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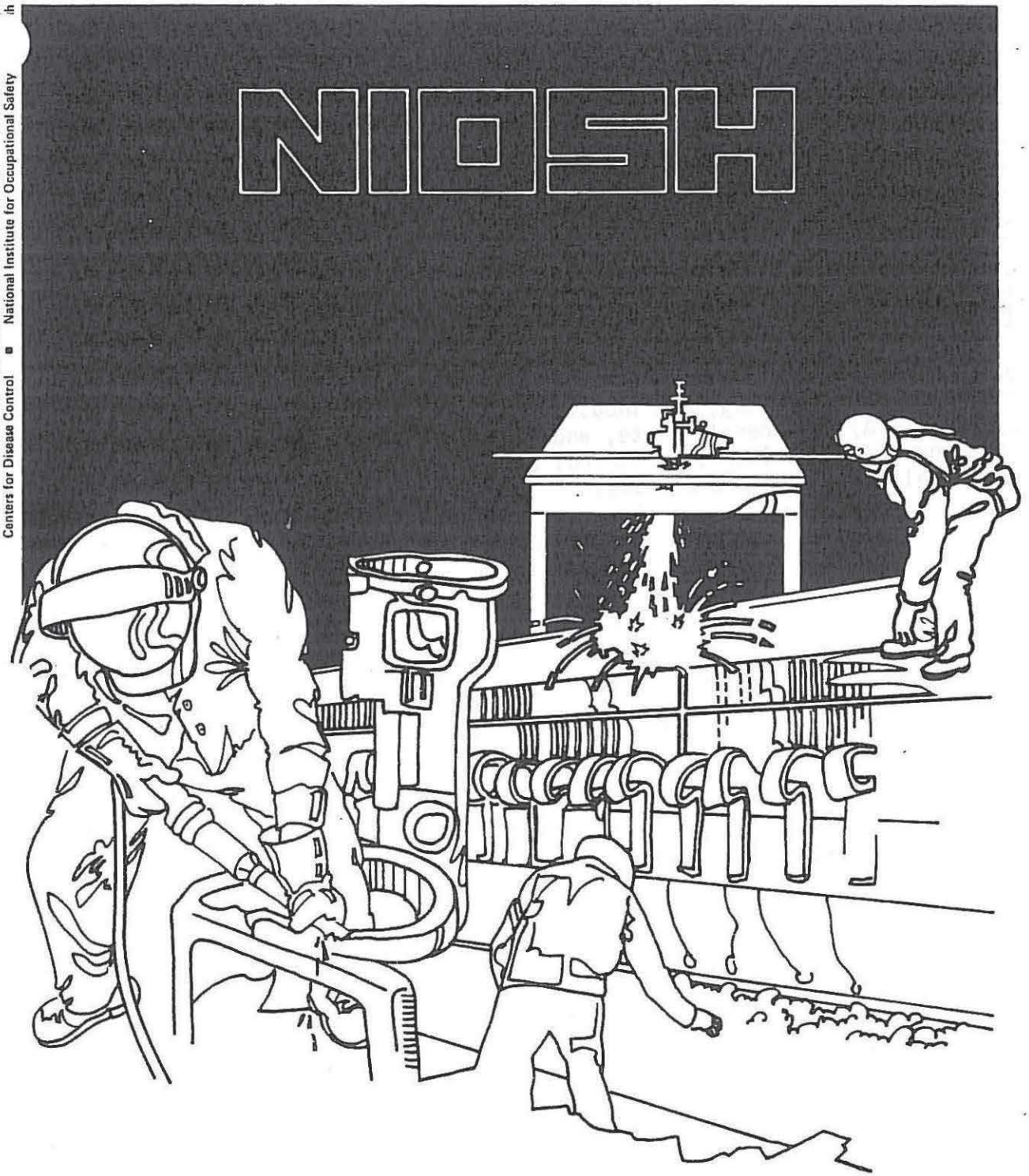
NIOSH



Health Hazard Evaluation Report

HETA 82-017-1067
CITY OF NORWOOD
NORWOOD, OHIO

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 82-017-1067
MARCH 1982
CITY OF NORWOOD
NORWOOD, OHIO

NIOSH INVESTIGATOR:
James M. Boiano, I.H.

