

1979 INDUSTRIAL HYGIENE SURVEY SUMMARY

DO 093213
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1979 INDUSTRIAL HYGIENE SURVEY SUMMARY

It is the responsibility of employers to annually determine employee exposure to potential health hazards in the work area and report the results to all involved personnel. The employee is also to be informed of the toxic and hazardous properties of these chemicals and physical agents, the limits they may be exposed to without danger, the symptoms of overexposure, and what they should do to prevent overexposure.

The 1979 I.H.S. was determined and carried out in accordance with the NIOSH occupational exposure sampling strategy.

Environmental Hazards Monitored in CA II Block

	<u>TLV or IHG</u>
Chlorine	1 ppm
HCBD	10 ppb
Asbestos	2 fib./cc > 5 μ
Sulfuric Acid Fumes	1 mg/m ³
Caustic Fumes	2 mg/m ³
Hydrochloric Acid Fumes	7 mg/m ³
Noise	85 db (A)

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CHLORINE:

Chlorine gas has a TLV of 1 ppm. Above this level it can be very irritating to the eyes, nose, throat and lungs. At high concentrations there can be a burning sensation to the skin. Operators are required to carry a mouth-bit type respirator at all times - these are designed to help escape from chlorine and are not meant to be used to work with in a chlorine atmosphere. Any routine job in which chlorine exposure is probable or likely to occur, requires the use of a half-face respirator. If required to work in a chlorine atmosphere under emergency conditions, Scott Air Pak equipment must be worn. Chlorine has very good warning properties with an odor threshold of approximately 0.25 - 1.0 ppm. Samples were obtained in impingers containing a dilute caustic solution (.02N) and analyzed using a photoelectric color meter.

<u>Type</u>	<u># Tested</u>	<u>Avg. Reading</u>	<u>Highest Reading</u>
Personnel - TWA	11	<.1 ppm	<.1 ppm
Area	13	<.104	.159
Excursion	8	<.541	2.73

HCBD:

HCBD is a colorless oily liquid with a strong pungent odor. Odor is considered a poor indication of excessive exposure. It can be detected at 200 ppb, however the exposure limit is 10 ppb.

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Because of the high toxicity of this material that may be able to cause cancer in man, HCBd should be handled with extreme care and all exposure avoided. Operators sampling and loading HCBd to the system or working on equipment associated with HCBd are required to wear full-face respirators with MSA #88340 GMC canisters. HCBd sampling is done every six months. Porapak QS tubes were used to collect samples and analysis was achieved by gas chromatography.

The HCBd system will be removed from CA II Plant during 1980, thus removing a potential health hazard from the work environment.

<u>Type</u>	<u># Tested</u>	<u>Avg. Reading</u>	<u>Highest Reading</u>
Personnel - TWA	11	5.79 ppb	16.4 ppb
Area	5	5.0	13.3
Excursion	10	195.5	891.9

ASBESTOS:

The Dow IHG for asbestos is 2 fibers per cc greater than 5 microns in length. Asbestos fibers in the atmosphere are potentially hazardous. There are no immediate chemical or physical warning properties and effects from overexposure may appear after a latency period of 20 or more years. Asbestosis, mesothelioma and asbestos corns may result from overexposure. A dust respirator, rubber gloves, rubber boots and a disposable paper suit must be worn when handling asbestos. Asbestos is to be handled wet at all times. The written procedure for asbestos handling should be read and adhered to. Good housekeeping is

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essential to keep area clear of asbestos. Asbestos sampling is done every six months. Samples were obtained on .8 micron pore size millipore filters. An asbestos count is made by magnifying a 4 square grid section of the sample 500 times and counting asbestos fibers.

<u>Type</u>	<u># Tested</u>	<u>Avg. Reading</u>	<u>Highest Reading</u>
Personnel - TWA	6	.078 fib/cc > 5 μ	.243 fib/cc > 5 μ
Excursion	8	.109	.435

SULFURIC ACID FUMES:

The TLV for sulfuric acid fumes is 1 mg/m³. Exposure to the skin causes severe chemical burns. Inhalation of this mist can produce irritation of the upper respiratory system and nasal passages. When working with sulfuric acid, a full acid suit and respirator must be worn. Samples were scrubbed in an impinger thru distilled water and analyzed for sulfates using a photoelectric color meter.

<u>Type</u>	<u># Tested</u>	<u>Avg. Reading</u>	<u>Highest Reading</u>
Excursion	7	<.012 mg/m ³	.024 mg/m ³

CAUSTIC FUMES:

The TLV for caustic fumes is 2 mg/m³. Contact with the skin or eyes causes severe burns and must be washed off immediately. Inhalation causes coughing and painful nose and throat irritation.

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When working with caustic, rubber boots, rubber gloves, respirator and monogoggles must be worn. The samples are obtained on .8 micron pore size filters. Caustic is extracted from the filters and analyzed by atomic absorption.

<u>Type</u>	<u># Tested</u>	<u>Avg. Reading</u>	<u>Highest Reading</u>
Personnel - TWA	21	$< .105 \text{ mg/m}^3$	$.668 \text{ mg/m}^3$
Excursion	5	$< .035$	.091

HYDROCHLORIC ACID FUMES:

The TLV for HCl is 7 mg/m^3 . The concentrated acid or gas can cause severe burns to the skin. Inhalation will irritate the nose, throat, lungs and eyes. Prolonged exposure can result in ulceration of the nose and throat. Samples were obtained by scrubbing through a .02N caustic solution and analyzed for chlorides using a photoelectric color meter.

<u>Type</u>	<u># Tested</u>	<u>Avg. Reading</u>	<u>Highest Reading</u>
Excursion	3	$< 1.73 \text{ mg/m}^3$	5.16 mg/m^3
Area	2	.528	.917

NOISE:

The Louisiana Division Noise Standard states "the permissible exposure to continuous noise shall not exceed an eight-hour time-weighted average of 85 db(A), with a doubling rate of

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5 db(A) which means that the allowable exposure time doubles with each 5 db(A) reduction in noise level". Prolonged and repeated exposures to levels exceeding 90 db(A) may cause severe damage to the nerves in the inner ear. Caution signs are placed in the high noise level areas throughout the plant as a reminder to wear hearing protection and to point out these problem areas. People with recorded hearing threshold shifts should wear hearing protection whenever they are outside the main building. An area survey of the plant was made using a Bruel and Kjaer model 2205 sound level meter calibrated at 94 db(A) (1000 Hz).. The noise survey showed that all production areas in the CA II block had some noise levels above 85 db(A). The Dupont Model 100 audio dosimeter was used to monitor noise exposure to CA II personnel.

