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HAZARD EVALUATION AND TECHNICAL ASSISTANCE
REPORT NO. TA 79-18

CEDAR RAPIDS SCHOOL DISTRICT
BUREAU OF LABOR
STATE OF IOWA
DES MOINES, IOWA 50319

MAY 1979

I. SUMMARY AND BACKGROUND INFORMATION

In January 1979, the Bureau of Labor, State of Iowa, Des Moines, Iowa, requested technical assistance from NIOSH to evaluate if the reported cases of cancer in maintenance and custodial workers employed at some time with the Cedar Rapids School District are in any way occupationally related to their employment with the school district. The request for assistance was generated by the Bureau of Labor from an employee's wife's concern and complaint on the question of an increased risk for cancer in maintenance and custodial workers in the Cedar Rapids School District.

The question of an increased risk for cancer in this group of workers was previously evaluated by Dr. Laverne Wintermeyer, M.D., and Dr. Russell W. Currier, M.D., Iowa State Department of Health, and Dr. Glyn G. Caldwell, M.D., Chief of the Cancer Branch, Bureau of Epidemiology, Center for Disease Control (CDC), Atlanta, Georgia. Their study was primarily conducted by Dr. Caldwell, M.D., and his report in the form of a letter and attachments dated March 22, 1977, was submitted to Dr. Currier. There were subsequent contacts with the interested parties as well as other state agencies on this matter in 1977 and 1978. NIOSH's study involved an on-site visit to evaluate the potential extent of exposure of maintenance and custodial personnel to various chemicals, and an evaluation of the previous epidemiological study by Dr. Caldwell, including updated information on deaths due to cancer.

An exit interview was held with the original requester, representatives of the Cedar Rapids School District, Iowa State Bureau of Labor, and the Service Employees International Union Local No. 55 to discuss the NIOSH findings which are in essential agreement with the initial findings by Dr. Caldwell. The following items and findings were discussed in more detail than noted below during the exit interview on March 22, 1979:

- A. The Cancer Branch of CDC and NIOSH conduct surveillance, field investigations, and epidemiological research concerning cancer and other effects or diseases which may be due to environmental conditions. These Federal agencies conduct such studies in collaboration

with the National Cancer Institute, other Federal state and local agencies, and private or public firms plus their respective unions in order to offer an unbiased opinion (e.g., conclusions dealing in facts and not pro union or management, etc.) concerning the particular study or evaluation.

- B. The walk-through survey revealed that maintenance and custodial employees have been exposed to only one common substance, asbestos, which is a known carcinogen. These exposures consist of an employee knocking off or repairing insulation which may contain asbestos on pipes and equipment in the boiler rooms of schools and buildings. Such exposures are limited to a few times during any one year and would be short-term exposures of a few hours per episode.
- C. In the group of custodial and maintenance employees, there was no preponderance of one type of cancer which might be indicative of an occupational hazard.
- D. Assuming that approximately one person in eight will have cancer in their lifetime, one would expect approximately 19 cases of cancer (all kinds) to occur in the custodial and maintenance employees.
- E. Most of the cancer cases in this study have occurred at appropriate ages and one would expect approximately three cases of lung cancer to have occurred in the custodial and maintenance group. One case of larynx, esophageal, and bladder cancer would not be unusual and if these people were smokers (all the cancers listed have been associated with cigarette consumption), the expected numbers might be even higher.

In view of the above and other detailed information contained in this report, it is concluded that there is no apparent connection between the exposure of maintenance and custodial employees of the Cedar Rapids School District to potentially hazardous materials and the deaths of some employees due to cancer. Therefore, the NIOSH investigators feel that a more detailed medical, epidemiological, and industrial hygiene evaluation is not warranted as such a large study probably would not be further productive.

II. GENERAL INFORMATION AND EVALUATION RESULTS

A. General Information

The following information was obtained during an on-site visit by a NIOSH industrial hygienist on March 21-22, 1979.

A list of various products used by the custodial and maintenance personnel over the past few years was obtained from the purchasing agent. In addition, a walk-through survey of several elementary, junior high and

senior high schools was accomplished with representatives from management and union to evaluate the current uses of the products and the potential exposures of personnel to various chemicals.