I. SUMMARY

On November 5, 1981, the National Institute for Occupational Safety and Health (NIOSH) collected environmental samples for arsenic in a vacant 700-square-foot building located in a residential area of Norwood, Ohio. The evaluation was initiated in response to a request for technical assistance from the City of Norwood Health Department (CNHD) to determine the present extent of arsenic contamination in the building. In 1974, NIOSH received a similar request from CNHD and found that the building was, at that time, highly contaminated with arsenic. The source of contamination was an arsenic trioxide based rodenticide reportedly mixed/packaged in the building nearly 40 years ago.

Fourteen dust samples were collected from various surfaces (floor, walls, ceiling beams) throughout the building and analyzed for arsenic by atomic absorption spectrophotometry. Six samples of bulk powder (bulk dust) obtained from the floor contained 3 to 41% by weight arsenic. Five wipe samples obtained from wall surfaces contained <0.5 to 310 micrograms of arsenic per square inch of surface area and 3 wipe samples obtained from ceiling beam surfaces contained 130 to 2100 micrograms per square inch. The highest arsenic concentrations were found in the northeast quadrant of the building - an area where the mixing and packaging was reportedly done.

Based on the analyses of the 14 dust samples collected, NIOSH concludes that the building is still contaminated with arsenic. Recommendations for decontamination and worker protection during this process are contained in the report.

KEYWORDS: SIC 9390 (local government), arsenic, arsenic trioxide, rodenticide, building contamination.

II. INTRODUCTION

In October 1981, NIOSH received a request for technical assistance from the City of Norwood Health Department (CNHD). The CNHD asked NIOSH to determine the present level of arsenic contamination in an old, vacant building located at 5421 Carthage Avenue, Norwood, Ohio. The building was recently purchased by a local businessman who wanted a reassessment of the contamination level made prior to having the building razed.

In response to the request, on October 22, 1981, NIOSH investigators conducted an initial inspection of the building. A follow-up visit was made on November 5, 1981, at which time NIOSH collected 14 samples from various interior surfaces of the building.

On February 2, 1982, NIOSH distributed a letter report presenting the sample results and recommendations concerning decontamination and corresponding guidelines for worker protection during the effort.

III. BACKGROUND

The building, located in a residential section of Norwood, Ohio, is situated approximately 100 feet from the road. It is one story with interior dimensions of 33 by 20 by 9 feet with an extended 36 square foot northwest corner (see Figure I). The entrance to the building is prefaced by a covered 150 square foot loading dock.

Years ago, the building was used by its owner, the founder of a local exterminating company, in the small-scale production of a rodenticide containing arsenic. According to CNHD officials, it has been at least 40 years since the poison was mixed and packaged in the building. Since that time, the building has remained unoccupied and relatively obscure.

In 1974, CNHD initially became aware of the building and its past history. Their inspection indicated that a white powder was present throughout the building. CNHD then requested NIOSH to determine the arsenic content of this material, since its presence was highly suspected. NIOSH collected environmental samples from the building on April 29, 1974. Based on the analyses of the samples, NIOSH determined that the white material was arsenic trioxide and, more importantly, that the building was highly contaminated with this compound. In a report to CNHD on May 16, 1974, NIOSH presented these results and recommended that the building be decontaminated and that workers be adequately protected during the decontamination process.[1] Since the report was issued in 1974, the building has not been decontaminated.

