Furnace-south side	2/19 12:05pm	Pb	.06	.10	<.006	0	17	--
			Zn	.01	.04	.003	0	17	--
	Fuming Furnace Charge Deck-south side	2/19 12:10pm	Pb	.25 (1)	.70	.06	54	25	7
			Zn	3.81	17.97	.09	29 (ZnO Fume)	25	8
			As	.05	.06	.03	0	4	--
Cadmium	Godfrey Roaster-northwest corner ground level	2/20 11:00 am	Cd	.08	.29	.006	24 (Fume) 3 (Dust)	29	--
			Pb	.07	.24	.02	10	29	9
	Godfrey Roaster-first floor	2/20 1:30pm	Cd	1.69 (1,3)	6.0	.13	100 (Fume) 96 (Dust)	27	10
			Pb	.46 (1)	1.20	.04	74	27	11
			As	.05	.10	.03	0	5	--

Footnotes:

(1) Mean exceeds OSHA 8-hour time-weighted average (TWA) limit.

(2) Mean may exceed OSHA 8-hour TWA limit depending upon type of exposure, i.e., dust and/or fume.

(3) Mean exceeds OSHA ceiling value for cadmium dust, which should be exceeded at no time during the 8-hour shift.

* 24-hour sample. Tape sampler did not advance to give hourly samples.

CURRENT OSHA STANDARDS

Substance	OSHA 8-hour TWA Limit (mg/m^3)	OSHA Ceiling Value (mg/m^3)
Pb	0.2	--
As	0.5	--
Cd	0.1 (Fume)	0.3
	0.2 (Dust)	0.6
Cu	0.1 (Fume)	--
	1.0 (Dust)	--
Zn	5.0 (as ZnO Fume)	-

OSHA PROPOSED STANDARDS

Pb	0.1	
As	0.004	.01 (15-minute sample)

2. Personal Monitoring

Department	Employee Name and S.S. No.	Job Title (Respirator Use)	1976 Date and Shift(5)	Sampling Time (Min)	Analysis	Conc'n. (mg/m^3)
Lead Dross Reverb		Craneman (yes)	2/11 D	365	Pb	.88 (1)
					As	.107
					Total Part.	2.26
		Furnaceman (yes)	2/11 D	363	Pb	2.40 (1)
					As	.514 (1)
					Total Part.	5.43
Lead Sinter Plant		Fireman (yes)	2/21 A	479	Pb	2.14 (1)
					As	.05
					Total Part.	8.12
		Fireman (yes)	2/21 A	477	Pb	.78 (1)
					Total Part.	4.02
		Beltman (yes)	2/21 A	463	Pb	2.12 (1)
					Total Part.	25.79 (1)
		Beltman (yes)	2/21 A	464	Pb	2.0 (1)
					As	.027
					Total Part.	10.21
Lead Blast Furnace		920 Cat Operator (yes)	2/18 D	325	Pb	.11
					As	.011
					Total Part.	.83
		Furnaceman (yes)	2/11 D	368	Pb	2.67 (1)
					As	.052
					Total Part.	8.19
		Charge Car Operator (yes)	2/11 D	357	Pb	.38 (1)
					Total Part.	1.50
Cadmium		Fireman (yes)	2/13 A	443	Cd	2.40 (1,
					Pb	1.74 (1)
					As	.062
					Total Part.	13.69
		Crane Operator (yes)	2/13 D	369	Cd	1.75 (1,
					Pb	1.15 (1)
					As	.059
					Total Part.	10.41
		Asst. Fireman (yes)	2/13 D	344	Cd	2.23 (1
					Pb	.92 (1
					Total Part.	10.47

2. Personal Monitoring (cont.)

Department	Employee Name and S.S. No.	Job Title (Respirator Use)	1976 Date and Shift(5)	Sampling Time (Min)	Analysis	Conc'n. (mg/m^3)
Cadmium (cont.)		Fireman (yes)	2/18 D	464	Cd	.52(1,4
					Pb	.35(1)
					Total Part.	2.88
		Fireman (yes)	2/13 A	460	Cd	3.78(1,3
					Pb	.16
					Total Part.	11.23
Zinc Kilns		Kiln Loader (yes)	2/13 D	338	Pb	1.42(1)
					Zn	5.34(2)
					As	.097
					Total Part.	9.61
		Kiln Loader (yes)	2/13 D	340	Pb	.47(1)
					Zn	1.58
					Total Part.	3.95
		Kiln Loader (yes)	2/12 A	482	Pb	.08
					Zn	2.07
					Total Part.	4.58
		Asst. Foreman (yes)	2/13 D	329	Pb	.65(1)
					Zn	1.73
					As	.043
					Total Part.	4.76
		Kiln Operator (yes)	2/12 A	363	Pb	2.39(1)
					Zn	6.22(2)
					As	.091
					Total Part.	12.94
		Kiln Operator (yes)	2/12 A	481	Pb	1.52(1)
					Zn	7.43(2)
					As	.078
					Total Part.	14.69
		Kiln Operator (yes)	2/13 D	334	Pb	.11
					Zn	.19
					As	.053
					Total Part.	4.91
		Kiln Operator (yes)	2/12 A	422	Pb	.40(1)
					Zn	1.32
					Total Part.	3.14
		East Helena Zinc Dust Unloader (yes)	2/16 A	443	Pb	.36(1)
					Zn	.17
					As	.021
					Total Part.	20.97(1)

2. Personal Monitoring (cont.)

Department	Employee Name and S.S. No.	Job Title (Respirator Use)	1976 Date and Shift(5)	Sampling Time (Min)	Analysis	Conc'n. (mg/m^3)
Zinc Kilns (cont.)		East Helena Zn Dust Unloader (yes)	2/12 D	361	Pb	.85(1)
					Zn	4.59
					Total Part.	6.40
Zinc Fuming Furnace	z	Zinc Fuming Furnaceman (yes)	2/12 D	352	Pb	.15
					Zn	.06
					Total Part.	17.77(1)
		Zinc Holding Furnaceman (yes)	2/12 D	291	Pb	.15
					Zn	.60
					Total Part.	4.06
		Zinc Fuming Furnace Helper Charge Deck (yes)	2/12 D	342	Pb	.27(1)
					Zn	.81
					As	.018
					Total Part.	4.90
Copper Converters		Craneman (yes)	2/13 A	484	Pb	.24(1)
					As	.07
					Cu	.24(2)
					Total Part.	3.00
		Craneman (yes)	2/16 A	488	Pb	.14
					Cd	.02
					Cu	.34(2)
					Total Part.	1.96
		Craneman (yes)	2/16 A	485	Pb	.13
					As	.028
					Cu	.08
					Total Part.	1.44
		Craneman (yes)	2/16 A	486	Pb	.15
					As	.023
					Cu	.12(2)
					Total Part.	1.53
		Crane Chaser (no)	2/11 A	313	Pb	.05
					As	.039
					Cu	.04
					Total Part.	1.09
		Skimmer (no)	2/11 A	319	Pb	.24(1)
					As	.019
					Cu	.08
					Total Part.	1.80

2. Personal Monitoring (cont.)

Department	Employee Name and S.S. No.	Job Title (Respirator Use)	1976 Date and Shift(5)	Sampling Time (Min)	Analysis	Conc'n. (mg/m^3)
Copper Converters (cont.)		Puncher (no)	2/10 A	325	Pb	.10
					As	.02
					Total Part.	3.57
Copper Roasters		Fireman (yes)	2/11 A	323	Pb	.03
					As	.011
					Cu	.50(2)
					Total Part.	2.66
		Feederman (yes)	2/11 A	330	Pb	.04
					As	.012
					Cu	.11(2)
					Total Part.	12.19
Copper Reverb		Matte Tapper (yes)	2/10 A	344	Pb	.03
					Total Part.	1.43
		Tapper Helper (yes)	2/10 A	344	Pb	.03
					As	.011
					Cu	.27(2)
					Total Part.	10.25
		Larryman (yes)	2/10 A	352	Pb	.07
					As	.047
					Cu	2.89
					Total Part.	7.63
		Waste Heat Boiler Lancer (yes)	2/16	479	Pb	.04
					As	.035
					Cu	.04
					Total Part.	1.64
		Waste Heat Boiler Lancer (yes)	2/16 A	476	Pb	.03
					Cu	.06
					Total Part.	.65
		Waste Heat Boiler Lancer (yes)	2/16 A	476	Pb	.06
					As	.031
					Cu	.14(2)
					Total Part.	1.31
		Waste Heat Boiler Lancer (yes)	2/16 A	292	Pb	.04
					Cu	.06
					Total Part.	.71
Mill		Unloader (yes)	2/18 D	342	Pb	1.28(1)
					Total Part.	46.19(1)
					Free Silica=	0.7%
			OSHA DUST LIMIT (based on free silica content			= 11.11

2. Personal Monitoring (cont.)

Department	Employee Name and S.S. No.	Job Title (Respirator Use)	1976 Date and Shift(5)	Sampling Time (Min)	Analysis	Conc'n. (mg/m^3)
Mill (cont.)		Feederman (yes)	2/18 D	350	Pb	.12
					Total Part.	5.96
					Free Silica=	0.7%
			OSHA DUST LIMIT (based on free silica content)			= 11.11
Unloading		Clean-up (yes)	2/19 A	454	Pb	.12
					As	.015
					Total Part.	2.73
		Motor Crane Operator (yes)	2/19 A	474	Pb	.07
					Cd	<.01
					As	.006
					Total Part.	1.08
		Switchman (yes)	2/19 A	474	Pb	.03
					Total Part.	.74
Sample Mill		High Grade Sample Cutter (yes)	2/18	357	Pb	.42(1)
					As	.03
					Total Part.	149.34(1)
		High Grade Sample Cutter (yes)	2/18 D	351	Pb	.60(1)
					Total Part.	213.51(1)
		High Grade Sample Cutter (yes)	2/18 D	353	Pb	.32(1)
					As	.016
					Total Part.	42.74(1)
Boiler Shop		Welder (yes)	2/18 D	346	Pb	.07
					Cd	<.01
					As	.01
					Total Part.	6.43
		Welder (no)	2/19 D	475	Pb	.10
					Cd	.01
					Total Part.	3.06
Leach Plant		Helper (yes)	2/18 D	474	Pb	.24(1)
					Total Part.	1.08
		Operator (yes)	2/18 D	478	Pb	.46(1)
					Cd	.10
					As	.013
					Total Part.	1.43
Umpire Lab		Fire Assayer (no)	2/19 D	474	Pb	.42(1)
					As	.002
					Total Part.	1.81

2. Personal Monitoring (cont.)

Department	Employee Name and S.S. No.	Job Title (Respirator Use)	1976 Date and Shift(5)	Sampling Time (Min)	Analysis	Con.c'n. (mg/m^3)
El Paso Lab		Fire Assayer (no)	2/18 D	509	Pb	.19
					As	.008
					Total Part.	1.57
		Fire Assayer (no)	2/19 D	430	Pb	.11
					total Part.	.64
		Fire Assayer (no)	2/19 D	431	Pb	.07
					Total Part.	.52
Ore Bins Copper		Beltman (yes)	2/21 A	463	Pb	.17
					As	.02
					Cu	.78
					Total Part.	6.43
		Beltman (yes)	2/21 A	471	Pb	.19
					Cu	.57
					Total Part.	3.23
Cottrell		Operator (resp. use unknown)	2/19 A	465	Pb	.04
					Total Part.	.19
		Conditioner Man (unknown)	2/19 A	456	Pb	.04
					As	.006
					Total Part.	.22

3. General Area Samples:

Department	Location	1976 Date & Shift(5)	Sampling Time (Min.)	Analysis	Conc'n. (mg/m^3)
Cadmium	Office, north wall	2/22 A	330	Cd	.04
				Pb	.03
				Total Part.	.55
	Lunch Area, north wall	2/22 A	335	Cd	.04
				Pb	.03
				Total Part.	.73
Zinc	Kiln Office, west wall	2/16 D	464	Pb	.02
				As	.009
				Zn	.87
				Total Part.	1.72
	Kiln Area Lunch Room, west wall	2/16 D	448	Pb	.06
				Zn	.10
				Total Part.	.96
	Fuming Furnace Control Room, operator's desk	2/16 D	428	Pb	.05
				As	.004
				Zn	.11
				Total Part.	1.28
Lead	Office, west wall	2/16 D	390	Pb	.10
				As	.008
				Total Part.	.79
Copper Reverb	Office, northwest corner	2/16 D	414	Pb	.14
				As	.082
				Cu	.05
				Total Part.	4.18
Copper Anode	Office, east wall	2/16 D	442	Pb	.04
				As	.007
				Cu	.04
				Total Part.	9.94
Boiler Shop	On Lighting Panel	2/19 D	378	Pb	.07
				Total Part.	.32

FOOTNOTES (Personal Monitor and General Area Samples)

(1) Exceeds OSHA 8-hour TWA limit.

