U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT HE 77-72-545

NAB CONSTRUCTION COMPANY
MORGAN STATION GENERAL MAIL FACILITY
341 NINTH AVENUE
NEW YORK, NEW YORK 10001

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I. TOXICITY DETERMINATION

During the period May 17-19, 1977, the National Institute for Occupational Safety and Health (NIOSH) conducted a survey at the Morgan Station General Mail Facility. The study was done at the request of the contractor who was concerned because 92 workers had sought medical advice on symptoms predominately related to the respiratory system. Based upon environmental air sampling, employee questionnaires, and analysis of the employees' complaints, it has been determined that the levels of dust found at the construction site, although exceeding the environmental criteria used for this report in several specific instances, could not have caused the symptoms of which the workers complained. However, the irritant dust could well have aggravated any inflamed mucous membranes in the respiratory tracts of the exposed workers. It appears that workers were suffering from contagious respiratory tract infection(s). Several general recommendations directed towards environmental measures are presented in the text of this report.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this report are available from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available from the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Nab Construction Company, New York City, New York
2. International Brotherhood of Electrical Workers, Local No. 3
3. International Union of Carpenters and Joiners of America, Local No. 740
4. U.S. Department of Labor, Region II
5. NIOSH, Region II

To inform the affected employees, copies of this report shall be posted in a place prominent to these employees for a period of 30 days.

III. INTRODUCTION

Section 20 (a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669 (a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by 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.

An authorized employer representative submitted a request for a health hazard evaluation at the Morgan Station General Mail Facility. The employer representative's concern was that during the period extending from the last week in February 1977 to the last week in April 1977, 92 workers had sought medical advice on symptoms predominately related to the respiratory system although a few workers also complained of nausea. The workers alleged that dust exposures at work were responsible for their symptoms. Eighty-six of these workers visited one local clinic while two visited a second local clinic. All workers received some form of treatment-unspecified in most cases. All of the workers returned to work with no time lost other than that used in visiting the clinic. An interim report (SHEFS-1) was sent to company and union officals on June 3, 1977.

IV. HEALTH HAZARD EVALUATION

A. Facility and Process Description

The Morgan Station General Mail Facility was built in the 1930's, measures approximately 200 x 800 feet, and has 10 floors with a basement and sub-basement. In 1967, a fire, lasting for 10 days, occurred within the building. As a result of the fire, the structurally intact building was closed for several years.

The Nab Construction Company, a contractor for the U.S. Postal Service, renovated the facility, primarily on a sub-contracting basis. During the NIOSH survey of April 17-20, 1977, about 20 different companies, employing about 400 people on site, were engaged in the activities essential for the renovation process. About 41% of the initial contract was for a mechanized mail handling system, while the remainder, 59%, was for general renovation construction.

The renovation process was handled in two phases. Phase I, started in 1972, was for the plumbing, electrical, and heating/ air conditioning systems. Phase II, started in 1975, included mail handling equipment installation and finishing of the building. Typical work activities included: electrical (installing conduit & lighting fixtures, pulling wire, drilling anchor bolt holes, etc.), mechanical (drilling anchor bolt holes, assembling conveyor systems, welding, etc.), installation of ventilation ductwork, painting, installation of automatic control systems, placing of partitions, and installation of lunch rooms, restrooms, and locker rooms. Phase II was scheduled for completion in the latter part of 1977.

B. Study Methods

1. Environmental

On the basis of symptomatology and comments expressed by the workers and observations made at the time of the NIOSH survey (April 17-20, 1977), it was judged desirable to conduct air sampling for respirable dust, respirable free silica, lead, and carbon monoxide.

Personal air samples for respirable dust and respirable free silica were collected by NIOSH using tared 37 mm diameter polyvinyl chloride filters encased in 2-piece cassettes. The cassettes were preceded by 10 mm diameter cyclones to provide the separation of the respirable dust. Airflows were maintained at 1.7 liters per minute using personal air sampling pumps. The respirable dust was determined by weight increase of the filters while the respirable free silica was determined by an X-ray diffraction technique (NIOSH Method P&CAM 259).