IV. ARSENIC TOXICITY

Exposure to arsenic can be through ingestion, inhalation, or via skin absorption. Once absorbed arsenic is widely distributed throughout the

body tissues including the liver, abdominal viscera, bone, and skin. Acute arsenic poisoning in humans is usually by accidental or intentional ingestion. Although rare, acute poisoning may be followed by difficulty in swallowing, irritation of the mouth, epigastric pain, vomiting, and diarrhea, followed by development of stupor, coma, and death.

Chronic or long-term exposure to arsenic usually manifests itself by the presence of the following symptoms: weakness, weight loss, nausea and diarrhea alternating with constipation, skin disorders, loss of hair, abdominal pain, occasional pleuritis, and peripheral neuritis. Numerous studies have shown that arsenic compounds including arsenic trioxide can cause cancer of the skin, lung, and lymphatic system.[2]

V. METHODS AND MATERIALS

A total of 14 dust samples were collected for arsenic determination. Six of the dust samples were collected from the floor, five from the walls, and three from the accumulation on the ceiling beams. Sampling locations are presented in Figure 1. All of the floor dust samples were collected with disposable plastic spoons and transferred to clean, prelabeled glass vials. Four of the six floor dust samples contained varying amounts of the white material. All four of these samples were collected from the northeast quadrant of the building - an area where the mixing and packaging of the rodenticide was reportedly done.

The dust on the wall and ceiling beam surfaces was collected by wiping a distilled water-soaked smear tab filter (Whatman No. 50) over an area of approximately 1 square inch. Five wall and three ceiling beam dust samples were collected in this manner and were also transferred to clean, prelabeled glass vials. To avoid potential cross contamination of the samples, each filter was handled using a new pair of disposable gloves.

The bulk dust and wipe filter samples were analyzed for arsenic by atomic absorption spectroscopy according to NIOSH Analytical Method No. P&CAM 173.[3]

VI. RESULTS AND DISCUSSION

Table I presents the bulk dust samples obtained from the floor. All six floor dust samples contained arsenic with concentrations ranging between 3 to 41%. The highest concentrations (8 to 41%) were found in samples collected from the northeast quadrant of the building where the rodenticide was reportedly mixed and packaged. The two floor dust samples (FB5 and FB6), which appeared to be free of white material, contained 3 and 6% arsenic, respectively.

Table II presents the surface wipe filter samples obtained from walls and ceiling beams. Two of five wall wipe filter samples collected from

the north and east wall surfaces contained 1.4 and 310 micrograms of arsenic per square inch of surface area, respectively. The remaining three wall wipe samples did not contain detectable quantities of arsenic. Three wipe filter samples from the ceiling beams revealed surface arsenic levels of 130, 1100, and 2100 micrograms per square inch. The two higher levels were from samples collected in the northeast quadrant.

VII. CONCLUSION

Based on the sampling results, NIOSH concludes that the building is still contaminated with arsenic. The heaviest arsenic concentration was determined in the northeast quadrant of the building.

VIII. RECOMMENDATIONS

1. The interior surfaces of the building should be decontaminated. Decontamination should include collection of all loose material, debris, etc., with particular emphasis on the material of a gray to white cast. The material should be properly packaged and secured for ultimate disposal according to EPA hazardous waste disposal guidelines.[4] The following EPA office should be contacted for specific details concerning disposal: Hazardous Materials Section, Ohio EPA, 7 East Fourth Street, Dayton, Ohio 45402.

2. Individuals involved in the decontamination process should be adequately safeguarded against any unnecessary exposure to the arsenic-laden material. Personal protective equipment should include air-supplied respirators, disposable full-body clothing including hoods, gloves, and footwear.

3. The effectiveness of the decontamination with respect to contaminated surfaces should be determined by the EPA toxicity test extraction procedure in order to define those structures, materials, etc., that should be classified and handled as hazardous waste.[5]

IX. REFERENCES

1. Letter to the City of Norwood Health Commissioner from K.J. Kronoveter, NIOSH, May 16, 1974.

2. National Institute for Occupational Safety and Health. Criteria for a recommended standard: occupational exposure to inorganic arsenic (revised). Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1975. (DHEW publication no. (NIOSH) 75-149).

