



DOW CHEMICAL U.S.A.

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CPE

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CPE INDUSTRIAL HYGIENE SURVEY, 1984

Summary:

The employees that had a likelihood for exposure in their jobs to chlorine, dust, tetrahydrofuran and noise were monitored using approved sampling and analytical methods. Personnel samples that were obtained on the Outside S.O.T. and Day Maintenance operators indicate a problem with instantaneous exposure to chlorine. Area samples of the plant have traced the source of the chlorine exposures and plans have been made to install engineering controls as soon as possible. Operators' potential exposures to dust, tetrahydrofuran and noise were below current exposure guidelines.

Conclusions and Recommendations:

1. Instantaneous exposures to chlorine that were detected on outside S.O.T.'s and Day Maintenance operators averaged 2.1 ppm and 8.1 ppm respectively. The OSHA Permissible exposure limit is a 1 ppm ceiling limit. Area samples of the plant have traced the source of the chlorine exposures to the water that is being discharged into the drainage ditch from the wash column's static screens during reactor transfers. The plant's current plans are to develop and implement engineering controls for neutralizing the residual chlorine in the water, before it is discharged into the ditches. The operators have been informed of the problem and of the areas where chlorine has been detected.
2. Operators' potential exposures to dust while operating the bag splitter and housekeeping in the weigh feeder room, were lower than the Exposure Guidelines for the additives in use. It is recommended that dust masks continue to be required for these jobs to control exposures to dust as low as possible.

3. Operators' exposures to Tetrahydrofuran, while performing pH tests on CPE resin, were below the Exposure Guideline. The solvent is used under a fume ventilation hood and the results of the personnel samples indicate that this is adequate for controlling exposures.
4. Area noise surveys of the plant did not reveal any significant changes in noise levels. The high noise areas (<90 dbA) of the plant are properly posted with ear protection warning signs and the location of these areas will be communicated to operators in the annual Industrial Hygiene meetings.

CHLORINE EXPOSURE EVALUATION

Explanation of Guidelines and Sampling Method

The OSHA Permissible Exposure Limit (PEL) for chlorine is a 1 ppm ceiling limit. A ceiling limit is the concentration that a person should not be exposed above for any period of time. The personnel samples were obtained from the operators breathing zones and represent as nearly as possible actual exposures. A chlorine direct reading dosimeter with a "Wolcott" Nafion membrane type sensor was used to obtain the personnel samples. The dosimeter stores the highest instantaneous reading that was detected for the duration of the sample. Other data storage capabilities are the highest 15 minutes average concentration, the average concentration for the duration of the sample, and the elapsed time from the start of the sample. Calibration of dosimeters was performed by the Division's Industrial Hygiene Department using a Metronics Dynacalibrator. All of the dosimeters and probes were calibrated before and after each sample with a known chlorine concentration of 1 ppm (vol,vol).

The area samples were obtained using the same sensor, but the data was collected and stored using a metronics datalogger. The datalogger was advantageous for these type samples due to it's capacity to store individual 30 second values.

1. Personnel Monitoring

As shown on Table 1 (Attachment 1), of the six (6) samples that were obtained on the Day Maintenance and Outside S.O.T. jobs; five (5) were above the OSHA PEL for chlorine. The highest exposure detected was in the Day Maintenance job and equalled greater than 12 ppm for the highest instantaneous reading, 1.27 ppm for the highest 15 minute average, and 0.11 ppm for the sample duration of 261 minutes. The average concentrations that were detected in both jobs are as follows:

Job	Number of Samples	Instantaneous	15 Minute Avg.	Time Weighted Average for Sample Duration
Day Maintenance	2	8.07 ppm	.67 ppm	.05 ppm
Outside S.O.T.	4	2.12 ppm	.01 ppm	.00 ppm

2. Area Monitoring

The area samples indicate that chlorine is being released from the water in the drainage ditches during reactor transfers. As shown on Attachment 2, the highest concentrations (3 - >16 ppm and 16 - >20 ppm) were detected near the wash columns on each train. Apparently the water that is transferred over from the wash column static screens contains residual chlorine and this is released as the water cools going to the drainage ditch. All of the concentrations that were detected dissipated rapidly.