Personal air samples for lead were collected by NIOSH using 37 mm diameter membrane filters (closed face cassettes) and personal air sampling pumps operating at 2.0 liters per minute. These samples were analyzed by conventional aqueous atomic absorption spectroscopy.

Several bulk dust samples were collected by NIOSH at various places in the facility (at union request) and were analyzed for lead, free silica, and asbestos. The lead analysis was made by aqueous atomic absorption spectroscopy. The free silica determination was made by grinding a portion of the sample and analyzing by X-ray diffraction. The asbestos determinations were made by examining the samples microscopically for the presence of asbestos, using phase contrast and polarizing techniques.

A certain amount of asbestos panel board is used for construction of the lookout gallerys (used for postal inspection purposes). On February 9, 1977, OSHA conducted a survey for asbestos exposures in the area where the panel board is cut and drilled. For 9 air samples, the asbestos concentrations ranged from 0.1 to 0.4 fibers per cubic centimeter of air. As a result of this sampling, the company was judged to be in compliance with the asbestos air level standard. However, the company was cited for: 1) lack of comprehensive medical examinations, and 2) lack of medical records. No penalty was assessed. No personal air sampling for asbestos was conducted by NIOSH.

2. Medical

One hundred and twelve men were interviewed by NIOSH industrial hygienists using the form "Health Hazard Evaluation Initial Survey, Employee Interview (Confidential)". These men were selected at random but it was attempted to interview a number of the individuals who had reported to one of the two earlier mentioned clinics. The interview forms were thoroughly reviewed by the NIOSH physician.

C. Environmental Criteria and Health Effects

The environmental evaluation criteria used for this study are presented in Table 1. Listed in Table 1, for each substance, are the recommended environmental limit for this study, the source of the recommended limit, the principal or primary health effects underlying each recommended limit, and, for reference, the current OSHA standard.

As noted in Table 1, the OSHA standard or ACGIH Threshold Limit Value, for respirable dust (containing quartz) is calculated by the following formula,

$$\text{Environmental Limit} = \frac{10}{\%\ \text{Free Silica} + 2}\ \text{mg/M}^3$$

As seen by this equation, the OSHA standard for "respirable dust" (containing quartz) can vary by sample according to the percent of free silica. Therefore, the OSHA standard is shown for each of the dust samples in Table 2.

D. Results-Discussion

1. Environmental Evaluation

The results of the environmental sampling are shown in Tables 2-5. The results of the personal air samples for respirable free silica and respirable dust generally show air levels below the NIOSH recommendation for free silica and the OSHA standard for respirable dust. Of twenty air sample results for respirable free silica, five were above the NIOSH recommendation of 0.05 mg/M^3. Of these five samples, three were within the OSHA standard of 0.100 mg/M^3 for a dust of 100% quartz. The other two samples were considerably above the OSHA quartz standard of 0.100 mg/M^3. However, it must be considered that for each of the five samples there was less than 1.0 mg of dust upon the filter. Free silica analyses upon such small amounts of dust often show variation. Of the 21 air samples results for respirable dust, 4 were above the OSHA standard for respirable dust. Two of the four samples approximately equaled the OSHA standard while the other two samples exceeded the OSHA standard by factors of 3x and 4x respectively. The two samples exceeding the OSHA standard significantly, did so because of the high values for the free silica (29% and 22%). These two high free silica analyses are consistent with the bulk sample analyses for settled dust. Calculation of an average respirable dust exposure yields 68% of the OSHA standard for respirable dust. If the two dust samples with the high free silica determinations are excluded, the average dust exposure is 30% of the OSHA standard for respirable dust. These air sample results can be summarized by stating that there appears to be a potential on occasion for hazardous exposures to airborne dusts for select jobs.

A visual appraisal of the construction site did not indicate high concentrations of airborne dusts, although the housekeeping was in need of improvement. Engineering controls for dust exposures at a construction site such as this are often difficult to achieve. It should be mentioned that suitable NIOSH approved respirators were made available to the workers by the contractor. Also it was noted that some of the workers used respirators while doing such operations as drilling ceiling holes for anchor bolts.

