



RWS

Interoffice Communication

To J. V. Uptain
From C. O. Tubb
Date December 29, 1975
Subject ABERDEEN CHEMICAL EXPOSURE ABATEMENT PROGRAM

On June 11, 1975, L. N. Vernon issued a letter which was to be used as a guideline in establishing a plant Chemical Exposure Abatement Program. On July 10, 1975, an Aberdeen Chemical Exposure Abatement Program was initiated. Listed below is an outline of the initial program and also the plan for the 1976 Chemical Exposure Abatement Program.

I. Initial Program

A. Materials

In the initial program, the Plant Safety Director, the Industrial Hygienist, and the Chief Plant Chemist worked together in developing a list of the ten most dangerous chemicals used in the plant. The chemicals were chosen on a basis of what the team "thought" to be the most dangerous. Publications sent to the plant by Dr. Steffey and David Kuhn were also used in deciding what chemicals to install on the list. The chemicals chosen in the initial program are listed as follows:

1. Vinyl Chloride - Feedstock used in the manufacture of PVC. Permissible level 1 ppm. The plant uses six or seven hundred thousand pounds of this material daily. All personnel working in the plant have been exposed to VCM at some time.
2. Phthalic Anhydride - Acid used in the manufacture of plasticizer. Permissible level 2 ppm. The plant uses approximately 32,000 pounds daily. Only two to three people are normally in contact with this chemical during an eight hour shift.
3. Lead - Component in heat stabilizer used in PVC compounding operation. Permissible limit 0.1 mg/m³. Two or three employees are usually exposed to this material on an eight hour shift. The plant usage (average) of lead containing materials is 18-20 thousand pounds monthly.
4. Nitrobenzene - Used in our quality control Laboratory as a solvent in resin viscosity testing. Permissible limit 1 ppm. One employee is normally exposed to this material 5 days/week. Plant usage is approximately five gallons a month.

Aberdeen Chemical Exposure Abatement Program

December 29, 1975

Page 2

5. Trichloroethylene - Solvent used as a diluent for anti-static solutions which is used in the vinyl dryer area. Permissible limit 100 ppm. The plant uses approximately 8-10 gallons monthly. Two employees per shift are normally exposed to this material.
6. Alphamethylstyrene - Inhibitor used to stop conversion of VCM to PVC in PVC reactors. Permissible limit 100 ppm. The plant uses up to five gallons of this material a day. Two employees per eight hour shift are exposed to this chemical.
7. Antimony - Component of flame retardant used in PVC compounding operation. Permissible limit 0.5 mg/m^3 . Plant usage over a five month period averages 830 pounds per month. Normally 2-3 employees are exposed to this chemical.
8. Barium - Component of heat stabilizer used in the PVC compound operation. Permissible limit 0.5 mg/m^3 . Approximately 26,000 pounds of liquid stabilizer with five percent Barium/Cadmium are used each month. Two to three employees are usually exposed to this material.
9. Cadmium - Same as 8. above except that the permissible limit is $.05 \text{ mg/m}^3$.
10. Ammonia - Used in the treatment of waste water at lagoons. Permissible limit 50 ppm. The plant uses an average of 50 pounds a day. Normally one or two employees are exposed to this material daily.

B. Monitoring Plan

1. The plan was to take the top four chemicals, excluding vinyl chloride, and run a "quick check" analysis on each of the four chemicals. Vinyl chloride was excluded from the list due to the fact that it was being monitored daily by use of eight hour dosimetry (once a month for each plant employee). The "quick check" analysis was defined by the Plant Safety Director as taking several areas where the concentration was thought to be the highest. A plant chemist suggested the monitoring methods to be used in monitoring the "top four". These chemicals and the monitoring methods and schedules are as follows:
 - (a) Lead - Eight hour area sample taken several times on a random basis using a Bendix Air Sampler Pump and filter media.

Aberdeen Chemical Exposure Abatement Program
December 29, 1975
Page 3

- (b) Phthalic Anhydride - Several 3-4 hour area samples taken on a random basis using a Bendix Air Sampler Pump with midget impinger. However, this chemical was put on "hold" as the plasticizer operation was shutdown for an indefinite period.
- (c) Nitrobenzene - Several eight hour area samples taken on a random basis using a Sipin Pump and carbon tubes.

C. Monitoring Results

Since the start of the Chemical Exposure Abatement Program, the following chemicals have been monitored:

- 1. Vinyl Chloride
 - 2. Lead
 - 3. Trichloroethylene
 - 4. Nitrobenzene was not monitored due to problems incurred obtaining reagents needed for analysis.
 - 5. Phthalic Anhydride was not monitored due to the plasticizer operation being shutdown for an indefinite period.
- See attached table for results.

