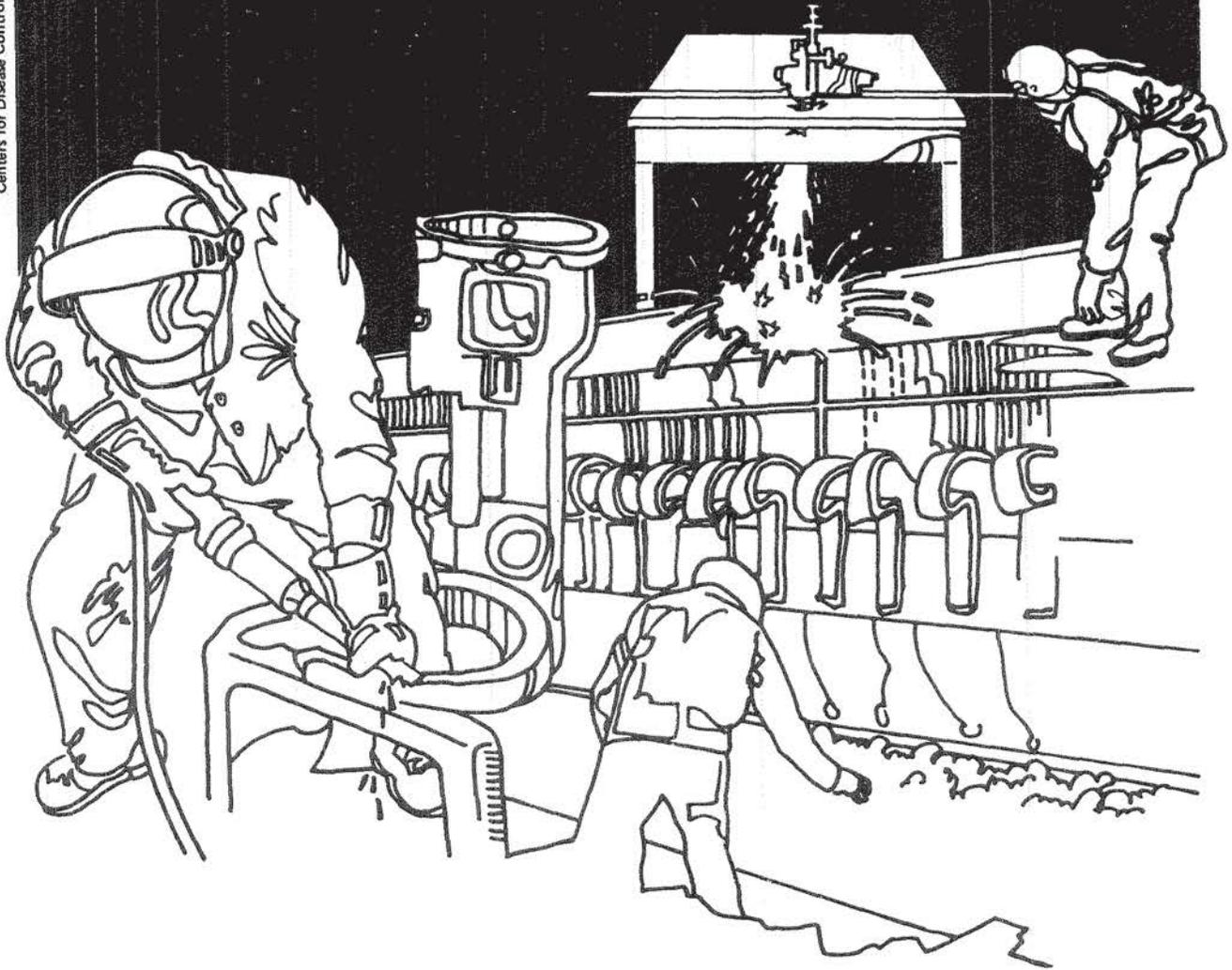


NIOSH



Health Hazard Evaluation Report

HETA 83-139-1422
CHEMUNG COUNTY HEALTH DEPARTMENT
ELMIRA, NEW YORK

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.

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CHEMUNG COUNTY HEALTH DEPARTMENT
ELMIRA, NEW YORK

NIOSH INVESTIGATOR:
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I. SUMMARY

The National Institute for Occupational Safety and Health (NIOSH) received a request in January 1983, to provide technical assistance to the Chemung County Health Department, Elmira, New York, to quantify the airborne levels of fungi at the Van Etten Elementary School, Van Etten, New York. Mold had been found growing on the ceilings of some of the classrooms when school opened in September 1982. The airborne fungi data were gathered to assist the health department in their determination of the health implications of the mold growth. Volumetric sampling to quantify viable airborne fungi was carried out at the Van Etten School. Two other similar elementary schools were also sampled as controls.

At the time of the environmental survey, Van Etten Elementary School had similar levels of airborne fungi as Spencer and Elm Street Schools. The levels collected at all three schools are considered to be in the normal range.

