PLAINTIFF'S
EXHIBIT
ASA-338

ENVIRONMENTAL SURVEY

Corpus Christi

October 11-13, 1977

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ENVIRONMENTAL SURVEY

Corpus Christi

October 11-13, 1977

Prepared by: Stanley G. Cothrin
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Department of Environmental Sciences
ASARCO Incorporated
Salt Lake City, Utah

Report Date: December 15, 1977

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ENVIRONMENTAL SURVEY

Corpus Christi

October 11-13, 1977

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ENVIRONMENTAL SURVEY

CORPUS CHRISTI

October 11-13, 1977

EXECUTIVE SUMMARY

Personal monitor samples in the Sulfide Unloading and Storage Departments indicated potentially excessive cadmium dust exposures during DeCad dust unloading. Personal monitor samples for a sulfide unloading laborer, the sulfide front end loader operator, the sweeper operator in the Yard Department, and leadman in the Oxide Storage Department exceeded the OSHA lead standard. Excessive noise exposures were measured for personnel unloading DeCad dust and the boiler tender in the Lurgi Roaster Department. All other areas of the plant were in compliance with the appropriate OSHA standards.

Recommendations include: use of NIOSH/MESA-approved respirators for personnel with potentially excessive lead and cadmium exposures; implementation of the Asarco Cadmium and Lead Hygiene Programs for exposed personnel; implementation of a written respirator program; use of personal hearing protection by personnel with excessive noise exposures and installation of engineering controls, where feasible; and implementation of a confined space entry procedure.

ENVIRONMENTAL SURVEY

CORPUS CHRISTI

October 11-13, 1977

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I. OPERATING CONDITIONS

Operating conditions were normal.

II. SAMPLING AND ANALYTICAL PROCEDURES

A. Air:

1. One-hour sequential samples of airborne fugitive emissions were collected with R.A.C. Model G-2 tape samplers. The samples were analyzed for zinc, cadmium and lead by atomic absorption spectrophotometry.

2. Individual dust, fume, and mist samples were collected with M.S.A. personal monitoring devices equipped with closed-face (plastic cover in place and inlet plug removed) Gelman filter (0.8-micron pore size) cassettes.

   The personal monitor samples were analyzed for zinc, cadmium and lead by atomic absorption spectrophotometry. The arsenic content was determined using a modified Gutzeit method with quantitation by silver diethyldithiocarbamate procedure.

   Sulfuric acid mist samples were analyzed by the standard volumetric procedure as recommended by NIOSH.

B. Noise:

1. Noise measurements were taken with a B&K Model 2205 Sound Level Meter using the "A" scale and "slow" response setting. The meter was calibrated with a type 4320 standard noise calibration source before and after each set of measurements.

2. Individual noise exposure data were collected using DuPont Permissible Audio Dosimeters, Model D-100, which measure noise exposures in terms of the present

B. Noise: (continued)

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. A DuPont Audio Dosimeter Calibrator was used to establish that the calibration on each dosimeter was within the acceptable range of ±2 dBA.

III. RESULTS

A. Air:

1. Tape Samplers

Department	Location	1977 Date & Starting Time	Analysis	Conc'n. (mg/m^3) Mean	Max.	Min.	No. of Hourly Samples	Percent Exceeding OSHA Limit	Graph No.
Sulfide Unloading & Storage	Tripper Floor Belt Junction	10/11 11:15a.	Zn	.91	4.55	.04	28	0	--
			Cd	<.04	.20	<.001	28	0	--
			Pb	<.04	.16	.01	28	0	--
		(Day Shift Only - DeCad Dust Unloading)							
		10/12 6:15a.	Cd	.10	.20	.004	9	0	1
	Column Between C & D Bins	10/12 3:20p	Zn	.27	1.23	.02	21	0	--
			Cd	<.005	.02	<.001	21	0	--
			Pb	.03	.11	.01	21	0	--

PERSONAL MONITOR SAMPLES
CORPUS CHRISTI

DEPARTMENT	NAME S.S. NUMBER	JOB TITLE (RESP. USE)	1977 DATE & SHIFT	SAMPLING TIME (MIN.)	ANAL-YSIS	CONC'N (mg/m3)
SULF.UNLD.	GARCIA 449442751	SHOVEL OPER. NO	10/11 D	257		
					Zn	1.06
					Cd	.04
					Pb	.05
	CROSS 464211111	LABORER NO	10/11 D	260		
					Zn	5.28
					Cd	.17
					Pb	.34
	CROSS 464211111	LABORER YES	10/12 D	420		
					Zn	9.03
					Cd	.39 (
					Pb	.15 (
	GARZA 451744981	LABORER NO	10/11 D	263		
					Zn	1.68
					Cd	.02
					Pb	.06
	GARZA 451744981	LABORER NO	10/12 D	477		
					Zn	1.03
					Cd	.05
					Pb	.02
	MUNOZ 455321437	LABORER NO	10/12 D	421		
					Zn	1.77
					Cd	.09
					Pb	.03
	LANDIN 462240147	LABORER NO	10/12 D	475		
					Zn	1.14
					Cd	.05
					Pb	.03

