PLAINTIFF'S EXHIBIT

SWB-301

Subject: Occupational Safety and Health - Sprayed-on Asbestos in Company-owned and Leased Buildings

type letter: Strong Recommendation

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related letters:

other:

American Telephone and Telegraph Company
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to: AVP - Support Services
Copies to Medical Directors, Safety, and Environmental Coordinators.

from: AVP - Support Services

description: Provides guidelines required for OSHA compliance in company-owned and leased buildings with sprayed-on asbestos.

* * *

Section 29 CFR 1910.1001 of standards issued by the Occupational Health and Safety Administration (OSHA) requires all employers to establish and maintain an effective program for protecting their employees against asbestos exposures which are above acceptable levels. The major areas of concern for the Bell System in this matter are in automotive operations (brakes and clutches) and in buildings (sprayed-on fire protection and insulation).

The attached document considers sprayed-on asbestos in company-owned and leased buildings, and is one of a series of Bell System guidelines intended to satisfy the requirements of the standards. Previous documents include:

- SR 79-05-398 "Occupational Safety and Health - Exposure to Airborne Asbestos Fibers - Request for Survey" - surveys all System-owned and leased buildings to determine if sprayed-on asbestos was used.
- RL 79-07-254 "Asbestos Hazards in Leased Buildings" - recommends that facilities under consideration for lease, containing sprayed-on asbestos, be reviewed before final decision.
- GL 73-08-054 "Motor Vehicle Maintenance - Protection Against Exposure to Asbestos Fibers" - provides general procedures for protecting employees against asbestos exposure in garages.
- GL 77-07-024 "Motor Vehicle Maintenance - Brakes and Clutches" - provides specific recommendations for protecting employees against asbestos exposure while performing maintenance operations on brakes and clutches.

In addition, an SR will be issued shortly entitled "Occupational Safety and Health - Exposure to Airborne Asbestos Fibers" which will provide basic information to establish an overall asbestos control program.

The results of the survey of approximately 29,000 owned and leased Bell System buildings (SR 79-05-398) indicates that there are less than 1% or 216 (108 owned and 108 leased) buildings which are suspected to have sprayed-on asbestos. However, bulk sample tests necessary to determine if a substance is asbestos were not performed in all cases during the survey.

Concurrent with the building survey, Bell Laboratories was requested to perform tests to determine the possible levels of exposure where asbestos was present. The results of these tests may be summarized as follows:

- If sprayed-on asbestos is undisturbed, airborne levels of asbestos are well below OSHA standards (typical office or work space environment).

- During typical work operations which do not require the removal or displacement of the sprayed-on material, exposure levels are below OSHA standards.

- During any work operations where there is significant disruption of the sprayed-on material, there may be exposures above the OSHA standard (for example, work in crawl spaces or ceilings or removing ceiling panels).

- During renovations, ripouts and remodeling activities, airborne asbestos levels are generally above OSHA standards.

As a result of the above it is recommended that:

1. Bulk sample tests be performed to confirm the presence or absence of asbestos in each of the 216 buildings identified in the survey, and any other building which may have asbestos.

2. [redacted]

3. Methods must be developed to minimize or eliminate the possibility of excessive exposure during renovations or removal activities in the affected buildings. The Environmental Protection Agency (EPA) has specific requirements on these activities.

4. A disposal procedure must be established for any collected asbestos-contaminated materials. The EPA also has requirements on this activity.

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We recommend the primary responsibility for implementation of the required program as detailed in the attached instruction will reside with the Building Engineering Group at BOC Headquarters. As such, a coordinator in this organization must be identified. In addition, Building Engineering must work closely with appropriate Medical, Safety, Environmental and Building Operations Force representatives. The Building Operations Force supervisor responsible for effected buildings will ultimately be responsible for the day-to-day procedures that are required. It is strongly recommended that implementation of these guidelines be initiated immediately.

The resource impact of this letter on the Bell System is estimated as follows:

Capital

. Signage	$10,000	
. Air Sample Test Kit	10,000	($500 per kit)
. Respirators	10,000	($ 10 per cartridge type)
Total Capital	$30,000	

Expense

. Bulk Sample Analysis by Outside Laboratories	$10,000	($25 to $50 per sample)
. Air Sample Analysis by Outside Laboratories	50,000	($300 to $500 per sample)
Total Expense	$60,000	

Revenue Change

No revenue impact

Force Changes

No additional manpower required, however, certain Building Engineering, Building Operations, Medical and Safety personnel must include this activity with their other responsibilities.

In addition to the above impact, there may be situations where the sprayed-on asbestos must be removed, contained or encapsulated. It is anticipated that this will occur only in areas which are to be renovated or remodeled. The cost for these activities (based on current prices) per square foot of floor area renovated is estimated as follows:

. Removal	$6 per sq. ft.
. Encapsulation	$4 per sq. ft.
. Containment	$3 per sq. ft. (for painting)
	$6 per sq. ft. (for structural enclosing)

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The name of the BOC coordinator should be forwarded to N. J. DeCapua, AT&T, 222 Mount Airy Road, Basking Ridge, NJ by Sept. 1, 1980. In addition, it is recommended that the coordinator consult with Mr. DeCapua on (201) 221-4984 so that maximum benefit can be obtained from the experience gained by AT&T and BTL efforts to date.