The major exposures would be to the various cleaners, waxes, and polishes routinely used by employees. These commercially available products contain a wide variety of chemicals such as acids/bases (e.g., sulfuric acid, hydrochloric acid, sodium hydroxide, ammonia, sodium carbonate, potassium hydroxide, borax, trisodium phosphate, etc.) and organic compounds (e.g., butyl carbitol, naphtha, toluene, methylene chloride, methanol, freon, xylene, paints, waxes, oils, aliphatic hydrocarbons, methyl ethyl ketone, ethylene glycol monomethyl ether, dimethyl benzyl ammonium chlorides, etc.). These commercial products are also in fairly wide use in households throughout the country. To the authors' knowledge none of the major chemicals routinely used in the school district are suspected or known carcinogens which would produce the types of cancer covered by this evaluation. These exposures would be for the custodial and janitorial employees who are involved in general cleanup operations of rest rooms, halls, rooms, and offices. The main concern from the use of these products would be from the short-term acute effects (e.g., skin rashes, burns, and irritation) and central nervous system effects (e.g., dizziness and headaches).

The engineers or maintenance employees are in charge of custodial personnel and have similar exposures but are also involved in running and maintaining the mechanical portion of the facilities such as air conditioning and heating units plus use of pesticides. Therefore, the engineers or maintenance employees may be occasionally exposed on a short-term basis (e.g., few hours at most) to welding and soldering fumes (e.g., carbon monoxide, iron, zinc, chromium, nickel, cadmium, fluorides, etc.) and pesticides (e.g., diazinon, pyrethrins, pipernyl buterol, methyl carbamate, monobenzylparachlorophenol, etc.). Once or twice a year they add chromate solution to the heating units. Two schools still use coal-fired boilers while all other facilities were converted to or have oil or gas-fired boilers. The amounts of welding and soldering materials and pesticides used are small and the occasional exposures are such as to not arouse suspicion that these materials are a possible cause of the employees' diseases covered by this evaluation. The acute effects from exposure to certain pesticides include blurred vision, pinpoint pupils, vomiting, headache and serious illness. There have not been any reported cases of pesticide poisonings in the maintenance and custodial employees. Also, the school district currently requires employees who use pesticides to receive training and be a licensed user of pesticides.

The walk-through survey revealed that maintenance and custodial employees may be exposed to asbestos which is considered a known carcinogen. Exposure to asbestos may increase the risk of asbestosis, lung cancer, mesothelioma and other cancers. These exposures consist of an employee knocking off or repairing insulation which may contain asbestos on pipes

and equipment in the boiler rooms of schools and buildings. Such exposures are limited to a few times during any one year and would be short-term exposures of a few hours. The amount of exposure to asbestos during these episodes has not been quantitated. No operations involving the repair of insulation which may contain asbestos were conducted at the time of the survey. An air sample in the boiler room of the Annex and an air sample in the boiler room of the Harrison Elementary School were obtained to see if there are any ambient airborne asbestos fibers being flaked off from the insulation. No airborne asbestos was detected and results were all well below OSHA's current environmental standard of 2 fibers of asbestos or NIOSH's recommended level of 0.1 fibers of asbestos over 5 microns long per cubic centimeter of air sampled. The minimal detectable level for asbestos on these samples was 0.01 fibers of asbestos over 5 microns long per cubic centimeter of air sampled. Bulk insulation samples were obtained in the boiler rooms of Taft, Harrison, Annex, and the ESC plus the insulation in the attic of the Harrison school. Asbestos for purposes of this report is defined as chrysotile and/or amosite. Sample results from the Taft boiler room and the attic of the Harrison school did not show any asbestos material. The boiler room of the Harrison school showed 5-15 percent amosite and 2-8 chrysotile. The results from the boiler room of the ESC building was 2-15 percent chrysotile with no amosite detected. The results from the boiler room of the ESC Annex showed 2-15 percent chrysotile and no amosite.

Although the exposure of employees to asbestos is episodic, the answer to the question of how much asbestos exposure is hazardous is not known. In the case of asbestosis and lung cancer, the risk increases with increasing amounts of exposure. Asbestos-induced disease is not likely to appear until 15 to 35 or more years after the first exposure. The time between first exposure and the appearance of disease appears related to the amount and duration of exposure. More intense exposure sometimes results in an asbestos-related disease within 15 years. Some investigators have reported evidence of impaired lung function in workers with less than 10 years of exposure to asbestos. Asbestos and cigarette smoking together produce more lung cancer than either factor acting alone. For instance, asbestos workers who smoke have a risk of lung cancer eight times that of smokers in the general population, and 92 times non-smokers, non-asbestos workers.