<u>Type</u>	<u># Tested</u>	<u>Avg. Reading</u>	<u>Highest Reading</u>
85db(A) for 100%			-
Personnel - TWA	27	53.3 %	354%
Excursion	1	24	24

CHLORINE EMPLOYEE EXPOSURE SUMMARY

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 2 YEAR 1991PLANT CATI BLOCK 200 STRESS Chlorine MINIMAL DETECTABLE LIMIT AND UNIT 1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)	2						6 hrs	1	< 1	< 1				

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 2 YEAR 1979PLANT 2A IIBLOCK 1STRESS 2MINIMAL DETECTABLE
LIMIT AND UNIT 1 ppm

			PERSONNEL					AREA				EXCURSION			
NO.	JOB CLASS	AREA/TASK	*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)	6													

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PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 2 YEAR 1979PLANT DATABLOCK 200 STRESS 2MINIMAL DETECTABLE
LIMIT AND UNIT .1 ppm

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	0	2 hr.	1	<.1	<.1								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)	2						6 hr.	1	<.1	<.1				

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PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1979

PLANT 101

BLOCK 1

STRESS Chronic

MINIMAL DETECTABLE
LIMIT AND UNIT 1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)	2						6 hr	2	<1	<1				

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 4 YEAR 1971

PLANT CAI BLOCK 5001 STRESS 2000 MINIMAL DETECTABLE LIMIT AND UNIT .1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT	2	0	8 hr	2	<.1	<.1								
02	OT	4	1									5 1/2 hr	1	<.1	<.1
03	SOT	4	1									5 1/2 hr	1	.473	.483
04	OS														
05	SS														
06	EDO	4	0									3 1/2 hr	2	<.1	<.1
07	LAB														
08	TECH														
09	CLER.														
10	INSTR	4/14	0	8 hr	2	<.1	<.1								
11	LABORER	4/5	3	8 hr	3	<.1	<.1								
12	SUMMER														
13	CONT MAINT	2/14	4									1 hr	2	<.165	.204
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)	2						1 hr	2	<.1	<.1				

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 4 YEAR 1979PLANT CA II BLOCK 200 STRESS 200 MINIMAL DETECTABLE
LIMIT AND UNIT 0.1 ppm

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	0	8hr	2	<.1	<.1								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)	2							2	0.11	0.13				

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PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4 YEAR 1979

PLANT C A II BLOCK 300 STRESS 2 MINIMAL DETECTABLE LIMIT AND UNIT .1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	2/5	1									15 min	1	2.73	2.73
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)	4						6.10	3	<.1	<.1				

PROTECTIVE EQUIPMENT: (1) Mouthbiter (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1974PLANT II BLOCK 3.1 STRESS Heavy MINIMAL DETECTABLE LIMIT AND UNIT 1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	2/5	1									1/2 hr	1	.492	.492
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 4 YEAR 1979

PLANT CA II

BLOCK 3601 STRESS 1 hr

MINIMAL DETECTABLE
LIMIT AND UNIT .1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	3	0	8 hr	1	<.1	<.1								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

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HCBD EMPLOYEE EXPOSURE SUMMARY

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1977PLANT 1077BLOCK 2STRESS 11.1MINIMAL DETECTABLE
LIMIT AND UNIT 1

			PERSONNEL					AREA				EXCURSION			
NO.	JOB CLASS	AREA/TASK	*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT	3			1	3									
03	SOT	2			2	16.3	16.4								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
1	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)	2						4			13				

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* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1971PLANT DAVE BLOCK 2 STRESS 1 MINIMAL DETECTABLE LIMIT AND UNIT 1

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO	2/7	2									1 Hr	1	9.7	9.7
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

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* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1961

PLANT 2A-71 BLOCK 1 STRESS 1 MINIMAL DETECTABLE LIMIT AND UNIT 1

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	0	8.8	1	5.1	5.1								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

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EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1971PLANT 2A 51BLOCK 500 STRESS 11/1MINIMAL DETECTABLE
LIMIT AND UNIT 1/11

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	5	0	8.0	1	4.0	4.0								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)														

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* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1/79

PLANT Q A

BLOCK 350

STRESS 1000

MINIMAL DETECTABLE
LIMIT AND UNIT

1.4

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	2/2	2									4 hr/2 min	2	156.8	283.4
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

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* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 11/1PLANT QATBLOCK STRESS 11/1MINIMAL DETECTABLE
LIMIT AND UNIT

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	2/6	2									2 hr	1	286.4	286.4
04	OS	2/6	2									2 hr	1	224.7	224.7
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

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* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1974

PLANT 11 BLOCK 1 STRESS 1 MINIMAL DETECTABLE LIMIT AND UNIT 1 ppc

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT	3	1	8.2	1	1.5									
03	SOT	2	1	2.2	1	1.6	1.6								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093237
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1977PLANT 107BLOCK 501STRESS 110MINIMAL DETECTABLE
LIMIT AND UNIT 1

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO		2									4 hr	1	8.39	8.39
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)														

DO 093238
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1971PLANT C A - 11 BLOCK 200 STRESS 100% MINIMAL DETECTABLE LIMIT AND UNIT 1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO	2	2									1 1/2 hr	3	377.1	891.9
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093239
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4 YEAR 1979PLANT PAIBLOCK 300 STRESS 11'80MINIMAL DETECTABLE
LIMIT AND UNIT 1 ppm

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR	2	0	84	2	2.58	4.6								
11	LABORER														
12	SUMMER														
13	CONT MAINT	2	0									1 hr	2	0.5	1.5
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093240
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

ASBESTOS EMPLOYEE EXPOSURE SUMMARY

DO 093241
CONFIDENTIAL

EMPLOYEE EXPOSURE SUMMARY

QUARTER 2nd YEAR 1979PLANT CA II BLOCK 3601 STRESS R. Weston MINIMAL DETECTABLE LIMIT AND UNIT .001 fpi/cc > 5µ

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	3									2 hr	1	.063	.062
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER	11	0	8 hr	1	.020	.020								
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093242
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 2nd YEAR 1979

PLANT CAL BLOCK 5001 STRESS Limit MINIMAL DETECTABLE LIMIT AND UNIT .001 fil/cc = 5u

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	3									1 hr	1	.072	.072
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

DO 093243
CONFIDENTIAL

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3rd YEAR 1979

PLANT CA II

BLOCK 3401 STRESS (in heat)

MINIMAL DETECTABLE
LIMIT AND UNIT

0.21 fib/cc 75u

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	3									3 1/2 hrs	1	.053	.053
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER	11	0	8 hr	1	.006	.006								
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093244
CONFIDENTIAL