S. R. Collis
Assistant Vice President-
Support Services

Attachment

Guidelines for Sprayed-On Asbestos In Company-owned and Leased Buildings

General

The following guidelines are to be used in conjunction with the general program outlined in an SR to be issued shortly, "Occupational Health and Safety - Exposure to Airborne Asbestos Fibers," in complying with OSHA standards pertaining to Bell System-owned and leased buildings which have sprayed-on asbestos used for fire protection and/or heat insulation.

OHSA Asbestos Standard 1910.1001 (July 1, 1976)

The eight hour time weighted average (TWA) airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air. In addition, no employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air. Medical surveillance is required if employees are exposed to .1 fibers per cubic centimeter (8 - hours TWA) or greater.

Confirmation of Asbestos

SR-79-05-398 requested that the BOCs perform a comprehensive survey to identify all owned and leased buildings which apparently contain sprayed-on asbestos. A summary of the System results is shown as Appendix A. It was not necessary to confirm the asbestos with a bulk sample test as part of the survey, however, a number of companies have performed this testing.

As part of the steps required for compliance with the asbestos standard, it will be necessary (in each facility identified as apparently having sprayed-on asbestos) to perform a bulk sample test for confirmation that the material is or is not asbestos. If the test indicates asbestos, then an ambient air test must also be performed. Such ambient air tests will determine the level of airborne asbestos in the area on an 8-hr TWA basis. The ambient air tests should be made in areas where the asbestos exists and is in an undisturbed state, i.e., no one is working on the asbestos. If the material exists throughout the building, several typical locations should be identified and an ambient air test made in each location. It is extremely important that the ambient samples as well as the bulk be analyzed by qualified laboratories approved by NIOSH. See SR to be issued shortly, "Occupational Health and Safety - Exposure to Airborne Asbestos Fibers," for a discussion of bulk sample and ambient air sample testing.

The objectives of the bulk sample and ambient air tests are two-fold.

1. To establish a permanent record which indicates that each company has identified the existence of the material and recorded the normal airborne exposure levels. The bulk and air sample results should also be forwarded to AT&T, Real Estate and Property Management Group, 222 Mount Airy Road, Basking Ridge, New Jersey 07920.

2. To confirm that ambient levels are not above the OSHA standard. Numerous BTL tests have indicated that this will be the normal case. If, however, a situation occurs where ambient levels in an undisturbed environment are above OSHA standards, and this is corroborated with additional testing, then it is necessary to implement some type of engineering controls. These controls may be one of the following:

   . Enclosure of the material - this may be achieved with a dropped ceiling.

   . Sealing of the material - this can be achieved by spraying an additional material over the sprayed-on asbestos. Presently, there are a number of different types of sealants available for this purpose including latex paints, vinyl or butyl polymers, plaster emulsions, epoxy materials and inorganic silicates.

   . Removal of the material - this activity should be avoided, if at all possible, due to the disturbance of work activity as a result of the extremely high levels of airborne asbestos that are generated in the removal, and the need to replace the material with other building products to achieve the original objective of the asbestos. If it is not possible to avoid removal then the appropriate procedures outlined below must be followed.

Before any of the above engineering controls are implemented, a case by case feasibility study must be made and individual situations discussed with the Real Estate Management Group at AT&T.

Follow-up Measurements

It is recommended that follow-up ambient air tests be performed every five years to assure that asbestos deterioration has not occurred to the point where levels are above OSHA standards.

[redacted]

Compliance with the OSHA standard also requires that either Caution labels be employed to identify the sprayed-on asbestos material or engineering controls be employed as described above under Objective 2. The label should be approximately 6" x 3" with red lettering and shall state

Caution
This Area Contains Asbestos Materials
Avoid Creating Dust
Breathing Asbestos May Cause
Serious Bodily Harm

At least one label shall be prominently located in each area where exposed sprayed-on asbestos exists so that anyone working in the area will be alerted to the potential hazard. For unexposed areas, such as hung ceilings, the label should be located in a central control point so that the people who would have the need to enter these areas would be made aware of the asbestos and its location. This area may be the building maintenance office or a similar location. It may also be desirable to provide a wall-mounted drawing in the building manager's office illustrating asbestos covered areas in the building.

Work Procedures

In all buildings identified as having sprayed-on asbestos every effort should be made to avoid work procedures which result in disruption of the asbestos material and the resultant release of fibers into the air. Preliminary data has indicated that for routine work operations which do not require the removal or displacement of any sprayed-on asbestos, exposure levels are well below those permitted by the current OSHA standard. In those cases where some handling of the material is necessary the sprayed-on asbestos should be worked in a moistened state, if possible.

If it is not possible to avoid work procedures which result in a significant disruption of the sprayed-on material then protective clothing and respirators must be employed during the work procedures. See SR to be issued shortly "Occupational Health and Safety - Exposure to Airborne Asbestos Fibers" for a discussion of protective clothing and the OSHA requirements for respirator protection. Of particular concern are exposures to employees who work within hung ceilings, doing such work operations as installing or removing telephone cables and electrical wiring, or working on building equipment.

The above work procedure modification must be achieved through meetings with employees in the building and by posting such a policy in appropriate central work locations in the building. Before engaging in any work procedures which may disturb sprayed-on asbestos, employees must contact the Building Operations Control Center (BOCC), if implemented in that Company, or the individual in that building who is responsible for implementing these guidelines.

In addition to employee activity, it is also important that any contractor engaged in work activities which might disrupt the asbestos material be informed that they must comply with these procedures.