DUST EXPOSURE EVALUATION

Explanation of Guidelines and Sampling Method

The dust that operators may potentially be exposed to in the weigh feeder room or at the bag splitter are non-asbestos talc, calcium carbonate and CPE resin. The American Conference of Governmental Industrial Hygiene (ACGIH) Threshold Limit Value (TLV) for non-asbestos talc is 2 mg/m³ respirable dust. The TLV for nuisance dust such as calcium carbonate and CPE resin is 10 mg/m³ total dust or 5 mg/m³ respirable dust. TLV's are exposure guidelines for a normal eight-hour workday and 40 hour work week. Both of the jobs that were monitored were relatively short-term jobs lasting from 16 to 180 minutes, but may be performed several times a day. ACGIH recommendations for short-term exposures are as follows: "Short-term exposures should exceed three times the TLV-TWA for no more than a total of 30 minutes during the workday and under no circumstances should they exceed five times the TLV, provided that the TLV-TWA is not exceeded."

A Gilian Hi Flow Air Sampler with a Bendix midget cyclone and matched weight filter cassette was used to obtain breathing zone samples from operators working in the weigh-feeder room and at the bag slitter. The samples were analyzed gravimetrically for respirable and non-respirable dust.

1. Personnel Monitoring

Because a dust mask is required to be worn when working in the weigh feeder room or operating the bag slitter, the concentrations that were detected are potential exposures.

Table 2 (Attachment 3) lists the results of the excursion samples that were taken on the housekeeping job in the weigh feeder room and the bag slitter job. The highest concentration that was detected on the housekeeping job was 3.5 mg/m³ respirable dust and 10.6 mg/m³ non-respirable dust for 16 minutes. The highest concentration that was detected for the bag slitter job was 4.1 mg/m³ respirable dust and 1.4 mg/m³ for non-respirable dust for 41 minutes. The following are the average concentrations that were detected for all of the samples:

Job	Number of Samples	Respirable Dust (mg/m ³)	Total Dust (mg/m ³)
Housekeeping	3	2.2	8.6
Bag Slitter	5	2.9	6.1

NOISE EXPOSURE EVALUATION Method and Explanation of Guidelines

- The new Dupont MK-2 Audio Dosimeter was used to measure employee's exposure to noise and was also used as a sound level meter to measure area noise levels. The dosimeter meets or exceeds all current requirements established by government agencies in the United States for personal audio dosimeters. All noise measurements were made using an 80 and 90 db(A) threshold level and a 90 db(A) criterion level. The threshold is the level that noise must exceed to be included in the dose calculation and the criterion is the decibel level that will yield a 100 percent dose in eight hours. The 90 db(A) criterion level is an OSHA regulation, to obtain the dose percent using the Louisiana Division criterion level of 85 db(A) the results were multiplied by two (2). This is true due to the 5 db(A) doubling rate that is included in both the OSHA regulations and the Louisiana Division Standard. All of the audio dosimeters were calibrated before and Audio Dosimeter Calibrator) at sound levels of 94 and 114 decibels.

1. Personnel Monitoring

Because ear protection is required to be worn in the high noise areas of the plant, the noise doses that were detected are potential doses. As shown in Table 4 (Attachment 5), two samples were run on Technical personnel. The average potential exposure was 9.8% of the Louisiana Division Guideline.

2. Area Surveys

As shown in Attachments 6 - 8, the high noise areas (>90 dbA) are the fluid bed dryer areas; the air compressor area; the 601, 602, and 603 blower areas; Blowers 1A and 2A, Blowers 105 and 205, and the cyclone blowers areas.