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3rd YEAR 1979PLANT CA IIBLOCK 300 STRESS 2.5MINIMAL DETECTABLE
LIMIT AND UNIT.001 fib/cc = 5u

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	3									2 hrs	1	.028	.022
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)														

DO 093245
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3rd YEAR 1977PLANT CA IIBLOCK 3601 STRESS AmiteMINIMAL DETECTABLE
LIMIT AND UNIT.001 fib/cc = 5u

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT	4	3	8h	2	.130	243								
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093246
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4th YEAR 1971PLANT CA II BLOCK 3601 STRESS 1.7.1 MINIMAL DETECTABLE
LIMIT AND UNIT 1001 fib/cc > 5μ

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT	4	3	8hr	2	.023	.025								
03	SOT	4	3									1hr	1	.435	.435
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093247
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4th YEAR 1979PLANT CA II BLOCK 3601 STRESS Delivered MINIMAL DETECTABLE
LIMIT AND UNIT .001 fib/cc - 5 μ

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	3									2h	1	.104	.104
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093248
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4th YEAR 1977PLANT CA IIBLOCK 304STRESS Asbestos

MINIMAL DETECTABLE

LIMIT AND UNIT

.001 f.b./cc > 5µ

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	3									2 hrs	1	.011	.011
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093249
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4th YEAR 1177PLANT CA IIBLOCK 3501 STRESS AsbestosMINIMAL DETECTABLE
LIMIT AND UNIT.001 fib/25u

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	3									15 hr	1	.114	.114
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)														

DO 093250
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

SULFURIC ACID EMPLOYEE EXPOSURE SUMMARY

DO 093251
CONFIDENTIAL

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4 YEAR 1979PLANT CA IIBLOCK 301STRESS Subjective

MINIMAL DETECTABLE

LIMIT AND UNIT

.01 mg/m³

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT	2/6	1									2 hr.	1	<.01	<.01
02	OT	2/6	1									2 hr.	1	.024	.024
03	SOT	2/6	1									2 hr.	1	.011	.011
04	OS														
05	SS														
06	EDO	2	1									2 hr.	2	<.01	<.01
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT	2	1									1 1/2 hr.	2	<.01	<.01
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093752
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

CAUSTIC EMPLOYEE EXPOSURE SUMMARY

DO 023,453
CONFIDENTIAL

EMPLOYEE EXPOSURE SUMMARY

QUARTER 2 YEAR 1977

PLANT CA II BLOCK 3601 STRESS Quartz MINIMAL DETECTABLE LIMIT AND UNIT .01 mg/m³

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	5	0	8hr	5	.231	.648								
04	OS	5	0	8hr	1	.030	.030								
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093054
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 2 YEAR 1971PLANT CA IIBLOCK 2001 STRESS 1000MINIMAL DETECTABLE
LIMIT AND UNIT 0.01 mg/m³

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	4	0	620	3	.235	.513								
04	OS	3	0	120	1	.0312	0.12								
05	SS														
06	EDO	5	0	120	1	.0200	.020								
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER	4/5	0	120	1	.025	.025								
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 095255
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 2 YEAR 1979PLANT CA IIBLOCK 36-1 STRESS CraneMINIMAL DETECTABLE
LIMIT AND UNIT .01 mg/m³

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO	5	0									1 hr	2	.073	.091
07	LAB														
08	TECH														
09	CLER.														
10	INSTR	5	0	2 hr	2	.021	.024								
11	LABORER														
12	SUMMER														
13	CONT MAINT	5/14	0									1 hr	2	<.01	<.01
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093256
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1979PLANT CA II BLOCK 3601 STRESS Combie MINIMAL DETECTABLE LIMIT AND UNIT .01 mg/m³

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS														
06	EDO	5	0	8hr	1	<.01	<.01								
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT	5	0									2 hr	1	<.01	<.01
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093257
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1971PLANT CA II BLOCK STRESS MINIMAL DETECTABLE LIMIT AND UNIT

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT	3	0	8 hr	1	.04	.042								
03	SOT	5	0	8 hr	1	.014	.014								
04	OS														
05	SS														
06	EDO	5/2	0	8 hr	2	.014	.013								
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER	4/5		8 hr	1	.045	.045								
12	SUMMER														
13	CONT MAINT	5	0	8 hr	1	.01	.01								
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093258
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

HYDROCHLORIC ACID EMPLOYEE EXPOSURE SUMMARY

DD FORM 89-454
CONFIDENTIAL

EMPLOYEE EXPOSURE SUMMARY

QUARTER 4 YEAR 1979

PLANT CA II

BLOCK 3601 STRESS HCl

MINIMAL DETECTABLE
LIMIT AND UNIT .01 mg/m³

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	2/5	1									3 min.	3	< 1.73	5.16
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)	3						6 min		5.5	5.17				

DO 093260
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

NOISE EMPLOYEE EXPOSURE SUMMARY

DO 0937.1
CONFIDENTIAL

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1979PLANT CA IIBLOCK 3501 STRESS 7.0MINIMAL DETECTABLE
LIMIT AND UNIT 0

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT	3	5	2.2	2	12.5	19								
03	SOT	2	5									4.1	1	24	24
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)														

DO 09326.2
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1971PLANT 217BLOCK 3601 STRESS 1MINIMAL DETECTABLE
LIMIT AND UNIT 0

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	6	5	320	7	61	2115								
04	OS														
05	SS														
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093263
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1979

PLANT CAII

BLOCK 3601 STRESS 7112

MINIMAL DETECTABLE
LIMIT AND UNIT

0

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	5	5	2.2	3	45.3	56								
04	OS														
05	SS														
06	EDO	5	5	1.1	1	60	60								
07	LAB														
08	TECH														
09	CLER.														
10	INSTR	6	5	8.2	1	0	0								
11	LABORER														
12	SUMMER														
13	CONT MAINT				1										
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093264
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 2 YEAR 1979PLANT CA IIBLOCK 3601 STRESS 7MINIMAL DETECTABLE
LIMIT AND UNIT

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	3	5	8 hr	1	14	14								
04	OS	3	5	8 hr	1	21	21								
05	SS														
06	EDO	6	5	8 hr	1	121	129								
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT	5	5	8 hr	1	21	21								
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)														

DO 093265
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 3 YEAR 1979PLANT 2A IIBLOCK 3601 STRESS 7101MINIMAL DETECTABLE
LIMIT AND UNIT 0

NO.	JOB CLASS	AREA/ TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT	2	5	2h	2	34.5	36								
04	OS														
05	SS														
06	EDO	3	5	1h	1	1	1								
07	LAB														
08	TECH														
09	CLER.														
10	INSTR	-	5	2h	1	2	2								
11	LABORER														
12	SUMMER														
13	CONT MAINT		5	2h	1	12	12								
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON- OP														
20	AREA SAMP (NO JC)														

