

SHELL OIL COMPANY

SHELL CHEMICAL COMPANY

DEER PARK MANUFACTURING COMPLEX ,

DATE MARCH 2, 1976

TO DEER PARK MANUFACTURING COMPLEX
MANAGER - SAFETY & INDUSTRIAL HYGIENE

FROM INDUSTRIAL HYGIENIST
DEER PARK MANUFACTURING COMPLEX

SUBJECT INDUSTRIAL HYGIENE - EXPOSURE
MONITORING PROGRAM

Monitoring the work environment is an essential portion of the industrial hygiene effort. Measurements of this type serve to define employee exposure and identify conditions which may be hazardous to health.

Personal (breathing zone) monitoring provides the measure of employee exposure which is comparable to the OSHA exposure limits. The results of such monitoring, not only ensure that employee exposures do not exceed safe exposure limits, but also provide the initial evaluation to comply with future health standards. This information may also be useful in any future epidemiological work.

The complexity of operation and the numerous process materials necessitate an organized plan for industrial hygiene surveillance with defined priorities and objectives. The plan in this memo outlines the criteria for selecting and prioritizing materials for industrial hygiene surveillance. This plan includes continuation of on-going personal sampling programs such as for vinyl chloride and benzene and introduces evaluation strategy for other significant materials.

Accomplishment of this plan will ensure that employee exposures do not pose a health risk, and will provide the initial measurement data necessary to comply with future health standards. Although no new periodic monitoring is scheduled in this plan, there is a possibility that periodic monitoring will be appropriate where exposures approach OSHA exposure limits. In terms of the standard language seen in the most recent proposed standards, the "action level" for periodic monitoring is one-half the exposure limit.

I. PRIORITY-SETTING CRITERIA

With the concurrence of Manufacturing Safety & Health, the determination of survey priorities is based on the following factors:

A. Material Toxicity

Toxicity is the inherent property of a material to do harm. Materials of greater toxicity are rated higher in priority.

PLAINTIFF'S EXHIBIT

SH-3658

ABS-012994

LAM 030403

B. Promulgation of OSHA Standard

The likelihood of a proposed or finalized standard which details monitoring (initial exposure evaluation and periodic), medical surveillance, compliance methods, etc., is also considered in the establishment of priorities. The Standards Completion Project (SCP) could lead to standards for over 300 materials in the next few years. Materials appearing early on this list (e.g., MEK, MIBK, mesityl oxide, allyl chloride, epichlorohydrin, ethylene dichloride, phenyl glycidyl ether, hydrogen sulfide, butyl glycidyl ether, allyl alcohol, ethyl chloride, trichloropropane, acetone, and hexane) are rated higher in priority as well as materials for which OSHA is considering exposure limit revisions (e.g., free silica, asbestos, benzene).

C. Potential for Exposure

The true hazard of a material depends not only on the toxicity but on the potential for the material to escape into the working environment. This potential is determined by three factors: (1) the physical process (e.g., amount of material present, high temperature and pressure resulting in fugitive leaks, and process operations which are open to the atmosphere); (2) employee work practices (e.g., process sample collection and housekeeping); and (3) the materials's physical properties (e.g., volatility and density of vapor in air).

D. Number of Exposed Workers

As the number of exposed workers increases, more people are potentially affected so the survey priority of a material is adjusted upwards.

Since the prime consideration in this surveillance plan is to evaluate the risk to employee health, factors (A), (B), and (D) are given the strongest consideration.

II. INDUSTRIAL HYGIENE SURVEILLANCE PLAN

On the basis of factors presented in priority setting, twenty-one materials are identified for surveillance. This total includes materials for which monitoring is in progress as well as materials that have not been monitored.

The survey scheduling of the other materials are discussed subsequently.

The total manpower requirements for the surveillance plan consists of: (1) 28.5 man-days per month to continue the present vinyl chloride monitoring, the present benzene monitoring, the planned monthly allyl chloride monitoring, and the planned monthly free silica monitoring; and (2) 350-450 man-days to complete initial exposure evaluations for the other materials.

Completion of the initial exposure evaluations, while maintaining the periodic monitoring, will require two full-time laboratory technicians and approximately 50 percent of the industrial hygienist's time through 1977. Eighty to ninety percent of the monitoring would be in the Chemical Plant. Ten materials are in the Chemical Plant only and another nine materials are in both the Chemical Plant and Refinery with approximately eighty percent of the monitoring for such materials occurring in the Chemical Plant.