(2) May exceed OSHA 8-hour TWA limit, depending upon type of exposure, i.e., dust and/or fume.

(3) Exceeds OSHA ceiling value for cadmium dust.

(4) May exceed OSHA ceiling value, depending upon type of exposure, i.e., dust and/or fume.

(5) Shift Notation: D = day
A = afternoon

FOOTNOTES (Personal Monitor and General Area Samples) (cont.)

CURRENT OSHA STANDARDS:

Substance	OSHA 8-hour TWA Limit (mg/m^3)	OSHA Ceiling Value (mg/m^3)
Pb	0.2	--
As	0.5	--
Cd	0.1 (Fume)	0.3
	0.2 (Dust)	0.6
Cu	0.1 (Fume)	--
	1.0 (Dust)	--
Zn	5.0 (as ZnO fume)	--
Free Silica (SiO_2)	$\frac{50\ mg/m^3}{\%\ quartz + 2}$	--
Total Particulate	$15\ mg/m^3$	--

OSHA PROPOSED STANDARDS:

Pb	0.1	--
As	0.004	0.01 (15-minute sample)

4. Asbestos Sampling

Because of heavy dust loading on the filters caused by Blast Furnace caulking, asbestos fibers were not recognizable for counting.

5. Sulfur Dioxide Sampling - Stationary

Department	Location	1976 Date & Shift(2)	Sampling Time (Min.)	Sampler Type	Concentration (mg/m^3)	Concentration (ppm)
Converter	Stairway between #1 & #2 control panels	2/10 A	285	Dosimeter	4.4	1.7
				Impinger	5.7	2.2
		2/11 D	375	Dosimeter	0.8	0.3
				Impinger	2.5	0.9
		2/20 D	496	Dosimeter	2.1	0.8
				Impinger	22.0	8.4(1)
	#2 Control Panel	2/13 D	260	Dosimeter	0.5	0.2
				Impinger	2.4	0.9

Sulfur Dioxide Sampling - Stationary (cont.)

Department	Location	1976 Date & Shift[2]	Sampling Time (Min.)	Sampler Type	Concentration (mg/m^3)	Concentration (ppm)
Converter (cont.)	Above and between #1 & #2 converters	2/20 D	502	Dosimeter	2.6	1.0
				Impinger	8.2	3.1
	Crane #2 Cab	2/11 D	340	Dosimeter	1.0	0.4
				Impinger	4.6	1.7
Reverb	Charge Deck, south side above reverb	2/10 A	385	Dosimeter	2.9	1.1
				Impinger	9.9	3.7
		2/11 D	366	Dosimeter	39.0	14.6[1]
				Impinger	8.3	3.1
		2/13 D	348	Dosimeter	25.0	9.5[1]
				Impinger	9.8	3.7
	Charge Deck, north side of charge ports	2/20 D	500	Dosimeter	141.0	54.4[1]
				Impinger	18.0	6.8[1]
	Charge Deck, south side of charge ports	2/20 D	499	Dosimeter	19.0	7.4[1]
				Impinger	10.8	4.1
	Front of reverb, ground floor	2/20 D	532	Dosimeter	5.7	2.2
				Impinger	9.4	3.6
	Front of reverb, charge deck, south of converter slag receiving port	2/20 D	508	Dosimeter	12.0	4.5
				Impinger	21.7	8.3[1,4]
Roaster	Center of fire floor	2/10&13 D	488	Dosimeter	16.0	6.1[1]
				Impinger	12.1	4.6[3]

6. Sulfur Dioxide Sampling - Personal

Department	Employee Name and S.S. No.	Job or Operation	1976 Date & Shift (2)	Sampling Time (Min.)	Concentration (mg/m^3)	Concentration (ppm)
Converter		Clean up	2/12 A	340	8.1	3.1
		Skimmer #1	2/10 A	403	7.3	2.8
		Crane Operator	2/11 D	340	1.8	0.7
		Crane Operator	2/12 A	330	3.6	1.4
		Skimmer #2	2/10 D	370	5.2	2.0
Roasters		Feeder	2/11 A	329	1.0	0.4
		Fireman	2/11 A	342	4.2	1.6
Reverb		Mucker	2/10 A	405	10.0	3.9
Blast Furnace		Feeder	2/10 A	408	0.8	0.3

Footnotes - Sulfur Dioxide Sampling (Stationary and Personal)

(1) Exceeds OSHA 8-hour TWA limit for sulfur dioxide, which is 5 ppm.

(2) Shift Notation: D = day
A = afternoon

(3) Some spillage from one of three impingers in set.

(4) Solution from one of three impingers evaporated.

7. Settled Dust Sample

Laboratory analysis showed the free silica content of Mill dust to be 0.7%. This percentage has been applied to personal samples collected for total dust in the Mill.

B. Noise:

1. Employee Samples

Department	Employee S.S. No.	Job Title	1976[7] Date & Shift	Sampling Time (Min)	Hearing Protection	Dosimeter[1] Readout (Percent)	Adjusted[2] to 8 Hours (Percent)	Sound[3] Level Exceeded 115 dBA?
Copper Roasters		Fireman	2/11 A	338	No	56	80[5]	Yes
		Feederman	2/11 A	324	No	3	4	No
Copper Anode		---	2/11 A	321	No	7	10	No
		Anode Caster	2/11 A	231	No	10	21	No
Copper Converters		Skimmer	2/11 A	309	No	23	36	No
		Crane Chaser	2/11 A	305	Yes	17	27	No
		Puncher	2/10 D	372	Yes	14	18	No
		Puncher	2/10 D	372	Yes	95	123[5]	Yes
		Puncher	2/10 A	408	Yes	0	0[8]	Yes
		"	2/12 A	321	Yes	178	266[4]	Yes
		Puncher	2/10 A	405	Yes	228	270[4]	Yes
		Puncher	2/11 A	312	Yes	16	25	Yes
		"	2/12 A	318	Yes	71	107[5]	Yes
		Puncher	2/12 A	319	Yes	32	48	Yes
		Foreman	2/12 A	285	No	354	596[6]	Yes

Employee Samples (cont.)

Department	Employee S.S. No.	Job Title	1976[7] Date & Shift	Sampling Time (Min)	Hearing Protection	Dosimeter[1] Readout (Percent)	Adjusted[2] to 8 Hours (Percent)	Sound[3] Level Exceeded 115 dBA?
Copper Converters		Middle Crane Operator	2/11 D	335	No	0	0[8]	No
		South Crane Operator	2/12 A	347	No	11	15	No
		North Crane Operator	2/12 A	330	No	28	41	No
		Middle Crane Operator	2/12 A	339	No	35	50	Yes
		"	2/13 A	480	No	22	22	Yes
Copper Reverb		Larry Motorman	2/10 A	393	No	24	29	Yes
		Tapper	2/11 D	292	No	2	3	No
		Tapper	2/11 D	315	No	117	178[4]	Yes
		Furnaceman	2/11 D	317	No	32	48	Yes
Power House		Foreman	2/10 D	290	No	34	56	No
		Helper	2/10 D	361	No	38	50	No
		Helper	2/13 A	385	No	45	56	No
		Helper	2/10 A	415	No	57	66	No
		"	2/13 A	378	No	15	19	No

Employee Samples (cont.)

Department	Employee S.S. No.	Job Title	1976[7] Date & Shift	Sampling Time (Min)	Hearing Protection	Dosimeter[1] Readout (Percent)	Adjusted[2] to 8 Hours (Percent)	Sound[3] Level Exceeded 115 dBA?
Blast Furnace		Furnaceman	2/10 D	346	No	104	144[4]	No
		Furnaceman	2/10 D	333	No	116	167[4]	Yes
		Furnaceman	2/10 A	385	No	165	206[4]	Yes
		Furnace Feeder	2/10 A	388	No	172	213[4]	Yes
		Asst. Furnace Feeder	2/10 A	412	No	0	0[8]	No
Sinter Plant		Fireman	2/13 A	405	No	60	71	No
		Fireman	2/13 A	395	No	123	149[4]	No
		Fireman	2/21 A	482	No	150	149[4]	No
		Fireman	2/21 A	482	No	77	77[5]	No
		Beltman	2/21 A	467	No	6	6	No
		Beltman	2/21 A	467	No	44	45	No
Ore Bins Copper		a Beltman	2/21 A	472	No	2	2	No
		Beltman	2/21 A	464	No	2	2	No
Zinc Fuming Furnace		Furnaceman	2/11 D	325	No	60	89[5]	Yes
		Furnace Helper	2/11 D	319	No	53	80[5]	Yes
		Charge Deck Laborer	2/11 D	322	No	39	58	Yes

Employee Samples (cont.)

Department	Employee S.S. No.	Job Title	1976[7] Date & Shift	Sampling Time (Min)	Hearing Protection	Dosimeter[1] Readout (Percent)	Adjusted[2] to 8 Hours (Percent)	Sound[3] Level Exceeded 115 dBA?
Zinc Kilns		Asst. Foreman	2/13 D	355	No	32	43	Yes
		Operator	2/13 D	340	No	70	99[5]	No
		Laborer	2/13 D	345	No	94	131[5]	Yes
Cadmium		Craneman	2/13 D	373	No	5	6	No
		Asst. Fireman	2/13 D	373	No	48	62	Yes
		Asst. Fireman	2/13 A	445	No	7	8	No
Sample Mill		Head Bucker	2/17 D	403	No	4	5	No
		Sample Cutter	2/17 D	398	No	33	40	No
		Sample Cutter	2/17 D	392	No	1	1	No
Mill		Foreman	2/12 D	282	No	2	3	No
		Beltman	2/12 D	304	No	49	77[5]	Yes
		Unloader	2/12 D	301	No	53	85[5]	Yes
		Unloader	2/12 D	300	No	34	54	Yes
		Tripper man	2/12 D	293	No	20	33	No
		Feeder-man	2/12 D	290	No	70	116[5]	Yes
		Feeder-man	2/12 D	283	No	35	59	No

Footnotes for Personal Noise Exposures:

(1) Readout based on elapsed sampling time.