3. National Institute for Occupational Safety and Health. NIOSH manual of analytical methods. Vol. 5, 2nd ed. Cincinnati, OH:

National Institute for Occupational Safety and Health, 1979. (DHEW (NIOSH) publication no. 79-141).

4. Environmental Protection Agency, Hazardous Waste and Consolidated Permit Regulations. Federal Register, May 19, 1980, Volume 45, No. 98: pps. 33140-50.

5. Environmental Protection Agency, Hazardous Waste and Consolidated Permit Regulations. Federal Register, May 19, 1980, Volume 45, No. 98: pps. 33127-33.

X. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared by:	James M. Boiano Industrial Hygienist Industrial Hygiene Section
Environmental Assistance:	Mark Nutter Co-Op Student Industrial Hygiene Section
Originating Office:	Hazard Evaluations and Technical Assistance Branch Division of Surveillance, Hazard Evaluations, and Field Studies
Report Typed By:	Debra A. McDonald Clerk-Typist Industrial Hygiene Section

XI. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. Information regarding its availability through NTIS can be obtained from NIOSH Publications Office at the Cincinnati address. Copies of this report have been sent to:

1. City of Norwood Health Commissioner, Norwood Health Center, 2059 Sherman Avenue, Norwood, Ohio 45212.
2. Building Owner
3. Hazardous Materials Section, Ohio EPA, 7 East 4th Street, Dayton, Ohio 45402.
4. NIOSH, Region V
5. OSHA, Region V

TABLE I

Arsenic Content of Floor Dust Samples

City of Norwood
Norwood, Ohio
HETA 82-017
October 22, 1981

Sample No.	Sample Location	Arsenic Content (percent)	Sample Appearance
FB1	3.5 ft. NE of I - beam	41	Contained white material
FB2	Between platform and north wall	23	Contained white material
FB3	NE corner of building	8	Contained white material
FB4	South corner of platform step	17	Contained white material
FB5	SW corner of building	6	Contained no white material
FB6	NW corner of building	3	Contained no white material

TABLE II

Arsenic Content of Wall and Ceiling Beam Wipe Filter Samples

City of Norwood
Norwood, Ohio
HETA 82-017
October 22, 1981

Sample No.	Sample Location	Micrograms Arsenic Per Square Inch Of Surface Area	Surface Appearance
WF1	West side of north wall	1.4	White material present
WF2	North wall in recessed corner	<0.5	No white material present
WF3	Middle of west wall	<0.5	White material present
WF4	Middle of east wall	310	White material present
WF5	On wall opposite WF2 sampling site	<0.5	No white material present
CF1	On top of ceiling beam near SW corner	130	No white material present
CF2	On top of ceiling beam - 5 ft. north of door	1100	No white material present
CF3	On top of ceiling beam in NE corner	2100	No white material present

FIGURE 1

Building Schematic Indicating Sample Locations
5421 Carthage Avenue, Norwood, Ohio

