

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION

REPORT NO. HE 76-63-487

BASF WYANDOTTE CORPORATION
SOUTH KEARNY, NEW JERSEY

MAY 1978

I. TOXICITY DETERMINATION

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at BASF Wyandotte Corporation, South Kearny, New Jersey in July of 1976. The primary goal of this study was to screen workers for evidence of liver disease and to determine if any areas of the plant were more likely associated with these abnormalities than other parts of the plant.

Based on the medical screening studies, it has been determined that the Pa-Dop plant had a greater number of workers with abnormalities than any other area of the plant, statistically significant at ($p < .05$).

The etiologic agent or agents or other factors responsible for this difference were not identified. Recommendations for further investigations are included in this report.

II. DISTRIBUTION AND AVAILABILITY

Copies of this determination report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. BASF Wyandotte
2. United Rubber Workers, Local and International
3. U.S. Department of Labor, Region II
4. NIOSH Region II

For the purposes of informing the approximately 300 affected employees, copies of this report shall be posted in a prominent place accessible to the employees for a period of 30 calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) authorizes the Secretary of Health, Education, and Welfare following a written request by any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effect in such concentrations as used or found.

NIOSH received such a request from the United Rubber Workers to evaluate potential hazards to employees from vinylidene chloride exposure. The request was based on the fact that animal data has shown that vinylidene chloride has a hepatotoxicity similar to vinyl chloride and that preliminary data obtained by the company indicated a number of abnormalities in those workers with a history of significant vinylidene chloride exposure.

IV. HEALTH HAZARD EVALUATION

A) Environmental

An environmental study done by NIOSH's Industry-Wide Studies Branch, six months prior to the health hazard evaluation, revealed environmental vinylidene chloride levels between .001 (limit of detection) and 1.45 parts per million (ppm). Highest concentrations were found in the area of the Dispersions Plant (this portion of the plant was no longer involved in vinylidene chloride production at the time of the HHE). Measurable levels were found elsewhere. Because of the known actions of vinylidene chloride on animals and the presence of abnormalities in those workers screened by the company, a health hazard evaluation designed to screen workers for evidence of liver malfunction was performed in July and August of 1976.

B) Medical Evaluation Design and Analytical Methods

All workers were invited to participate in the evaluation. Testing consisted of a questionnaire eliciting occupational history as well as alcohol consumption and other pertinent historical facts, and blood analysis for total bilirubin (TB), serum glutamic oxalic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), alkaline phosphatase (AP), and gamma glutamyl transpeptidase (GGTP).

The questionnaire yielded information of a demographic nature, i.e., age, sex, job title, years at job, previous job history, etc. as well as eliciting general symptomatology related to the presence of liver disease. Alcohol intake, medications, and previous history of blood transfusions were also collected on each participating worker. All data were recorded in a form suitable for computer analysis. The statistical analysis was done by Support Services Branch, DSHEFS, NIOSH.

Blood evaluations were performed using standard techniques by Metpath Laboratories of Hackensack, New Jersey using the local "normal" data for comparison. Results for each worker's blood data were tabulated and abnormal values identified. Any worker having one or more of the five tests outside the limits of normal for the reference laboratory was considered to be abnormal by our definition. These abnormal workers were then evaluated with respect to age, alcohol intake and job title to see if a clustering effect was present. Statistical evaluations were performed using the chi-square method.

C) Medical Results and Discussion

A total of 256 workers of about 300 who were currently employed were evaluated during this study. Seventy-five workers had at least one test result that was above the laboratory's upper limit of normal.

Table I shows the areas of the plant and the corresponding area number as well as the tests that were performed, the total number of workers surveyed, those who were abnormal, and the case definition of those workers who were abnormal.

Table II is the table from which the chi-square analysis was computed and shows the breakdown of total workers and those who were found to be abnormal in each department of the plant. Table II shows that the chi-square value of 14.34 is significant at the $p < .05$ level. It is important to remember that in this particular case a significant value indicates that the distribution of normal and abnormal cases as they were defined in this study did not appear to be independent of current job category. Using the assumptions and definitions that were made in this study, it appears as though there are a larger number of abnormal liver studies than one would expect if a normal distribution was present in the 200 series job classifications, that is the Pa-Dop Plant.

Additional statistical manipulations of these data showed no significant areas of concern when different definitions were applied to what was an abnormal case. If an abnormal case was defined as 2 or more or 3 or more abnormalities as being a case, no significant differences were present from area to area of the plant.