The Cedar Rapids School District and the State of Iowa along with assistance from Federal agencies such as the Environmental Protection Agency are well aware of the current emphasis on asbestos in schools and the potential exposure of school children to airborne asbestos. In addition to cooperating with state and Federal agencies on the potential problem, the school district has hired a private firm to provide an unbiased professional evaluation of this problem. In this regard, five schools have auditoriums and/or gym-auditorium combinations which have asbestos acoustical material for noise control purposes. The asbestos material has a very strong organic binder which may preclude undue

amounts of asbestos fibers from becoming airborne. Three ambient airborne samples were obtained and analyzed for asbestos. Results of these samples were all less than 10 percent of the current OSHA environmental standard of 2 fibers of asbestos over 5 microns long per cubic centimeter of air sampled. The school district is to be commended on their actions concerning asbestos and they are way ahead of the vast majority of school systems in solving any potential problems which may arise due to asbestos. Corrective action is being taken by the school district on this matter. Although, the custodial and maintenance employees may be exposed to asbestos, their exposure is not comparable to that of insulation, shipyard, brake shoe and similar type workers who may be routinely exposed to asbestos fibers.

A few junior and senior high biological and chemical laboratories were visited during the walk-through survey. No undue conditions were noted (although one chemistry laboratory was messy) which would result in undue exposure of school children or employees. However, there are several chemicals (e.g., formaldehyde, carbon tetrachloride, benzene, trichloroethylene, chloroform, etc.) which were stored (not in use as survey was during spring break or just not in use) at the time of the survey. Some of the chemicals in storage are highly toxic and are suspected or known carcinogens which may result in aplastic anemia, leukemia, and other cancers not reported in this evaluation. Therefore, caution should be exercised in the use of these chemicals and less toxic chemicals should be substituted for the more toxic chemicals. Employees covered by this evaluation are not normally exposed to these chemicals.

During the walk-through survey at the stadium, it was noted that conditions in the maintenance shop (e.g., running of motors, etc.), which is a confined area, did result in some headaches and obnoxious odors to some employees and the NIOSH investigator. Again, this is an acute rather than a serious chronic health problem and should be remedied.

Dr. Glyn G. Caldwell's original evaluation concerning the incidence of cancer in the maintenance and custodial personnel in the Cedar Rapids School District is contained in Dr. Caldwell's letter and attachments dated March 22, 1977, to Dr. Russell W. Currier, M.D., Iowa State Department of Health. Table I to this report is an updated summary of deaths or disabilities due to cancer or related cases from January 1973 to January 1979 obtained during the recent on-site visit on March 21-22, 1979. The comments included in this table on smoking are from those who knew the individual and may not be accurate but are indicative that they smoked. Since the evaluation by Dr. Caldwell, there has been one additional cancer mortality. Dr. Caldwell's findings are included in Section I of this report and NIOSH is in agreement with Dr. Caldwell's conclusions even when considering the additional case of cancer.

B. Evaluation Results and Conclusions

The primary evaluation results are contained in Section I of this report and need not be repeated in this section. In conclusion, it does not

appear that there is an occupational exposure to hazardous materials which warrants further evaluation or consideration by NIOSH and Center for Disease Control and other agencies. The authors are not aware of other studies of school district employees which may lead one to consider that these exposures should be any different from others in the general population of smokers and non-smokers. The absence of known toxicants, save asbestos, is consistent with Dr. Caldwell's conclusion that the risk of cancer in this worker population in the Cedar Rapids School District is not unusual.

III. GENERAL CONCLUSION AND RECOMMENDATIONS

The number and type of deaths found in the custodial and maintenance employees at the Cedar Rapids School District are the same as one would anticipate for the general population in the United States. Therefore, a more in-depth industrial hygiene or epidemiological evaluation is not appropriate. However, the following recommendations are offered to management to provide for improved environmental conditions:

- A. Efforts on improving any potential problems concerning asbestos should receive continued emphasis and cooperation with appropriate Federal, state and local agencies and regulations. Of particular interest concerning asbestos is the use of protective clothing, respirators, disposal, etc., as covered by the requirements and/or recommendations contained in the Occupational Safety and Health Standard, Title 29 of the Code of Federal Regulations, Part 1910, Section 1910.1001, entitled "Asbestos"; NIOSH Revised Recommended Asbestos Standard, December 1976, DHEW(NIOSH) Publication No. 77-169; and Sprayed Asbestos-Containing Materials in Buildings - A Guidance Document, Publication No. EPA 450/2-78-014.
- B. An education program should be implemented to inform employees concerning the hazards of the various chemicals used and the proper precautions to be taken while using the products. Particular emphasis should be made concerning good personal hygiene practices.
- C. The current program concerning the use and licensing of pesticide users is good and should be continued for anyone using pesticides in the school district.
- D. Improved engineering (e.g., elephant trunks from vehicle exhaust pipes to outside air, etc.) and/or administrative controls should be implemented in the maintenance shop at the stadium to preclude any excessive exposure to vehicle exhaust or other fumes.
- E. Better control procedures and elimination of unnecessary storage or use of toxic chemicals (e.g., benzene, etc.) should be implemented in the chemistry and similar laboratories where chemicals are used or stored.