(2) The 8-hour adjusted readout is an extrapolation of the original dosimeter reading. This extrapolation assumes that the employee will be exposed to the same noise level during the remainder of the shift when the dosimeter is not worn.

(3) The OSHA noise standard does not allow employees to be exposed to sound levels greater than 115 dBA. However, experience to date shows that most dosimeter measurements greater than 115 dBA are the result of employee mischief, i.e. shouting into the microphone of the dosimeter. Therefore, these data must be interpreted cautiously.

(4) Dosimeter readouts greater than 100% indicate a violation of the OSHA noise standard. However, the accuracy of the dosimeters (as specified by A.N.S.I. S1.4 - 1971) is $\pm$ 2 dBA which translates to an upper confidence limit of 133%. Therefore, only readings greater than 133% are a positive violation of the OSHA noise standard.

(5) Readings from 75% - 133% fall within the dosimeter calibration limits and may be violations of the OSHA standard.

(6) Suspected tampering.

(7) Shift Notation: D = day
A = afternoon

(8) Dosimeter probably did not record properly.

IV. COMMENTS

A. Lead Department:

The tape sampler mean concentration (0.98 mgPb/m^3 - Graph 1) and craneman personal monitor result (0.88 mgPb/m^3) both indicate excessive lead levels in the Dross Reverb Area. The Dross Reverb furnace went down about noon on February 11, 1976, the day the craneman and furnaceman personal samples were collected. Although operations were not normal, hourly tape sample results beginning 3:00 p.m. on February 10, show levels considerably above the 0.2 mg/m^3 OSHA limit for lead a full day before scheduled shut down.

Three of the four Sinter Plant personal samples, in addition to the Dross Reverb furnaceman result, were an order of magnitude greater than the current OSHA 8-hour TWA limit for lead. Half-mask respirators, equipped with standard dust and fume cartridges, are routinely worn by these employees. However, their use is authorized in atmospheres containing up to ten times the OSHA lead standard only. These four workers are borderline for being required to wear more acceptable respiratory protection, such as supplied air respirators. It is recognized that such equipment would seriously limit worker mobility and possibly create a safety hazard, if dragging along air hoses is involved. Full facepiece respirators could also be used, provided these do not cause undue discomfort and are well received by the workers. The new Sinter Plant planned for El Paso may affect substantial reductions in airborne lead concentrations and thereby remedy the situation. The Dross Reverb Area is not scheduled for modification, so the continuing problem of excessive airborne lead concentrations in this department goes unresolved. Serious consideration should be given to enclosing the Dross Reverb crane cab and providing heating, ventilation and air conditioning, as recommended in prior survey reports, as an initial step.

The blast furnaceman personal sample (B.Sosa - 2.67 mgPb/m^3) was taken the same day the Dross Reverb furnace ceased operating, and therefore may have been influenced by fugitive emissions from the Dross Reverb Area. The Sosa sample result suggests that more adequate respiratory protection is indicated, such as a supplied air respirator or a full facepiece respirator.

The stationary personal sampler placed in the Lead Plant Office showed a concentration of 0.10 mgPb/m^3, which is at the 8-hour TWA limit being proposed by OSHA as a new lead standard.

B. Copper Department:

Of the six sets of tape samples collected, only one (between Coverter Nos. 2, 3 - Graph 2) recorded a mean lead concentration above the current OSHA limit. At one station (Reverb Matte Tapping Launder) the average of eight hourly samples was almost three times the current OSHA standard for arsenic.

It is important to note that the mean lead concentration at all six tape sampler locations exceeded the proposed OSHA lead standard of 0.10 mg/m^3 based on an 8-hour TWA. Spot checks for arsenic consistently demonstrate levels considerably above the proposed OSHA limit for inorganic arsenic, which is 0.004 mg/m^3.

(Craneman) and (Skimmer) personal samples in the Converter Area were above the OSHA TWA limit for lead. The other fourteen Copper Department personal samples were below the OSHA lead standard. The arsenic limit as proposed by OSHA was consistently exceeded, as verified by personal sampling data.

Stationary personal samplers located in the Reverb and in the Anode Offices demonstrated acceptably low airborne lead levels.

The scheduled enclosure of the Converter Building, which accommodates three converters, a reverberatory and a holding furnace, a zinc fuming and a holding furnace, and two anode furnaces, is welcomed as a partial answer to low level emission control and applauded by the Texas Air Control Board as a positive step toward enhancement of community air quality. On the other hand, from an occupational health standpoint, the repercussions of enclosure are viewed, at best, with guarded optimism. At present, El Paso is treading a fine line between compliance and non-compliance with the present OSHA lead standard inside the Converter Building, as measured by tape and personal air sampling in both past and present surveys. Most personal samples collected in the most recent study violate the proposed OSHA lead standard. Should enclosure concentrate to any great degree or even localize fugitive emissions within the building, the burden of trying to comply with even the air quality portion of the proposed OSHA lead standard may prove intolerable. Lead was singled out as one example. The same comments could equally apply to sulfur dioxide, copper, and possibly to other air contaiminatns, such as arsenic.

C. Zinc Department:

Both tape sampler locations on the Fuming Furnace charge deck showed mean lead-in-air concentrations in excess of the OSHA TLV limit. The Ochoa personal sample (Fuming Furnace charge deck helper)also showed an excessive

airborne lead level. It is noteworthy that the tape sampler positioned on the charge deck's south side (Graphs 7 and 8) ran during the Fuming Furnace start-up period (slag from one Blast Furnace) and recorded more hourly excursions above the OSHA 8-hour TWA for lead and zinc oxide fume than did the sampler on the charge deck's north side (Graph 6), which sampled when the furnace was operating normally (slag from two Blast Furnaces). Personal and tape sampler results indicate that this area would be hard-pressed to comply with the proposed OSHA airborne lead standard.

The Control Room stationary personal sampler recorded minimal airborne lead concentrations.

Personal monitor data for Kiln workers and East Helena fume unloaders continue to show unacceptably high airborne lead concentrations. Eight of the ten Zinc Kiln personal samples violated the OSHA 8-hour TWA for lead. One (Olivas-Kiln Operator) exceeded the limit by a factor greater than ten. Improved dust handling procedures need to be instituted.

East Helena fume unloaders continue to occupy the same enclosure as the car being unloaded. This procedure should be modified to reduce personal dust exposures. The possibility of erecting a platform outside the enclosure, where dust unloading could be viewed, should be considered. As an alternative, a spray fog system within the enclosure may serve to reduce dust levels without clogging dust handling equipment.

Both stationary samplers (Lunch Room and Kiln Office) showed acceptable airborne lead levels, under both current and proposed OSHA standards.

D. Cadmium Department:

Uncontrolled Godfrey Roaster emissions, material handling, and blowing dust contribute to excessive airborne cadmium and lead levels in the Roaster and Mixing Areas, as repeatedly shown by tape and personal sampling. The cadmium dust OSHA ceiling limit (never to be exceeded) is consistently violated. Because dust and fume respirators are approved for dust concentrations up to ten times the applicable TLV, in this case cadmium, the firemen and cranemen should be provided with supplied air or full facepiece respirators until effective engineering controls can be implemented. These controls may include sealing roaster leaks and ventilating the charge conveyor. The craneman may be alternately protected by sealing the crane cab and supplying tempered air through a high efficiency dust filter, such as High Efficiency Particulate Air (HEPA) filter. Paving the yard area may serve to decrease blowing dust. Frequent water spraying or covering with an emulsion of petroleum oils and resins may also control yard dust.

Stationary samplers (Office and Lunch Room) showed acceptably low cadmium and lead levels (see photo).

E. Mill, Sample Mill:

Personal samples for A.Valdez (Mill-Unloader), R.Pax, L.Esparza and H.Fournier (High Grade sample cutters) were above the permissible limit for lead. However, exposures were probably due to lead sulfide, which is much less soluble than lead oxide or elemental lead. Total particulate concentrations in the Mill and in High Grade were excessive and indicate the need for respirators more suitable than the dual cartridge,half face mask variety presently in use. Supplied air respiratory protection should be provided during high grade sample cutting. The Valdez personal sample also exceeded the OSHA silica dust standard based on free silica content.

F. Leach Plant, Umpire Lab, El Paso Lab:

Dust handling with front end loaders probably can be credited with causing dusting in the Leach Area. Both operator and helper personal sample results were above the OSHA TWA limit for lead. Of four fire assayers sampled in the two labs, only one (F.Gonzales-Umpire Lab) showed unacceptable levels of airborne lead in the personal sample. Mr. Gonzales should definitely wear a NIOSH-approved dust and fume respirator during fire assay work. The other fire assayers should wear respirators during fire assaying as a matter of good industrial hygiene practice. Engineering controls or process ventilation should be investigated to decrease airborne lead levels in the fire assaying area of the Umpire Lab.

G. Sulfur Dioxide Sampling:

Walden Gasbadges were used concurrently with impinger sampling trains at stationary locations as part of an on-going study to determine the feasibility of using dosimeters only in evaluating workroom SO_2 concentrations. The impinger method is considered accurate at higher SO_2 concentrations, but may be subject to titration errors up to 25 percent at concentrations less than 1 ppm. The higher impinger values may be due in part also to contamination from the lip of the impinger during transfer of the absorbing solution to the vial for shipping. The dosimeters appear to be influenced by excessive heat, causing artificially high readings. Sulfur dioxide impinger data should be accepted as most nearly approaching the true value, except in the case of spilled or dried-up impinger solutions. A total of eight impinger and dosimeter samples exceeded the present OSHA SO_2 standard. Five of these samples were collected on the

Reverb Charge deck. These data indicate that larry cars should be covered to prevent release of SO_2 in transit to the charging area, as is the practice at Tacoma.

None of the dosimeters employed for personal sampling showed levels above the 5 ppm OSHA SO_2 standard. Six impinger samples and nine gasbadge results were above the limits prescribed in the OSHA proposed standard for SO_2.

H. Asbestos - Sampling and Use:

Heavy dust concentrations generated during Blast Furnace caulking effectively masked any asbestos fibers collected on the open-face Millipore filters. No fiber counts were possible. Shorter sampling times and wetting down to suppress dust may aid future sampling endeavors. To comply with OSHA regulations, asbestos sampling should be conducted at six-month intervals to determine asbestos concentrations in the breathing zones of furnace caulkers, masons, and any other plant personnel who may use asbestos. In addition, all employees exposed to asbestos (exposure level not defined by OSHA) should receive an annual comprehensive medical examination. It may be helpful to maintain a roster on these individuals.

Several Quigley products were noted in the Brick Mason Shed, namely Plastic Insulcrete, Heathcrete, Q-Chrome and Insulag AF. An inventory of Kaiser Lo-Set S-405 was also observed. These bags contained no asbestos disclaimers. The respective manufacturers should be requested to provide a written statement or a Meterial Safety Data Sheet for each product. The manufacturers' reply should specifically address the subject of asbestos content.

I. Noise:

The Lopez dosimeter result (Fireman-Copper Roasters) was within the calibration range of the dosimeter (75-133%) and therefore may be a violation of the OSHA 8-hour TWA limit of 90 dBA. The 115 dBA ceiling limit, which should never be exceeded, was surpassed. The exursion over the ceiling value is probably traceable to burner noise as Lopez was rabbling. No hearing protection was observed.