Remodeling-or Renovation Activites

Remodeling or renovation work in areas with sprayed-on asbestos poses the greatest asbestos hazard in Bell System buildings and may require the removal, sealing or enclosure of the asbestos. As such it will be necessary to fully protect all employees by isolating the work area from the rest of the facility, and monitoring both inside and outside the work

areas. Workers should wear appropriate protective clothing and respirators, and the area should be cleaned after the renovations with wet methods. Remeasurement of ambient levels should be performed to ascertain that they are below OSHA standards.

In contracting remodeling and renovation work, specific guidelines must be established and included in the specification for bidding by outside contractors. It is extremely important to recognize that asbestos removal activities are complex and not routine to most building contractors. As such the BOCs must be assured that any contractor who will perform this work has experience in asbestos removal. Section 61.22(d) "Demolition and Renovation" of the EPA's National Emission Standard for Asbestos details federal requirements for these activities and is attached as Appendix B.

Waste Disposal

All asbestos scrap and debris must be collected and disposed of in accordance with EPA requirements. Section 61.22(j) of the EPA's National Emission Standard for Asbestos details the federal requirements for asbestos waste disposal and is attached as Appendix C. However, some states may have their own laws regarding disposal and Companies are advised to check with the EPA State Waste Management Agencies for compliance with local disposal regulations.

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RESULTS OF ASBESTOS SURVEY

	Owned		Leased	
	Total	W/Asbestos	Total	W/Asbestos
PNB	696	4	254	1
Wisconsin	320	8	72	0
NJ	388	13	223	6
NY	1001	15	357	26
Southern	1302	3	622	5
Ohio	404	0	231	4
NWB	2469	6	303	0
SNET	200	1	54	4
Michigan	483	3	317	0
Mountain	1868	4	438	5
Southwestern	4458	4	568	1
New England	812	3	347	8
C & P	839	8	363	8
Pacific	1020	9	649	9
Illinois	240	3	195	0
South Central*	1284	1	561	0
Cincinnati	70	0	19	0
Bell of Pa.	674	6	325	3
Indiana	298	0	64	0
Long Lines	4300	2	100	7
BTL	26	3	2	1
195 Broadway	19	12	41	19
BSCTE	0	0	2	1
TOTALS	23,199	108	6108	108

* Not including Louisiana

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ENVIRONMENTAL PROTECTION AGENCIES REQUIREMENTS - NATIONAL EMISSION STANDARD FOR ASBESTOS 61.22(d) - "Demolition and Renovation"

The requirements of this paragraph shall apply to any owner or operator of a demolition or renovation operation who intends to demolish any institutional, commercial, or industrial building (including apartment buildings having more than four dwelling units), structure, facility, installation, or portion thereof which contains any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member that is covered or coated with friable asbestos materials, except as provided in paragraph (d)(1) of this section; or who intends to renovate any institutional, commercial, or industrial building, structure, facility, installation, or portion thereof where more than 80 meters (ca. 260 feet) of pipe covered or coated with friable asbestos materials are stripped or removed, or more than 15 square meters, (ca. 160 square feet) of friable asbestos materials used to cover or coat any duct, boiler, tank, reactor, turbine, furnace, or structural member are stripped or removed.

(1) (i) The owner or operator of a demolition operation is exempted from the requirements of this paragraph: Provided, (A) The amount of friable asbestos materials in the building or portion thereof to be demolished is less than 80 meters (ca. 260 feet) used on pipes, and less than 15 square meters (ca. 160 square feet) used on any duct, boiler, tank, reactor, turbine, furnace, or structural member, and (B) the notification requirements of paragraph (d)(1)(ii) are met.

(ii) Written notification shall be postmarked or delivered to the Administrator at least 20 days prior to commencement of demolition and shall include the information required by paragraphs (d)(2) of this section, with the exception of the information required by paragraphs (d)(2) (iii), (vi), (vii), (viii), and (ix) of this section, and shall state the measured or estimated amount of friable asbestos materials which is present. Techniques of estimation shall be explained.

43 FR 26372, June 19, 1978

(2) Written notice of intention to demolish or renovate shall be provided to the Administrator by the owner or operator of the demolition or renovation operation. Such notice shall be postmarked or delivered to the Administrator at least 10 days prior to commencement of demolition, or as early as possible prior to commencement of emergency demolition subject to paragraph (d)(6) of this section, and as early as possible prior to commencement of renovation. Such notice shall include the following information:

(i) Name of owner or operator.

(ii) Address of owner or operator.

(iii) Description of the building, structure, facility, or installation to be demolished or renovated, including the size, age, and prior use of the structure, and the approximate amount of friable asbestos materials present.

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(iv) Address or location of the building, structure, facility, or installation.

(v) Scheduled starting and completion dates of demolition or renovation.

(vi) Nature of planned demolition or renovation and method(s) to be employed.

(vii) Procedures to be employed to meet the requirements of this paragraph and paragraph (j) of this section.

(viii) The name and address or location of the waste disposal site where the friable asbestos waste will be deposited.

(ix) Name, title, and authority of the State or local governmental representative who has ordered a demolition which is subject to paragraph (d)(6) of this section.

(3) (i) For purposes of determining whether a planned renovating operation constitutes a renovation within the meaning of this paragraph, the amount of friable asbestos material to be removed or stripped shall be:

(A) For planned renovating operations involving individually non-scheduled operations, the additive amount of friable asbestos material that can be predicted will be removed or stripped at a source over the maximum period of time for which a prediction can be made. The period shall be not less than 30 days and not longer than one year.

(B) For each planned renovating operation not covered by paragraph (d)(3)(i)(A), the total amount of friable asbestos material that can be predicted will be removed or stripped at a source.