IV. ACKNOWLEDGEMENTS

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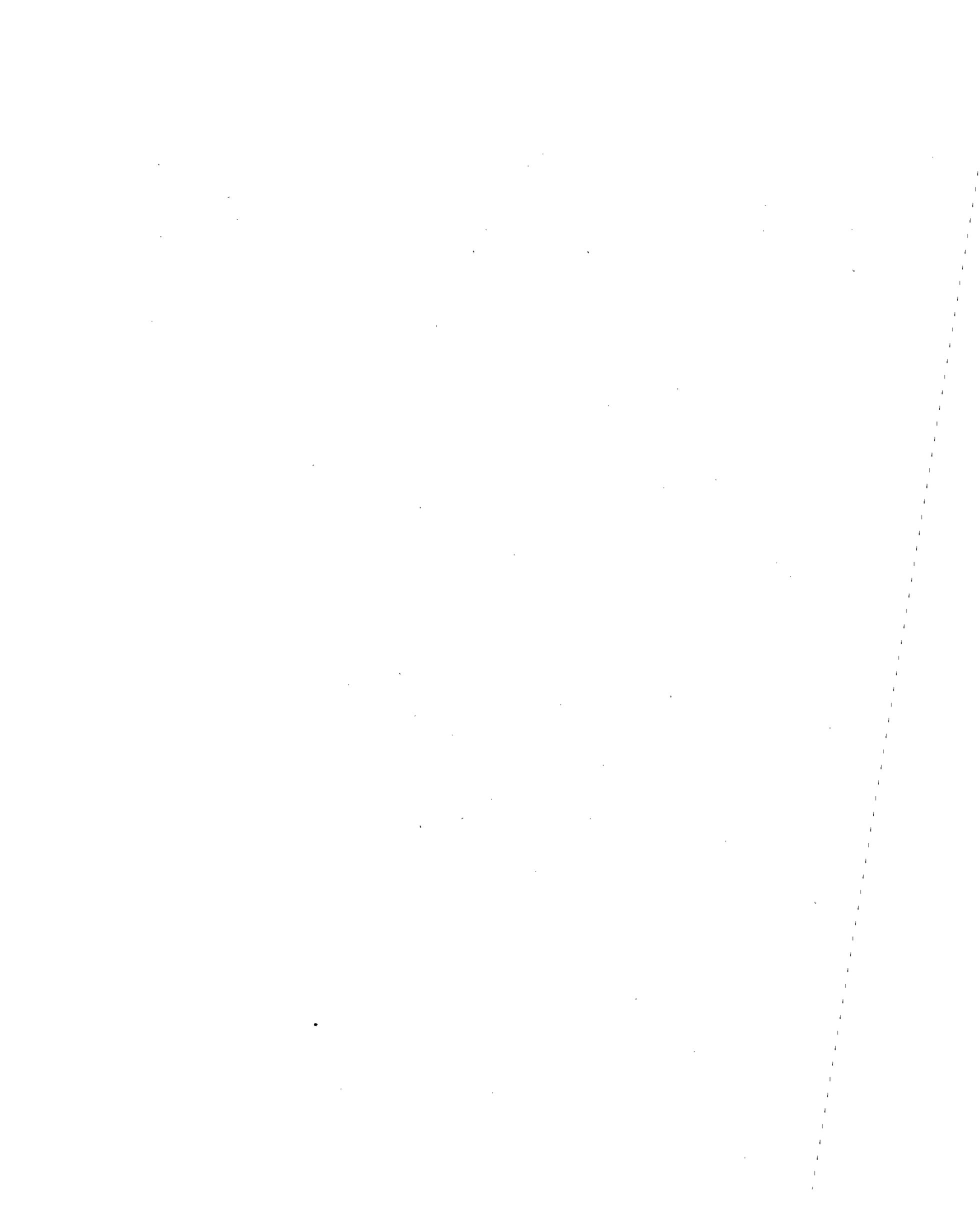
TABLE I

SUMMARY OF DEATHS OR DISABILITIES DUE TO CANCER OR RELATED CAUSES FROM JANUARY 1973 to JANUARY 1979
 AT CEDAR RAPIDS COMMUNITY SCHOOL DISTRICT, COUNTY OF LINN, STATE OF IOWA TA 79-18
 (NOTE: ES-Elementary School; JS-Junior High School; and SS-Senior High School.
 DoB-Date of Birth; DoD-Date of Death; and H-Date hired by school district)

