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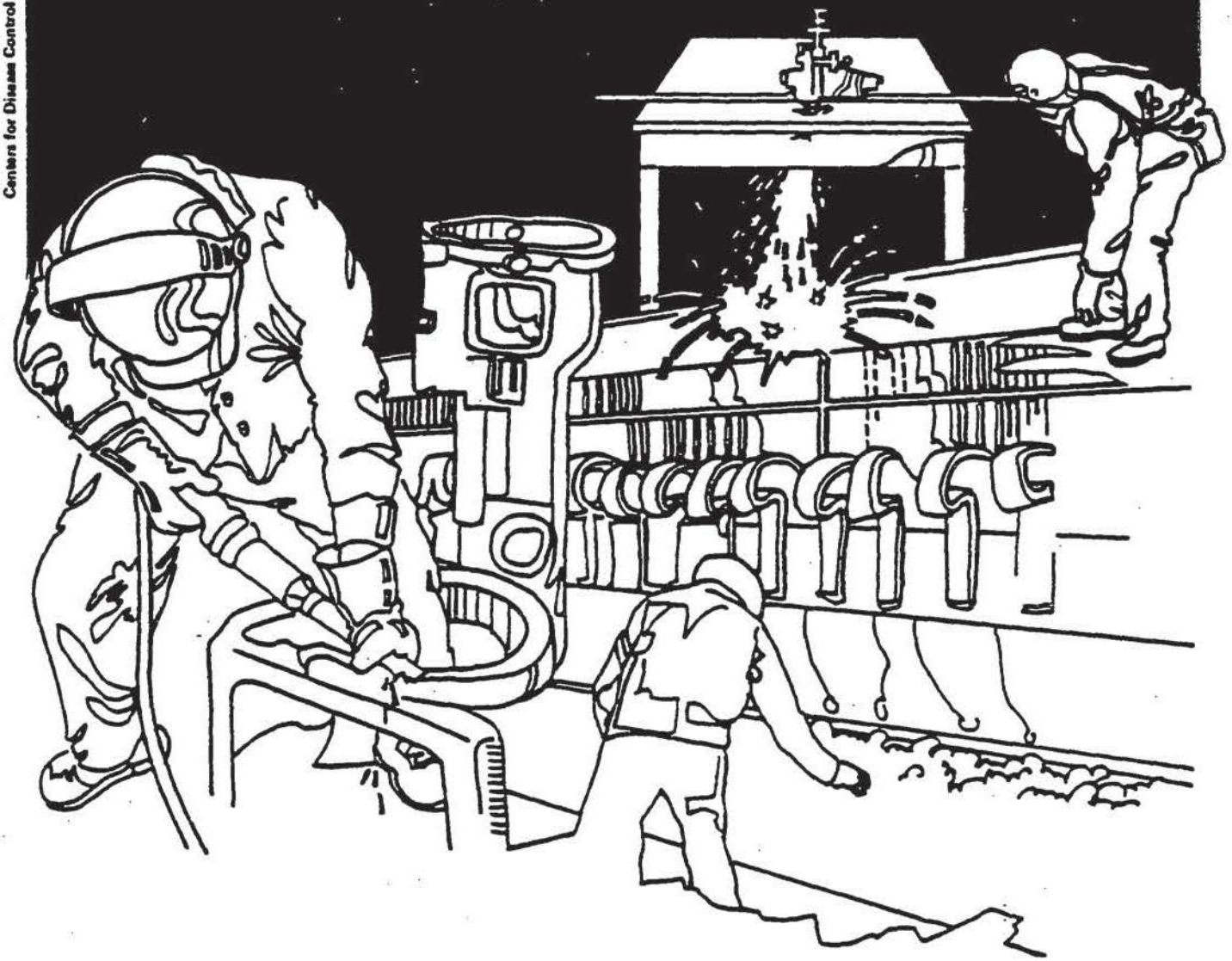

Health Hazard Evaluation Report

HETA 84-010-1445
TAYLOR BOROUGH DRUM SITE
TAYLOR BOROUGH, 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.