Anode Casting, Power House and Ore Bins dosimeter data were all within permissible limits.

The measurements taken from Converter tuyere punchers continue to demonstrate unacceptably high 8-hour average readings. Of sixteen dosimeter samples collected, two were definite and three were possible violations of the permissible 8-hour limit. One dosimeter result was a blatant case of employee mischief (C.Smith-Foreman). Ten of the sixteen samples exceeded the

115 dBA ceiling limit. The ceiling value data should be interpreted cautiously because employees are prone to tamper with the instruments. For example, the violations of the ceiling value recorded by the [redacted] dosimeters (Middle Craneman) are suspect, because the data for the other cranemen indicate that no such noise exposures appear possible.

(Tapper-Copper Reverb) used an air hammer to clean out launders. His dosimeter showed violations of allowable 8-hour and ceiling limits for noise.

Of the lead workers sampled, six of their dosimeters recorded definite violations of the OSHA 8-hour TWA limit for noise. One additional sample may be a violation, because it falls within calibration limits of the dosimeter. Three excursions above the ceiling limit were recorded by dosimeters worn by two blast furnacemen and one blast feederman. Manual tuyere punching may explain the ceiling violations in the case of the furnacemen. The feederman's activities were not observed.

Burner noise may also explain ceiling value violations for several zinc and cadmium workers. Four samples collected in the two departments fall within the dosimeter calibration range, and may be violations of the OSHA 8-hour TWA limit.

Higher noise levels than those presently found in the Sample Mill can be expected in future sampling when the rolls are operating.

Mill dosimeter results reinforce the data which were collected during the last survey. By enclosing the rail car being unloaded and keeping the employees outside the enclosure, both noise and dust levels recorded by personal sampling instrumentation could be reduced. Mill workers, including rail car unloaders, who remain close to the car when the car shaker is in operation, were observed to wear no hearing protection. To forestall future workmens' compensation claims of occupational hearing loss, the wearing of hearing protection should become a rigidly enforced program in all areas demonstrated in present and past reports to have average noise levels in excess of the OSHA 8-hour TWA limit or excursions above the OSHA 115 dBA ceiling limit.

Workers in extremely noisy areas, such as tuyere punchers and rail car unloaders, should be given an audiogram every six months instead of annually. These audiograms should be reviewed by a physician or a qualified consultant to determine if noise induced hearing loss is occurring. A well-administered audiometric program, with feedback to plant safety and supervisory personnel, can pinpoint breakdowns in the hearing protection program and provide the necessary surveillance over negligent employees.

J. Biological Monitoring:

As of June 1, 1976, there are seven employees above Asarco's action list and five on the confirmed list for excessive blood lead levels. Of the seven exceeding the action level, three are D&L employees (Foreman, Operator and Beltman), two are Blast Furnacemen, one is a Baghouse Helper and one is a Boilermaker in the Shop. The five confirmed employees include a D&L Fireman, a Boiler Shop Helper, a Blast Furnace Cat Operator, a Pipefitter, and a Zinc Kiln Tender. It is disturbing that two of the five who are confirmed are maintenance personnel. One employee on the action list is also a shop worker. Supervisory personnel should stress the importance of wearing respirators into production areas where many repairs occur. Supervisors should also exemplify the importance of respirators by carrying and wearing respirators in high exposure areas.

K. Welding:

The two personal samples collected from welders in the Boiler Shop are acceptably low for lead, cadmium and total particulate. [redacted] was not using available exhaust ventilation as he welded steel plate. He also wore no respirator. [redacted] had no available flexible hose exhaust ventilation as he welded with manganese and so-called P-5 rods. [redacted] wore respiratory protection.

Depending upon the metal being welded and the type of metal coatings, fluxes, and other combustibles (e.g., cleaning solvents) at the weld site, toxic gases and aerosols produced from welding may include ozone, carbon monoxide, carbon dioxide, nitrogen oxides, phosgene, hydrogen fluoride, acreolin, metal fumes and other hazardous substances. The Department of Environmental Sciences is desirous of obtaining a description of El Paso's welding operations and a list of the welding rod inventory to plan for future sampling.

El Paso is to be complimented for installing exhaust ventilation at welding stations. Employees should now be encouraged to use it. If not available, such as on location in the plant, respirators should be worn.

V. RECOMMENDATIONS

A. Crane cabs in the Dross Reverb and Cadmium Departments should be enclosed and provided with filtered, tempered air.

B. Zinc fume unloading should be modified so that lead exposures to unloaders may be reduced, as described in Comments.

C. Personal exposures to Godfrey Roaster workers should be reduced by sealing roaster leaks, exhaust ventilating the charge conveyor, and paving or coating the yard area with a dust suppressant.

D. Until engineering controls are implemented, Cadmium cranemen and firemen should be provided with supplied air respirators or full facepiece respirators.

E. High Grade sample cutters should wear supplied air respirators or full facepiece respirators.

F. Fire assayers should wear NIOSH-approved respirators for dust and fume during fire assay work.

G. Semi-annual asbestos sampling should be conducted at El Paso. The Department of Environmental Sciences will be happy to coordinate the project with plant personnel.

H. A determination should be made of how many El Paso employees are exposed to asbestos in their work. Based on this determination, annual medical examinations should be provided.

I. Material Safety Data Sheets or disclaimer letters should be requested from Quigley & Kaiser regarding asbestos content of their products.

J. Mill unloaders should be protected from car shaker noise by enclosing the rail car or providing a sound booth. Until engineering controls are realized, it is urged that the wearing of hearing protection be strictly enforced.

K. Workers in extremely noisy areas, such as tuyere punchers and Mill unloaders, should be given semi-annual audiograms. Feedback to supervisors should be established in cases where significant threshold shifts are observed. The supervisors may then more closely monitor the wearing of hearing protection.

L. Maintenance personnel shown to be above the action level or confirmed for high blood lead should be reminded to wear respirators in production areas and in any visible dust or fume. Production workers above the action level or with confirmed high blood lead levels should have their work, respirator-wearing and personal hygiene practices reviewed, as outlined in the Asarco Lead Hygiene Program.

M. El Paso is requested to furnish D.O.E.S. with a listing of the types of welding conducted in the shop areas and the kinds of welding rods used. It may be necessary to contact vendors to determine the composition of the various rods. Material Safety Data Sheets may be available from them upon request.