A. Priority Setting

The 21 materials are categorized into four groups to facilitate priority setting and survey planning: (1) carcinogens, mutagens, and teratogens (known or highly suspected); (2) chlorinated hydrocarbons; (3) ketones; (4) products of significant toxicity. Category (1) rates the highest priority in terms of the toxicity factor followed by groups (2) and (4). The potential for exposure is present with every material in each group. The exposure potential rating for groups (2) and (3) are about equal and generally higher than for materials in group 1. Group 4 materials vary in this respect with free silica rated highest followed by hydrogen sulfide. The remaining materials fall somewhere between group (3) and group (1). The number of exposed workers for each material is shown in the appendix with the number of job classifications scheduled for surveillance shown in table 1.

Priority based solely on the OSHA standard status is as follows. Vinyl chloride and asbestos rate highest because of existing standards. Because of impending proposed standards, group (3), benzene and free silica follow after vinyl chloride and asbestos. OSHA activities indicate glycidyl ethers, allyl alcohol, hexane and hydrogen sulfide would follow group (3) proposed standards. The next stage of standards development would include group (2) and ethylene dibromide with chlorine appearing near the end of the SCP list. No standards promulgation is foreseen for the aromatic amines in EPON Curing Agents for at least the next few years.

B. Monitoring Schedule

The vinyl chloride sampling results for 1975 indicate that eventually the frequency of monitoring can be reduced. Likewise, the 1975 results for benzene are low and a reduction in monitoring is likely. As the AC abatement program proceeds and exposures drop, so

should the frequency of AC monitoring. The reduction in monitoring will probably not occur in 1976, but in 1977 it is foreseeable that VCM monitoring would be reduced from monthly to quarterly and benzene and AC monitoring would be reduced 75 and 50 percent, respectively. As these reductions occur, sampling for the remaining materials will increase. The projected sampling schedule is diagramed in figure 1 and summarized in table 1.

The order in which the materials are surveyed depends not only on the priority-setting criteria, but also on the manufacturing conditions (e.g., whether the material is being used or manufactured or shipped) and the availability of a sampling collection/analytical method. Because of this, there is a great deal of overlap between surveys as shown in figure 1.

C. Sampling Collection/Analytical Methods

Since the list of 21 materials consist of vapors and particulates, a variety of sampling/analytical methods will be used. The plastic bag/gas chromatographic analysis method used for VCM will apply to the chlorinated hydrocarbons, allyl alcohol, and the ketones. Therefore, all analytical work will be at Deer Park. Sample analysis for aromatic amines, polycyclic aromatics, asbestos, free silica, and glycidyl ethers is or can be arranged with the Industrial Hygiene Laboratory, Westhollow Research Center.

Table 1 shows the sampling procedures for each material and estimates of survey time. Initial exposure evaluation for each material will be determined by collecting a number of personal samples on different employees in the same job classification. The number of samples (usually 5-10) should be adequate enough to define the day-to-day variability of exposure. The sampling protocol (i.e., job classifications and number of samples) for each material is detailed in the appendix.

D. Manpower Requirements

On the basis that these monitoring reductions occur after 1976, the present staffing of two laboratory technicians and one industrial hygienist would complete the planned initial exposure evaluations while continuing the planned periodic monitoring by the end of 1977. Figure 1, which outlines the surveillance schedule, shows the workload for the two laboratory technicians. Not included in this figure is the industrial hygienist's time. Approximately 50% of his time over the next two years would be required to arrange sampling protocols, review and interpret results, and work with the laboratory technicians in the collection of samples.

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The estimates of sample collection/analysis time are based on experience with vinyl chloride, benzene, and allyl chloride monitoring. In addition to sample collection and analysis, there is a certain amount of recordkeeping, report writing, equipment maintenance, etc., which usually consume as much time as the actual sample collection and analysis. Therefore, the total survey time is approximated by doubling the sampling/analytical time.

III. IMPLEMENTATION

This plan is designed to mesh with present survey work and can be implemented immediately. Additional manpower will be unnecessary.

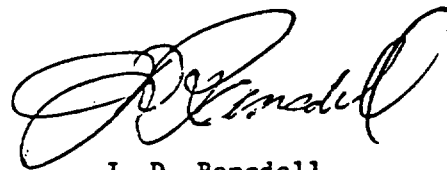
Prior to beginning surveys for each material, the industrial hygienist and/or the laboratory technician should present the survey plans at appropriate shift foreman's meetings. At that time, an explanation can be made of the intent of the survey and the sampling procedure.

The sample results will be reported as promptly as possible to each department concerned. Each department should be encouraged to present the survey plan to their hourly personnel and to discuss sampling results. If survey results indicate overexposure, engineering or administrative controls should be prepared and scheduled for implementation. These plans should be communicated in writing to Safety and Industrial Hygiene.

IV. SUMMARY

The priority-setting criteria and the industrial hygiene surveillance plan are intended to organize the approach to employee exposure evaluation.

Your comments are invited, and I request your concurrence to implement this plan.