DO 093246
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

EMPLOYEE EXPOSURE SUMMARY

QUARTER 1 YEAR 1977

PLANT LA II BLOCK 260 STRESS 11 MINIMAL DETECTABLE LIMIT AND UNIT 0

NO.	JOB CLASS	AREA/TASK	PERSONNEL					AREA				EXCURSION			
			*PT. EQ.	TWA BASIS	NO. SAMPLES	AVG.	HIGH	SAMPLE DURATION	NO. SAMPLES	AVG.	HIGH	EXCUR. DURATION	NO. SAMPLES	AVG.	HIGH
01	OTT														
02	OT														
03	SOT														
04	OS														
05	SS		5	8.4	3	34	42								
06	EDO														
07	LAB														
08	TECH														
09	CLER.														
10	INSTR														
11	LABORER														
12	SUMMER														
13	CONT MAINT														
14	NON-OS SPEC.														
15	SECUR.														
16	MATL CONT														
17	LOADING														
18	T/C CLNG														
19	MGRS/NON-OP														
20	AREA SAMP (NO JC)														

DO 093267
CONFIDENTIAL

* PROTECTIVE EQUIPMENT: (1) Mouthbit (2) Full Face (3) Half or Dust Face (4) Air Supply (5) Hearing Protection

TEST RESULTS BY CLASSIFICATION

DO 093268
CONFIDENTIAL

DO 093269
CONFIDENTIAL

CLASSIFICATION:

OT

DATE	TYPE	AREA	JOB CLASS.	NAME	TIME START	TIME STOP	DURATION	CALIBRATE BEFORE/AFTER	WIND COND.	SAFETY EQUIPMENT	HCBD	NOISE	CHLORINE	ASBESTOS	CAUSTIC	HCl	H ₂ SO ₄	CHLOROTHENE	REMARK
											10 ppb	85 dbA 100%	1 ppm	2 f/b/cc >5 μ	2 mg/l/m ³	7 mg/l/m ³	1 mg/l/m ³	350 ppm	OSHA OR DOW STANDARD
3/26	P			S. Curcio			6 hr	.35/.05	NE 6		3.5								Washed Brine
6/14	"			A. Williams			6 hr	1.5/1.5	NE 6	3				.020					catching ph - pump in area
6/26	P			B. Miles			6 hr	.14/.13	NE 5		.47								Normal Rds - Brine
7/11	P			A. Williams			6 hr	1.6/.4	NE 5						.048				Brine man - general rds.
8/8	F			B. Miles			6 hr					19							Brine - gen
8/15	F			C. Achard			6 hr	1.5/1.4	NE 5	3					.035				Cell Crew - ph sampling
8/22	P			A. Williams			6 hr					16							Brine - gen
10/10	F			B. Miles			6 hr	.4/.3	NE 4	3			<.1						Cell Crew existing data
10/15	P			A. Williams			6 hr	.4/.3	NE 4	3			<.1						Cell Crew existing data
10/16	P			B. Miles			6 hr	.45/.4	NE 4	3			<.1						Cell Crew existing data
10/25	F			A. Williams			4 hr	1.5/1.45	NE 10	3				.020					fulfilling S. 4 problem
10/25	F			B. Miles			4 hr	1.5/1.5	NE 10	3				.025					fulfilling S. 4 problem
10/25	F			C. Achard			2 hr	.4/.4	NE 10								.024		unloading sulfuric acid
10/26	F			B. Miles			5 1/2 hr	.4/.4	NE 8				<.1						filling S. 7 with brine

DO 093270
CONFIDENTIAL

CLASSIFICATION:

SOT

DATE	TYPE	AREA	JOB CLASS.	NAME	TIME START	TIME STOP	DURATION	CALIBRATE BEFORE/AFTER	WIND COND.	SAFETY EQUIPMENT	HCBD	NOISE	CHLORINE	ASBESTOS	CAUSTIC	HCl	H ₂ SO ₄	CHLOROTHENE	REMARK
											10 ppb	85 dbA 100%	1 ppm	2 fib/cc > 5 µm	2 mg/m ³	7 mg/m ³	1 mg/m ³	350 ppm	OSHA CP DOV STAN
2/12	P			M. Schuminsky			8 hr	1.4	SEW4		16.4								Don. Riba w/ part of R. upon
2/15				K. Gay			4 hr 10 min	1.55	NE calm	4	20.3								ch. 504 filter into bucket air
2/19	E			R. Bowersock			4 hr 10 min	1.55	NE calm	4	283.4								ditto
2/21	E			M. Schuminsky			2 hr	1.55	calm	4	286.4								Leading Head to up. was bent
2/26	P			M. Bertholet			6 hr	1.55	NE 6		16.2								working R. at officer with
2/26	P			R. Bourgeois			6 hr	1.40	NE 6		5.1								Cell area
2/26	P			R. Saizon			12 hr	1.40	NE 6		4.0								worked under section
2/27	E			W. Nyer			6 hr	1.50	SEW8	4	7.7								HCBD pump breathing and filter
4/9	P			M. Bertholet			7 hr	1.8	calm		1.6								Ry - normal recording
5/8	P			K. Green			7 hr	1.14	calm										ink on top of filter to timer
5/25	E			J. Landry			2 hr	1.5	W 5	3									helping cell
6/1	P			R. Saizon			6 hr	1.5	NE 6										Don. Riba cell area
6/12	P			C. Wacker			6 hr	1.5	SEW5										cell area - 2nd rd
6/12	P			W. Nyer			6 hr	1.5	SEW10										cell area opt. 2nd rd
6/13	P			M. Schuminsky			6 hr	1.5	SEW5		1.6								cell area in Ry
6/14	P			D. Moore			6 hr	1.5	NE 6	3									cell area in 2nd rd
6/26	P			J. Landry			6 hr	1.5	NEW5										cell area normal rd
6/26	P			J. Zeringue			6 hr	1.5	NEW5										cell area normal rd
6/27	P			W. Nyer			6 hr	1.5	NEW10										cell area normal rd
6/27	P			H. Mullins			6 hr	1.5	NEW10										cell area normal rd
6/28	P			D. Landry			6 hr	1.5	calm										cell area normal rd

DO 093271
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CLASSIFICATION:

507

DATE		JOB CLASS.	NAME	TIME START	TIME STOP	DURATION	CALIBRATE BEFORE/AFTER	WIND COND.	SAFETY EQUIPMENT	HCBD	NOISE	CHLORINE	ASBESTOS	CAUSTIC	HCl	H ₂ SO ₄	CHLOROTHENE	OSHA OR DO STANDARD
										10 ppb	85dBA 100%	1 ppm	2 f/6/cc 25 µ	2 mg/m ³	7 mg/m ³	1 mg/m ³	350 ppm	
6/5	E		S. Paul			1 hr	1.11 1.17	SEW4	3				.072					Power - general
8/1	P		E. Boudreau			4 hr					24							Power - general
8/8	P		P. LeMaitre			6 hr					56							Power - general
8/2	P		C. Neugien			6 hr					115							Power - general
8/3	P		H. Mellien			6 hr					41							Caustic - general
8/3	P		C. Neuge			6 hr					33							Caustic - general
8/6	P		W. Dyer			6 hr					14							Power - general
8/14	P		M. Thompson			6 hr					87							Power - general
8/14	P		V. Roubey			6 hr					56							Caustic - general
8/21	P		R. Saigard			6 hr					39							Power - general
8/23	E		B. Boudreau			3 hr	1.53 1.35	SEW4	3				.023					Power - general
8/24	P		B. Cutler			6 hr					76							Power - general
8/27	P		R. Butler			6 hr					36							Caustic - general
8/27	P		R. Roubey			6 hr	1.53 1.5	SEW4	3				.014					Power - general
8/29	E		S. Paul			2 hr	1.5 1.35	SEW4	3				.022					Power - general
8/31	P		W. Dyer			6 hr					70							Power - general
9/5	P		R. Saigard			6 hr					42							Power - general
9/11	P		S. Paul			6 hr					39							Power - general
10/12	E		J. Roubey			1 hr	1.6 1.6	SEW4	3				.155					Power - general
10/16	E		J. Roubey			1/2 hr	1.6 1.6	SEW4	3				.107					Power - general
10/22	P		B. Cutler			6 hr	4/4	SEW4				<.1						Power - general
10/22	P		T. 1.53			10 hr	4/3	SEW4				<.1						Power - general

DO 093272
CONFIDENTIAL

SOT

DO 093273
CONFIDENTIAL

05

DO 093274
CONFIDENTIAL

CLASSIFICATION: Shift Supervisor

[illegible]

DO 093275
CONFIDENTIAL

CLASSIFICATION: END

DATE	TYPE	AREA	JOB CLASS.	NAME	TIME START	TIME STOP	DURATION	CALIBRATE BEFORE/AFTER	WIND COND.	SAFETY EQUIPMENT	HCBD	NOISE	CHLORINE	ASBESTOS	CAUSTIC	HCl	H ₂ SO ₄	CHLOROTHENE	OSHA OR DC STANDARD
											10 ppb	85 dbA 100%	1 ppm	2 ft ³ /cc > 5 μ	2 mg/lm ³	7 mg/lm ³	1 mg/lm ³	350 ppm	
8/6	P		OS	D. Dingle			6 hr.					100							with and sparkler filter
8/2	P		OS	B. Kieley			6 hr.	1.67/1.13	ESD 2						0.18				with and sparkler filter in next
8/22	P		OS	J. Biggers			6 1/2 hr.	1.5/1.2	ESD 1						0.01				P-317
7/10	E		SOT	W. Johnson			1 hr.	1.6/1.6	Calms						0.054				with under flatbed
7/10	E		SOT	H. Mellison			1 hr.	1.5/1.4	Calms						0.091				with under flatbed
6/29	P		SOT	S. Paul			6 hr.	1.5/1.4	Calms						0.060				framed in creation of sparkler filter
8/15	P		SOT	D. Moore			6 hr.	1.5/1.4	Calms						0.01				P-317
8/28	E		SOT	M. Harris			4 hr.	1.6/1.4	NEW 4	4	8.37								P-5048
8/29	P		SOT	W. Johnson			6 hr.					1							Brine area with on pump
8/29	E		SOT	D. Ramsey			1 1/2 hr.	1.9/1.8	ESD 2	4	371.9								P-5048
9/11	P		SOT	B. Boudreau			6 hr.					127							HCB pump
9/11	E		OS	J. Hubert			1 1/2 hr.	1.5/1.4	NEW 28	4	173.1								Power - Trans
9/11	E		SOT	D. DeBourgeois			1 1/2 hr.	1.4/1.3	NEW 28	4	16.5								Chg. and on P-5048
10/11	E		OS	B. Wilkes			3 1/2 hr.	1.4/1.3	Sup 56				0.1						with and sparkler filter
10/11	E		SOT	R. Ray			3 1/2 hr.	1.4/1.3	Sup 56				0.1						little
10/25	E		SOT	M. Henthert			1 1/2 hr.	1.5/1.5	NEW 10								0.01		P-5048
10/25	E		OS	B. Monmouth			2 hr.	1.5/1.4	NEW 10								0.01		little

DO 093276
CONFIDENTIAL

CLASSIFICATION: *Instrument*

DATE	TYPE	AREA	JOB CLASS.	NAME	TIME START	TIME STOP	DURATION	CALIBRATE BEFORE/AFTER	WIND COND.	SAFETY EQUIPMENT	HCBP	NOISE	CHLORINE	ASBESTOS	CAUSTIC	HCL	H ₂ SO ₄	CHLOROTHENE	REMARKS
											10 ppb	85dbA 100%	1 ppm	2 fib/cc 75 µg/m³	2 mg/lit	7 mg/m³	1 mg/m³	350 ppm	OSHA CR DOW STANDARD
8/27	P	I.S.	R. Johnson	6 hrs	1.58 1.5	EYES								.017					working on new Centrifuge on P-100
8/1	"	I.T.	K. Lammie	6 hrs								0							working in Power Room
9/6	P	I.T.	W. Patz	6.5 hr	1.57 1.45	MU374								.024					working on EV30 feed computer
9/7	P	Sr.I.S.	B. Pierce	7 hr								L							per duties
10/10	F	I.S.	B. Rabalais	6 hr	1.15 .14	NRW15					.57								working in Rig on analysis gear
10/24	P	I.T.	W. Patz	6 hr	.4/.3	T/R 5							<.1						working on S-P control & act along
10/24	P	I.S.	R. Bello	6 hr	.4/.3	T/R 5							<.1						ditto
10/30	P	I.S.	R. Bello	6 hr	1.40 1.17	S/W 10					4.6								5+0.5 ph flow meter in Rig area