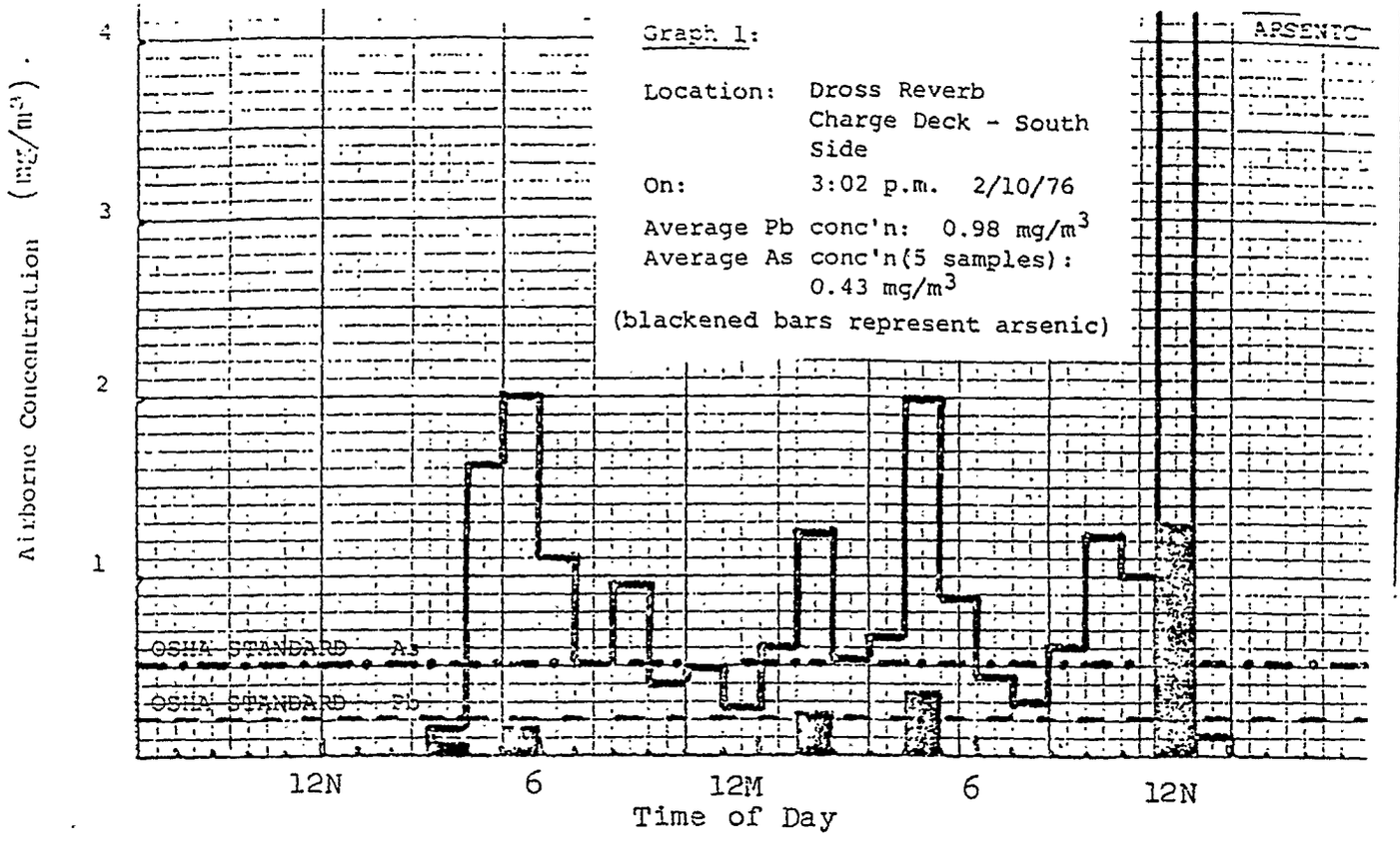
John B. Richardson

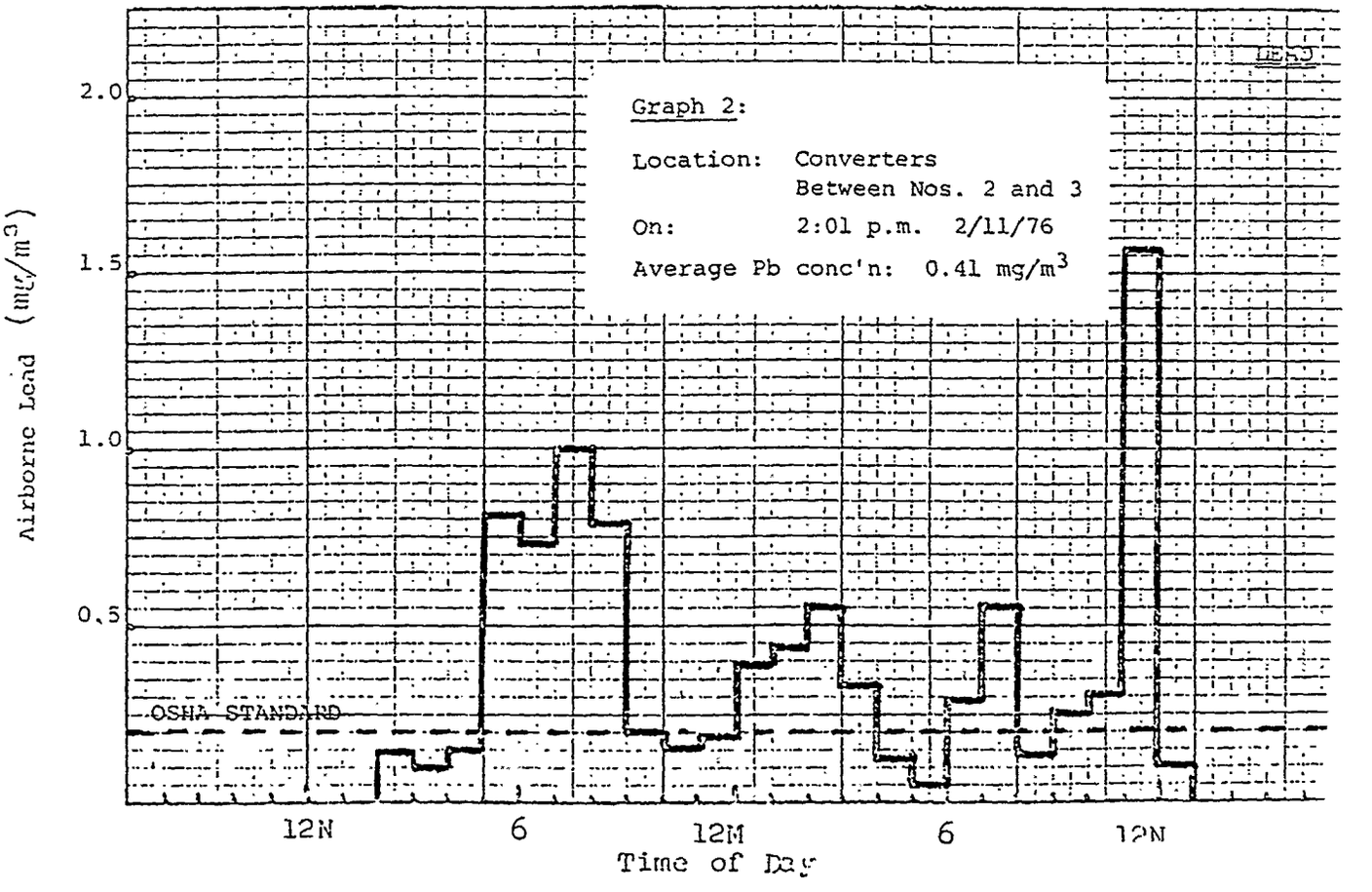
John B. Richardson
Environmental Specialist

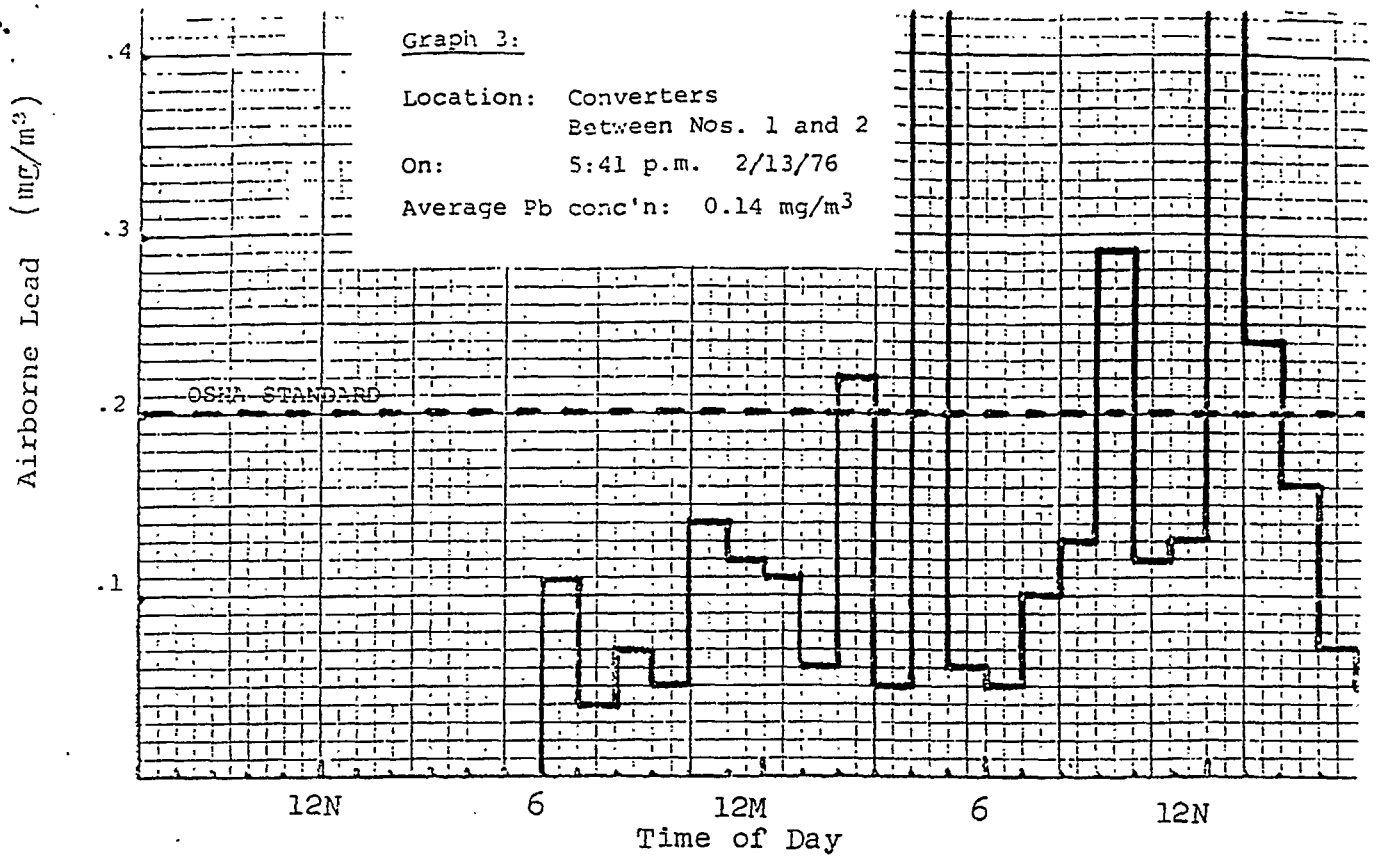
Lowell D. White

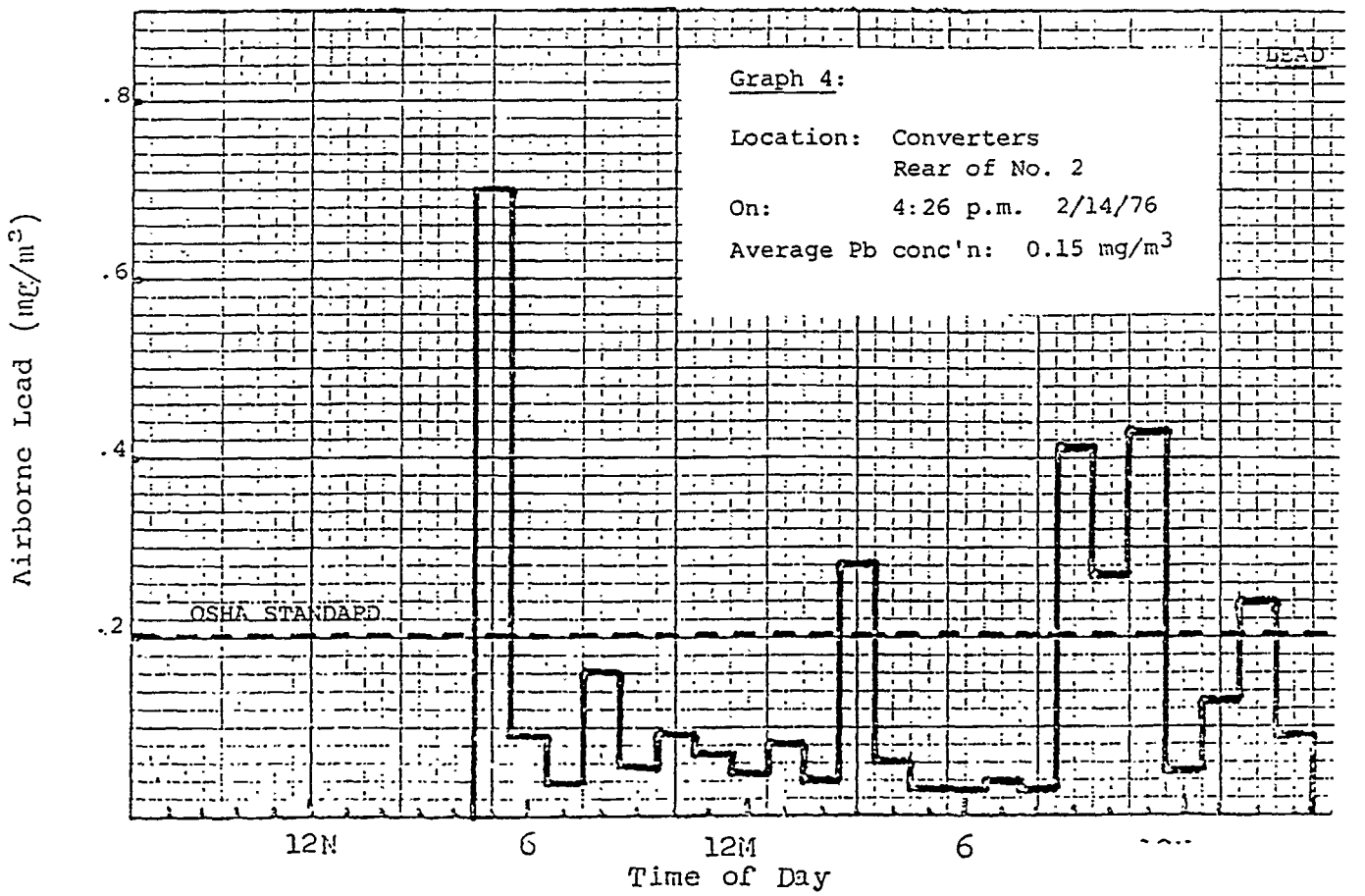
Lowell D. White, Ph.D.
Environmental Scientist