(ii) For purposes of determining whether an emergency renovating operation constitutes a renovation within the meaning of this paragraph, the amount of friable asbestos material to be removed or stripped shall be the total amount of friable asbestos material that will be removed or stripped as a result of the sudden, unexpected event that necessitated the renovation.

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(4) The following procedures shall be used to prevent emissions of particulate asbestos material to outside air:

(i) Friable asbestos materials, used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member, shall be removed from any building, structure, facility or installation subject to this paragraph. Such removal shall occur before wrecking or dismantling of any portion of such building, structure, facility, or installation that would break up the friable asbestos materials and before wrecking or dismantling of any other portion of such building, structure, facility, or installation, that would preclude access to such materials for subsequent removal. Removal of friable asbestos materials used on any pipe, duct, or structural member which are encased in concrete or other similar structural material is not required prior to demolition, but such materials shall be adequately wetted whenever exposed during demolition.

(ii) Friable asbestos materials used on pipes, ducts, boilers, tanks, reactors, turbines, furnaces, or structural members shall be adequately wetted during stripping except as provided in paragraphs (d)(4)(iv), (d)(4)(vi), or (d)(vii) of this section.

(iii) Pipes, ducts, boilers, tanks, reactors, turbines, furnaces, or structural members that are covered or coated with friable asbestos materials may be taken out of any building, structure, facility, or installation subject to this paragraph as units or in sections provided the friable asbestos materials exposed during cutting or disjoining are adequately wetted during the cutting or disjoining operation. Such units shall not be dropped or thrown to the ground, but shall be carefully lowered to ground level.

(iv) The stripping of friable asbestos materials used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member that has been removed as a unit or in sections as provided in paragraph (d)(4)(iii) of this section shall be performed in accordance with paragraph (d)(4)(ii) of this section. Rather than comply with the wetting requirement, a local exhaust ventilation and collection system may be used to prevent emissions to the outside air. Such local exhaust ventilation systems shall be designed and operated to capture the asbestos particulate matter produced by the stripping of friable asbestos materials. There shall be no visible emissions to the outside air from such local exhaust ventilation and collection systems except as provided in paragraph (f) of this section.

43FR 26372, June 19, 1978

(v) All friable asbestos materials that have been removed or stripped shall be adequately wetted to ensure that such materials remain wet during all remaining stages of demolition or renovation and related handling operations. Such materials shall not be dropped or thrown to the ground or a lower floor. Such materials that have been removed or stripped more than 50 feet above ground level, except those materials removed as units or in sections, shall be transported to the ground via dust-tight chutes or containers.

(vi) Except as specified below, the wetting requirements of this paragraph are suspended when the temperature at the point of wetting is below 0°C (32°F). When friable asbestos materials are not wetted due to freezing temperatures, such materials on pipes, ducts, boilers, tanks, reactors, turbines, furnaces, or structural members shall, to the maximum extent possible, be removed as units or in sections prior to wrecking. In no case shall the requirements of paragraphs (d)(4)(iv) or (d)(4)(v) be suspended due to freezing temperatures.

(vii) For renovation operations, local exhaust ventilation and collection systems may be used instead of wetting as specified in paragraph (d)(4)(ii), to prevent emissions of particulate asbestos material to outside air when damage to equipment resulting from the wetting would be unavoidable. Upon request and supply of adequate information, the Administrator will determine whether damage to equipment resulting from wetting to comply with the provisions of this paragraph would be unavoidable. Such local exhaust ventilation systems shall be designed and operated to capture the asbestos particulate matter produced by the stripping and removal of friable asbestos material. There shall be no visible emissions to the outside air from such local exhaust ventilation and collection systems, except as provided in paragraph (f) of this section.

(5) Sources subject to this paragraph are exempt from the requirements of 61.05(a), 61.07, and 61.09.

(6) The demolition of a building, structure, facility, or installation, pursuant to an order of an authorized representative of a State or local governmental agency, issued because that building is structurally unsound and in danger of imminent collapse is exempt from all but the following requirements of paragraph (d) of this section:

(i) The notification requirements specified by paragraph (d)(2) of this section;

(ii) The requirements on stripping of friable asbestos materials from previously removed units or sections as specified in paragraph (d)(4)(iv) of this section;

(iii) The wetting, as specified by paragraph (d)(4)(v) of this section, of friable asbestos materials that have been removed or stripped;

(iv) The portion of the structure being demolished that contains friable asbestos materials shall be adequately wetted during the wrecking operation.

39 FR 15936, May 3, 1974;
40 FR 45292, October 14, 1975

ENVIRONMENTAL PROTECTION AGENCY REQUIREMENTS - NATIONAL EMISSIONS STANDARD FOR ASBESTOS 61.22(j) WASTE DISPOSAL

Waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations: The owner or operator of any source covered under the provisions of paragraphs (c), (d), (e), or (h) of this section shall meet the following standards:

(1) There shall be no visible emissions to the outside air except as provided in paragraph (j)(3) of this section, during the collection; processing, including incineration; packaging; transporting; or deposition of any asbestos-containing waste material which is generated by such source.

(2) All asbestos-containing waste material shall be deposited at waste disposal sites which are operated in accordance with the provisions of 61.25.