Despite the statistical indication of a problem in the Pa-Dop plant, there are no indications as to the agent or agents responsible for the differences observed. Among the number of variables present for each worker, the only one that was statistically related was the length of employment in relationship to the number of abnormalities present in the screening profile. The

longer an individual worked at BASF the more likely that worker was to have one or more of the screening tests abnormal. The medical significance of this is unknown.

In June of 1977 NIOSH attempted to re-evaluate the 75 workers who were defined as abnormal based on the test results obtained in July and August of 1976. The rationale behind this attempt was to further investigate the possibility that area 200, the Pa-Dop Plant, was causing a larger number of abnormalities in the liver profile screening test than one would expect. Only 9 of the 75 individuals contacted expressed interest in cooperating in a re-study of the group. Therefore, NIOSH elected not to re-study this cohort.

V. CONCLUSIONS

It is apparent based on the screening tests performed on the workers at BASF Wyandotte in July and August of 1976, that a statistically higher portion of workers in the Pa-Dop Plant showed abnormalities in the liver profile screening test than did those workers in all of the other areas of the plant. The reason for this is unclear and may or may not have medical significance. Prudent medical practice would dictate that the workers in the Pa-Dop Plant be followed closely in the future with a liver screening profile or other means of assessing liver function so that the abnormalities, if indeed they are real, can be substantiated and a cause of the abnormalities discovered.

VI. RECOMMENDATIONS

1. That the company provide a pre-employment history, physical, and liver profile as a minimal baseline screen.
2. Employees of BASF Wyandotte be given a periodic history, physical, and laboratory evaluation directed at detecting liver dysfunction but not necessarily limited to the liver.
3. That the Pa-Dop Plant be monitored, not only from a medical screening point of view, but also from an industrial hygiene aspect so that the environment of that area of the plant may be classified more completely.

VII. AUTHORSHIP AND ACKNOWLEDGEMENTS

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| AREA OF PLANT | AREA NUMBER | WORKERS SURVEYED FROM EACH AREA |
|---------------------------------------|-------------|---------------------------------|
| Maintenance | 100 | 57 |
| Pa-Dop | 200 | 33 |
| Palanil | 300 | 60 |
| Basacryl | 400 | 30 |
| Plant Services | 500 | 31 |
| Manufacturing Services | 600 | 27 |
| Dye Labs | 700 | 18 |
| TOTAL WORKERS FROM ALL AREAS SURVEYED | | 256 |
| ABNORMALS* | | 75 |

TESTS PERFORMED ON EACH PERSON INCLUDED

| | <u>NORMAL RANGE</u> |
|---|---------------------|
| 1) Total Bilirubin (TB) | 0.1 - 1.7 mg/dl |
| 2) Serum Glutamic Oxalic Transaminase (SGOT) | 1 - 50 μ /ml |
| 3) Serum Glutamic Pyruvic Transaminase (SGPT) | 1 - 50 μ /ml |
| 4) Alkaline Phosphatase (AP) | 10 - 50 μ /dl |
| 5) Gamma Glutamyl Transaminase (GGTP) | 1 - 40 μ /ml |

*An abnormal or a "case" is defined as one or more of the tests performed as being above the accepted "normal limit" for the laboratory performing the testing.

TABLE II
 BASF Wyandotte
 SOUTH KEARNY, NEW JERSEY
 JULY-AUGUST 1976
 HE 76-63

WORKERS WITH ABNORMAL LIVER PROFILES
 By Current Department

| | 100 | | 200 | | 300 | | 400 | | 500 | | 600 | | 700 | | TOTAL |
|----------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-------|
| | OBS | EXP | |
| NORMAL | 40 | 40.3 | 16 | 23.3 | 42 | 42.4 | 20 | 21.2 | 24 | 21.9 | 23 | 19.1 | 16 | 12.7 | 181 |
| ABNORMAL | 17 | 16.7 | 17 | 9.7 | 18 | 17.6 | 10 | 8.8 | 7 | 9.1 | 4 | 7.9 | 2 | 5.3 | 75 |
| TOTAL | 57 | | 33 | | 60 | | 30 | | 31 | | 27 | | 18 | | 256 |

$$\chi^2 = 14.34 \text{ Significant at } p < .05$$

A significant value indicates that the distribution of normal and abnormal cases as they are defined in this study, is not independent of current job category.