PERSONAL MONITOR SAMPLES
CORPUS CHRISTI

DEPARTMENT	NAME S.S. NUMBER	JOB TITLE (RESP. USE)	1977 DATE & SHIFT	SAMPLING TIME (MIN.)	ANAL-YSIS	CONC'N. (mg/M3)
SULF.UNLD.	BARRIENTES 453183910	FRNT.END LDR YES	10/13 D	285		
					Zn	5.13
					Cd	.09
					Pb	.37 (
YARD	LIRA 459056853	BELTWATCHER YES	10/11 D	242		
					Zn	.99
					Cd	.04
					Pb	.04
	LIRA 459056853	BELTWATCHER YES	10/12 D	410		
					Zn	1.92
					Cd	.08
					Pb	.05
	YBARRA 449106079	SWEEPER OPER YES	10/12 D	330		
					Zn	5.16
					Cd	.18
					Pb	.78 (
LUR. ROAST	TREVINO 457587992	BELTWATCHER YES	10/11 D	213		
					Zn	.58
					Cd	.01
					Pb	.03
LUR.ROAST.	BROWN 463745946	BOILER TEND. NO	10/13 D	315		
					Zn	2.13
					Cd	.01
					Pb	.07
	ALVAREZ 449721164	2ND GRADE OP NO	10/13 D	237		
					Zn	.55
					Cd	< .01
					Pb	.03

PERSONAL MONITOR SAMPLES
CORPUS CHRISTI

DEPARTMENT	NAME S.S. NUMBER	JOB TITLE (RESP. USE)	1977 DATE & SHIFT	SAMPLING TIME (MIN.)	ANAL-YSIS	CONC'N (mg/m3)
SULF.LEACH	FLORES 455189909	CD HELPER NO	10/13 D	290		
					Cd	.01
	PEREZ 465249751	CD LEADMAN NO	10/13 D	290		
					Cd	.01
SULF.PURIF	REYNA 454907295	2ND GRADE NO	10/12 D	328		
					As	.001
	CASTANEDA 454685001	LEADMAN NO	10/12 D	328		
					As	.001
SULF.CELL	BENAVIDES 464141475	CELL INSPECTOR NO	10/12 D	302		
					H2SO4	.24
	MARTINEZ 455127651	CELL INSPECTOR NO	10/12 D	305		
					As	< .001
	DALRYMPLE 458603477	DROSS MILL OP. YES	10/13 D	373		
					Zn	.72
					Cd	< .01
					Pb	< .01

PERSONAL MONITOR SAMPLES
CORPUS CHRISTI

DEPARTMENT	NAME S.S. NUMBER	JOB TITLE (RESP. USE)	1977 DATE & SHIFT	SAMPLING TIME (MIN.)	ANAL-YSIS	CONC'N. (mg/m3)
OX.STORAGE	MARTINEZ 452468416	LOADER OPER. NO	10/12 D	317		
					Zn	1.12
					Pb	.14 (
	CAVADA 464144645	LEADMAN NO	10/12 D	312		
					Zn	2.24
					Pb	.29 (
OX.LEACH	NUNEZ 459467253	LEACH LEADMAN NO	10/13 D	300		
					As	.006 (
OX.PURIF.	ALEMAN 466527913	2ND GRADE OP. NO	10/13 D	265		
					As	.008 (
OXIDE CELL	PINEDA 449781597	3RD GRADE OPER NO	10/13 D	222		
					Zn	.56
	WHITE 449665773	STRIPPER NO	10/13 D	225		
					As	< .002
	HENRY 457966787	CELL INSPECTOR NO	10/13 D	235		
					As	< .007
	BARRERRA 449782088	CELL INSPECTOR NO	10/13 D	233		
					H2S04	.88

Footnotes:

(1) Exceeds the current OSHA 8-hour time-weighted average (TWA) standard.

(2) Exceeds the proposed OSHA TWA standard.

(3) Shift Notation: D = Day

CURRENT STANDARDS:

Zn		=	15 mg/m^3 (nuisance dus
ZnO	(fume)	=	5 mg/m^3
Cd	(dust)	=	0.2 mg/m^3
Cd	(fume)	=	0.1 mg/m^3
Pb		=	0.2 mg/m^3
As		=	0.5 mg/m^3

PROPOSED STANDARDS:

Pb	=	0.1 mg/m^3
As	=	0.004 mg/m^3

B. Noise:

1. Sound Level Meter Readings

Department	Location	Noise Level (dBA)	OSHA Permissibl Noise Exposure Duration per Da (Hrs./Min.)
Sulfide Unloading	General Area Around Car During DeCad Unloading (vibrator)	107	0/46
	Tripper Belt Floor (vibrator noise)	88	8+
Lurgi Roaster	Slinger Deck (slinger operating)	92-95	6/4-4/0
Sulfide Leach	Leach Tank & Burk Filter Area	82-83	8+
	By #1 Purification Tank (fan noise)	90	8/0
	By #5 Purification Tank	85	8+

1. Sound Level Meter Readings (continued)

Department	Location	Noise Level (dBA)	OSHA Permissible Noise Exposure Duration per Day (Hrs./Min.)
Sulfide Cast	Ingot Mold Line	87	8+
Oxide Storage	By Oxide Grinding Mill	91-94	6/58-4/36
	By Feed Bin for Oxide Grinding Mill	83	8+
Sulfide Leach	Oxide Leach Tanks	85-88	8+
	Oxide Purification Tanks	84	8+
Zinc Dust Unit	Three feet from Dust Chamber	98	2/50
	Foot of Stairs to Operator's Platform	93	5/17
	Dust Unit Operator Platform	88	8+

