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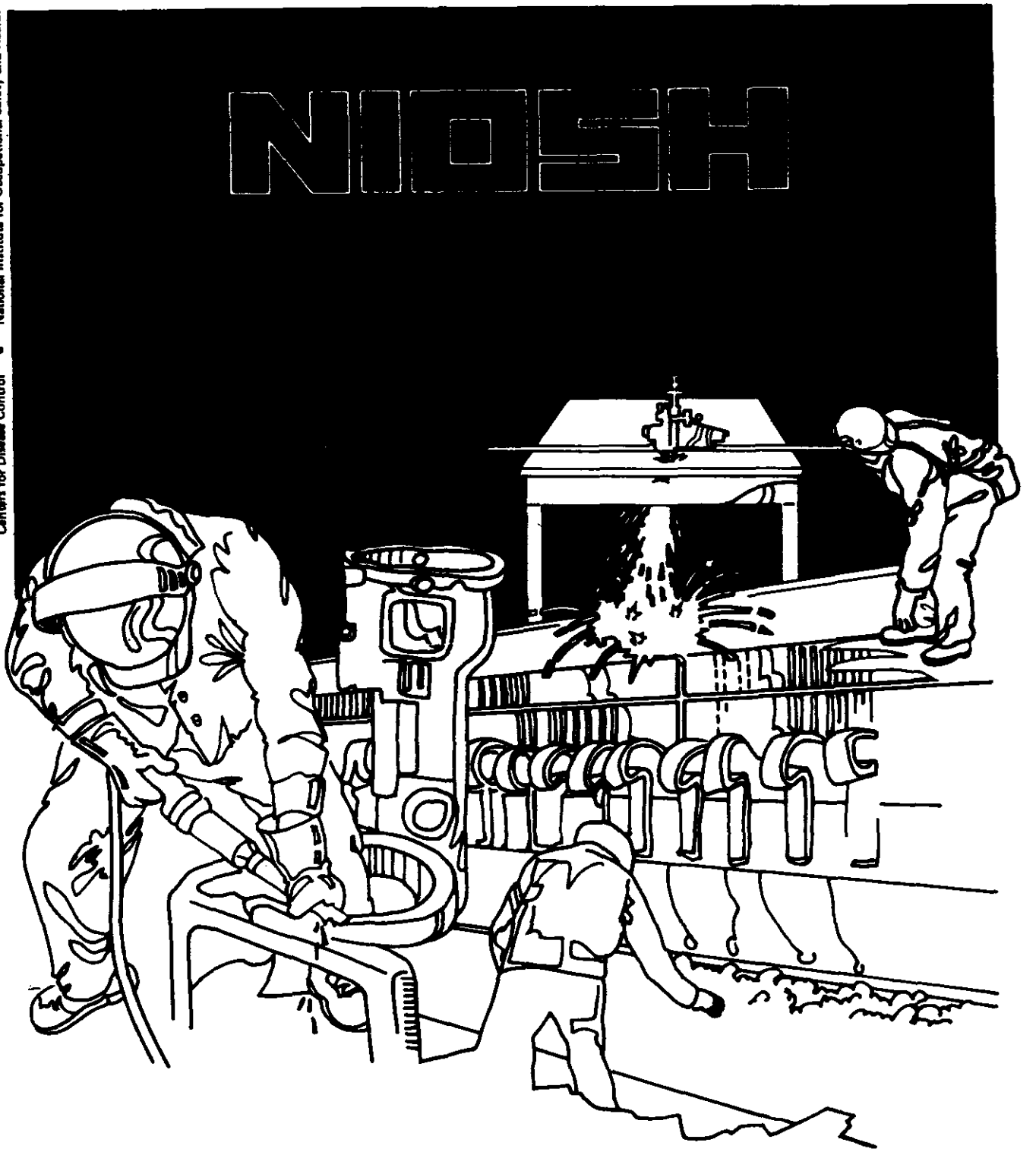

Health Hazard Evaluation Report

MHETA 88-088-1925
PENRECO
KARNS CITY, PENNSYLVANIA

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

MHETA 88-088 -1925
PENRECO
KARNS CITY, PENNSYLVANIA
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NIOSH INVESTIGATOR:
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I. SUMMARY

On 3 December 1987, the vice president of operations for Penreco, Pennzoil Products Company requested the Division of Respiratory Disease Studies (DRDS), National Institute for Occupational Safety and Health (NIOSH), to evaluate a worksite at their Karns City, Pennsylvania facility. The company official submitted the request because an individual employed in the storeroom building had experienced eye and skin irritation which the employee felt was due to the work environment.