D. Continued Monitoring Under Initial Program

- 1. The initial plan called for personnel dosimetry if any of the "top four" chemicals exceeded the action level during the "quick check" analysis monitoring program. It was planned to monitor one employee working in the area once a week, where the concentration was thought to be the highest, for a two month period.
- 2. The initial plan also called for quarterly monitoring using personnel dosimetry, if none of the "top four" chemicals being monitored exceeded the action level.

E. Further Action by Safety Department

- 1. The initial program listed other steps that the Safety Department would take if any of the top four chemicals exceeded the action level at the completion of the two month personnel dosimetry program. They are as follows:
 - (a) Propose a change in work practices to the affected operating department.
 - (b) Propose the use of personnel protective equipment.
 - (c) Propose use of less toxic chemicals.
 - (d) Propose engineering plans to be developed.

Aberdeen Chemical Exposure Abatement Program
December 29, 1975
Page 4

II. Revised Monitoring Plan

1. The ten chemicals identified in initial program will be monitored from 12-8-75 to 4-15-76 as follows:
 - (a) Vinyl Chloride - Sipin pump-air bag, personnel dosimetry for an eight hour (TWA) except for employees working in non-regulated areas. Employees working in non-regulated areas are monitored by an area sample once per month.
 - (b) Lead - Bendix Air Sampler w/filter, personnel dosimetry for an eight hour (TWA) for color weigh man, area dosimetry for an eight hour (TWA) at Line I and Line III blender. This sampling will be done on an alternating basis, alternating once a week between the personnel dosimetry sample and the area sample.
 - (c) Phthalic Anhydride - Bendix pump, midget impinger w/water/alcohol mixture; eight hour personnel dosimetry once a week for plasticizer operator; personnel dosimetry for yard operator when unloading material.
 - (d) Nitrobenzene - Sipin pump and carbon tubes, eight hour personnel dosimetry once a week on lab technician running viscosity tests.
 - (e) Trichloroethylene - Sipin pump- air bag, personnel dosimetry (15 minute) once a week for employees when painting sifter screens.
 - (f) Alphamethylstyrene - Sipin pump- carbon tube, twenty-four hour personnel dosimetry once a week on large reactor operators when adding AMS to reactors.
 - (g) Antimony - Bendix Pump, filter; eight hour area dosimetry once a week at Line I or Line III blenders.
(Note) There are no present plans to use any of this material in production before January 15, 1976. This material will be tested as soon as it is used.
 - (h) Barium - Bendix pump-filter, eight hour area dosimetry once a week at Line I or Line III blenders.
 - (i) Cadmium - Same as (h) above. These two chemicals are used together in production and monitoring will be done for both at one time.
 - (j) Ammonia - Bendix Pump-midget impinger, eight hour area sample at waste treatment lagoons (weekly) and personnel dosimetry (8 hr.) for employees when working on ammoniator. The personnel dosimetry sample will be taken when the ammoniator unit is plugged and this does not happen on a scheduled basis.

Aberdeen Chemical Exposure Abatement Program
December 29, 1975
Page 5

2. If any of the ten chemicals exceed the action level, a personnel dosimetry program will be initiated. This program calls for personnel dosimetry for each job classification in the department once a week for a two month period.

III. Revised Chemical Exposure Abatement Program

A. Objective

The objective of the Chemical Exposure Abatement Program is to reduce employee exposure to all chemicals used in the plant. Even though the plant is required by OSHA regulations to reduce employee exposure to toxic materials, it is believed that the plant should strive toward reducing exposure to all chemicals, whether currently classed as toxic or not.

B. Implementation

Plant management has given its' full support to the abatement program and will take whatever means necessary to reduce employee exposure. However, a full share of the responsibility is required of the supervisory personnel working in all areas of the plant. The abatement program will be explained to all supervisory personnel in the near future in one of the "Supervisory Work Shops". Full cooperation from all personnel is expected.

- C. By January 23, 1976, the Safety Department will propose a plant-wide chemicals exposure educational program, to be given to all plant employees by each department, by February 27, 1976. The goal of the program is to be the minimization of employee exposure to all chemicals by means of the employees duty to:

1. Use all personal protective equipment required.
2. Maintain high standards of personal hygiene.
3. Perform good housekeeping on a routine basis.
4. Follow correct general work practices in handling all chemicals.

D. Written Determination of Exposures

1. In the first week of January, 1976, a letter will be issued by the Safety Department, requesting that all departments in the plant perform a survey of all chemicals used by each department. This includes all feedstocks, inhibitors, initiators, solvents, and other additives used in each area. Forms will be supplied by the Safety Department to each department for use in obtaining all the needed information on each chemical. The information needed will include:

Aberdeen Chemical Exposure Abatement Program
December 29, 1975
Page 6

- (a) Name of the chemical.
- (b) How handled.
- (c) Amount used daily.
- (d) Number of employees exposed on an eight (8) hour shift.
- (e) Toxicity of chemical (if known).
- (f) Written determination of employee exposures (estimated).