(3) Rather than meet the requirement of paragraph (j)(1) of this section, an owner or operator may elect to use either of the disposal methods specified under (j)(3)(i) and (ii) of this section, or an alternative disposal method which has received prior approval by the Administrator:

(i) Treatment of abestos-containing waste material with water:

(A) Control device asbestos waste shall be thoroughly mixed with water into a slurry and other asbestos-containing waste material shall be adequately wetted. There shall be no visible emissions to the outside air from the collection, mixing and wetting operations, except as provided in paragraph (f) of this section.

(B) After wetting, all asbestos-containing waste material shall be sealed into leak-tight containers while wet, and such containers shall be deposited at waste disposal sites which are operated in accordance with the provisions of 61.25.

(C) The containers specified under paragraph (j)(3)(i)(B) of this section shall be labeled with a warning label that states:

Caution
Contains Asbestos
Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous
to Your Health

Alternatively, warning labels specified by Occupational Safety and Health Standards of the Department of Labor, Occupational Safety and Health Administration (OSHA) under 29 CFR 1910-93a(g)(2)(ii) may be used.

(ii) Processing of asbestos-containing waste material into non-friable forms:

(A) All asbestos-containing waste material shall be formed into non-friable pellets or other shapes and deposited at waste disposal sites which are operated in accordance with the provisions of 61.25.

(B) There shall be no visible emissions to the outside air from the collection and processing of asbestos-containing waste material, except as specified in paragraph (f) of this section.

(4) For the purpose of this paragraph (j), the term all asbestos-containing waste material as applied to demolition and renovation operations covered by paragraph (d) of this section includes only friable asbestos waste and control device asbestos waste.

Subject: Occupational Safety and Health

SL: PL-80-07-21

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date: July 7, 1980

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file no. related letters: None

file no. other: None

to: Company Presidents and AT&T Vice Presidents

from: Vice Chairman

description: States System policy regarding hazards in customer premises or workplaces that could expose telephone company personnel to substantial risk of injury or illness.

AT&T

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* * *

The Bell System has long accepted a basic responsibility for employee safety and health. It has endeavored to provide and maintain safe and healthful workplaces. It has provided safety devices, methods, and equipment to enable employees to perform their assigned work safely and without risk to their health. For many and obvious reasons, however, the Bell System can not readily extend these obligations, commitments, and programs to workplaces and environments which it does not own, operate, or otherwise control.

Recently, several Bell Operating Companies have been notified by customers of hazards on customer premises that could expose telephone employees to substantial risk of injury or illness. In some instances, these Companies were asked to comply with detailed safety and health regulations specifically applicable to customer premises. Included, were requirements to furnish and maintain special safety and health equipment in order to gain access and to perform work.

In responding to these issues, the Companies should undertake to assure that employees are provided with safe and healthful working conditions in all assigned workplaces and work environments. The Companies should also undertake to assure that employees conduct themselves in non-company workplaces while conducting company business so they do not constitute a hazard to non-company personnel or property. In discharging these responsibilities, the Companies should comply with all applicable provisions of Federal, State, and Local Laws and regulations that mandate standards and practices for safety and health, as well as those established by their own organizations.

NOTICE

Not for use or disclosure outside the Bell System except under written agreement

Decisions and programs for assuring safe and healthful working conditions for Company employees assigned to work in non-company workplaces should be based on provisions of the Occupational Safety and Health Act which assert that all employers have an obligation under law to provide and maintain a safe and healthful workplace. When advised of safety or health hazards in non-company workplaces or work operations by (1) Company employees, (2) customers, (3) other non-company personnel, or (4) signage, the Companies should:

a. Determine if these hazards jeopardize the safety or health of company employees who must enter these workplaces to conduct company business.

b. Determine what safety and health procedures are required to protect company employees from these hazards. In this connection, the Companies must be prepared to comply with safety and health requirements and practices more stringent than their own or those specified by the government.

c. Assure that company work operations do not begin in hazardous workplaces or work environments until a mutually acceptable method of operation has been established.

d. Recover the cost of any special training, equipment, or work procedures required to protect company employees who must work in hazardous, non-company workplaces and environments directly from the customers who cause these costs to be incurred.

I would appreciate your help in assuring that your people understand and support this position fully. Specific problems should be referred to our Corporate Safety and Environmental Health Staff for consultation and resolution.

J.E. Olson
Vice Chairman

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REQUIREMENTS FOR

A MINIMAL ACCEPTABLE RESPIRATORY PROGRAM

The Eleven Commandments of 29 CFR 1910.134

1. Written standard operating procedures governing the selection and use of respirators shall be established.

2. Respirators shall be selected on the basis of hazards to which the worker is exposed.

3. The user shall be instructed and trained in the proper use of respirators and their limitations.

4. Where practicable, the respirators should be assigned to individual workers for their exclusive use.

5. Respirators shall be regularly cleaned and disinfected. Those issued for the exclusive use of one worker should be cleaned after each day's use, or more often, if necessary. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use.

6. Respirators shall be stored in a convenient, clean and sanitary location.

7. Respirators used routinely shall be inspected during each cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use, such as self-contained devices shall be thoroughly inspected at least once a month and after each use.

8. Appropriate surveillance of work areas condition and degree of employee exposure or stress shall be maintained.

9. There shall be regular inspections and evaluations to determine the continued effectiveness of the program.

10. Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what conditions are pertinent. The respirator user's medical status should be reviewed periodically (for instance, annually).

11. Approved or accepted respirators shall be used when they are available. The respirator furnished shall provide adequate respiratory protection against the particular hazard for which it was designed in accordance with standards established by competent authorities.