NAME	CAUSE OF DEATH/DISABILITY	LOCATION & JOB	DATES	YEARS OF SERVICE	COMMENTS SMOKING
Case 1 DoB 9/19/13 DoD 9/21/76 H 9/17/73	Pulmonary Emphysema	JS Roosevelt custodian ES Grant Wood custodian	1973-75 1975-76	3	Moderate to heavy smoker-cigarettes
Case 2 DoB 1/20/14 DoD 6/15/78 H 11/01/57	Squamous cell carcinoma/lung	SS Jefferson custodian ES Grant custodian	1957-66 1966-69	12	Moderate to heavy smoker-cigarettes
Case 3 DoB 8/05/12 DoD 3/21/77 H 8/06/57	Metastatic cancer of breast	SS Washington janitor SS Jefferson janitor SS Kennedy janitor	1957-58 1958-68 1968-77	20	Don't know
Case 4 DoB 3/12/12 DoD 10/19/75 H 3/07/61	Metastatic anaplastic bronchiogenic CA of lung	ES Kenwood custodian ES Arthur custodian ES Buchanan engineer ES Noelridge engineer	1961-63 1963-71 1971-73 1973-75	14	Heavy pipe smoker
Case 5 DoB 1/23/24 DoD 6/15/73 H 10/06/58	CA lung	Warehouse manager	1958-73	15	Moderate to heavy smoker-cigarettes
Case 6 DoB 2/28/26 DoD 6/20/76 H 3/03/47	Metastatic CA of esophagus to the brain & liver	ES Harrison custodian JS Taft engineer ESC Annex-Maintenance	1947-65 1965-67 1967-76	29	Moderate smoker-cigarettes quit few yrs. prior to death
Case 7 DoB 6/17/22 DoD 8/13/75 H 10/02/46	CA of bladder	JS Roosevelt asst. engineer ES Fillmore engineer JS McKinley engineer Maintenance	1947-50 1950-57 1957-59 1959-75	28	Heavy smoker cigarettes

TABLE I (continued)

NAME	CAUSE OF DEATH/DISABILITY	LOCATION & JOB	DATES	YEARS OF SERVICE	COMMENTS SMOKING
Case 8 DoB 8/18/22 DoD 7/12/75 H 6/30/59	Metastatic carcinoma of the colon	Carpenter Stadium ES Arthur custodian Stadium	1959-61 1961-64 1964-67 1967-75	16	Moderate smoker cigarettes
Case 9 (Disability)	CA (Left lung- pneumonectomy prior to hiring) Emphysema- rt. lung			710	Moderate smoker cigarettes
Case 10 (Disability)	CA Clavical post laryngectomy			710	Moderate smoker cigarettes
Case 11 (Disability)	Emphysema			710	Moderate smoker cigarettes



BIBLIOGRAPHIC DATA SHEET		1. Report No. NIOSH TA-79-18	2.	P880-153687	
4. Title and Subtitle Hazard Evaluation and Technical Assistance Report No. TA 79-18, Cedar Rapids School District, Bureau of Labor, State of Iowa, Des Moines, Iowa			5. Report Date 05/00/79		
7. Author(s) R. Hervin			8. Performing Organization Rept. No.		
9. Performing Organization Name and Address Hazard Evaluation and Technical Assistance Branch, National Institute of Occupational Safety and Health, U. S. Depart- ment of Health, Education, and Welfare, Cincinnati, Ohio 45226			10. Project/Task/Work Unit No.		
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12. Sponsoring Organization Name and Address SAME			13. Type of Report & Period Covered		
			14.		
15. Supplementary Notes NIOSH TIC 00091534					
16. Abstracts					
<p>ABSTRACT: A site visit was made on March 21 and 22, 1979 to the Cedar Rapids School District in Des Moines, Iowa to investigate reported cancer deaths among custodial and maintenance workers. The Bureau of Labor, State of Iowa, Des Moines requested technical assistance to determine if the cancer deaths were occupationally related. Worker exposure to a variety of chemical cleaners and asbestos (1332214) was noted, but only asbestos was identified as a known carcinogen. Exposures to asbestos were always found to be infrequent and of short duration. No sampling or analyses were performed. Biology and chemistry laboratories were inspected. It is concluded that the cancer deaths were not occupationally related or greater in number than those found in the general population. Recommendations are made for adherence to safety and hygiene practices concerning the use and handling of asbestos, pesticides, and chemical cleaning agents. Toxic chemicals used in the laboratories should be controlled and disposed of properly. Further investigation is not recommended.</p>					
17.					
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