HETA 84-010-1445
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TAYLOR BOROUGH DRUM SITE
TAYLOR BOROUGH, PENNSYLVANIA

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I. SUMMARY

The National Institute for Occupational Safety and Health (NIOSH), under an interagency agreement with the Environmental Protection Agency (EPA), evaluates the safety and health programs at selected hazardous waste sites around the country. On October 4-6, 1983, a NIOSH investigator evaluated the safety and health program for EPA and contract clean-up personnel at the Taylor Borough drum site, Taylor Borough, Pennsylvania.

Although no environmental air sampling was conducted by the NIOSH investigator, previous EPA air sampling at the site revealed detectable but low airborne concentrations of benzene, ethyl benzene, xylene, toluene, trichloroethylene (TCE), and 1,1,1 - trichlorethane. All concentrations were much less than 1% of their respective NIOSH recommended exposure limits. EPA analyzed 44 representative drum and drum spill samples for organic compounds and, in general, found a relatively limited range of priority pollutants.

On October 11, 1983, three workers at the Taylor Borough drum site complained of dizziness, nausea, and headaches which may have resulted from permeation of waste material through polyvinyl chloride (PVC) protective clothing. As a precautionary measure, one of these workers was hospitalized. NIOSH analytical chemists evaluated several specimens of the PVC clothing and identified the primary contaminants to be methyl isobutyl ketone (MIBK), methyl ethyl ketone (MEK), toluene, and xylene. Because PVC is readily permeated by most organic solvents, NIOSH scientists indicated that PVC is not appropriate material for protective clothing at most hazardous waste sites.

Based on the results of this survey, NIOSH has determined that, with some modifications, the safety and health program at the Taylor Borough drum site was adequate in providing protection for EPA and contract clean-up personnel. Recommendations for reducing worker exposure are contained in Section VIII of this report.

KEYWORDS: SIC 4953 (Refuse Systems), SIC 9511 (Air and Water Resource and Solid Waste Management); hazardous waste.

II. INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH), under an interagency agreement with the Environmental Protection Agency (EPA), evaluates the safety and health programs at selected hazardous waste sites around the country. On October 4-6, 1983, a NIOSH investigator evaluated the safety and health program for EPA and contract clean-up personnel at the Taylor Borough drum site, Taylor Borough, Pennsylvania.

Several government agencies or their representatives were present during the NIOSH survey. In addition to the on-site coordinator (OSC), Region III EPA was represented by two contract, technical assistance team (TAT) members who provided a variety of technical support services. The U.S. Coast Guard's (USCG) Atlantic Strike Team provided an on-site crew of three (including the site safety officer) for technical support and cost documentation. The Centers for Disease Control (CDC) provided two members (one from Region III and one from Atlanta) for health and safety expertise. In addition to these on-site groups, periodic visits were made by members of the Pennsylvania State Health Department, the Pennsylvania Department of Environmental Resources, and the U.S. Army Corps of Engineers.

III. BACKGROUND

The area on which the site is located is a reclaimed strip mine adjacent to a housing development which was formerly used by the City of Scranton as a municipal landfill. Unauthorized surface dumping of an estimated 600 to 700 fifty-five gallon drums occurred at various locations within the landfill. The majority of drums were crushed, perforated, riddled with bullet holes and in various stages of decay. Approximately half of the estimated 600 to 700 drums on site were crushed, severely corroded and empty.

The hazardous waste clean-up operation, which had just begun during the week of the NIOSH survey (October 4-6, 1983), consisted of the removal of barrels from the surface of the site to a level, demarcated area where all barrels were individually characterized and tested for compatibility using accepted field techniques after being screened for organic vapors using portable direct-reading instrumentation. Subsequently, selected representative individual drum samples, as well as composites of compatible groupings from all barrels, had analyses for priority pollutants. After testing, and when compatible, the barrel contents were dumped into a large mobile storage tank for future shipping to the disposal site. If the contents were very toxic or the barrel were particularly corroded, the contents were placed in a new over-sized barrel for future disposal.