CLASSIFICATION: Craft

DATE	TYPE	AREA	JOB CLASS.	NAME	TIME START	TIME STOP	DURATION	CALIBRATE BEFORE/AFTER	WIND COND.	SAFETY EQUIPMENT	HCBD	NOISE	CHLORINE	ASBESTOS	CAUSTIC	HCl	H ₂ SO ₄	CHLOROTHENE	REMARKS
											10 ppb	85 dbA 100%	1 ppm	2 f/b/cc > 5 μ	2 mg/l/m ³	7 mg/l/m ³	1 mg/l/m ³	350 ppm	OSHA OR DOW STANDARD
9/6	P	General	Udderhausen				6.5 hr					3.4							Power
9/6	E	Pipefitter	H. Hildebrand				2 hr	1.5/1.3	NE 4						< .01				Work on ammonia fluid tank
9/6	E	Pipefitter	C. Frank				6.5 hr	1.5/1.4	NE 4						< .01				P. 3015 4 centrifuge
9/7	E	Pipefitter	H. Herbert				1 hr	1.5/1.1	NE 6						< .01				F-301 wind flow meters
9/7	E	Pipefitter	J. Young				1 hr	1.5/1.5	NE 6						< .01				Little
9/10	P	Pipefitter	J. Graves				6 hr					21							Check on ammonia
9/10	P	Comp.	B. Stirling				6 hr					12							Check on ammonia
10/5	E	P-W	H. Herbert				1 hr	4/2	SW 24	4			< .01						5. T-35 chg. in process
10/5	E	P-W	P. Stevenson				1 hr	4/3.5	SW 24	4			0.229						Little
10/9	E	Pipefitter	P. Palmer				1.5 hr	4/3	SE calm							< .01			Work on ammonia - pulling in new line
10/9	E	Pipefitter	E. Hunt				1.5 hr	4/3	SE calm							< .01			Little
11/1	E	Pipefitter	E. Hunt				1 hr	1.5/1.2	SE 21		0.5								Running HCl line from T-35 to unit
11/6	E	Pipefitter	W. P. Stevenson				1 hr	1.5/1.4	SE 21		0.5								Little

DO 093278
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CLASSIFICATION: Stationary Samples (Area)

DATE	TYPE	AREA	JOB CLASS.	NAME	TIME START	TIME STOP	DURATION	CALIBRATE BEFORE/AFTER	WIND COND.	SAFETY EQUIPMENT	HCBD	NOISE	CHLORINE	ASBESTOS	CAUSTIC	HCl	H ₂ SO ₄	CHLOROTHENE	REMARKS
											10 ppb	85 dbA 100%	1 ppm	2 f.f./cc > 5 μ mg/m ³	2 mg/m ³	7 mg/m ³	1 mg/m ³	350 ppm	OSHA OR DC STANDARD
4/9				Pig area			7 hr	.22/.18	calm		1.2								NW of HCB
4/9				Pig area			7 hr	.22/.18	calm		6.3								NE of HCB
4/9				Pig area			7 hr	.22/.18	calm		2.6								SE of HCB
4/9				Pig area			7 hr	.22/.18	calm		1.6								SW of HCB
5/8				Flower area			6 hr	1.0/.8	calm				<.1						N of area
5/8				Pig area			6 hr	1.0/.6	calm				<.1						N of area
5/8				Brine area			6 hr	1.0/.8	calm				<.1						N of area
2/12				Pig area			8 hr	.05/.4	SEW 4		13.3								NW of area
9/19				Brine area			6 hr	.5/.3	NEP 8				<.1	.13P					S of cells
9/19				Brine area			6 hr	.5/.4	NEP 8				<.1	.917					S of cells
10/3				Pig area			6 hr	.4/.35	SEW 4				<.1						Between S-6 and S-7
10/3				Cell area			6 hr	.4/.4	SEW 4				<.1						Between S-4 and S-5
10/17				Pig area			6 hr	.4/.4	SEW 4				<.1						Between S-6 and S-7
10/17				Brine area			6 hr	.4/.3	SEW 4				<.1						Between S-6 and S-7
10/23				Brine area			6 hr	.4/.35	NEP 12				<.1						Between S-6 and S-7
10/23				Brine area			6 hr	.4/.35	NEP 12				.157						Between S-6 and S-7
11/12				Cell area			6 hr	.4/.3	NEP 10				<.1						Between S-6 and S-7
11/12				Cell area			6 hr	.4/.3	NEP 10				<.1						Between S-6 and S-7

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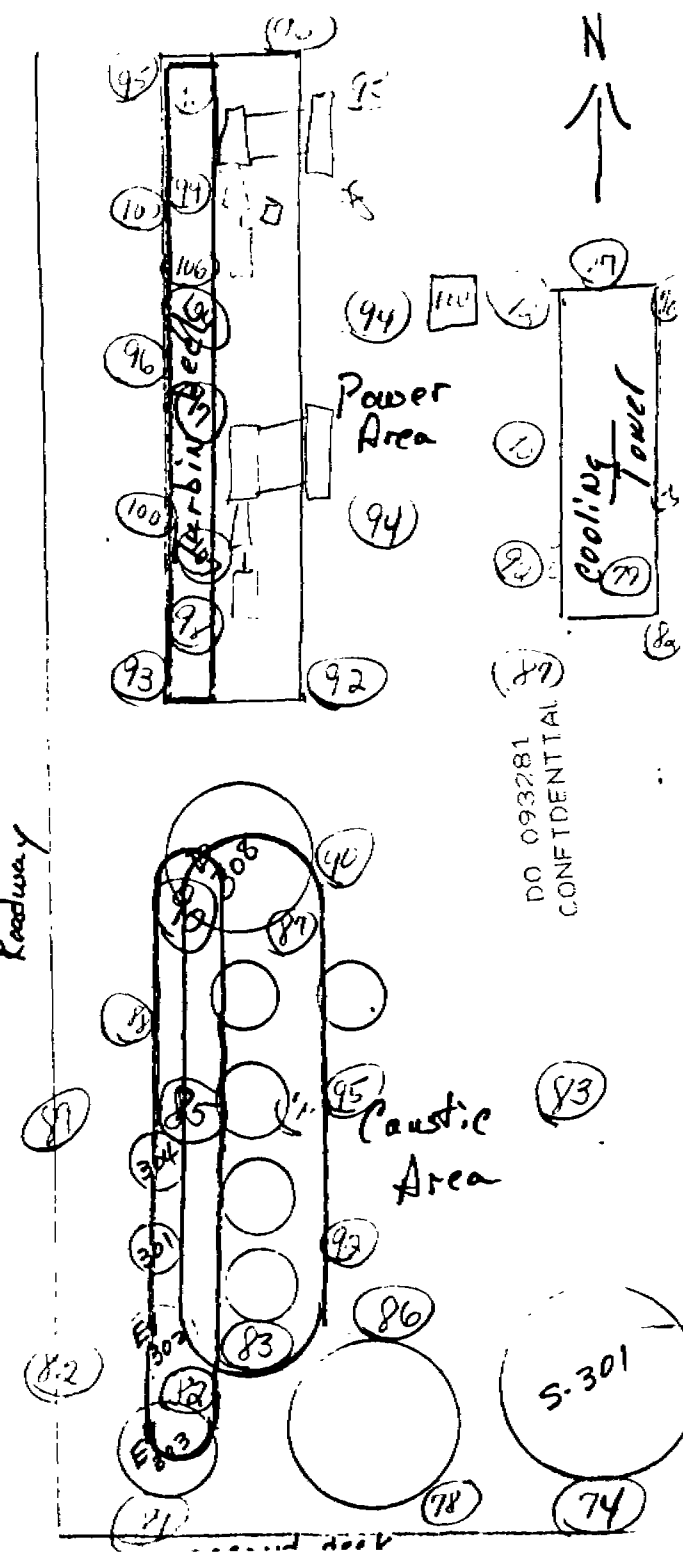
PLANT NOISE SURVEY MAP