NIOSH responded to the request by conducting an environmental and health survey at the worksite in February and March 1988. An inventory of work practices and supplies was conducted, ambient air samples collected and analyzed, interviews conducted with the employees, and medical reports reviewed. Review of the employee's medical records and interviews with the employee and fellow workers confirm that the employee has experienced and is still experiencing recurring dermatitis on the face, arms, neck, and eye irritation even though he has not worked at the facility for approximately 3 months. The environmental sampling was unremarkable and did not detect anything in the work environment on the date of our survey that could cause the problems experienced by the employee.

The NIOSH survey could not find evidence that the employee's symptoms were directly related to the work environment.

Keywords: SIC 2911, oil refinery, storeroom, dermatitis.

II. INTRODUCTION/BACKGROUND

In November, 1987, the Division of Respiratory Disease Studies, National Institute for Occupational Safety and Health (NIOSH) received a request from a company official of Pennzoil Product Company to provide assistance in evaluating a worksite at their Penreco oil refinery plant in Karns City, Pennsylvania. The request was precipitated because an employee in the storeroom building had experienced eye and skin irritation. The problem started in November 1986 and continued until May 1987, when the symptoms became so severe his physician recommended he not return to work in the storeroom. The company health and safety personnel conducted environmental sampling in the storeroom and their results were negative. The storeroom employee was evaluated by two physicians and their allergy test results were negative to specific substances in the storeroom. Also two health consultants from a local university reviewed the case and could not determine the cause of the irritation. Therefore, the company official submitted a request for a health hazard evaluation to determine if the previous evaluations had overlooked anything which may be the cause of the worker's problem.

Company officials provided NIOSH copies of all the reports prepared by the physicians and consultants that had evaluated the situation. These reports were reviewed by a NIOSH physician and an industrial hygienist.

An industrial hygienist from NIOSH conducted an initial site visit of the Penreco facility on 17 February 1988. An opening conference was attended by company and union officials, and the affected employee. The main topic of discussion was the sequence of events from October 1986 to 17 February 1987 and findings of the previous evaluations. Thereafter, a walkthrough of the storeroom was conducted. On advice of his personal physician the employee did not participate in the walkthrough. The walkthrough inspection did not reveal any obvious causes for the symptoms. Therefore, the NIOSH industrial hygienist decided to return at a later date (16 March 1988) to monitor the activity in the storeroom and conduct environmental sampling.

III. PROCESS

Principal products manufactured at the Penreco plant are white mineral oil, ink oil solvents, and petrolatum. The storeroom for the plant is a large building which serves as a repository for various supplies and machine parts used in the plant. The bulk chemicals are stored in drums or small containers on the floor, in bins, and on shelves. Most containers are closed and present minimal or no exposures. The stock items are distributed to employees on request by the storeroom employees. There is usually one storeroom employee and a supervisor in the building.

IV. EVALUATION DESIGN/METHODS

A. Environmental

In an attempt to determine the identity of airborne organic contaminants within the storeroom, six high volume, or "bulk air" charcoal tube air samples were obtained and submitted for qualitative gas chromatographic/mass spectrometric (GC/MS) analysis. Seven additional charcoal tube samples were taken for the quantification of those organic compounds detected in the bulk samples. These samples were collected over a 6-8 hour sampling period at a flow rate of 40 cc/min.