City of Norwood
Norwood, Ohio
HETA 82-017
October 22, 1981

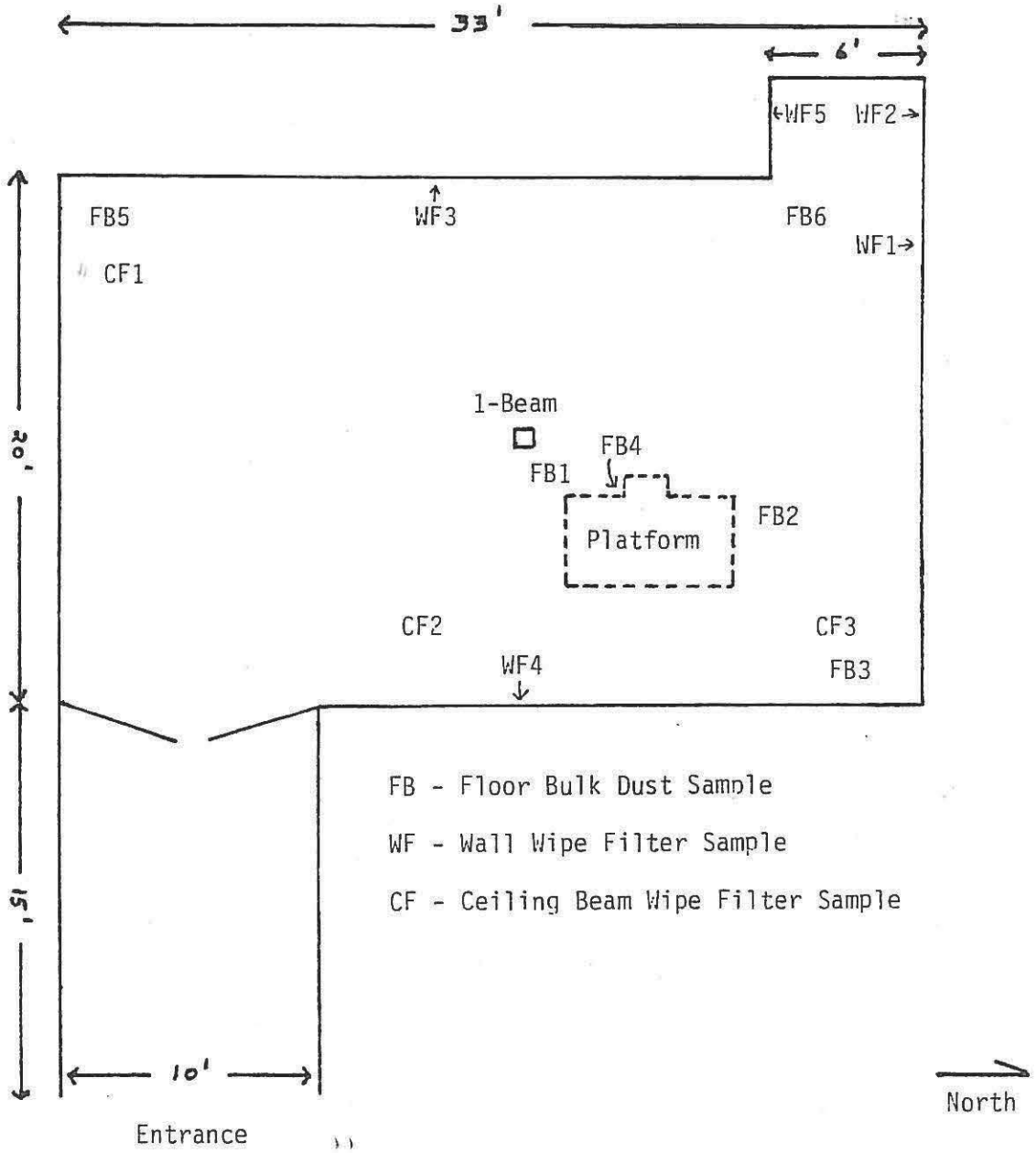


TABLE 2

The mean changes in FEV_1, FVC, and FEV_1/FVC from 1979 to 1981 in 26 exposed and 11 unexposed chemical workers at FMC, Nitro, W. Va.

	FEV_1	FVC	FEV_1/FVC
exposed (n=26)	- 16± 250cc	- 25± 286cc	+ 0.115± 3%
unexposed (n=11)	+ 84 ± 176cc	+ 85 ± 206cc	+ 0.27 ± 3%
	$p > 0.10$ by student's t test ($t = 1.20$, d.f = 35)	$p > 0.10$ by student's t test ($t = 1.5$ d.f = 35)	$p > 0.5$ by student's t test ($t = 0.14$, d.f 35)