At the Taylor Borough drum site, all personnel in the contaminated area were required to wear EPA designated class B protective clothing. This clothing consists of disposable or reusable coveralls, rubber boots and gloves, and self-contained breathing apparatus (SCBA). The clothing

and gloves were sealed with duct tape. All personnel moved from clean areas (Support Area-SA) to the contaminated work area (Exclusion Area-EA) by way of the decontamination zone (Contamination Reduction Area-CRA), where 3-5 workers dressed in class C protective clothing (same as B except for the use of full-face air-purifying respirators) clean off contaminated workers and exchange SCBA air tanks.

IV. EVALUATION DESIGN AND METHODS

No environmental sampling or medical evaluations were conducted by the NIOSH investigator at the site on October 4-6, 1983. However, the results of ambient air sampling, as well as drum sampling, conducted for EPA by a contract industrial hygiene laboratory, were reviewed.

The 1984 EPA Medical Monitoring Guidelines and the Site Safety Protocol for the Taylor Borough drum site were reviewed.

V. EVALUATION CRITERIA

The purpose of the ambient air sampling conducted at the site by EPA was to determine the approximate levels of airborne contaminants and to help select the appropriate personal protective equipment to be used by the on-site clean-up and EPA monitoring personnel. In this regard, traditional environmental evaluation criteria such as NIOSH recommended standards, American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLVs) and Occupational Safety and Health Administration (OSHA) standards are not completely applicable to hazardous waste operations because they refer to time-weighted average limits to which a worker may be exposed presumably without harm for 8 to 10 hours per day on a continuous basis. However, for reference, the pertinent environmental criteria (EC) are listed below.

Substance	Evaluation Criterion (Source)	OSHA Standard
Benzene	LFL* (NIOSH)	30mg/m^3
Ethyl Benzene	435 mg/m^3 (ACGIH)	--
o-Xylene	435 mg/m^3 (NIOSH)	435mg/m^3
Toluene	375 mg/m^3 (NIOSH)	750 mg/m^3
Trichloroethylene (TCE)	270 mg/m^3 (ACGIH)	--
1,1,1,-trichloroethane	1900mg/m^3 (NIOSH)	--

*lowest feasible limit

VI. RESULTS

On May 14, 1982, air sampling was conducted by EPA at four perimeter locations on the Taylor Borough drum site. Analysis of these samples revealed measurable but low airborne concentrations of benzene, ethyl benzene, o-xylene, toluene, trichloroethylene (TCE) and 1,1,1-trichloroethane. Benzene was detected at levels ranging from 0.00132 milligrams per cubic meter (mg/m^3) to 0.00372 mg/m^3 (EC-LFL). (NIOSH considers benzene a carcinogen and that exposures should be reduced to the lowest feasible limit (LFL) by engineering controls, work practices, and personal protective equipment.) Ethyl benzene was detected at a concentration of 0.00108 mg/m^3 (EC-435 mg/m^3). o-Xylene was detected at a concentration of 0.00244 mg/m^3 (EC-435 mg/m^3). Toluene was detected in one area sample at a level of 0.00972 mg/m^3 (EC-375 mg/m^3). TCE was detected in one of the EPA area samples at a concentration of 0.0086 mg/m^3 (EC-270 mg/m^3). Finally, 1,1,1-trichloroethane had a level of 0.00171 mg/m^3 (EC-1900 mg/m^3). All detected organic compounds were much below their respective environmental limits. Thus, potential exposures to these airborne contaminants do not appear to pose a health risk.

Of the 44 representative drum and drum-spill samples taken, the material varied from black viscous sludge to a white powdery solid. Analysis of these samples for organic compounds revealed, in general, a relatively limited range of organic substances. Several samples showed little or no organic chemicals; others contained primarily alkanes (paraffins) associated with petroleum or petroleum products. For the most part, the sample analyses revealed high levels of the common industrial solvent toluene (up to 25% in one drum) and lesser amounts of related complounds (substituted benzenes), phthalate acid ester plasticizing agents, and polycyclic aromatic hydrocarbons often associated with oil waste products and inefficient combustion of fuels.

Other compounds of toxicological concern which were detected in only one or two drum-spill samples included: trichloroethylene (0.1 to 1.0% in one drum), chloroform (92 parts per million (ppm) in one drum), benzene (2,600 ppm in one drum), hexachloropentadiene (223 ppm in one drum), and poly-chlorinated biphenyl (PCB) 1254 (1.75 ppm in one drum).