2. Noise Dosimeter Measurements

Department	Employee S.S.No.	Job (Hearing Protection Worn?)	1977 Date & Shift (6)	Sampling Time (Min.)	Dosimeter Readout (Percent) (1)	Adjusted to 8 Hours (Percent) (2)	115 dB Exceeded (3)
Sulfide Unloading	Cross 464-21-1111	Laborer No	10/12 D	402	285	340 (4)	Yes
	Garza 451-74-4981	Laborer No	10/12 D	417	150	173 (4)	Yes
Sulfide Storage	Barrientes 453-18-3910	Front-end Loader Oper. Yes	10/13 D	285	29	49	No
Lurgi Roaster	Brown 463-74-5946	Boiler Tender No	10/13 D	315	125	190 (4)	Yes
	Alvarez 449-72-1164	2nd Grade Operator No	10/13	297	55	89 (5)	No

2. Noise Dosimeter Measurements (continued)

Department	Employee S.S.No.	Job (Hearing Protection Worn?)	1977 Date & Shift (6)	Sampling Time (Min.)	Dosimeter Readout (Percent) (1)	Adjusted to 8 Hours (Percent) (2)	115 dBA Exceeded (3)
Sulfide Cast	Lerma 463-82-6801	Caster No	10/13 D	345	0	0	Yes
	Ramirez 454-76-1007	Caster Helper No	10/13 D	347	96	133*	No
Sulfide Cell	Dalrymple 458-60-3477	Dross Mill Operator No	10/13 D	373	36	46	No
	Nash 466-38-0027	Zinc Dust Unit Oper. No	10/13 D	208	44	51**	Yes
Oxide Storage	Martinez 452-46-8416	Loader Operator No	10/12 D	318	16	24	No
	Cavada 464-14-4645	Leadman No	10/12 D	313	24	37	Yes
Yard	Ybarra 449-10-6079	Sweeper Operator No	10/12 D	330	62	90 (5)	No

Footnotes: * This noise exposure is suspect because the sound level meter reading in this area was 87 dBA.

** The dosimeter readout was extrapolated to four hours instead of eight because an employee only works at the zinc dust unit for four hours and is then transferred to the cell house.

(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.

Footnotes (continued)

(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 ± 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) Shift Notation: D = Day

IV. COMMENTS

A. Sulfide Unloading and Storage:

Results of the tape samples obtained in the tripper floor and bin areas were all within OHSA limits for zinc, cadmium, and lead. Because sulfide unloading only occurs during day shift, a separate calculation of the tape sample results was performed for cadmium concentrations, during Columbus DeCad dust unloading on October 12, 1977. These results, which are presented graphically on Graph No. 1, show significant cadmium concentrations for the tripper floor area although they are within present OSHA standards.

One of the three personal monitor samples on the sulfide unloading crew exceeded the OSHA limit for lead on October 11, 1977. Material unloaded by this crew consisted of 3.5 hours of sulfide concentrate and one hour of Columbus DeCad dust.

One of the four personal monitor samples on the sulfide unloading crew exceeded the OSHA limit for cadmium on October 12, 1977. Material unloaded by this crew consisted of 5.5 hours of DeCad dust and two hours of sulfide concentrate. The excessive lead and cadmium samples which were taken on two different days, were both from the same employee (Cross). It is understood that Cross had worked for Asarco only a few days at the time of this survey and possibly his lack of experience in advoiding the dust had some bearing on his exposure. The cadmium content of the concentrate is about 0.5% and the DeCad dust varies from 3.8 to 5% cadmium.

NIOSH has published a criteria document for cadmium which recommends lowering the cadmium dust and fume limit to 0.04 mg/m^3. Five of the seven personal monitor samples for the unloading crew exceed this recommended limit.

No respirators were worn by the unloading crew during sulfide concentrate unloading and only about half the crew used NIOSH/MESA approved respirators during unloading of DeCad dust. The use of a non-approved bandana during DeCad unloading is shown in Section VII, Photographs.

The number of cars of DeCad dust to be unloaded varies from month to month with six cars being the highest number to date during 1977. Six cars would take approximately three days to unload.

The personal monitor sample for the front end loader operator (Barrientes) exceeded the OSHA limit for lead. During this sample, concentrate was being pulled from bins E, P, K, R, and S. Barrientes was wearing a 3-M 8710 dust respirator. A sample for this same job was obtained during the June 1976 survey and the lead exposure was very low; however, the operator only worked for a few hours in sulfide concentrate storage,then left to work around the waste heat boiler. Also, the lead content of the dust varies from 1.1 to 3.7% for sulfide concentrate and 0.15% for deCad dust.

Audio dosimeter measurements on members of the unloading crew during DeCad dust unloading showed noise exposures considerably in excess of OSHA limits. The noise source was a vibrator placed on the car hopper. Personal hearing protection was not generally being used by members of the unloading crew. Because DeCad dust unloading occurs a few days a month at the most, personal hearing protection is the noise control method of choice. Its use must be strictly enforced.

B. Yard:

Results of the two personal monitor samples for the belt watcher (Lira) were within applicable OSHA limits; however, the cadmium concentration on October 12, 1977, during DeCad dust unloading was above the NIOSH recommended limit of 0.04 mg/m^3. The personal monitor result during DeCad dust unloading is substantiated by the day shift tape sample results shown in Graph No. 1. Lira wore a 3-M 8710 dust respirator.