The results of the air samples for lead and carbon monoxide (Tables 3 and 4) show air concentrations which were just a fraction of the appropriate environmental criteria. Consequently it would not be judged that these contaminants posed a health hazard to the workers at the time of the survey.

The bulk sample analyses (done at union request) shown on Table 5 are much as expected. That is, low percentages of lead, zero percentages of asbestos, and high percentages of free silica. The lead comes from lead based paints which were used at one time in the building while the free silica derives from the sand used in the concrete. It must be noted that these analyses were of dust samples taken from the floor of the building and cannot be considered representative of worker exposures.

2. Medical Evaluation

One hundred and twelve men were questioned, using the non-directed questionnaire. Fifty of these men stated that they were currently symptom-free and 14 of this group had never complained of alleged, work-related disease. The remaining 62 workers complained of such symptoms as coughing, sore- or irritated-throat, a "cold", nose bleeds, chest pains, nausea and fever, listed in order of decreasing frequency. These symptoms occurred both alone, and in combinations. One worker complained, solely, of a foot-injury.

On analysis of the type, and timing of onset of the symptoms, predominantly relating to the respiratory system, it would appear that these workers were suffering from contagious respiratory tract infection(s). To substantiate this assumption, one must consider the clustering of cases from the 9th to the 18th of March (Figure I). This is not the distribution of irritant dust-related disease, which typically shows minimal effects at the beginning of a work-period, with increasing effects noted over the work-period, being maximal at the end. The week of March 7-11 could illustrate such a distribution, but the following week is completely atypical, when it is, also, considered that the majority of the men attending the local clinics, did so in the early morning, and returned to work. Again, over one third of the men volunteered that their physician(s), both personal, and clinic, had prescribed antibiotics, which had relieved their symptoms in the vast majority of cases. Eighteen of the workers stated that they had been, or were suffering from a "cold", and four men said that they had had a high fever.

On attempting to verify the infective nature of this outbreak, the NIOSH physician tried to contact a physician who had been employed at the clinic where the majority of the men were treated, but learned that that institution had closed down, and that all medical records had been transferred to another hospital. The administrator of that hospital informed the medical officer that he was too short of staff to provide the medical records requested. Of the two workers attending another clinic, one was prescribed an antibiotic, and one a decongestant. The diagnosis entered on the Workmen's Compensation Form (C-2-5) for these men was "injury to throat and chest." Although only twelve of the workers completing the health questionnaire stated that they were or had

been, suffering from chest-pains, this was the sole diagnosis entered on the form C-2-5 of sixty-two of these men; a further seven were diagnosed as suffering from chestpains and sore throat; five more from "alleged chest-pains"; five from "alleged injury to chest" and the remainder from "sore throat and cough", or chest pains, fever and cough, and "nausea." These forms indicated that all the men had received treatment before returning to work, but the form, or nature of the treatment was not specified, nor were any body temperatures recorded.

Although the dust measurements of this study indicated concentrations generally below accepted criteria, it must be considered that this type of irritant dust (concrete) could aggravate any inflamed mucous membranes in the respiratory tracts of the workers.

E. Recommendations

Although specific recommendations are not made, it is of course the responsibility of the company to provide a safe and healthful work environment for its employees. The provision of such an environment usually requires sincere efforts and often ingenuity on the part of the employer. For example, the use of properly fitted approved respirators will reduce dust exposures while drilling ceiling anchor bolt holes. However a better method of reducing such dust exposures might be a wet drilling method or the use of high velocity-low volume exhaust ventilation devices. Only if the engineering control systems are not feasible, is it acceptable for the company to resort to personal protective devices such as respirators. If respirators are used, it is necessary for the company to properly maintain them, and to insure that the workers wear the respirators when dictated by hazardous conditions.

As stated in the Discussion Section of this report, the housekeeping at the construction site was in need of improvement. Although poor housekeeping per se, may not constitute a health hazard, it certainly contributes to a negligent attitude on the part of workers and is not conducive to good morale. On current and future construction projects, the company is well advised to maintain a high degree of housekeeping as this will yield dividends to both the company and its employees.

V. REFERENCES

1. U.S. Department of Labor. Occupational Safety and Health Administration. Occupational Safety and Health Standards (29 CFR 1910) OSHA 2206 (Revised January 1976) p. 99.