It is necessary that this survey be completed by March 15, 1976 and all survey forms turned in to the Safety Department by this date.

- 2. At the completion of the survey, each department should evaluate the survey data and determine whether employee exposure to chemicals can be reduced. Some ways of accomplishing this could be as simple as improving housekeeping, use of protective equipment, and improved methods of material handling.
- 3. After the survey forms are sent in, the Safety Department will develop a file, by department, for each chemical in the plant. Material safety data sheets will also be filed for each chemical. The files will be available to all plant employees who might wish to see them. The files should be completed by May 30, 1976.

E. Monitoring Plan

- 1. During the month of April, 1976, a team composed of the plant Safety Director, Chief Plant Chemist, and the Industrial Hygienist will meet to evaluate the survey results. At that time, the team will develop a list of chemicals that have been assessed by the team as being dangerous enough to be monitored. This should be completed by May 1, 1976. The team will determine which chemicals to place on the list by the following priorities:

- (a) toxicity level of the chemicals
- (b) materials listed in OSHA's Suspected Carcinogen List
- (c) the volume used of each chemical
- (d) number of personnel exposed
- (e) written determinations of employee exposures.

2. Sampling Strategy

Starting May 15, 1976, the top "five" chemicals on the list will be sampled using the approach as defined in the NIOSH publication entitled "Sequential Sampling Plan and Decision Theory for Employer Monitoring of Employee Exposure to Industrial Atmospheres". The sampling strategy will include as follows:

Aberdeen Chemical Exposure Abatement Program

December 29, 1975

Page 7

- (a) Initial written determination of exposure of workers (Section III, C 1).
 - (b) Partial sampling groups. This is known as "quick check" sampling in which several short duration samples will be taken over a two month period using equipment such as OVA's MSA Universal Sampler, or drager tubes.
 - (c) After completion of sampling in (b), if any of the results exceed the action level but are less than the permissible level, one employee per month will be monitored using personnel dosimetry for the time period stated in the NIOSH publication (Section III, E 2).
 - (d) After completion of sampling in (b), if any of the results exceed the permissible limit, one employee per week will be monitored using personnel dosimetry for the same time period as stated in (c).
 - (e) After completion of sampling in (b), if none of the results exceed the action level, an area sample will be taken as in (b), once every six (6) months.
3. Five "new" chemicals will be monitored every two months until all the chemicals on the list are sampled or until the program is re-evaluated.

F. Control of Chemical Exposure to Employees

1. During the sampling step as stated in Section III, E 2 (c), the Safety Department will propose to the affected department immediate, short term action to be taken to reduce employee exposure. These actions are as follows:
 - (a) Education of employees in such matters as the proper handling of chemicals and improved standards of hygiene.
 - (b) Use of personnel protective equipment which might include gloves, respirators, and other protective apparel.
 - (c) Improved standards of housekeeping.
 - (d) Use of "substitute" less toxic materials.
 - (e) Changes in work practices that aid in reducing employee exposure.
2. During the sampling step as stated in Section III, E 2 (d), the Safety Department will request assistance from the Engineering Department to develop plans for reduction of chemical exposure to employees.

Aberdeen Chemical Exposure Abatement Program

December 29, 1975

Page 8

G. Records

1. As stated in Section III, D 3, the safety department will develop a file for each chemical used in the plant. This file will be available to all employees.
2. The Safety Department will keep a record of all sampling results which will be available to all employees.

H. Reporting

All sampling results will be published in the safety section of each monthly progress report.

I. Responsibilities

1. Laboratory

- (a) Responsible for notifying the Safety Department of any "new" chemicals entering the plant.
- (b) Responsible for analyzing sampling results and sending results to the Safety Department.
- (c) Responsible for assisting the Safety Department in determining the sampling methods to use.

2. Safety Department

- (a) Responsible for conducting sampling.
- (b) Responsible for keeping files on all chemicals.
- (c) Responsible for keeping file on sampling results.
- (d) Responsible for reporting sampling results in monthly report.
- (e) Responsible for assisting operating departments in training and education of employees in the use of chemicals.
- (f) Responsible for asking for engineering assistance when needed, to control employee exposure to employees.

3. Operating Departments

- (a) Assisting in Sampling Program
- (b) Training employees in the proper use of chemicals

Aberdeen Chemical Exposure Abatement Program
December 29, 1975
Page 9

- (c) Assisting in planning programs to reduce chemical exposures to employees.
- (d) Responsible for conducting plant survey.
- (e) Written determination of exposure.

4. Purchasing Department

The Purchasing Department is responsible for obtaining material safety data sheets for all chemicals used in the plant.

5. Engineering

The Engineering Department is responsible for planning engineering controls at the request of the Safety Department.

Owen Tubb
Owen Tubb
Industrial Hygienist

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c: RAD-GGD
ALL DEPARTMENT HEADS

Attachments