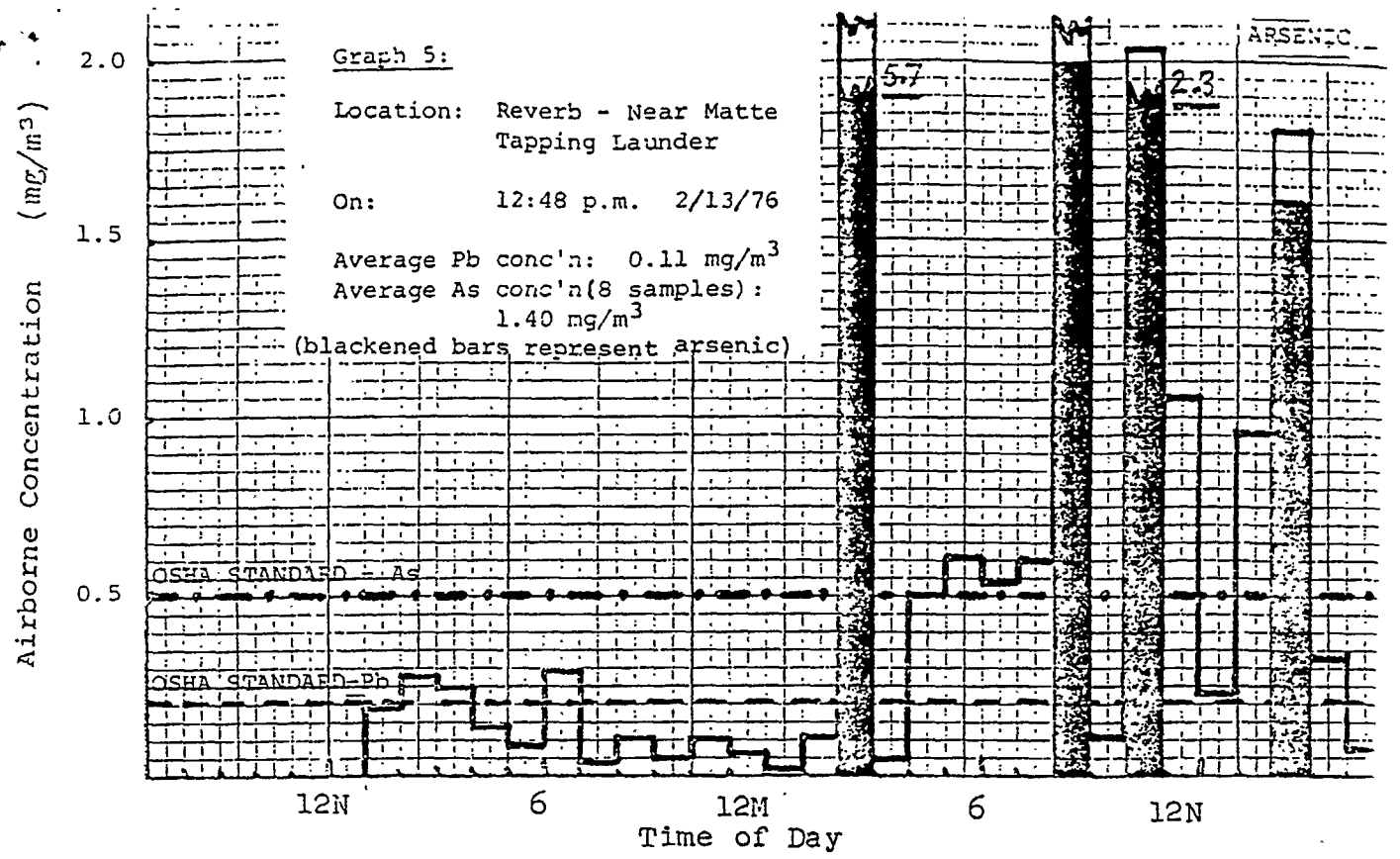
JBR/LDW:bjs
Encl.

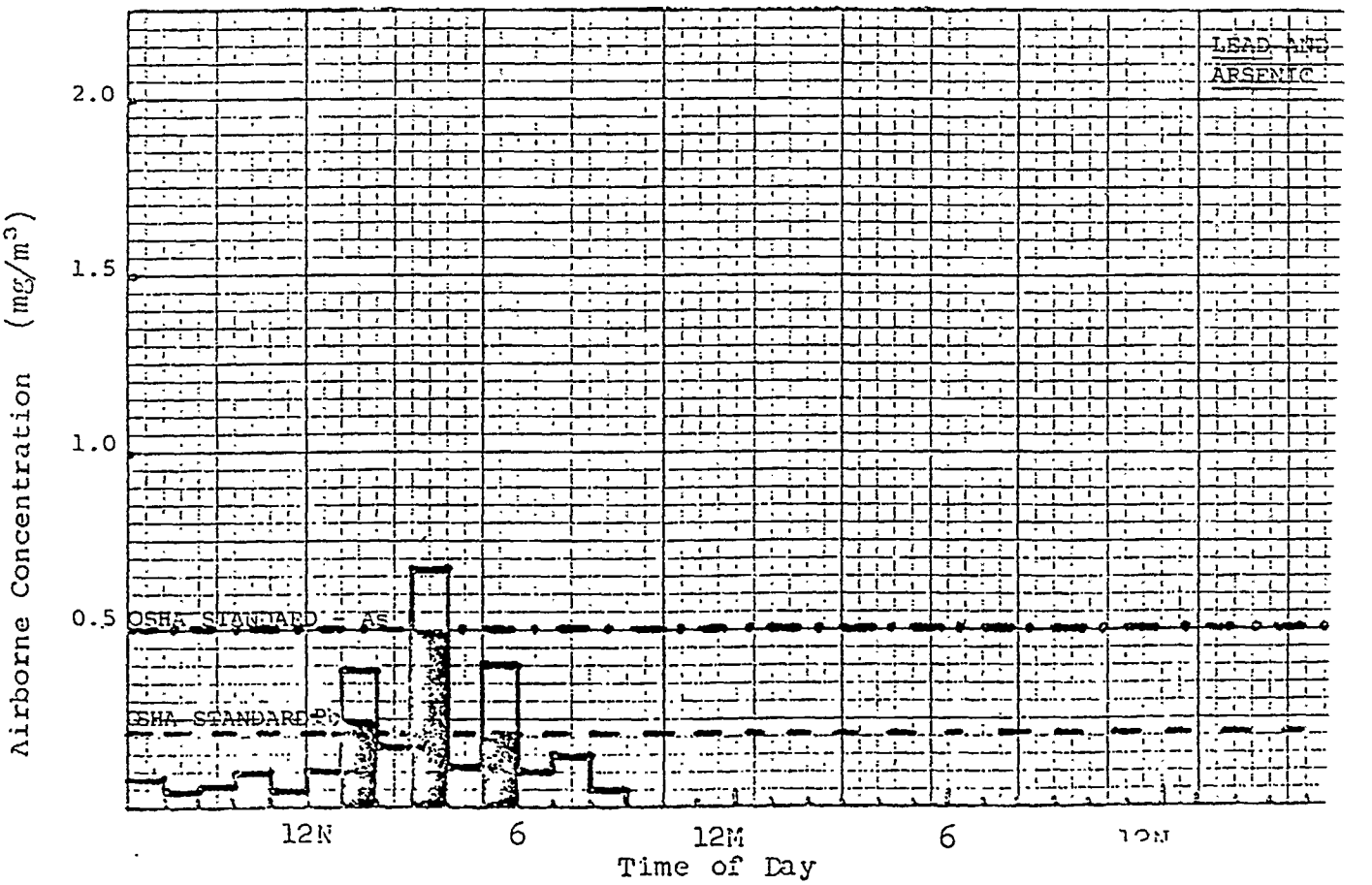

Graph 1:
Location: Dross Reverb Charge Deck - South Side
On: 3:02 p.m. 2/10/76
Average Pb conc'n: 0.98 mg/m3
Average As conc'n(5 samples): 0.43 mg/m3
(blackened bars represent arsenic)
ARSENIC
Airborne Concentration (mg/m3)
4
3
2
1
OSHA STANDARD - As
OSHA STANDARD - Pb
12N
6
12M
6
12N
Time of Day

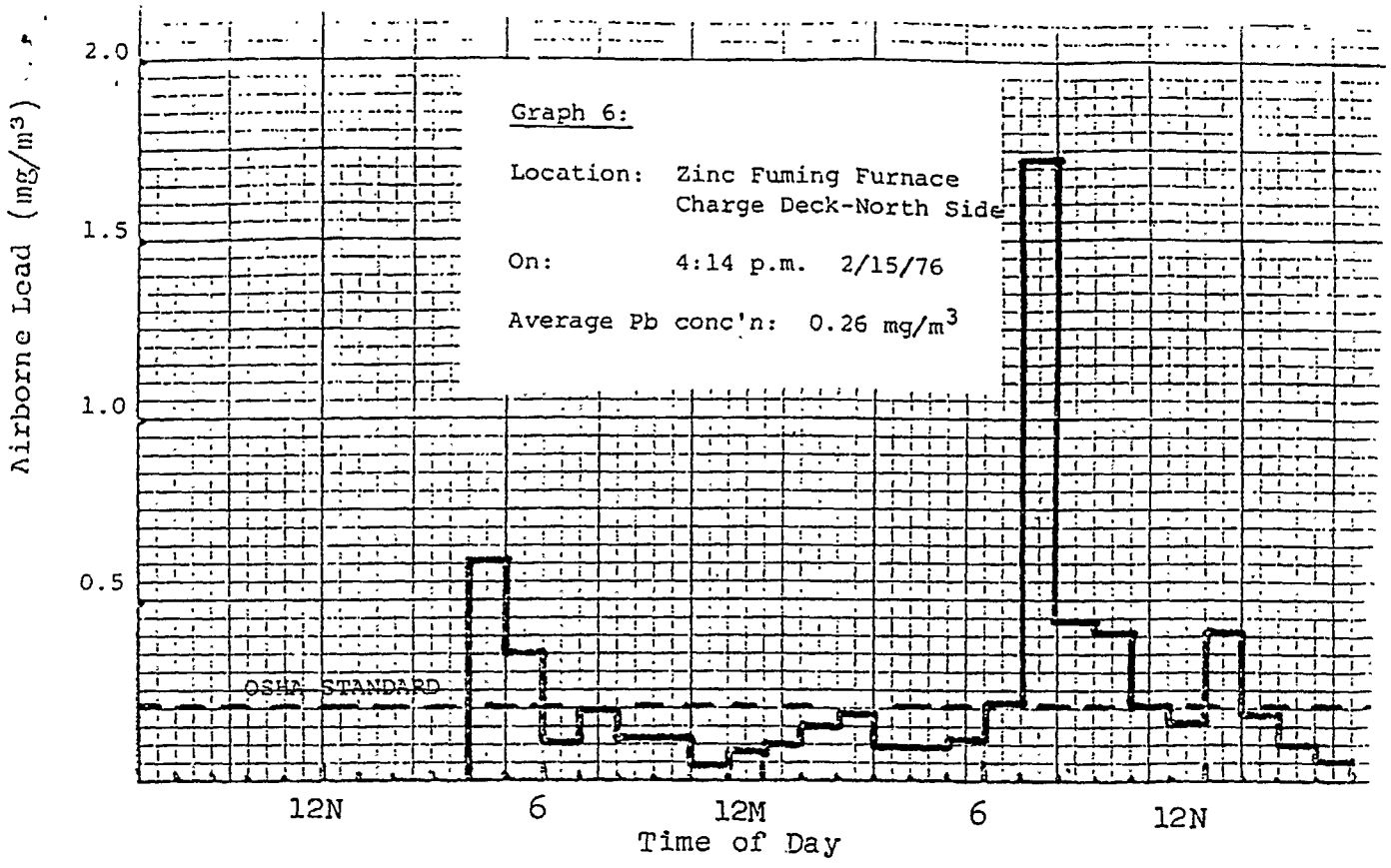

Graph 2:
Location: Converters Between Nos. 2 and 3
On: 2:01 p.m. 2/11/76
Average Pb conc'n: 0.41 mg/m3
LEAD
Airborne Lead (mg/m3)
2.0
1.5
1.0
0.5
OSHA STANDARD
12N
6
12M
6
12N
Time of Day