The environmental sampling conducted by the company health and safety personnel during the period February-March 1987 indicated the presence of small amounts of sulfur dioxide (SO_2). Therefore, NIOSH included SO_2 sampling during the survey conducted 16 March 1988. To determine concentrations of SO_2, cellulose acetate filters treated with potassium hydroxide were attached to sampling pumps operated at 1 liter per minute (lpm) and analyzed by ion chromatography per NIOSH Analytical Methods 6004.[1]

Six sampling sites, four on the lower level and two on the upper level, were selected inside the storeroom building and one site outside the building. The four lower level sampling sites included the center of isle AA, center of isle A, front of isle I near the dispersing area, and front of isle R. The upper level sampling sites included the center of isle Y, and the walkway into the gasket area. The outside sampling site was located at the northeast corner of the building downwind of the plant's operating units. The prevailing winds blow from the operating units toward the storeroom.

B. Medical

A NISOH physician reviewed the records and information provided by the allergists, dermatologist, health consultants, and employee's private physician.

V. EVALUATION CRITERIA

Evaluation criteria are used as guidelines to assess the potential health effects of occupational exposures to substances and conditions found in the work environmental. These criteria, time-weighted averages (TWA), threshold limit values (TLV) and permissible exposure limits (PEL), are generally established at levels that can be tolerated by most health workers occupationally exposed during 8 to 10 hour workday, 40 hour workweek, without adverse effects. Because of variation in individual

susceptibility, a small percentage of workers may experience health problems or discomfort at exposure levels below these existing criteria. Consequently, it is important to understand that these evaluation criteria are guidelines, not absolute limits between safe and dangerous levels of exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and 3) the U.S. Department of Labor (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLVs are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLVs usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the economic feasibility of controlling exposures in various industries where the agents are used; the NIOSH Recommended Exposure Limits (RELs), by contrast, are based primarily on concerns relating to the prevention of occupational disease.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

VI. FINDINGS/DISCUSSIONS

A. Work History

The storeroom employee has been employed by Penreco for 43 years. He was a welder for approximately 25 years, and has been a storeroom clerk for 15 years. He has worked in the current building for 8 years.

B. Past Medical History

The employee states that he has been in excellent health all of his life. He has had no serious illnesses or injuries. There is no history of childhood or adult skin problems, cardiovascular, respiratory diseases, or allergies.

C. Chronology

The following sequence of events was compiled from discussions with company officials, review of documents provided by company officials, and discussions with the affected employee.

1). November 1986 - The employee, while at work, complained of eye irritation (tearing) followed by a skin rash ("flushness") of his face, neck, forearms, and hands. He first reported these symptoms during a "turnaround" in November 1986 when hydroparts from the hydrotreater were kept in the storeroom. From November 1986 through April 28, 1987, these symptoms occurred daily at work, and improved off the job. The symptoms were observed by fellow workers and supervisors.

2). April 29-August 9, 1987 - On advise of his physician, he did not return to work.

3). April 30, 1987 - He visited a local shopping mall and returned home. At 11:30 a.m., he started to mow his lawn. At which time, he became ill (difficulty breathing, "hot flashes" and erythema of face, hands, and arms).

4). May 1-2, 1987 - While at home, he experienced periodic "hot flashes" and erythema of face, hands, and arms.

5). May 6-June 17, 1987 - He was evaluated by an allergist. The diagnoses were "probable photosensitive allergic contact dermatitis from unknown occupational agent complicated by perennial and seasonal allergic rhinitis, sinusitis, conjunctivitis and bronchitis."

6). August 10, 1987 (Monday) - He returned to work in the storeroom and worked the entire shift without any problems.

7). August 11, 1987 (Tuesday) - After working in the storeroom for approximately 2 hours, he began experiencing eye irritation (tearing) and erythema of the hands and face. He consulted his physician and was instructed not to return to work.

8). August 12, 1987-October 15, 1987 - He remained away from work. Also during this time he was again evaluated by another allergist. The second allergist's diagnosis was "contact dermatitis by history; etilogy of which is undetermined." The allergist also pointed out that the reaction described by the patient and noted by other observers was that of an irritant rather than a sensitizer.

9). October 15, 1987 - He attended a meeting at the Penreco offices. Other attendees at the meeting were company officials and health consultants from a local university. During a tour of the storeroom, the health consultants observed that the employee's neck became very flushed. He was advised to leave the storeroom and return home.