All of the high noise areas listed above are designated ear protection areas. The perimeters of these areas are posted with high noise warning signs and employees are informed of these areas annually in the Industrial Hygiene Safety Meetings.

TETRAHYDROFURAN EXPOSURE EVALUATION Guidelines and Sampling Method

The ACGIH Threshold Limit Value (TLV-TWA) for tetrahydrofuran is 200 ppm with a TLV-STEL of 250 ppm. The TLV-STEL is a 15 minute exposure guideline.

- The 3M organic vapor monitor badge (#3500) was used to obtain
- breathing zone samples of operators performing pH test on CPE resin
- using tetrahydrofuran. The badges, which use an activate charcoal wafer as a collection medium, were desorbed with carbon disulfide and analyzed by gas chromatography.

Discussion of Results

As shown on Table 3 (Attachment 4) the personnel samples were below the 250 ppm TLV-STEL. Of the four (4) samples that were run only one was above the detection limits of 10.2 ppm. This sample was on an Outside S.O.T. and equalled 104.6 ppm for 15 minutes.

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The average concentrations that were detected are as follows:

Job	Job Classification	Number of Samples	Average Concentration Detected
Resin pH Test	Lab S.O.T.	2	<10.2 ppm
Resin pH Test	Outside S.O.T.	2	56.6 ppm

Mark

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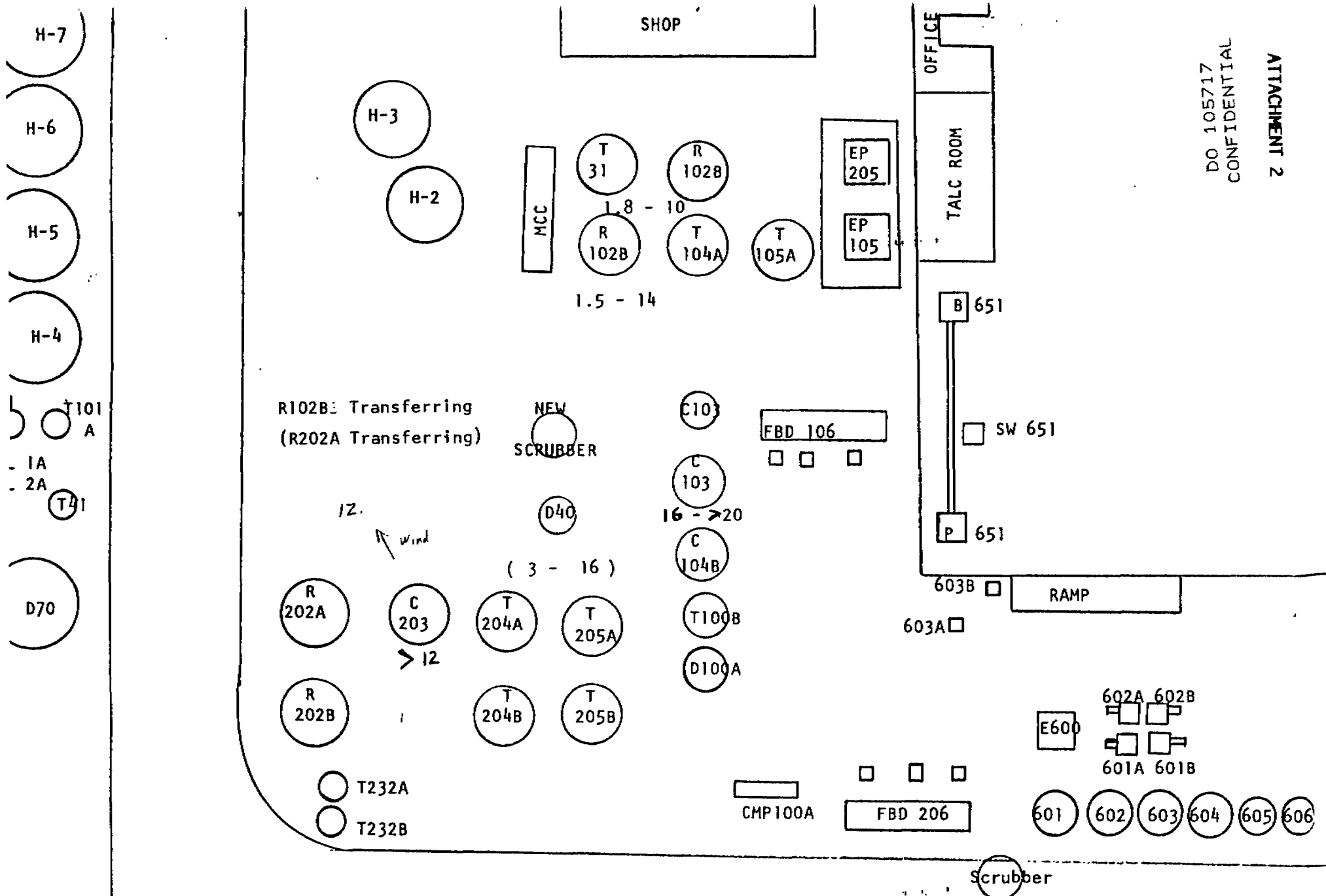
Attachments (8)