DO 093280
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70 110 51	71 110 52
72 110 54	73 110 53
74 110 55	75 110 56
76 110 58	77 110 57

Hand-drawn map of the site showing various areas and structures. The map includes labels for 'Lignification area', 'D-104', 'acid train area', 'Purification area', 'S101', 'Compressor Deck area', 'acid area', and 'Roadway'. Numerous numbered points (81-98) are marked throughout the site.

A hand-drawn floor plan of a building. On the left, three large circles are labeled 'D 316-A', 'D 316 B', and 'D 316 C'. Above them is a circle labeled 'D-301'. To the right of these is a rectangular area labeled 'wedding shop'. Further right is a larger rectangular area containing several smaller rooms: a 'shop' at the top left, a 'Lab' at the top right, a 'Control Room' to the right of the Lab, a 'Change Room' in the center, and an 'office' at the bottom right. Various numbered circles are scattered throughout the plan, including (95), (84), (75), (74), (69), (71), (63), (62), (61), (60), (70), (73), (72), (76), (77), (78), (79), (80), (81), (82), (83), (85), (86), (87), (88), (89), (90), (91), (92), (93), (94), (96), (97), (98), (99), and (100).



DO 093281
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DOW CHEMICAL U.S.A.

LOUISIANA DIVISION
P. O. BOX 180
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504-388-8000

INDUSTRIAL HYGIENE REPORT

ASBESTOS SURVEY
CHLOR-ALKALI II BLOCK 36
LOUISIANA DIVISION

CRI NO. _____

FILE NO. LAD-IH-79.03

DATE May 8, 1979

AUTHOR Dannie Kennedy

CHECKED Charles E. Helph

DATE 5-9-79

SUMMARY

The asbestos in air monitoring for 1978 has been completed in the Chlor-Alkali II block. Survey results were satisfactory and well below the acceptable threshold limit value of 2 fibers per cubic centimeter of air.

Only three (3) of thirty-three samples recorded above 0.01 fibers per cubic centimeter of air. Due to the low results obtained in routine time weighted sampling, it is recommended that short duration excursion sampling be emphasized in the future surveys.

Good Housekeeping, strict safe operating procedures and a constant vigil for problem areas are the most important considerations for a successful abatement program. Employees must be informed of the survey results and must review the consequences of over-exposure to asbestos fibers. (See Attachment No. 2)

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AN OPERATING UNIT OF THE DOW CHEMICAL COMPANY

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INTRODUCTION

The required asbestos in air monitoring has been completed for 1978. The employees were monitored in each area of the plant to determine levels of exposure to asbestos fibers. (This survey included those areas not associated with asbestos handling or usage to validate the judgment that no problems exist in these areas.) The two major areas of concern are the cell operators' exposure during cell pulping and the asbestos storage area.

DISCUSSION

In addition to everyday safety equipment, operators are required to wear disposable paper suits, rubber gloves and proper dust respirators when handling or working with asbestos. The Chlor-Alkali II procedure for handling asbestos and pulping cells should be discussed with each new cell operator and reviewed annually with the experienced operators as a part of the ongoing Industrial Hygiene Education Program.

EXPERIMENTAL

Sampling Method

Personnel samples are collected from the operators breathing zone with a millipore filter (37 mm diameter, 0.8 micron pore size) mounted on an open face filter holder and attached to the operator's lapel. These cassettes were connected to monitoring pumps calibrated with a soap bubble meter to operate at a range of 1.7 to 2.0 liters per minute.

Area samples are collected utilizing the same equipment and method as the personnel samples. Sampling pumps were located approximately ten feet downwind from the asbestos storage area and approximately five feet above the ground.

Analytical

After obtaining the sample on the millipore filter, a four-square-grid section is cut from the exposed filter and placed atop a drop of clear mounting solution. The sample is centered on a microscope slide, covered with a cover slip, and allowed approximately fifteen minutes to clear up before the fiber counting may begin. (The mounting solution is prepared by placing 3 ml each of diethyl oxalate and dimethyl phthalate in a container with 0.6 g of ground up plain white millipore filter paper which dissolves into a clear solution in approximately three days.)

The samples are magnified 500 times with the Reichert Zetopan optical microscope using the Nomarski interference contrast. All fibers over 5 microns in length with a 3:1 length to width ratio are counted as fibers (only one of the four squares is selected for a fiber count),

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After the square grid is selected to be counted, twelve passes are required with the microscope to cover the entire square. To obtain the fibers/cc concentration (greater than 5 microns in length), the following calculation is used.

$$\text{Fibers/cc} = \frac{\text{fiber count (>5 microns in length)} \times \text{sizing factor (92) for filter}}{\text{cc of air (sampling time in minutes} \times \text{flow rate of pump)}}$$

Standards are compared with other locations to confirm the integrity of the counting and analytical determination of fibers present.

RESULTS (see attachment)

Monitoring results indicate all samples were well below the threshold limit value of 2 fibers greater than 5 microns in length per cubic centimeter. The three highest results, of the thirty samples analyzed in the survey, exceeded 0.01 fibers but were less than 0.02 fibers per cubic centimeter. The remaining samples all recorded less than 0.01 fibers per cubic centimeter.

RECOMMENDATIONS

It is recommended that short term excursion sampling be emphasized in future surveys to better identify any potentially high exposure situations.

CONCLUSIONS

The monitoring results were satisfactory and well below the established threshold limit value of two fibers per cubic centimeter. However, due to the hazardous nature of asbestos, strict housekeeping practices and good safe operating procedures remain the most important considerations for a good abatement program. This must be a daily job-by-job program to be successful and to offer the greatest protection to employees.