The personal monitor sample for the sweeper operator (ybarra) exceeded the OSHA limit for lead and approached the OSHA limit for cadmium dust of 0.2 mg/m^3. The operator wore a 3-M 8710 dust respirator. The audio dosimeter measurement of 90% for Ybarra is in the potential noise violation range for audio dosimeters and correlates well with the June 1976 survey measurement of 117%. It is recommended that the sweeper exhaust ventilation system and filters be thoroughly checked and maintained for optimum performance and that a quieter muffler be installed. In the interim, proper respiratory and hearing protection must be worn.

C. Lurgi Roaster:

All personal monitor samples were within applicable OSHA limits.

The audio dosimeter measurement for the boiler tender (Brown) showed a positive violation of the OSHA noise standard. The excessive noise exposure is primarily caused by use of an air lance for blowing dust off the boiler coils. No hearing protection was worn by Brown. The feasibility of using lower pressure air should be investigated with personal hearing protection used as interim control. The audio dosimeter measurement of 89% for the second grade operator (Alvarez) is in the potential noise violation range. The noise source for this exposure is unknown; however, a potential source would be the roaster slinger which generates sound pressure levels of 92-95 dBA.

D. Sulfide-Oxide Leach and Purification:

Arsenic trioxide is added to process tanks in the Oxide Leach and Purification Departments and the Sulfide Purification Department. A picture of the point of addition in the Sulfide Purification Department is shown in Section VII, Photographs. This picture shows As_2O_3 spillage around the point of addition.

Personal monitor samples for arsenic in these departments showed levels well below the current OSHA standard. The samples on the oxide side were above the proposed OSHA limit of 0.004 mg/m^3, however. It is recommended that all employees using As_2O_3 be instructed as to the importance of handling this material to avoid dust generation and spillage.

E. Sulfide Cell:

All personal monitor samples were within applicable OSHA limits.

The audio dosimeter measurement for the zinc dust unit operator (Nash) showed his noise exposure to be within the OSHA noise standard because of the utilization of administrative control which limits his exposure time at the dust unit to four hours per shift.

F. Sulfide Casting:

The audio dosimeter measurement for the caster helper (Ramirez) during casting of ingots showed a noise exposure of 133% which is a positive violation of the OSHA noise standard; however, the noise measurement for the caster (Lerma) showed no noise exposure in excess of 90 dBA. Also, sound level meter measurements for this area were below 90 dBA. Therefore, the dosimeter result for Ramirez is suspect.

G. Oxide Storage:

The personal monitor sample for the leadman (Cavada) exceeds the OSHA limit for lead and the sample for the loader operator (Martinez) exceeds the proposed OSHA limit for lead. Neither employee sampled wore respiratory protection. The lead content of the oxide dust is about 3.4%.

The source of excessive lead exposure for the leadman is unknown because it is understood that this employee spends the majority of his time in the control room.

H. Oxide Cell:

Because of an employee complaint about excessive smoke from furnace charging ports, a personal monitor sample was obtained from the third grade operator (Pineda). The sample result for zinc of 0.56 mg/m^3 was well below the OSHA limit of 5 mg/m^3 for zinc oxide fume. A photograph of an Ajax furnace charge port showing the visible emissions is shown in Section VII, Photographs.

I. Asbestos:

All employees who may have any potentially measurable exposure to asbestos fibers receive the OSHA required medical examinations at the plant.

Three uses of asbestos at the plant are relining of furnace launders, cutting of asbestos cloth for gaskets, and the use of asbestos rope on the "cold guns" at the Lurgi Roaster precipitator. The asbestos rope is used to fill in the hole where the "cold gun" rod extends through the precipitator roof and also as gasket material for access covers. Calcium silicate is used to cement the rope in place.

OSHA obtained personal monitor samples during use of asbestos rope at the precipitator, but the plant has not received any sampling results to date. Because the asbestos rope use had been recently completed at the precipitator, D.O.E.S. personnel were unable to obtain air samples at this operation.

J. Respiratory Protection:

Respiratory protection, in general, and respirator programs, specifically, were discussed with plant personnel. A copy of the El Paso written respirator program was presented to and discussed with plant personnel at the time of the survey. It is recommended that a written respirator program similar to the El Paso program be developed for the Corpus Christi Plant because the El Paso program is brief, yet it covers all the OSHA requirements. Because "disposable" type respirators will probably be used exclusively at Corpus Christi and only a few personnel need to wear respirators, the required written program and training should be relatively simple to implement.

The OSHA compliance officer's guide for evaluating respirator programs accepts adherence to the respirator manufacturer's instructions in the place of fit testing. Because the disposable type respirators are not amenable to positive or negative pressure tests and the irritant smoke test is probably not justified for the type of exposure noted during this survey, it is recommended that the manufacturer's instructions be incorporated in the training sessions.