J. D. Ransdell

JDR:lk

Attachments

cc - R. L. Bryan
F. G. Reitz

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LAM 030407

TABLE I. INDUSTRIAL HYGIENE SURVEILLANCE PLAN

SAMPLING PROCEDURES			TIME REQUIREMENTS FOR SURVEY COMPLETION				SURVEY SCHEDULE		
Material	Sampling/ Analytical Method	Equipment Availability	No. of Job Classifications	No. of Samples	Sampling/ Anal. Time (Man-Days)	Time Allowed for		Start	Finish
						Recordkeeping, Report Writing, Equip. Maint. (Man-Days)	Total Survey Time (Man-Days)		
GROUP 1: Carcinogens/Mutagens/Teratogens (Known or Highly Suspected)									
Asbestos	Membrane filter collection/ microscopic fiber counting	Available	3	23-35 + 2/year	5-7	5-7	10-14	Feb/76	Dec/76

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TABLE I. INDUSTRIAL HYGIENE SURVEILLANCE PLAN

2

<u>Material</u>	<u>SAMPLING PROCEDURES</u>		<u>TIME REQUIREMENTS FOR SURVEY COMPLETION</u>				<u>SURVEY SCHEDULE</u>	
	<u>Sampling/ Analytical Method</u>	<u>Equipment Availability</u>	<u>No. of Job Classifications</u>	<u>No. of Samples</u>	<u>Sampling/ Anal. Time (Man-Days)</u>	<u>Time Allowed for Recordkeeping, Report Writing, Equip. Maint. (Man-Days)</u>	<u>Total Survey Time (Man-Days)</u>	<u>Start</u> <u>Finish</u>

GROUP 4: Products of Significant Toxicity

Free Silica	PVC filter collection/ Gravimetric & X-ray analysis	Available	2	10 + 1/mo	2-3 + 0.25/mo	2-3 + 0.25/mo	4-6 + 0.5/mo	In Progress
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FIGURE 1. INDUSTRIAL HYGIENE SURVEILLANCE SCHEDULE

YEAR: 1976													
Material	Total Survey Time (Man-Days)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Free Silica	4-6 + 3/mo	0.5	0.5	0.5	-	-	-	-	-	-	-	-	-
Asbestos	10-14	← 10-14 →											
		YEAR: 1977											
Total Survey Time:													
Man-days Required													Year
484.5 - 495.5													1976
360 - 432													1977

APPENDIX: SAMPLING PROTOCOL BY MATERIAL

Sample Collection/
Analysis Frequency
(Samples/Man-Day)

Sample Schedule
Long Term Short Term

No. of
Workers

Job
Title

Work
Area

Material

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APPENDIX; SAMPLING PROTOCOL BY MATERIAL

2

Sample Collection/
Analysis Frequency
(Samples/Man-Day)

Sample Schedule
Long Term Short Term

No. of
Workers

Job
Title

Work
Area

Material

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LAM 030412

APPENDIX: SAMPLING PROTOCOL BY MATERIAL

3

<u>Material</u>	<u>Work Area</u>	<u>Job Title</u>	<u>No. of Workers</u>	<u>Sample Schedule</u>		<u>Sample Collection/ Analysis Frequency (Samples/Man-Day)</u>
				<u>Long Term</u>	<u>Short Term</u>	
Asbestos	Process Area Demolition/ Renovation	Maintenance	Variable	← 20-30 →	→	
	CA	Cell Renewal Crew Member	4	2/yr		5
	Refy. or Chemical Garage	Mechanic	3	3-5 (during brake servicing)	→	
	Refy. or Chemical Carpenter Shop	Carpenter		← 5 →		

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APPENDIX: SAMPLING PROTOCOL BY MATERIAL

4

Sample Collection/
Analysis Frequency
(Samples/Man-Day)

Sample Schedule
Long Term Short Term

No. of
Workers

Job
Title

Work
Area

Material

LAM 030414

ABS-013005

APPENDIX: SAMPLING PROTOCOL BY MATERIAL

6

Sample Collection/
Analysis Frequency
(Samples/Man-Day)

Sample Schedule
Long Term Short Term

No. of
Workers

Job
Title

Work
Area

Material

LAM 030416

ABS-013007

APPENDIX: SAMPLING PROTOCOL BY MATERIAL

7

<u>Material</u>	<u>Work Area</u>	<u>Job Title</u>	<u>No. of Workers</u>	<u>Sample Schedule</u>		<u>Sample Collection/ Analysis Frequency (Samples/Man-Day)</u>
				<u>Long Term</u>	<u>Short Term</u>	

LAM 030417

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APPENDIX: SAMPLING PROTOCOL BY MATERIAL

8

Sample Collection/
Analysis Frequency -
(Samples/Max.-Day)

Sample Schedule
Long Term Short Term

No. of
Workers

Job
Title

Work
Area

Material

DPMC
2-12-76
JDR:lrc

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