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INDUSTRIAL HYGIENE REPORT

LOUISIANA DIVISION - CHLORINATED
METHANES PLANT INDUSTRIAL HYGIENE
PROGRAM REVIEW, 1978CRI NO. _____
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SUMMARY

The Chlorinated Methanes Industrial Hygiene Program was reviewed to determine the effectiveness of the current program approach and to identify areas of concern for future improvements. The program was found to be comprehensive and active. Measured routine exposures to chemical and physical stresses were well within current guidelines. Future efforts need to concentrate on the evaluation and control of individual tasks where there are high potentials for over-exposure and on the continuation of educational programs.

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INTRODUCTION

The 1978 Chlorinated Methanes Industrial Hygiene Program was reviewed to determine the effectiveness of the current program approach and to identify areas of concern for future improvement.

CONCLUSIONS

The Chlorinated Methanes Plant Industrial Hygiene Program is in excellent shape. Extensive efforts over the past year have developed a comprehensive program covering all areas included in this review and providing a valuable data base which demonstrates that employees' exposures to chemicals and noise are routinely within current guidelines.

Future efforts need to include the evaluation and control of tasks where there is a high potential for over-exposure, periodic checks on time-weighted average exposures and the continuation of educational programs.

RECOMMENDATIONS

1. Personnel and excursion samples are needed in 1979 for exposures to: methyl chloride, methylene chloride, chloroform, carbon tetrachloride, caustic, hydrogen chloride, ammonia, bis-chloromethyl ether and carbon disulfide as described in the chemical and physical agent inventory sheets.
2. Jobs involving exposures to the following stresses need to be evaluated by observation of activities and/or sampling: noise, vinyl chloride, dimethyl ether, hexachlorinated organics, pyridine, methanol, propylene oxide, 1,1,1-trichloroethane and sulfuric acid.

These tasks should especially be reviewed: changing caustic filters, loading products for shipment, mining reactors, sampling the process, pumping the tar pot pit, and running lab tests.

Also the heat stress involved in repairs on the thermal reactor cooling fans needs to be measured.

3. Industrial hygiene guides are needed for pentachloroethane and methyl hydrogen sulfate. Handling guidelines are also needed for the Betz® phosphate and sulfite products.
4. A quality control program including spiked and blank samples is needed to support routine sampling.
5. The Division Safety Standards for protective equipment need to be supplemented with written procedures specific to CMP needs to meet OSHA regulations (1910.132, 1910.134).
6. Review work practices to minimize chemical contamination of the control room, eating areas and locker facilities.

DISCUSSION

Explanation

This report is a supplement to comprehensive reports published by the plant contact and historical data recorded in the computer file. It is a summary of findings from observations in the plant and from answers to the Industrial Hygiene Program Review Questionnaire which should be consulted for detailed answers to individual questions.

People

Job profiles are complete and include times employees spend in the various plant areas. This might be used at some time in the future to attempt to correlate continuous monitor data with personnel monitoring results.

Chemical and Physical Inventory Sheets

A comprehensive inventory was recently prepared for all job classifications. Degrees of exposure and hazard ratings are believed to reflect actual work conditions including the possible additive effects from the presence of a number of chlorinated hydrocarbons, the warning properties of the substances and the types of hazards associated with each one.

Industrial hygiene guides are needed for: Betz® phosphate, Betz® sulfite, methyl hydrogen sulfate and pentachloroethane.

Process/Chemistry Flow Sheets

A simplified process flow sheet is available to which the scrubber, tar pot and eventual shipping methods have been added for industrial hygiene information.

Waste disposal is currently as follows: all liquids are burned in the waste heat boiler; solids are shipped to Rollins for incineration; carbon tetrachloride and last column heavies are pumped by pipeline to solvents; the catalyst is buried in landfill.

Floor Plans/Plant Layout

A plant layout is available with major equipment, tank car loading and tank truck loading stations identified and continuous monitor sampling points noted. Sumps are located at the Dowtherm system, below the M2 filters and in the tar pot area.

Employee Education

A new employee reviews the chemical hazards and the necessary protective measures as part of the initial checklist before beginning work in the block. These subjects are also frequently reviewed at monthly training and

safety meetings. The annual update is done by the industrial hygiene contact in shift safety meetings where the Consequences of Over-exposure book or overhead transparencies are used and data from the most recent surveys are discussed as evidence of control. A copy of the survey reports, the Consequences of Over-exposure book and the printout from the continuous monitor are always available for employee inquiries. Plant personnel are getting involved in the program by identifying possible problems such as leaks or jobs that tend to involve higher chemical exposures. The October Industrial Hygiene Indices reflected a rate of 80% for Consequences of Over-exposure education and 96% for evidence of control education over the last 12 months.