2. Criteria for a Recommended Standard . . .Occupational Exposure to Crystalline Silica. U.S. Department of Health, Education, and Welfare, PHS, NIOSH, 1974. HEW Publication No. (NIOSH) 75-120.

3. Threshold Limit Values for Chemical Substances in Workroom Air by ACGIH for 1978. American Conference of Governmental Industrial Hygienists, P.O. Box 1937, Cincinnati, Ohio 45201.

4. Criteria for a Recommended Standard . . Occupational Exposure to Inorganic Lead. Revised Criteria 1978. U.S. Department of Health, Education, and Welfare, PHS, NIOSH. DHEW (NIOSH) Publication No. 78-158.

5. Criteria for a Recommended Standard . . . Occupational Exposure to Carbon Monoxide . . . U.S. Department of Health, Education, and Welfare, PHS, NIOSH, 1972. Publication No. HSM 73-11000.

VI. AUTHORSHIP- ACKNOWLEDGEMENTS

Report Prepared By:

K.J. Kronoveter
Senior Sanitary Engineer
Industrial Hygiene Section
Hazard Evaluations and
Technical Assistance Branch
Cincinnati, Ohio

W. Elva Elesh, M.D.
Medical Officer
Medical Section
Hazard Evaluations and
Technical Assistance Branch
Cincinnati, Ohio

Originating Office:

Jerome P. Flesch
Acting Chief
Hazard Evaluations and
Technical Assistance Branch
Cincinnati, Ohio

Survey Assistance:

Nick Fannick
Regional Industrial Hygienist
NIOSH - Region I

Clint Collins
Engineer
NIOSH - Cincinnati

Analtyical Services:

Measurements Support Branch
NIOSH - Cincinnati

Report Typed By:

Linda Morris
Clerk-Typist
Industrial Hygiene Section
Hazard Evaluations and
Technical Assistance Branch
Cincinnati, Ohio

Table 1

Environmental Evaluation Criteria

Substance	Recommended Environmental Limit	Source	Primary Health Effects	OSHA Standard (Ref. 1)
Respirable Free Silica	0.050 mg/M^3	NIOSH (Ref. 2)	Silicosis - pulmonary effects	
Respirable Dusts	$\frac{10}{\% \text{ Free Silica} + 2}$ mg/M^3	OSHA (Ref.1)	Silicosis, pulmonary effects and irritation	$\frac{10}{\% \text{ Free Silica} + 2}$ mg/M^3
Lead	0.10 mg/M^3	NIOSH (Ref. 4)	Systemic effects (lead poisoning), kidney damage	0.20 mg/M^3
Carbon Monoxide	35 ppm (200 ppm-ceiling)	NIOSH (Ref. 5)	Tissue hypoxia, heart strain, injury to nervous system and brain	50 ppm

All air concentrations are time weighted average (TWA) exposures for a normal 8 to 10 hour work day of a 40 hour work week unless designated "ceiling". A ceiling value is one which should not be exceeded.