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EMPLOYEE'S TIME-WEIGHTED AVERAGE POTENTIAL EXPOSURES TO CHLORINE AT THE CPE PLANT, 1984

SAMPLING DURATION (MINUTES)	JOB	EMPLOYEE NUMBER	CHLORINE CONCENTRATION, PPM (VOL,VOL)		
			INSTANTANEOUS	15 MINUTES	TIME WEIGHTED AVERAGE
OSHA PERMISSABLE EXPOSURE LIMIT (CEILING)			1.0		
360	DAY MAINTENANCE	433425	4.75	0.07	0.00
261	DAY MAINTENANCE	434134	>12.00	1.27	0.11
386	OUTSIDE S.O.T.	433363	0.15	0.00	0.00
372	OUTSIDE S.O.T.	433363	1.20	0.02	0.00
390	OUTSIDE S.O.T.	434002	1.35	0.03	0.00
383	OUTSIDE S.O.T.	433425	5.80	0.01	0.00

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Peak Cl₂ Levels 1984 Samples.

1ppm Max Exposure

CPE AREA CHLORINE SAMPLES, PPM (Vol,Vol) 25ppm IDLH Limit

CONTROL ROOM

EMPLOYEE'S TIME-WEIGHTED AVERAGE POTENTIAL EXPOSURES TO DUST AT THE CPE PLANT, 1984

				TIME WEIGHTED AVERAGE POTENTIAL ² , EXPOSURE TO DUST ¹	
SAMPLING DURATION (MINUTES)	SAMPLE VOLUME (LITERS)	JOB	EMPLOYEE NUMBER	RESPIRABLE DUST	TOTAL DUST
ACGIH TLV FOR NUISANCE DUST				5.0	10.0
ACGIH TLV FOR NON-ASBESTOS TALC				2.0	
16	28.2	HOUSEKEEPING	434020	3.5	14.1
180	384	HOUSEKEEPING	432698	1.5	7.1
35	63	HOUSEKEEPING	434291	<1.6	4.8
38	68.4	OPERATING BAG SLITTER	434133	1.5	7.4
41	73.8	OPERATING BAG SLITTER	434133	4.1	5.5
36	63.0	OPERAITNG BAG SLITTER	434291	3.2	4.8
43	73.1	OPERATING BAG SLITTER	434133	4.1	5.5
40	68	OPERATING BAG SLITTER	434133	1.5	7.4

¹ CPE resin, calcium carbonate, non-asbestos talc.

² An approved dust mask is required to be worn when performing these jobs.