Respirators currently in stock at Corpus Christi are:

Respirator	NIOSH/MESA Approved for:
MSA Custom Comfo II with Type S Filter	Toxic Dust, Fume
MSA Custom Comfo II with GMA Cartridge	Organic Vapors
AO R2090N	Toxic Dust
MSA Dustfoe 66	Toxic Dust
3-M 8710	Pneumoconiosis Producing Dust

The 3-M 8710 respirator is currently used for all dust exposures although it is only approved by NIOSH/MESA for pneumoconiosis producing dusts such as asbestos, silica and coal dust. It is recommended that the 3-M 9900 or 3-M 9910 toxic dust respirators be used in place of the 3-M 8710 because they meet both the toxic and pneumoconiosis producing dust approvals. The 3-M Company also has an approved disposable organic vapor respirator with particulate pre-filter available which could be used by painters.

Del-Monox air purifiers (see Section VII, Photographs) are used at air supplied respirator outlets to protect the respirator user against carbon monoxide. These units convert carbon monoxide that may be present in the air supply to carbon dioxide. The plant air compressor is equipped with a high temperature control; however, carbon monoxide alarms or frequent testing for carbon monoxide is not performed as required by the respirator standard 1910.134(d)(2)(ii). It is this writer's opinion that the Del-Monox units are better than carbon monoxide alarms or frequent testing; however, in order to present possible citations, a request will be made to the OSHA national office for an opinion on the suitability of the Del-Monox purifiers. The use of appropriate and NIOSH/MESA-approved respirators should be mandatory for the crew unloading DeCad dust, the sulfide storage loader operator, and the sweeper operator. Respirator use is recommended for the oxide storage loader operator and the leadman, and for both belt watchers in sulfide storage.

K. Biological Monitoring:

Because of potentially excessive cadmium exposures, it is recommended that the Asarco Cadmium Hygiene Program be initiated for the unloading crew, loader operator, yard and roaster belt watchers in sulfide storage, and the sweeper operator.

The Asarco Lead Hygiene Program should be initiated for the loader operator and leadman in oxide storage, sulfide storage loader operator, and the sweeper operator.

Contact Dr. R. D. Putnam at D.O.E.S. for instructions concerning program implementation.

L. Confined-Space Entry:

Leach and purification tanks must be entered periodically for maintenance. Because of the potential hazards associated with confined-space entry, it is recommended that the plant develop a confined-space entry procedure.

OSHA does not have confined-space entry standards for general industry; however, OSHA is in the process of promulgating standards for this procedure. A written procedure should require as a minimum the following steps:

1. Isolation of the vessel by positive blanking off of process lines.

2. Drainage and washing out of hazardous materials.

3. Introduction of forced air ventilation prior to and during entry of the vessel.

4. Evaluation (testing) of the atmosphere inside the vessel prior to entry.

5. Positioning of an outside observer immediately adjacent to the vessel at all times.

M. Hearing Conservation:

All plant personnel currently receive a pre-employment and annual audiometric examination.

Because of potentially excessive noise exposures, the wearing of personal hearing protection must be strictly enforced for the sulfide unloading crew during DeCad unloading, the sweeper operator and the Lurgi Roaster boiler tender.

The feasibility of installing a quieter muffler on the sweeper and using lower pressure air in the air lance used for the boiler tender's duties should be investigated.

V. RECOMMENDATIONS

A. The use of NIOSH/MESA-approved respirators should be mandatory for personnel unloading DeCad dust, the sulfide storage loader operator, and the sweeper operator. Respirator use is recommended for the oxide storage loader operator and leadman, and both beltwatchers in sulfide storage.

B. The Asarco Lead and Cadmium Hygiene Programs should be implemented as discussed in Section IV.K.

C. A written respirator program which includes training should be implemented as discussed in Section IV.J.

D. The use of personal hearing protection should be mandatory for personnel unloading DeCad dust, the Lurgi Roaster boiler tender, and the sweeper operator.