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APPENDIX II

USPHS/NIOSH MEMBRANE FILTER METHOD FOR EVALUATING AIRBORNE ASBESTOS FIBERS

I SCOPE

A This method describes the equipment and procedures for collecting, mounting, sizing, and counting asbestos fibers on membrane filters in the evaluation of breathing zone samples of airborne asbestos fibers.

B The method has been successfully applied using 37 mm Millipore AA filters and small battery operated personal sampling pumps at a flow rate of 1.0 to 2.5 liters per minute for time periods of 15 to 150 minutes at concentrations of 1 to 20 fibers (longer than 5 micrometers)/cubic centimeter. Large deviations from these conditions may result in filters with either too few or too many fibers, which will yield air concentration estimates of low statistical precision and accuracy.

C This method considers only fibers with a length to width ratio of 3 to 1 or greater and a length greater than 5 micrometers.

II SUMMARY OF METHOD

A The sample is collected by drawing air through a membrane filter by means of a battery powered personal sampling pump. The filter is transformed from an opaque solid membrane to a transparent, optically homogeneous gel. The fibers are sized and counted by phase-contrast microscope at 400-450X magnification.

III SIGNIFICANCE

A This method was first used by the Asbestosis Research Council in Great Britain[1] and later was slightly modified by the U.S. Public Health Service for asbestos dust studies in the United States[2]. It has been specified as the method of test[3] for the Federal Standard for asbestos in industrial air (29 C.F.R. Part 1910. 93a), in the U.S. Public Health Service Criteria Document on occupational exposure to asbestos[4], and in sampling procedures of the Occupational Safety and Health Administration, Department of Labor.[5]

IV DEFINITIONS

A For definitions of terms used in this method, refer to ASTM Definitions D 1356, Terms Relating to Atmospheric Sampling and Analysis.

V INTERFERENCES

All particulates with a length to width ratio of 3 to 1 or greater and a length greater than 5 micrometers should, in the absence of other information, be considered to be asbestos fibers and counted as such.

VI APPARATUS

A Sampling Equipment

The personal sampling equipment train consists of 1) personal sampling pump, 2) tubing, 3) clothing spring clip, 4) tubing-to-field monitor metal adaptor, and 5) field monitor (collecting filter and holder).

1 Personal sampler pump. The pump must be battery powered and weigh less than 2 pounds (0.91 kg). The pump must be capable of sampling at 1.0 to 2.5 lpm against a flow resistance of 7.5 inches H_2O (1.4 cm Hg) for 8 continuous hours on a fully charged battery. See Note A for sources of pumps that have been found satisfactory for this method.

2 Tubing. Laboratory tubing such as rubber or plastic with 6 mm bore (1/4 inch) and about 90 cm length (3 feet).

Prepared by Nelson A. Leidel, Stephen G. Bayer, and Ralph D. Zumwalde, NIOSH, 11/73.

3 Clothing spring clip. This clip attaches the rubber tubing to the lapel or shirt of the individual being monitored. See Note B for the source of a clip that has been found satisfactory for this method. Large spring paper clips will also work.

4 Tubing-to-field monitor adaptor. See See Note C for a source of an adaptor that has been found satisfactory.

5 Field monitor (collecting filter and holder). The only field monitor currently approved by the National Institute for Occupational Safety and Health is manufactured by the Millipore Corporation. The unit consists of: 1) A three-section styrene plastic case designated Millipore Aerosol Monitor Case, 2) a 37 mm diameter plain white cellulose ester membrane filter designated Millipore AA (nominal pore size of 0.8 micrometer), 3) a support pad, and 4) two plastic sealing caps. If a large number of samples are to be taken, it will be less expensive to reuse the plastic cases. Great care must be taken in the cleaning and reassembly process. The outside mating surfaces of the field monitors should be covered with "shrink-fit" sealing bands to seal the units and provide a writing surface for filter identification. See Notes D and E.

B Optical Equipment

For general guidance on microscopes consult Needham[6] and Clark[7] under phase contrast microscopes and accessories.

1 Microscope body with binocular head.

2 10X Huygenian eyepieces are recommended. Other eyepieces can be substituted if necessary.

3 Koehler illumination (preferably built in and having provisions for adjusting light intensity).

4 A Porton reticle is recommended. Others such as the Patterson Globe and Circle can be substituted, if necessary.

5 Mechanical stage.

6 Abbe or Zernike condenser fitted with phase ring (or Heine) with a numerical aperture (N.A.) equal to or greater than the N.A. of the objective.

7 40-45X (N.A. 0.65 to 0.75) positive phase contrast achromatic objective.

8 Phase-ring centering telescope or Bertrand lens.

9 Green filter, if recommended by microscope manufacturer.

10 Stage micrometer with 0.01 mm subdivisions.

C Filter Mounting Equipment

Experience has shown that certain equipment is useful for efficient sample mounting. The following items are recommended for extracting and mounting a portion of the filter onto the microscope.

1 Microscope slides: 2.5 by 7.5 cm (one inch by three inches) glass slides are most commonly used. Sample number, data, initials, etc., can be conveniently written on a frosted end slide.

2 Cover slips: Cover slips are a necessary part of the slide mount and optical system. The shape should be appropriate for the size of the filter wedge. The appropriate cover slip depends upon the objective to be used. Ordinarily objectives are optically corrected for a #1 1/2 (0.17 millimeter) thickness cover slip. Improper cover glass thickness will detract from the final image quality.

3 Scalpel: A scalpel is needed to remove a portion of the filter to be

examined. A number-ten curved blade scalpel works very well.