Table 2

RESULTS OF PERSONAL AIR SAMPLES FOR RESPIRABLE DUST AND RESPIRABLE FREE SILICA

Date	Time	Trade	Job	Respirable Free Silica (mg/M^3)	Respirable Dust (mg/M^3)	% Free Silica	OSHA Standard Based on % Free Silica (mg/M^3)
5/18/77	0900-1512	Electrician	Installing pipe, 2nd floor	N.D.	0.22	N.D.	5.0
5/18/77	0921-1500	Electrician	Pulling wire, sub-basement	N.D.	0.73	N.D.	5.0
5/18/77	0910-1457	Electrician	Installing pipe, basement & 1st floor	N.D.	0.80	N.D.	5.0
5/18/77	0903-1512	Electrician	Installing pipe, basement & 1st floor	N.D.	0.32	N.D.	5.0
5/18/77	0913-1502	Electrician	Installing pipe, basement & sub-basement	N.D.	0.83	N.D.	5.0
5/18/77	0916-1457	Electrician	Installing pipe, basement	0.075	1.19	6	1.3
5/18/77	0928-1459	Millwright	Drilling ceiling holes, 1st floor	0.390	1.35	29	0.3
5/18/77	0943-1501	Millwright	Fabrication, LOG, 1st floor	N.D.	0.57	N.D.	5.0
5/18/77	0948-1441	Millwright	Installing chutes, so. basement	N.D.	1.22	N.D.	5.0
5/18/77	0953-1455	Millwright	Assembly, s.w. basement	N.D.	0.66	N.D.	5.0
5/18/77	1000-1445	Millwright	Burning & welding, sub-basement	N.D.	1.13	N.D.	5.0
5/18/77	1003-1450	Millwright	Burning & assembly, sub-basement	0.093	1.78	5	1.4
5/19/77	0838-1500	Electrician	Shooting stud weld, 6th floor	N.D.	0.45	N.D.	5.0
5/19/77	0835-1503	Electrician	Installing tubing, 5th floor	S.C.*	S.C.	N.D.	S.C.
5/19/77	0830-1507	Electrician	Installing tubing, 3rd floor	N.D.	0.24	N.D.	5.0
5/19/77	0845-1518	Electrician	Pulling cables, throughout bldg.	0.030	0.81	4	1.7
5/19/77	0805-1459	Millwright	Forklift, 1st floor	N.D.	0.33	N.D.	5.0
5/19/77	0820-1459	Millwright	Welding, 1st floor	0.322	1.46	22	0.4
5/19/77	0815-1458	Ironworker	Welding, 1st floor	N.D.	0.38	N.D.	5.0
5/19/77	0812-1500	Ironworker	Fabrication, sub-basement	0.089	1.43	6	1.3
5/19/77	0810-1459	Engineer	Forklift	N.D.	0.26	N.D.	5.0
5/19/77	0825-1503	Laborer	Sweeping LOG	A.I.*	3.77	A.I.	A.I.

Environmental Criteria (NIOSH) for respirable free silica . . . . . 0.050 mg/M^3

*NOTES
1. mg/M^3 = milligrams of free silica or dust per cubic meter of air
2. S.C. = sample contaminated
3. A.I. = analytical interference

Table 3

RESULTS OF PERSONAL AIR SAMPLES FOR LEAD

Date	Time	Trade	Job	Lead (mg/M^3)
5/19/77	0848-1505	Electrician	Installing conduit, sub-basement	0.01
5/19/77	0900-1501	Electrician	Running tubing, basement	0.02
5/20/77	0825-1145	Millwright	Drilling holes, 2nd floor	0.01
5/20/77	0805-1137	Millwright	Installing conveyor, 1st floor	<0.01
5/20/77	0814-1139	Millwright	Burning & assembly, 1st floor	0.02
5/20/77	0820-1142	Ironworker	Welding, 2nd floor	0.03
5/20/77	0810-1154	Laborer	Cleaning, basement & 6th floor	0.02
5/20/77	0813-1154	Laborer	Cleaning, basement & 6th floor	0.01
5/20/77	0815-1154	Laborer	Cleaning, basement & 6th floor	0.03
5/20/77	0820-1148	Laborer	Cleaning, basement & 6th floor	0.02

Environmental criteria (NIOSH recommended standard). 0.10

milligrams of lead per cubic meter of air

Table 4

RESULTS OF AIR SAMPLES FOR CARBON MONOXIDE

May 20, 1977

Time	Location	CO concentration (ppm)*
	≈10' from forklift, sub-basement	10
	≈ 5' from forklift, 1st floor	10
	≈ 5' from forklift, 1st floor	10
	≈ 5' from forklift, 1st floor	5

Environmental criteria (NIOSH) for carbon monoxide . . . 35 (8-hour TWA)
. . . 200 (ceiling)