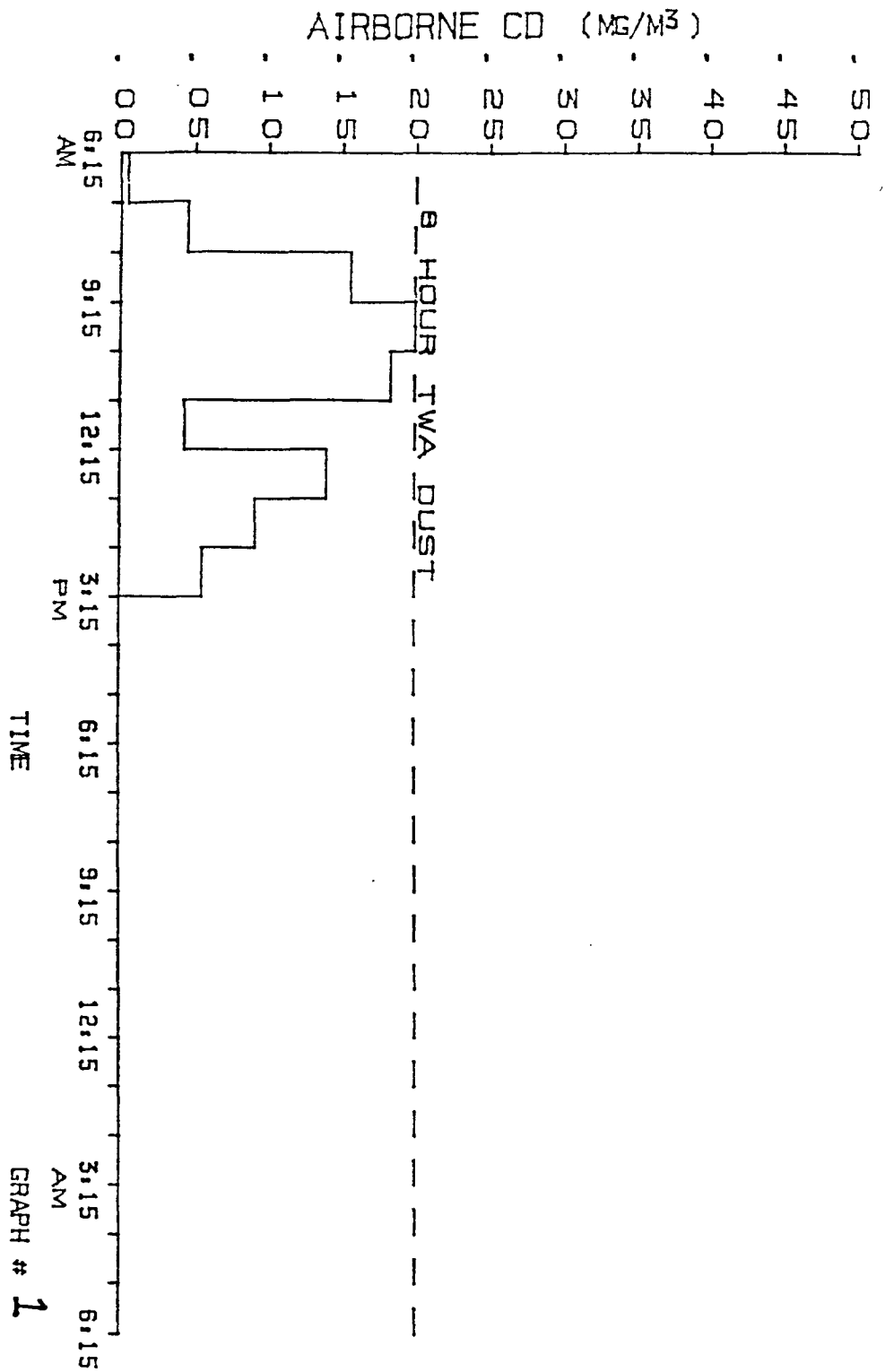
E. A quieter muffler should be installed on the sweeper and lower pressure air should be used for the boiler tender's lance, if feasible.

F. A written confined-space entry procedure should be developed and used for the Leach and Purification Departments.

Stanley G. Cothrin

Stanley G. Cothrin
Environmental Scientist

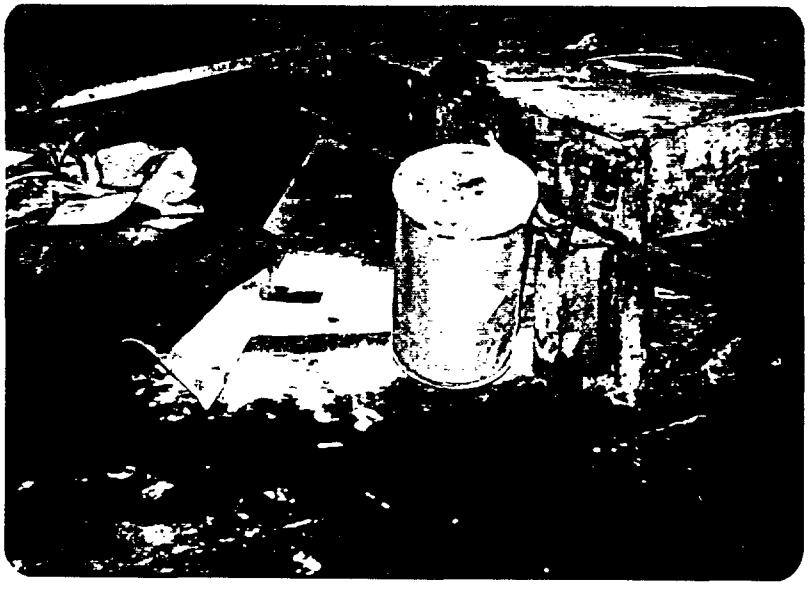
SGC/mcs
Attachments


AIRBORNE CD (MG/M3)
.00
.05
.10
.15
.20
.25
.30
.35
.40
.45
.50
6:15 AM
9:15
12:15
3:15 PM
6:15
9:15
12:15
3:15 AM
6:15
8 HOUR TWA DUST
TIME
GRAPH # 1
DEPARTMENT: SULFIDE
LOCATION: STOR. TRIPPER FLOOR JUNCTION
MEAN: .102
MAXIMUM: .200
MINIMUM: .004
STARTING DATE: 10-12-77
INTERVAL (MIN): 60