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ATTACHMENT 4

TABLE 3

EMPLOYEE'S TIME-WEIGHTED AVERAGE POTENTIAL EXPOSURES TO TETRAHYDROFURAN AT THE CPE PLANT, 1984

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SAMPLING DURATION (MINUTES)	SAMPLE VOLUME (LITERS)	JOB ¹	EMPLOYEE NUMBER	TIME WEIGHTED AVERAGE EXPOSURE, PPM (VOL,VOL)
				TETRAHYDROFURAN -----
ACGIH THRESHOLD LIMIT VALUE - STEL (15 MIN)				250.0
15	0.6	OUTSIDE S.O.T.	434205	104.6
18	0.7	OUTSIDE S.O.T.	434020	<8.7
15	0.6	LAB S.O.T.	433998	<10.2
15	0.6	LAB S.O.T.	434040	<10.2

¹ These excursion samples were taken while the operator was performing a routine pH test on CPE resin using Tetrahydrofuran.

EMPLOYEE'S TIME-WEIGHTED AVERAGE POTENTIAL EXPOSURES TO NOISE AT THE CPE PLANT, 1984

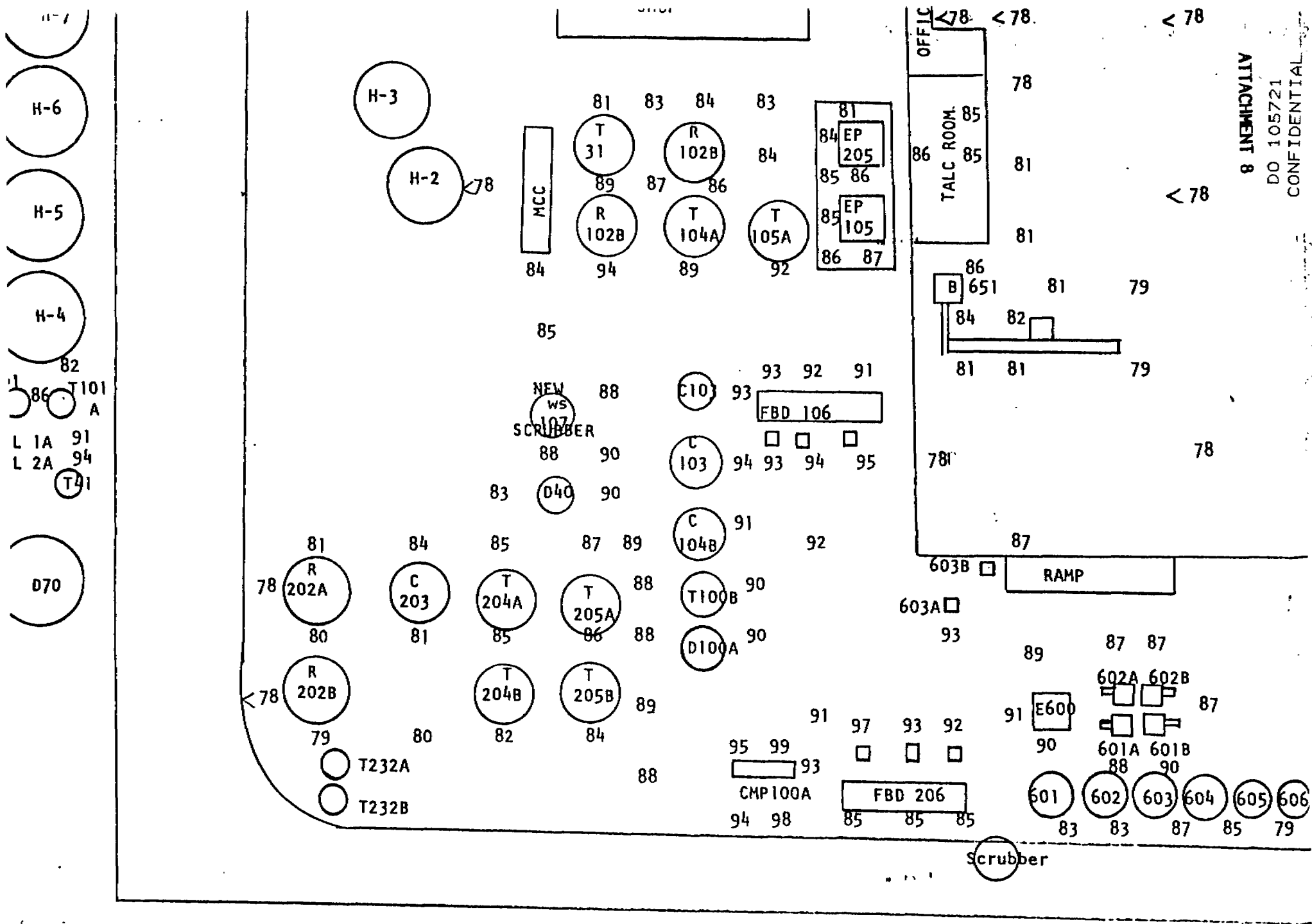
SAMPLING DURATION (MINUTES)	JOB	EMPLOYEE NUMBER	POTENTIAL EXPOSURE > 115 db(A)	TIME WEIGHTED AVERAGE EXPOSURE, PERCENT OF ALLOWABLE DOSE		
				DOSE % OSHA REGULATION ¹	DOSE % 90 db(A) THRESHOLD ²	DOSE % LOUISIANA DIVISION STANDARD ³
407	TECHNICAL	432332	NO	7.2	2.2	14.4
420	TECHNICAL	433955	NO	2.6	1.0	5.2