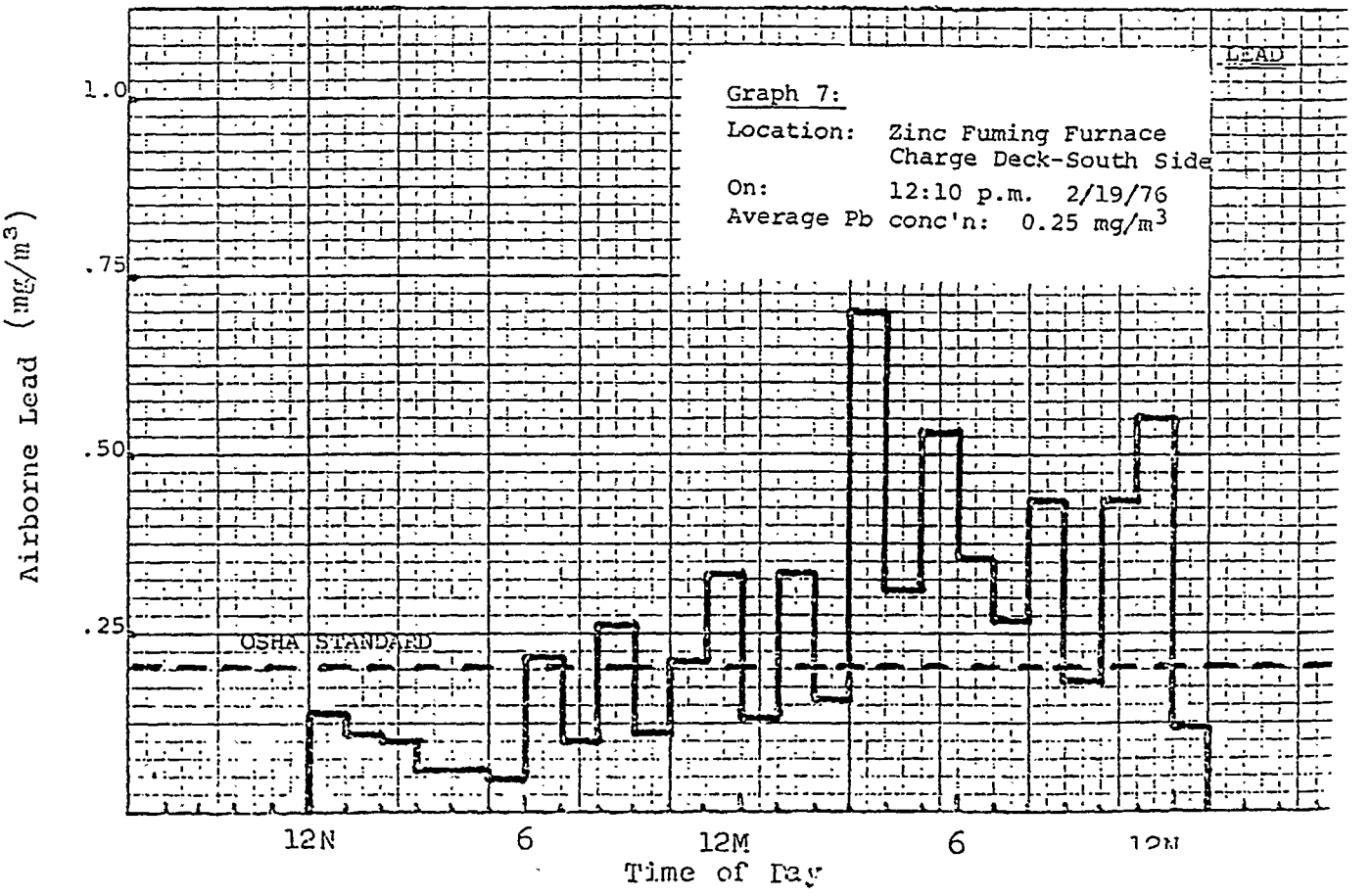

Graph 3:
Location: Converters
Between Nos. 1 and 2
On: 5:41 p.m. 2/13/76
Average Pb conc'n: 0.14 mg/m3
Airborne Lead (mg/m3)
.4
.3
.2
.1
OSHA STANDARD
12N
6
12M
6
12N
Time of Day

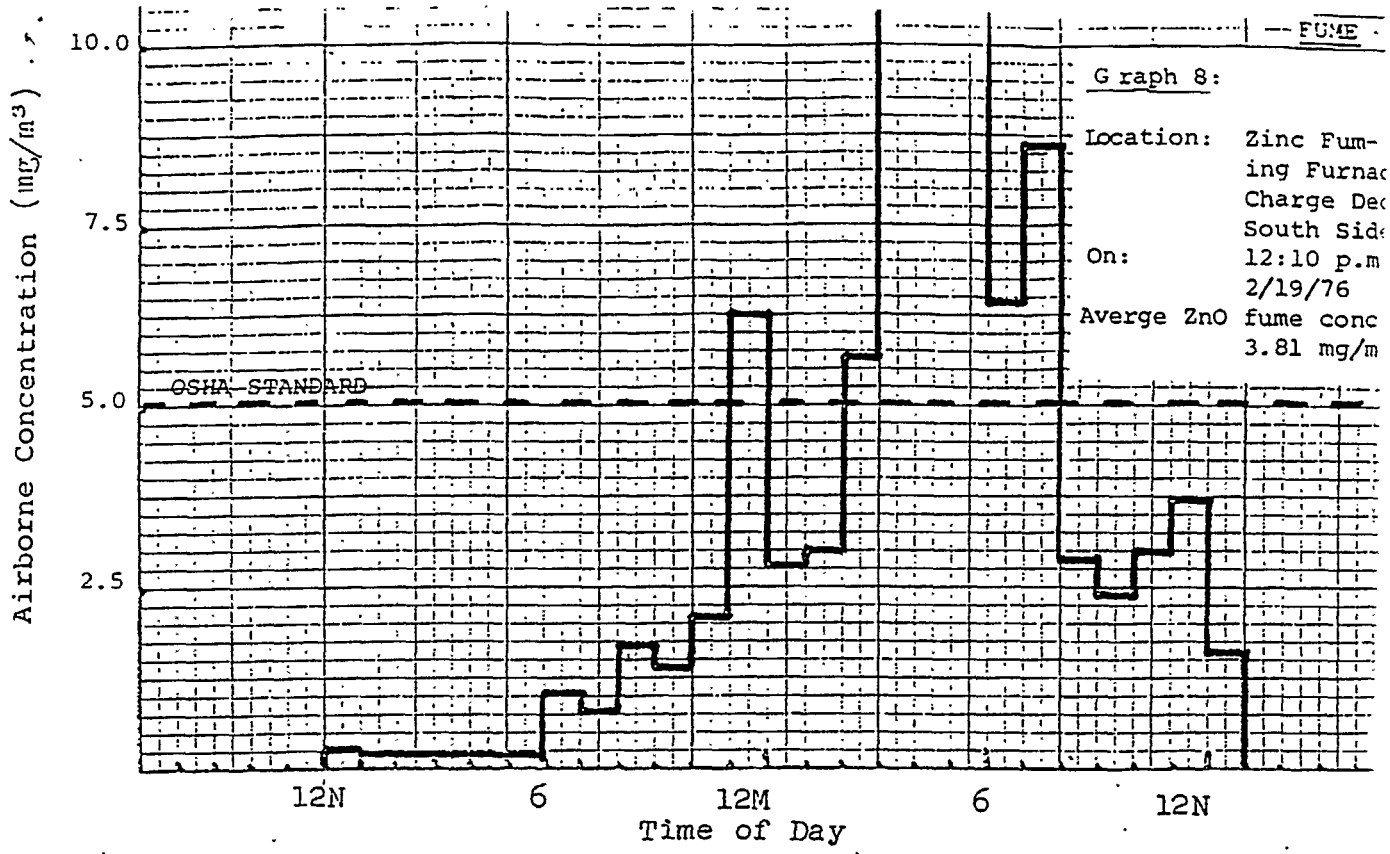

Graph 4:
Location: Converters
Rear of No. 2
On: 4:26 p.m. 2/14/76
Average Pb conc'n: 0.15 mg/m3
Airborne Lead (mg/m3)
.8
.6
.4
.2
OSHA STANDARD
12N
6
12M
6
Time of Day


Graph 5:
Location: Reverb - Near Matte Tapping Launder
On: 12:48 p.m. 2/13/76
Average Pb conc'n: 0.11 mg/m3
Average As conc'n(8 samples): 1.40 mg/m3
(blackened bars represent arsenic)
ARSENIC
5.7
2.3
2.0
1.5
1.0
0.5
OSHA STANDARD - As
OSHA STANDARD-Pb
Airborne Concentration (mg/m3)
12N
6
12M
6
12N
Time of Day


LEAD AND ARSENIC
2.0
1.5
1.0
0.5
OSHA STANDARD - As
OSHA STANDARD-Pb
Airborne Concentration (mg/m3)
12N
6
12M
6
12N
Time of Day


Airborne Lead (mg/m³)
2.0
1.5
1.0
0.5
Graph 6:
Location: Zinc Fuming Furnace
Charge Deck-North Side
On: 4:14 p.m. 2/15/76
Average Pb conc'n: 0.26 mg/m³
OSHA STANDARD
12N
6
12M
6
12N
Time of Day


Airborne Lead (mg/m³)
1.0
.75
.50
.25
LEAD
Graph 7:
Location: Zinc Fuming Furnace
Charge Deck-South Side
On: 12:10 p.m. 2/19/76
Average Pb conc'n: 0.25 mg/m³
OSHA STANDARD
12N
6
12M
6
12N
Time of Day