KEYWORDS: SIC 8211. Educational-Facilities, Fungi.

II. BACKGROUND

The Van Etten School sustained ceiling damage in the school's new wing, when leakage occurred during the reconstruction of the new roof. In September, 1982, mold was found growing on the ceiling in some areas of the new wing. In November the students were removed from the new wing which was closed off from the rest of the school. The cafeteria, which has a separate access through a hall that connects the new wing and the original school building, remained open. The contaminated ceiling was brushed and vacuumed and then cleaned with a quaternary ammonium solution. Reportedly no new mold growth has occurred since the rooms were cleaned in the fall.

The school is ventilated by individual window units in each classroom and dampers in the hallways.

III. MATERIALS AND METHODS

The rooms were visually inspected for signs of microbial growth.

Airborne fungi were collected with Andersen single stage viable samplers operating at a flow rate of $0.0283 \text{ m}^3/\text{minute}$.^(1,2) The samples were collected on rose bengal streptomycin (RBS) agar over sampling periods ranging from 10 to 30 minutes. Side by side Andersens were used to collect duplicate samples at each location with the window ventilation units off and again with the units on, after having run at least 30 minutes.

Airborne fungi were collected on May 8 at the Van Etten Elementary School in the following locations: Rooms 15, 18, and 10 in the new wing, the interconnecting hallway between wings and in room 25 and the learning center in the old wing.

Samples were also collected at two control schools on May 7. Rooms 132 and 115 were sampled at the Elm Street Elementary School in Waverly. Rooms 105 and 101 were sampled at the Spencer Elementary School in Spencer. Outdoor levels were collected at the Elm Street and Spencer locations. Rain prevented outdoor samples from being collected at the Van Etten location.

The sampled RBS culture plates were stored in a cooler for one to two days prior to incubation at 28°C in Morgantown. The plates were counted each day until no new growth was detected. The concentration of microorganisms from each sample was calculated as colony forming units per cubic meter (CFU/M³).

$$\text{CFU/M}^3 = \frac{\text{Number of colonies growing in sample}}{\text{Sample volume in M}^3}$$

IV. EVALUATION CRITERIA

No standards or environmental guidelines exist to evaluate exposure to microorganisms. The control schools were sampled so that the levels in the area of concern, the Van Etten new wing, could be compared to what is normally found in similar classrooms with the same age groups of children and the same means of ventilation.

V. RESULTS and DISCUSSION

The airborne sampling results are tabulated in Table 1. Due to the nature of viable sampling and the sample size, some variation in CFU/M³ is expected. The highest levels of CFU/M³ were measured when the ventilation units were operating with 70 to 80% outside makeup air. Outdoor levels are generally higher, as evidenced by the levels measured outside at Spencer (534 CFU/M³) and Elm Street (450 CFU/M³).

It has been estimated, based on measurements in schools, hospitals, and residences, that humans live in air from 20 CFU/M³ to over 700 CFU/M³ without apparent ill effects. (3)

Microorganisms are ubiquitous. The water leak that occurred optimized microbial growth. The leak was repaired, the ceiling areas dried and were thoroughly cleaned with a disinfectant. At the time of the survey no microbial growth was observed. Prompt repair of any future leaks should discourage the new growth of microorganisms. The classrooms should be thoroughly cleaned with either a chlorox or a quaternary ammonium solution. At the time of the survey, the walls had been

recently repainted and the floors rewaxed. The curtains were scheduled to be cleaned and sample carpet squares used in the classrooms were to be discarded.

V. RECOMMENDATIONS

Prompt repair of all future water leaks will discourage the new growth of microorganisms.

In preparation for the coming school year the classrooms should be thoroughly cleaned as indicated in the results and discussion section.

VI. REFERENCES

1. Jones, W., K. Moring, P. Morey, and W. Sorenson. Evaluation of a Single Stage Andersen Sampler (in preparation).
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VIII. 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. Chemung County Health Department
2. Van Etten Elementary School
3. NIOSH Regional Office II

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

Table 1

Ventilation

School	Location	OFF CFU/m ³ *			ON CFU/m ³			COMBINED CFU/m ³		
		N	Range	Mean**	N	Range	Mean	N	Range	Mean
Elm Street	Rms 115,132 Outside	10	60-149	103.7	8	59-153	105.9	18	59-153	104.7 450
Spencer	Rms 101,105 Outside	9	123-277	185.2	9	92-213	148.9	18	92-277	167.1 534
Van Etten	Hall	4	115-196	154.3	6	82-165	142	10	82-196	146.9
	New Wing	18	74-269	156.9	14	103-377	203.7	32	74-377	177.4
	Old Wing	8	30-170	82.6	8	136-353	241.6	16	30-353	162.1
	Combined	30	30-269	131.3	28	82-377	195.7	58	30-377	167.2

*Colony forming units per cubic meter

**Arithmetic mean

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