10). October 27-November 6, 1987 - He returned to work at Penreco. He worked on a temporary job in the canning facility. He did not experience any problems.

11). November 9, 1987 (Monday) - He returned to work in the storeroom. After approximately 2 hours, he experienced skin irritation. He was instructed to see his physician.

12). November 10, 1987 - He reported to work on the temporary job in the canning facility. After 30 minutes, he experienced eye irritation (tearing). He reported that he went home and had to apply ice packs to both eyes to relieve the "burning and watering."

13). November 11, 1987-January 18, 1988 - He remained away from work. During the week of November 11, he experienced throat irritation and chest tightness. On November 23, he consulted his physician due to the throat irritation and "peeling skin" on his neck.

14). December 1987 - Penreco received the final report from the university health consultants. They felt that his problem was contact dermatitis most likely caused by an airborne agent. The exact cause of his problem was undetermined, but the onset and frequent recurrences on the job with improvement off the job appear to support an initial occupational etiology. They recommended that he not return to work in the storeroom until a causative agent was identified and controlled.

15). January 19-February 1, 1988 - He returned to work at Penreco. He worked in the shipping department and the "yard". He did not experience any problems.

16). February 1, 1988 - He visited his physician for a regular "check-up." His physician advised him not to return to work. During the NIOSH visit on 17 February 1988, he explained that he had not worked since 1 February. He explained that his last "attack" occurred 7 February 1988 while traveling in his automobile with his family. He explained that he experienced hot flashes and difficulty breathing.

17). May 1988 - In telephone conversations with the employee, he indicated that he had not returned to work but he was still "having problems" with his eyes.

D. Environmental Findings

The company health and safety personnel used diffusion tubes to monitor for SO_2 during the months of February and April 1987. The diffussion tubes which were exposed to the ambient air for approximately 72 hours indicated SO_2 levels of 0.5 to 0.9 parts per million (ppm). However, there were no detectable concentrations observed on the filter samples collected during a normal 8 hour work shift on 16 March 1988 and analyzed per NIOSH method 6004.

The current OSHA standard for SO_2 is 5 ppm for an eight-hour TWA exposure.[2] The ACGIH recommends a TLV of 2 ppm and NIOSH recommends a 10-hour TWA of 0.5 ppm.[3,4] These recommended standards are based on the fact that SO_2 is particularly irritating to the mucous membranes of the upper respiratory tract. Studies have indicated that workers exposed to concentrations of 1 to 3 ppm have developed a slight increase in small airway resistance resulting in decreased pulmonary function.[5] Chronic exposure to levels of 10-20 ppm may result in a sensation of burning, dryness and pain in the nose and throat. Slight tolerance to the odor threshold (3-5 ppm) and general acclimitization are common.[4,6]

The amount of organics found on the solid sorbent tubes was extremely small. The major peaks noted on the ion chromatogram from the GC/MS analysis of the "bulk air" charcoal tube samples were C_8 aliphatic hydrocarbons and limonene. Other compounds detected included a dichlorobenzene isomer, ethanol, toluene, some tetrahydrofuran (THF), 1,1,1-trichloroethane, hexane, heptanes, and C_{11}-C_{14} alkanes. The remaining charcoal tubes were quantitated for the compounds detected on the qualitative samples. However, the amounts detected were too low to quantify.

VII. CONCLUSION

There is little doubt the employee has experienced and is still experiencing recurring eye irritation and dermatitis of the face, arms, and neck. Based on early information describing the onset and frequent recurrences of these symptoms on the job, with improvement off the job, one may conclude that the condition was work related. However, further evaluation suggests that his symptoms do not necessarily improve off the job. He has suffered similar symptoms while at home, away from the workplace for several days and even months.

Although the employee's symptoms may be workplace related, we have been unable to identify the environmental cause of these symptoms. However, because symptoms also occur temporally and geographically distant from the worksite, either a ubiquitous environmental trigger may be responsible for his symptoms or he has a medical condition unrelated to known environmental causes.

VIII. REFERENCES

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IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

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1. Pennzoil Company
2. OSHA Regional Office
3. NIOSH Regional Office

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