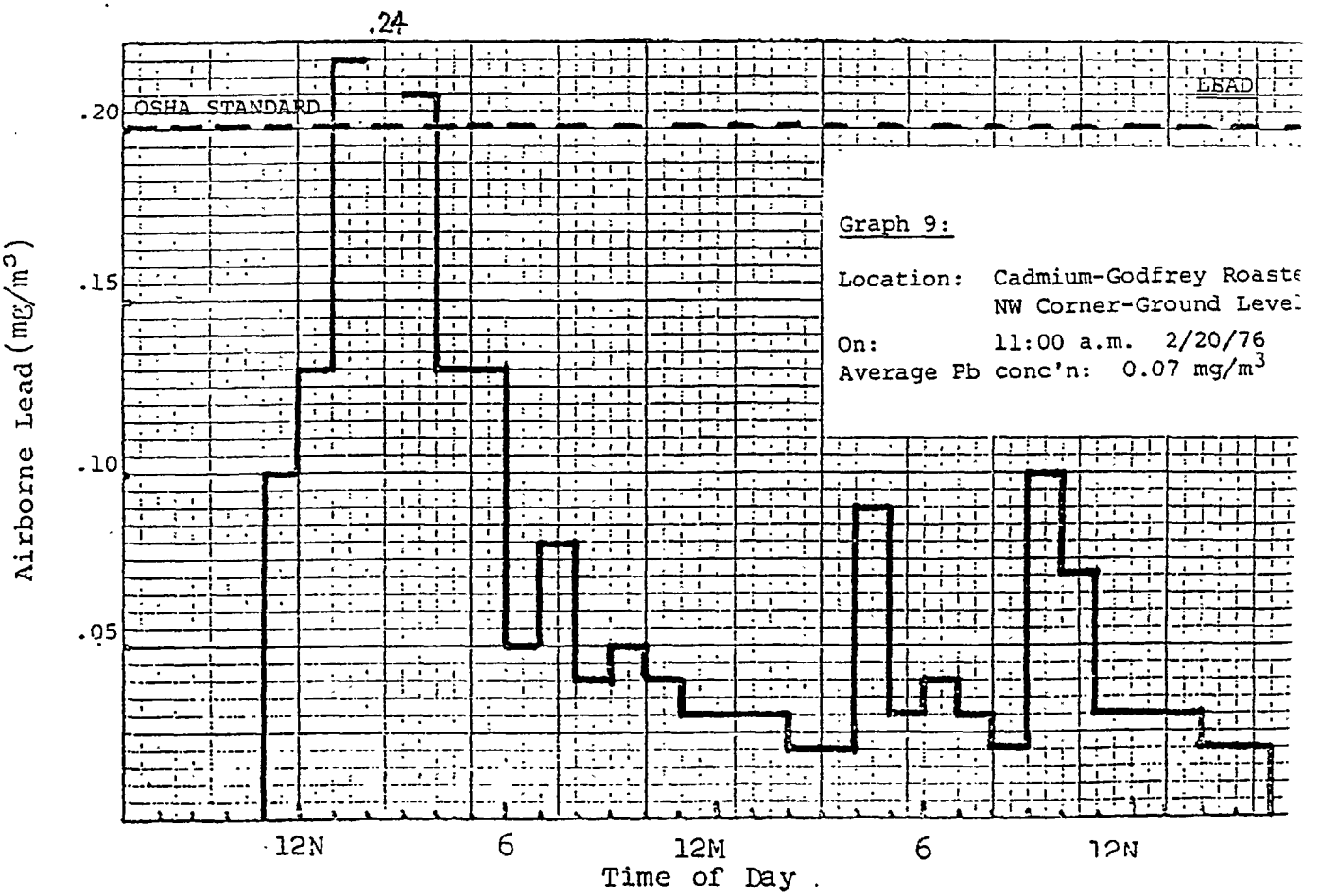


Graph 8:

Location: Zinc Fuming Furnace Charge Deck South Side

On: 12:10 p.m. 2/19/76

Average ZnO fume conc: 3.81 mg/m³



Graph 9:

Location: Cadmium-Godfrey Roaster NW Corner-Ground Level

On: 11:00 a.m. 2/20/76

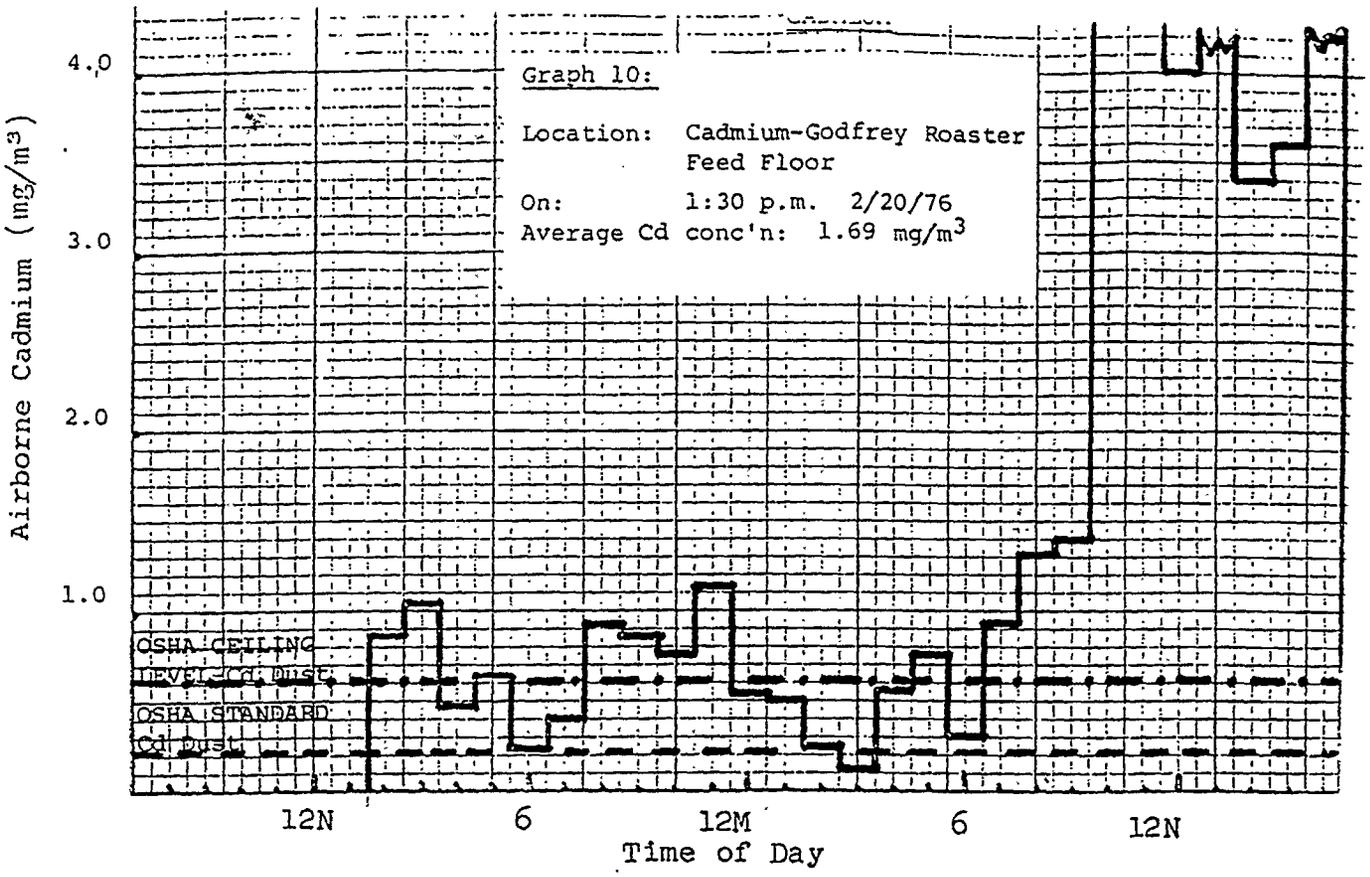
Average Pb conc'n: 0.07 mg/m³

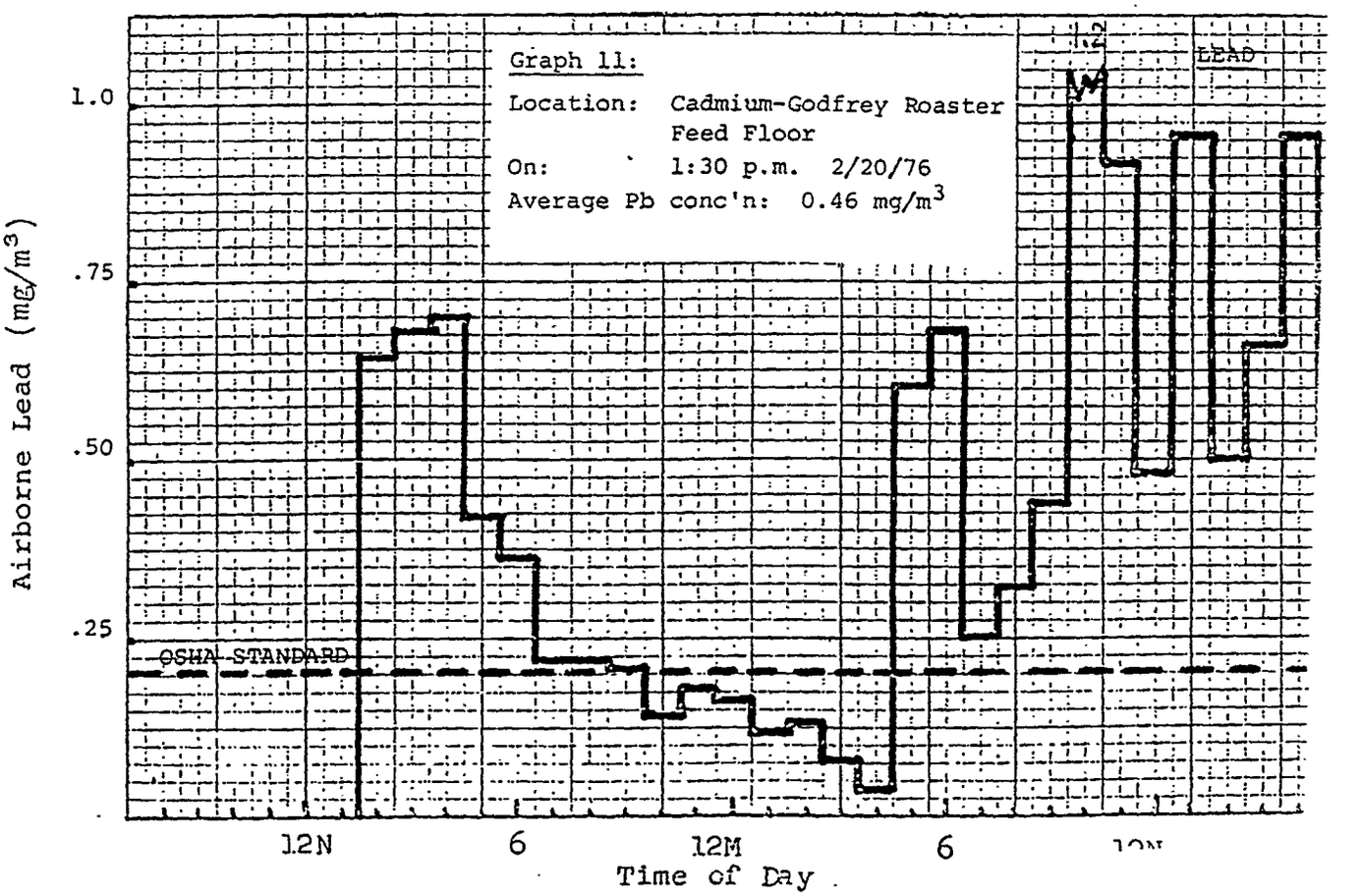
CONVERTER DEPARTMENT

Uncontrolled converter emissior contribute to background levels of various airborne contaminants in the Converter Building.

CADMIUM DEPARTMENT

Stationary personal monitor to check air quality in Godfrey Roaster office.


Graph 10:
Location: Cadmium-Godfrey Roaster Feed Floor
On: 1:30 p.m. 2/20/76
Average Cd conc'n: 1.69 mg/m3
Airborne Cadmium (mg/m3)
4.0
3.0
2.0
1.0
OSHA CEILING LEVEL Cd DUST
OSHA STANDARD Cd DUST
12N
6
12M
6
12N
Time of Day


Graph 11:
Location: Cadmium-Godfrey Roaster Feed Floor
On: 1:30 p.m. 2/20/76
Average Pb conc'n: 0.46 mg/m3
LEAD
Airborne Lead (mg/m3)
1.0
.75
.50
.25
OSHA STANDARD
12N
6
12M
6
Time of Day