*parts of carbon monoxide per million parts of air by volume

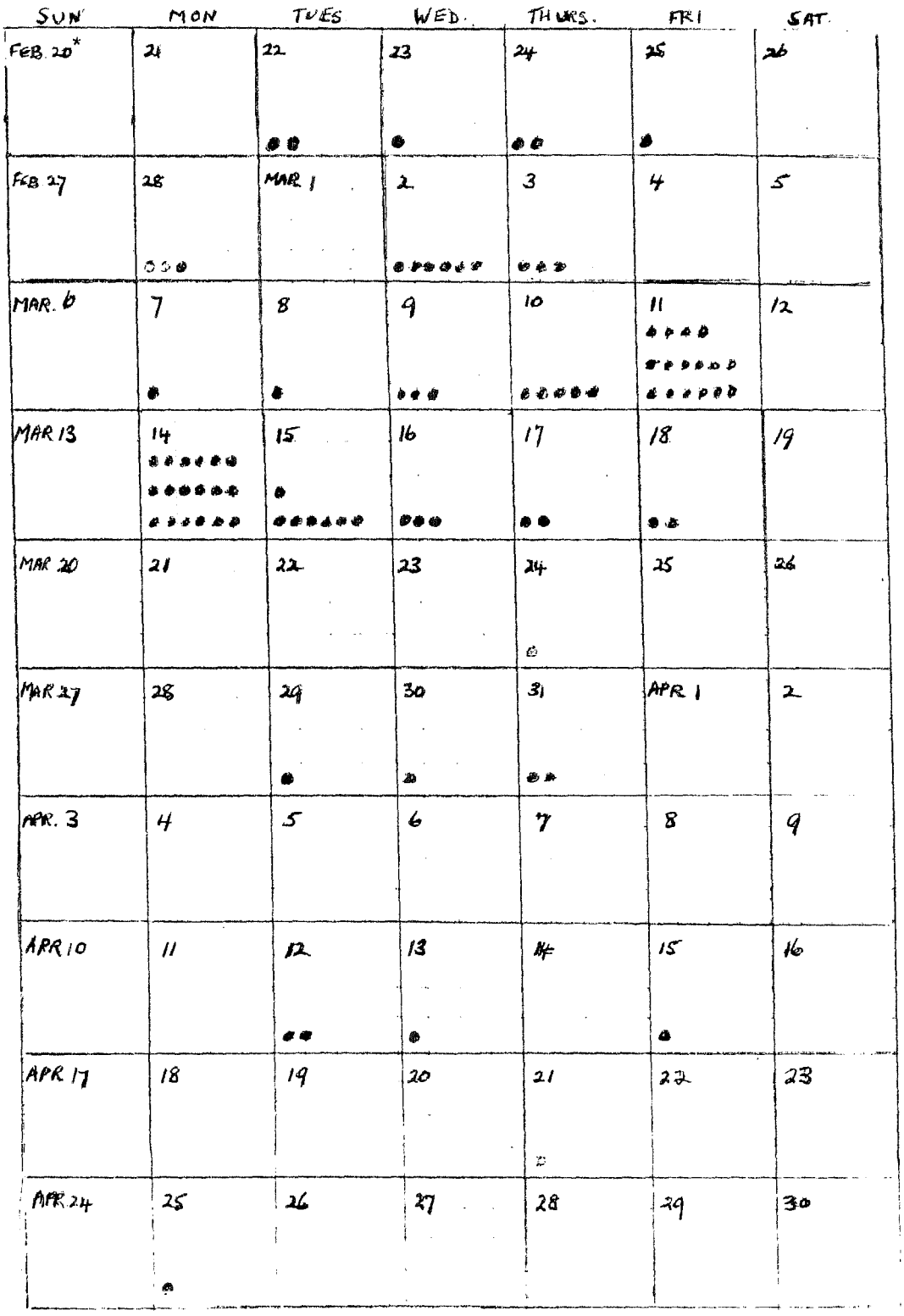
Table 5

RESULTS OF BULK SAMPLE ANALYSES
FOR
LEAD, ASBESTOS, AND FREE SILICA

Sample Location	Lead %	Asbestos %	Free Silica %
Basement Stairwell by C-15	0.03	0	41
1st floor by E-10	0.02	0	72
2nd floor by E-12	0.02	0	23
3rd floor by E-11	1.7	0	19
4th floor by E-12	0.06	0	45
5th floor by C-21	0.03	0	31

Figure 1

DISTRIBUTION OF MEN SEEKING MEDICAL ASSISTANCE BY DATES



*One case of angina on February 2, 1977.