VII. PHOTOGRAPHS

Sulfide Unloading Department

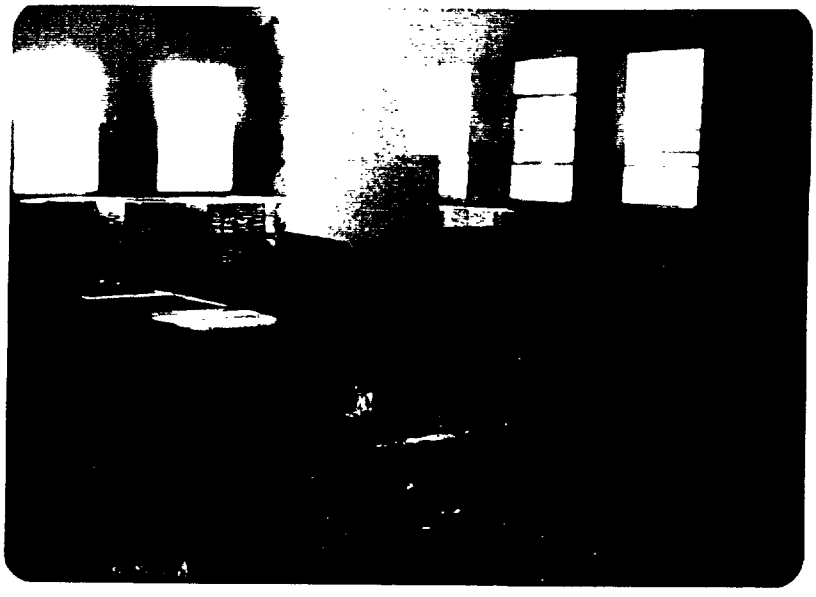
Wearing non-approved bandana during DeCad dust unloading.



Sulfide Purification Department

As_2O_3 spillage at purification tank.

VII. PHOTOGRAPHS



Oxide Cell Department

Zinc oxide fume escaping from
Ajax Furnace charge port.

Sulfide Cell Department

Del-Monox air purifier
used for air-supplied
hood in head bar buffing
room.

ASARCO CADMIUM HYGIENE PROGRAM

Dust and fume control by exhaust ventilation and other means is the best way of preventing employees from inhaling amounts of cadmium which could in time accumulate in the body and cause illness. When control of air contaminants is not feasible, approved respirators, properly fitted and worn, will effectively prevent inhalation of contaminants. Ordinarily, respirators are required only a part of the time on ASARCO Jobs.

As a further safeguard against the excessive intake and accumulation of cadmium, either by inhalation or by ingestion through carelessness in personal hygiene, measurements of cadmium in urine can be done. The toxicological effects of cadmium are not completely understood. Injury to the kidney and lungs has been reported, however, and therefore tests for cadmium in the blood, protein in the urine, and spirometric measurement of pulmonary function are also recommended.

Biological monitoring is the general term applied to periodic measurements of metals and other substances in body fluids. A program of biological monitoring for lead has been carried on by ASARCO for 30 years. It has been a generally successful program and has revealed much that was not known about absorption and excretion of lead. A similar program has been in operation for cadmium, but because much less is known about cadmium than lead, many diagnostic tests are being used to provide the maximum health protection and to gather more information. This program, along with allied policies on respirator-wearing indoctrination, and actions to be taken on discovery of excessive absorption, is given on the following pages.

New Employee Indoctrination

1. The simple facts of cadmium dust or fume intake into the body by inhalation and/or ingestion shall be explained carefully to each new employee before he is assigned to work involving possible exposure to cadmium.

2. The care, use and effectiveness of dust and/or fume respirators shall be explained.

3. The manner by which the fit of the respirator face-piece may be tested for air leakage shall be explained and the employee shall be asked to demonstrate the method to be sure he understands it.

4. His supervisor must explain to the new employee as specifically as practicable when and why his respirator must be worn in the course of his duties.

Biological Monitoring Program

1. Blood samples and urine samples (taken on the same day) for cadmium determination shall be collected and sent to the Department of Environmental Sciences (D.O.E.S.) once per year from all hourly employees and all supervisor employees whose duties are carried on in whole or in part in areas of potential cadmium exposure. The annual samples should normally be collected at the time of an employee's annual physical examination (if annual examinations are given). All urine

samples will be tested for total urinary protein by turbidity with trichloroacetic acid. Hemoglobin will be measured in all blood tests.

2. Blood samples and urine samples (same day) for cadmium determinations and protein excretion shall be collected at least every three months from all employees, including supervisors, working in areas or on tasks known to involve exposure to airborne, cadmium-bearing dust and/or fume. It is also recommended that spirometric tests be given every two years. This should be done at least 10 days after the last respiratory tract infection and one hour after last smoking.

3. Blood and urine samples for determination of cadmium and urine samples for the measurement of specific and/or total protein excretion shall be collected at the time of the pre-employment physical examination and 30 days after beginning work. Thereafter, sampling shall be done according to the exposure classification of the employee. Pre-employment blood tests for a deficiency in serum alpha-antitrypsin may be useful in detecting individuals who are likely to develop emphysema with or without smoking cigarettes excessively or being occupationally exposed to airborne lung irritants.

4. Urine samples having a cadmium concentration above 50 micrograms showing the presence of light chains or having total protein values over 150 mg/L shall be followed up by repeat samples, collected as soon as possible after the results are received, to assure the validity of the original results. Repeat samples

not received by the D.O.E.S. laboratory within three weeks after they were requested will be routinely brought to the attention of the plant manager.

Action to be Taken on Excessive Absorption Levels

1. Confirmed urine cadmium levels between 50 and 100 micrograms per liter, i.e., two (2) consecutive samples:

   a. This must be followed as soon as possible by an investigation of an employee's work habits to discover the possible sources of exposure.

   b. The department head and plant superintendent must be informed of the indicated excessive absorption so that corrective action may be taken.

   c. The employee and/or his supervisor must be informed of the indicated excessive absorption so that their observations can be used in formulating corrective actions that can be simply taken.

   d. If it is determined by the management that no corrective action is feasible or that the corrective action taken is not adequate, as indicated by a failure of urine cadmium levels to be reduced to 30 micrograms per liter or less in a sample taken 30 days later, the employee shall be transferred to a job of known lesser effective exposure and shall not resume his original job until his urine cadmium level is 30 micrograms per liter or less.