Transient workers and visitors are given the appropriate safety equipment with explanations for its use when a safe work permit is issued.

No further information is given, but the safety of the work area is the responsibility of the permanent Dow employees.

Sampling and Analytical Methods

Sampling and analytical methods for the most recent survey were as follows:

<u>Stress</u>	<u>Sampling Method</u>	<u>Analytical Method</u>
Carbon tetrachloride Chloroform Dimethyl ether Ethylene dichloride Methylene chloride β -Trichloroethane Vinyl chloride	Eight-hour personnel samples using 600 mg PCB charcoal tubes.	Desorbed with chilled CS_2 and analyzed by GC-FID in the production laboratory.
Methanol Methyl chloride 1,1,1-Trichloroethane	Area samples caught in Saran bags (used in conjunction with job profiles to calculate eight-hour TWA's).	Direct analysis through gas sample loop to GC-FID in the production lab.
Chlorine Hydrochloric acid Sulfuric acid	Six to eight-hour area samples by drawing air through a midget impinger containing water or 1.0 N NaOH.	Analyzed by titration in the R&D Analytical lab.

<u>Stress</u>	<u>Sampling Method</u>	<u>Analytical Method</u>
Hexachlorobenzene Hexachlorobutadiene Hexachloroethane	40-minute excursion samples caught on Porapak Q5 tubes.	Desorbed with hexane and analyzed by GC-EC in the Environmental Control lab.
	Wipes using 5.5 cm Whatman #2 filter circles to check a 100 sq cm surface area.	Same as above.
Carbon tetrachloride Chloroform Methyl chloride Methylene chloride Vinyl chloride	Continuous area monitoring used mostly for early leak detection.	Direct GC-FID.
Noise	Eight-hour personnel samples using duPont dosimeters (calibrated for 85 dBA standard).	

Area Surveys Using
Edmont-Wilson Meter

Instruments are calibrated weekly except the continuous monitor which is checked every other week. Spikes and blanks are not routinely run. Sampling and recovery efficiencies are assumed to be 100%.

Annual Audiogram - Review annually as good indicator of noise over-exposures.

Sampling strategy in 1978 was to sample everyone in every job for all major hazards in order to build a strong data base. More details on sampling and analysis are given in R. J. Bordelon's report - Environmental Health Survey - First Half of 1978 - Chlorinated Methanes Plant - Louisiana Division, published September 1, 1978.

The continuous monitor has sample points located in areas that have high leak potential and in normal work areas. Data summaries include cumulative averages and excursions for each sample point.

Exposure Data and Reports

Sampling done during the first half of 1978 showed all routine personnel exposures to be well within acceptable limits. Excursions such as caustic filter changes, reactor mixing, loading product and sampling the process, and areas such as the acid area, the P-253 area and the tar pot area have high potentials for exposures although they were normally within acceptable limits.

Historically, nearly all exposures have been relatively low. Some of the 1977 data will be lower than first reported when corrected for accidental contamination during sample storage.

Recent reports reflect the comprehensive program in progress. They will support future epidemiological needs as well as providing an explanation of industrial hygiene methodology for future work.

Exposure Controls

Current engineering controls include: a compressor seal purge system, a recycle ventilation system for the control building, ventilation hoods in the laboratory and process vents tied into a waste heat boiler. The caustic filters will also be vented to the boiler to minimize the release of methyl chloride directly to the air. A continuous air monitoring system serves as a sensitive leak detector for the major chlorinated organics.

Protective equipment is provided where necessary for specific jobs. The respiratory protection program involves a strong emphasis on training. Written procedures are the Louisiana Division Safety Standards.

Lunch and locker facilities are minimal, especially for contract employees. More effort will be needed to ensure that these and other control building facilities are not contaminated with chemicals.

Attitudes and Efforts

Block employees are quite receptive toward the Industrial Hygiene Program. Management support and nearly full-time contact efforts have been instrumental in creating a very comprehensive program.

More communications on IHG's, analytical methods and government affairs are needed from the Environmental Control Industrial Hygiene Group as well as plant supervision. Also, an analytical quality control program with evaluation of routine spiked samples needs to be developed.

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