¹ 90 db(A) for 8 hours using an 80 db Threshold.

² 90 db(A) for 8 hours using a 90 db Threshold.

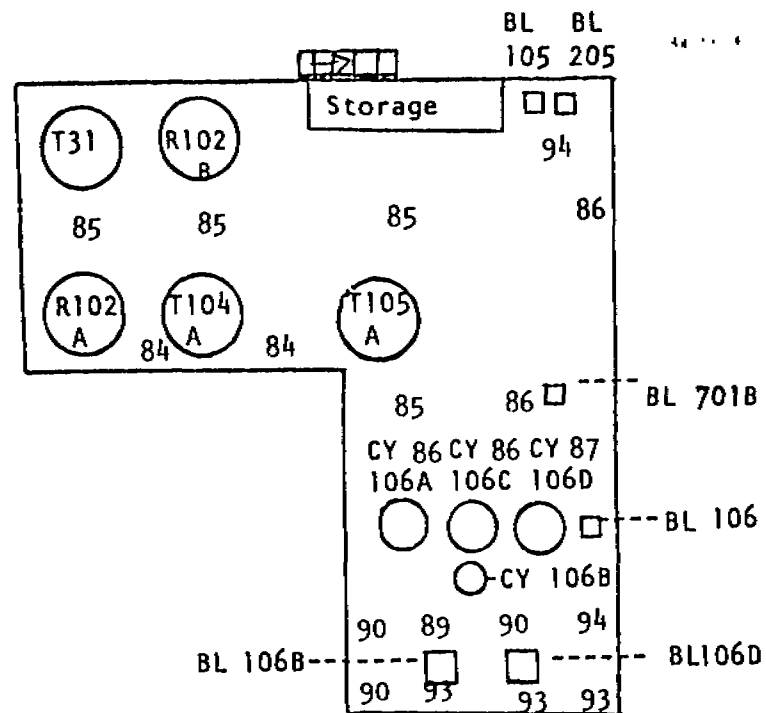
³ 85 db(A) for 8 hours using an 80 db Threshold.

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CPE AREA NOISE SURVEY db(A)

TRAIN 1 - UPSTAIRS
AREA NOISE LEVELS (dba)



ATTACHMENT 6

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TRAIN 11 - SECOND DECK
AREA NOISE LEVELS - (dba)