4 Tweezers: A pair of fine-tipped tweezers is used to remove the membrane filter slice from the field monitor and place it upon the slide.

5 Lens tissue: To insure cleanliness, use of a lint-free lens tissue is recommended. This tissue should also be used for wiping mounting tools and for cleaning slides and cover slips.

6 Glass rod or spatula: A spatula or fire-polished glass rod is needed to spread the mounting solution on the slide.

7 Wheaton Balsam bottle: This special glass container has a glass top which prevents contamination of the mounting solution. A glass rod is included for dispensing the solution.

VII REAGENTS

Chemicals should be reagent grade, free from particles and color, conforming to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.

A Dimethyl Phthalate

B Diethyl Oxalate

VIII SAFETY PRECAUTIONS

A Avoid getting the mounting solution on the skin. Wash skin with soap and water if contact occurs.

IX SAMPLING

A General Information

Refer to the Recommended Practice D 1357, for Planning the Sampling of the Atmosphere and Recommended Practice D 2009, for Collecting by Filtration and Determination of Mass, Number, and Optical Sizing of Atmospheric Particulates. These guides are cited only for general principles, as they are intended primarily for air pollution measurements at fixed sampling stations.

B Calibration

The personal sampling pump should be recharged prior to calibration and then calibrated[8] against a bubble meter, wet test meter, spirometer, or similar device at 1.0 to 2.5 lpm. The sampling train used in the calibration (pump, hose, filter) should be the same as the one used in the field. The calibration should be of sufficient accuracy that the 95% confidence limits on the flowrate are ± 10% (two standard deviations).

C Mounting the Sampler

Fasten the sampling pump to the worker's belt and fasten the field monitor to the lapel or shirt front (as close to the face as is practical). Remove the cover of the plastic monitor making certain the exposed filter is facing downward. Turn on the pump and adjust to the previously calibrated flowrate (1.0 to 2.5 lpm). Immediately record the following information in a logbook:

1 Filter number

2 Pump start time and date

3 Flow rate

4 Subject's name

5 Type of operation

6 Ventilation controls and/or if worker is wearing a respirator approved for asbestos.

The pump should be checked periodically during the sampling period for proper operation and flowrate.

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D Optimum Sampling Times

Leidel[9] has described the requirements for optimum sampling times for airborne

asbestos fibers. A nomogram to aid in the calculation of these times is shown as Figure 1. For typical microscope field areas and pump flow rates the optimum collection times are about 50 to 80 minutes. The nomogram is intended as a guide to be used where no prior knowledge of the air concentration is available. If, after sampling for the times recommended by Figure 1, the sample is very heavily loaded (greater than 10 fibers/field), then the air concentration probably greatly exceeded the ceiling standard of 10 fibers/cm^3. Conversely if the filter fiber density is very low (less than 1 fiber/field) then the air concentration probably was less than the 1976 TWA Standard of 2 fibers/cm^3. The nomogram gives the the sampling times which produce optimum fiber densities on the filter (1 to 5 fibers/field) for air concentrations of 1 to 10 fibers/cm^3.

If the air concentrations are very high or very low, then graphs given by Leidel[9] would aid in the calculation of the proper sampling times. If there is a dense visible cloud, short (5-15 minutes) sampling times should probably be used. To sample for the ceiling standard of 10 fibers/cm^3, a 15-minute period should be used.

E End of Sampling Period

Remove the field monitor, replace the plastic top cover and the small end caps, and store the monitor. Always shut off the pump when changing monitors to avoid contaminating or damaging the pump. Record the pump shutoff time in the logbook.

F Blanks

With each batch (25 to 50 filters) of samples submit two unopened filters which have been subjected to the same handling as the samples except that no air has been drawn through them. Label these as blanks. If the blanks yield fiber counts greater than about 5 fibers/100 fields, then the entire sampling procedure should be examined carefully for the cause of contamination.

G Shipping

The field monitors in which the samplers are collected should be shipped in a rigid container with sufficient packing material to prevent crushing.

H Numbers of Samples

When sampling for the ceiling standard only one sample (15-minute minimum duration) is theoretically necessary. However, several 15-minute samples should be taken during expected periods of peak air concentrations to allow for detection of gross sampling or counting errors.

When sampling for determination of noncompliance with the 8-hour TWA Standard one should continuously sample as large a portion of the work day as is feasible. Normally this would mean 6 to 10 consecutive samples on the same man. However, if this is not feasible the 8-hour TWA air concentration can be estimated from fewer than 6-10 samples. Leidel and Busch[10] have shown an optimum number would be 4 to 7. Refer to (10) for treatment of the data for the determination on noncompliance. See Jones and Brief[11] for how to treat data taken for an environmental monitoring program.

X CALIBRATION AND STANDARDIZATION

A Porton Reticle

The asbestos fiber count procedure consists of comparing fiber length by comparison with calibrated circles, and counting all fibers greater than 5 micrometers in length within a given counting field area. It is recommended that a Porton reticle be used for this purpose. The Porton reticle is a glass plate inscribed with a series of circles and rectangles. The square on the left, divided into six rectangles, is defined as the counting field.

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B Placement in Eyepiece

The Porton reticle is placed inside the Huygenian eyepiece where it rests on the field-limiting diaphragm. The reticle should be kept clean, since dirt on the reticle is in focus and will complicate the counting and sizing process. For mounting in other eyepieces such as a Ramsden, a counting collar must be used.