The Chlor-Alkali employees must be informed of this survey's results and the consequences of overexposure must be reviewed. (See attachment 2)

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Attachment 1

MONITORING RESULTS

Sample #1	Date	Sample Description	Sampling time	Flow rate	Fibers per cc 5 microns in length
1	4/14/78	Operator working in the cell area performing routine duties on day shift. Wind was out of South at approximately 5 mph.	420 min	1500 cc/min	<0.01
2	4/19/78	Operator performing expanded day operations job duties - performing daily maintenance in plant on day shift.	480 min	2000 cc/min	<0.01
3	4/19/78	Stationary Sample - Sampler located in asbestos storage area:	480 min	1800 cc/min	<0.01
4.	4/19/78	Operator working in cell area performing routine duties.	360 min	1800 cc/min	<0.01
5	4/19/78	Operator working expanded day operations - performing daily maintenance duties.	480 min	1000 cc/min	<0.01
6	4/20/78	Stationary Sample - Sampler located in asbestos storage area approximately 10 feet downwind from asbestos Pallet.	360 min	1000 cc/min	<0.01
7	4/20/78	Operator working with cell crew performing cell operator duties.	360 min	2000 cc/min	<0.01
8	4/20/78	Operator working with cell crew performing cell operator duties.	360 min	1700 cc/min	<0.01
9	4/20/78	Operator working in the cell area performing routine duties.	360 min	1900 cc/min	<0.01
10	4/21/78	Operator working in the cell area performing routine duties.	360 min	1900 cc/min	<0.01

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Attachment 2

CONSEQUENCES OF OVEREXPOSURE

COMPOUND: ASBESTOS

EXPOSURE LIMIT: 2 FIBERS/CC, <5 MICRONS IN LENGTH.

ODOR: NONE

EYES: CONTACT WITH THE DUST CAN CAUSE IRRITATION SIMILAR TO THAT CAUSED BY SIMILAR FOREIGN BODIES..

INGESTION: SOME EVIDENCE INDICATES THAT SWALLOWED ASBESTOS MAY INCREASE CHANCES OF STOMACH CANCER..

DUST INHALATION:

SHORT TERM: INHALATION OF HIGH CONCENTRATIONS OF THE DUST MAY CAUSE MODERATE DISCOMFORT.. INHALATION OF MODERATELY HIGH CONCENTRATIONS MAY CAUSE DISCOMFORT..

LONG TERM: INHALATION OF THE ASBESTOS FIBERS IN CONJUNCTION WITH SMOKING HAS BEEN SHOWN TO INCREASE CHANCES OF LUNG CANCER BY ABOUT 90 TIMES THAT OF A PERSON WHO NEITHER SMOKES NOR WORKS WITH ASBESTOS.. CAN ALSO CAUSE A SERIOUS LUNG DISEASE CALLED ASBESTOSIS.. CAN ALSO CAUSE CANCER OF THE CHEST LINING..

COMMENTS: PROPER RESPIRATOR IS REQUIRED WHEN WORKING WITH ASBESTOS..

BSHorvath
6/22/76

Attachment 1 (Cont'd)
MONITORING RESULTS

Sample #1	Date	Sample Description	Sampling t	Flow rate	Fibers per cc 5 microns in length
24	9/7/78	Operator working expanded day operations - worked on start-up blower. Wind out of SE at 5 mph.	360 min	1610 cc/min	<0.01
25	9/13/78	Operator working in Liquefaction area making routine rounds. Winds out of South at 5 mph.	360 min	1650 cc/min	0.012
26	9/15/78	Operator working expanded day operations - Working on start-up blower. Wind out of SE at 6 mph.	240 min	1650 cc/min	<0.01
27	9/13/78	Operator working caustic section of plant making general rounds. Wind out of South at 5 mph.	360 min	1600 cc/min	<0.01
28	9/21/78	Operator working power section of plant. No direct contact with asbestos. Wind out of North at 6 mph.	360 min	1650 cc/min	<0.01
29	9/28/78	Operator mixed dry asbestos with water to make pulp and pulped cells for one hour. Winds were out of NE at 6 mph.	60 min	1700 cc/min	<0.01
30	10/4/78	Instrument Specialist working near flat bed filters in caustic area. Winds were out of NW at 4 mph.	360 min	1650 cc/min	<0.01
31	10/4/78	Instrument Specialist worked in shop most of day. Worked in cell area for approximately one hour	480 min	1650 cc/min	<0.01
32	10/13/78	Craftsman worked 4 hours in the shop area and 2 hours in the caustic section of plant. Wind was out of NNW at 4 mph.	360 min	1650 cc/min	<0.01
33	10/13/78	Craftsman worked 4 hours in the shop area and 2 hours in the caustic section of plant. Wind was out of NNW at 10 mph.	360 min	1650 cc/min	VOID - Contaminated slide (Could not see any asbestos fibers.)

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Attachment 1 (Cont'd)

MONITORING RESULTS

Sample #1	Date	Sample Description	Sampling time	Flow rate	Fibers per cc 5 microns in length
11	4/22/78	Sampler was accidently wet during sampling period - could not be counted.			VOID Sample-(Could NOT Count)
12	5/16/78	Operator working in brine area performing routine duties.	360 min	2000 cc/min	<0.01
13	5/16/78	Operator working in caustic area performing routine duties.	360 min	1900 cc/min	<0.01
14	5/16/78	Operator working in the control room performing boardman duties.	360 min	2000 cc/min	<0.01
15	5/16/78	Operator working in the cell area performing routine duties.	360 min	1800 cc/min	<0.01
16	7/24/78	Operator working power section making routine rounds	360 min	1900 cc/min	<0.01
17	8/10/78	Operator working power section - making normal rounds running Lab samples and making adjustments - No upsets. Day shift, winds out of North at 3 mph.	360 min	2000 cc/min	0.014
18	8/10/78	Operator working caustic section - working near EV303 and ARU301. Wind out of North at 3 mph. Day shift.	360 min	1900 cc/min	<0.01
19	8/30/78	Operator working brine section of plant making routine rounds. Winds out of NE at 4 mph.	360 min	1800 cc/min	<0.01
20	8/30/78	Operator working expanded day operations - Worked in liquifaction area only. Winds out of NE at 4 mph.	480 min	2000 cc/min	0.011
21	9/5/78	Operator working Liquifaction Area making general rounds. Winds out of NNW at 3 mph	480 min	1600 cc/min	<0.01
22	9/5/78	Stationary Sample - Sampler located in CA II administration building by secretary's desk.	480 min	1600 cc/min	<0.01
23	9/5/78	Stationary Sample - Sampler located in control room under vent.		1300 cc/min	<0.01

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