The 1984 EPA Medical Monitoring Guidelines were reviewed and found to provide the essential elements of such a program. The contractors medical monitoring protocol was very general. It was not clear whether employees were required to participate or how it was determined if they were "physically fit" to wear respirators.

The site safety protocol for the Taylor Borough drum site was also reviewed and, although general in nature, was adequate in helping protect EPA and contract clean-up personnel. However, some deficiencies were apparent in the site safety protocol. Specifically, the protocol calls for a written respiratory protection program and the quantitative fit testing (QNFT) of all persons required to wear air-purfying respirators. No such written program nor any record of QNFT was apparent during the NIOSH survey. Also, the protocol does not specify the type of protective clothing to be worn for level B and C areas.

VII. CLOTHING PERMEATION INCIDENT

In a clothing related problem on October 11, 1983, three workers at the Taylor Borough drum site complained of dizziness, nausea, and headaches which may have resulted from permeation of "sweet smelling" waste material through borrowed polyvinyl chloride (PVC) clothing. As a precautionary measure, one of these workers was hospitalized. NIOSH analytical chemists in Cincinnati, Ohio evaluated several specimens of the clothing and within one day (October 12, 1983) had identified the primary contaminants to be methyl isobutyl ketone (MIBK), methyl ethyl ketone (MEK), toluene, and xylene. Evaluation of swab samples from inside the suit revealed that MIBK may have permeated through the PVC suit. NIOSH protective clothing experts from NIOSH's Division of Safety Research indicated that PVC material is readily permeated by most organic solvents and is, therefore, inappropriate material for protective clothing at most hazardous waste sites. These clothing experts recommended that all personnel in the contaminated work-zone wear the more substantial Saranex Tyvek® suits. This recommendation was implemented immediately.

VIII. DISCUSSION AND RECOMMENDATIONS

Hazardous waste clean-up operations had just begun during the week of the NIOSH survey (October 4-6, 1983). Consequently, since the contract clean-up crew was relatively inexperienced, several changes were recommended by NIOSH, EPA, CDC, and USCG personnel regarding their protective equipment and work practices.

A. Personal Protective Equipment

1. Respirators

Changes were recommended in the type of filter media used in the full-face air-purifying respirators for the contract workers in the Level-C decontamination area. Originally, the

decontamination personnel used only organic vapor cartridges in their respirators. They were advised that a combination filter such as an organic vapor/acid gas/particulate cartridge or, at the very least, a particulate filter placed on top of a organic vapor cartridge would provide better protection against the alleged contaminants in the area.

EPA Region III should develop a formal, written respiratory protection program to be incorporated into the site safety protocol which meets the requirements of OSHA standard 29 CFR 1910.134. An appropriate individual should be designated and trained to clean, inspect, and maintain the respirators. A specific medical determination of the worker's fitness to wear a respirator should be added to the medical monitoring program.

2. Protective Clothing

Also of concern was the protective clothing being used by the contract personnel during the NIOSH survey. Although the relatively impermeable Tyvek® clothing was worn initially, some workers tore these suits and required several changes during the workshift. To help alleviate this problem and to reduce organic solvent permeation, the more substantial Saranex Tyvek® suit was recommended for use in the contaminated work zone.

EPA Region III should develop a formal, written protective clothing program which explains the logic required for selecting the appropriate type of clothing for the given contaminants and for the desired level of protection.

B. Work Practices

During the survey, several changes were implemented by NIOSH, EPA, CDC, and USCG to help improve the work practices of the clean-up crew. Among those were substantial refinements in the decontamination procedure to help minimize the exposure of the on-site crew and to help improve the flow of workers into and out of the work zone. For example, to minimize cross-contamination, the wash-down area was moved away from the SCBA tank change area. Another work practice recommendation occured after the contamination incident on October 11. To help minimize the possibility of chemical permeation, all workers in the contaminated zone were required to change their Saranex Tyvek® clothing every two hours.

C. Medical Monitoring

An on-going review should be made of employee (EPA and contractor) field activities to determine whether there are specific exposures

or conditions which might call for special medical tests such as serum PCB testing. This medical determination could be made a routine part of the site safety protocol.

IX. REFERENCES

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