2. Confirmed urine cadmium levels over 100 micrograms per liter:

   a. This is grounds for removing the employee from effective exposure to cadmium-bearing dust and/or fume, until the employee's urine cadmium drops to 30 micrograms per liter or less.

   b. Follow steps "a" through "c" under number 1., above, in order to determine and correct the circumstances that lead to excess exposure.

3. Confirmed presence of light chains or excess protein excretion, i.e., urinary total protein values over 150 mg/L in two consecutive samples:

   a. The employee should be examined by the plant physician as soon as possible.

   b. Medical evaluation may dictate a reduction or termination of exposure to cadmium-bearing dust and/or fume.

   c. If medical opinion indicates that cadmium exposure is suspect, follow steps "a" through "c" under number 1., above, to determine and correct the circumstances that lead to excess exposure.

4. Hemoglobin levels of 12.5 grams percent or less must be followed by a medical exmination promptly, regardless of the level of cadmium absorption indicated by a blood sample.

K. W. Nelson

K. W. Nelson
Vice President
Environmental Affairs

February 18, 1975

November 1, 1971

ASARCO LEAD HYGIENE PROGRAM

Dust and fume control by exhaust ventilation and other means is the best way of preventing employees from inhaling amounts of lead which could in time accumulate in the body and cause illness. When control of air contaminants is not feasible, Bureau of Mines-approved respirators, properly fitted and worn, will effectively prevent inhalation of contaminants. Ordinarily, respirators are required only a part of the time on ASARCO jobs.

As a further safeguard against the excessive intake and accumulation of lead, either by inhalation or by ingestion through carelessness in personal hygiene, measurements of lead in blood and urine can be done. Such measurements will show, well in advance of any possible illness, when lead intake is rising and approaching levels of potential health effects. Biological monitoring is the general term applied to body fluid measurements.

A program of biological monitoring has been carried on by ASARCO for 25 years. It has been a generally successful program and has revealed much that was not known about absorption and excretion of lead, but it must be revised now in some details in order to conform more closely to anticipated legal requirements. The revised program, along with allied policies on respirator-wearing indoctrination, and actions to be taken on discovery of excessive absorption, is given on the following pages.

New Employee Indoctrination

1. The simple facts of lead dust or fume intake into the body by inhalation and/or ingestion shall be explained carefully to each new employee before he is assigned to work involving possible lead exposure.

2. The care, use and effectiveness of dust and/or fume respirators shall be explained.

3. The manner by which the fit of the respirator face-piece may be tested for air leakage shall be explained and the employee shall be asked to demonstrate the method to be sure he understands it.

4. His supervisor must explain to the new employee as specifically as practicable when and why his respirator must be worn in the course of his duties.

Biological Monitoring Program

1. Blood samples and urine samples (same day) for lead determinations shall be collected and sent to the Department of Environmental Sciences once per year from all hourly employees and from all supervisory employees whose duties are carried on in whole or in part outside the main office. The annual samples should normally be collected at the time of an employee's annual physical examination. Hemoglobin in addition to lead will be measured in all blood samples.

2. Blood samples and urine samples (same day) for lead determinations shall be collected at least every three months from all employees, including supervisors, working in areas or on tasks known to involve exposures to airborne, lead-bearing dust and/or fume. An employee may be removed from the quarterly sampling list only after it has been shown, by three consecutive quarterly blood and urine samples that his lead absorption is consistently minimal, i.e., blood lead levels are below 50 micrograms per 100 grams of whole blood and urinary lead levels are below 120 micrograms per liter.

3. Blood and urine samples for lead determinations shall be collected at the time of the pre-employment physical examination and 30 days after beginning work. Thereafter, quarterly sampling shall be done until it is shown the employee can be placed on the annual sampling list.

4. Blood samples found to have a lead concentration above 80 micrograms per 100 grams and urine samples having a lead concentration above 200 micrograms per liter shall be followed up by repeat samples, collected as soon as possible after the results are received, to assure the validity of the original results.

5. Special samples may be obtained and sent to the Environmental Sciences Laboratory at any time there is doubt about the lead absorption status of an employee.

Action to be Taken on Excessive Absorption Levels

1. Confirmed blood lead levels above 80 or urine levels above 200 or a rising trend approaching those levels must be followed as soon as possible by an investigation of an employee's work and work habits to discover the possible sources of exposure.

2. The department head and plant superintendent must be informed of the indicated excessive absorption so that corrective action may be taken.

3. The employee and/or his supervisors must be informed of the indicated excessive absorption so that their observations can be used in formulating corrective actions that can be simply taken.

4. If it is determined by the management that no corrective action is feasible or that the corrective action taken is not adequate, as indicated by a failure of blood lead levels to be reduced in samples taken within 30 days, the employee shall be transferred to a job of known lesser effective exposure and shall not resume his original job until his blood lead level is reduced to 60 micrograms per 100 grams or less.

5. Hemoglobin levels of 12.5 grams percent or less must be followed by a medical examination promptly, regardless of the level of lead absorption indicated by a blood sample.

K. W. Nelson