C Stage Micrometer

The Porton reticle cannot be used for counting until it has been properly calibrated with a stage micrometer. Most stage micrometer scales are approximately two millimeters long and are divided into units of one-hundredth of a millimeter or ten micrometers.

D Microscope Adjustment

Follow the manufacturer's instructions while observing the following guidelines.

1 The light source image must be in focus and centered on the condenser iris or annular diaphragm.

2 The object for examination must be in focus.

3 The illuminator field iris must be in focus, centered on the sample, and opened only to the point where the field of view is illuminated.

4 The phase rings (annular diaphragm and phase-shifting elements) must be concentric.

E Porton Reticle Calibration Procedure

Each eyepiece-objective-reticle combination on the microscope must be calibrated. Should any of the three be changed (disassembly, replacement, zoom adjustment, etc.) the combination must be re-calibrated. Calibration may change if interpupillary distance is changed. For proper calibration, the following procedure should be followed closely.

With a 10X objective in place, place the stage micrometer on the mechanical stage, focus, and center the image. Change to the 40-45X objective and adjust the first scale division to coincide with the left boundary of the Porton rectangle. Count the number of divisions between the left and right boundaries of the long horizontal dimension of the largest rectangle, estimating any portion of the final division. This measurement represents 200 L units and one divides the measurement by 200 to find "L". The large rectangle is 100 L units long on the short vertical dimension. The calculated "L" is inserted into the formula $D = L(2^N)^{\frac{1}{2}}$ where "N" is the circle number (indicated on the reticle) and "D" is the circle diameter. Since the circle diameters vary logarithmically, every other circle doubles in diameter. For example, number three is twice the diameter of number one; number four is twice the diameter of number two. When the circle sizes have been determined, the counting field area consisting of the left six smaller rectangles can be calculated from the relation $10{,}000\ L^2$. This completes the reticle calibration for this specific objective - eyepiece - recticle combination.

XI PROCEDURE

A Mounting

A very important part of the sample evaluation is the mounting process. This process involves a special mounting medium of prescribed viscosity. The mixture must be stirred periodically until the filters have dissolved and a homogeneous mixture is formed. The normal shelf life of the mounting solution is about six months. Twenty milliliters of mounting solution will prepare approximately 300 samples.

B Sample Mounting

Cleanliness is important! A dirty working area may result in sample contamination and erroneous counts. The following steps should be followed when mounting a sample.

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1 Clean the slides and cover slips with lens tissue. Lay the slide down on a clean surface with the frosted end up. It is a good practice to rest one edge of the cover slip on the slide and the other edge on the working surface. By doing this, you keep the bottom surface (the one which contacts the filter) from becoming contaminated.

2 Wipe all the mounting tools clean with lens tissue and place them on a clean surface (i.e., lens tissue). When mounting a series of filters the scalpel should be wiped clean before cutting each sample.

3 Using a glass rod which is supplied with the Wheaton balsam bottom, apply a small drop of mounting solution onto the center of the slide. It may be necessary to adjust the quantity of solution used or the size of the wedge. The correct amount will result in the solution extending only slightly beyond the filter boundary. If the quantity is greater than this, adverse particle migration will occur.

4 With the spatula or a supplemental glass rod, spread the mounting media into a triangular shape. The size of this triangle should coincide with the dimension of the filter wedge.

5 Separate the middle and bottom sections of the field monitor case to expose the fragile filter. Cut a triangular wedge from the center to the edge of the filter using the scalpel. The size of the wedge should approximate one-eighth of the filter surface.

6 Grasp the filter wedge with the tweezers in the outer area of the filter which was clamped between the monitor case sections. Do not touch the filter with your fingers. Place the wedge, sampled side up, upon the mounting medium.

7 Pick up the cover slip with the tweezers and carefully place it on the filter wedge. Once this contact has been made, do not reposition the cover slip.

8 Label the slide with the sample number and current date before proceeding to the next filter.

9 The sample should become transparent after about fifteen minutes. If the filter appears cloudy, it may be necessary to press very lightly on the cover slip. This is rarely necessary.

10 Discard the sample mount after three days if it has not been counted. Crystals which appear similar to asbestos fibers may begin to grow at the mounting media/air interfaces. They seldom present any problems if the slide is examined before three days. In any case, stay away from the filter's edges when counting and sizing.

C Counting and Sizing

1 Finding and inspecting counting fields. Place the slide on the mechanical stage and position the center of the wedge under the objective lens and focus upon the sample. Nearly all of the particulates (particles and fibers) will be found in the upper ten to fifteen micrometers of the filter surface. When counting and sizing, continual use of the fine focus control is required to insure that nothing is missed. Start counting from one end of the wedge and progress along a radial line to the other end (count in either direction from circumference to wedge tip). Random fields are selected, without looking into the eyepieces, by slightly advancing the slide in one direction with the mechanical stage control.

D Achieving Comparable Results

1 Size only fibers with a length to width ratio greater than or equal to 3:1.

2 Count only fibers greater than 5 micrometers in length. (Be as accurate as possible in accepting or rejecting fibers near this length). Measure curved fibers along the curve to estimate the total length.

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3 Count as many fields as necessary to yield a total count of at least 100 fibers. Exceptions: a) count at least 20 fields even if you count more than 100 fibers and b) stop at 100 fields even if you haven't reached 100 fibers.

4 Select the field of view without looking through the microscope's eyepieces to eliminate unconsciously selecting "heavy" or "light" areas.

5 The fields are selected along the entire length of a radial line running between the outside perimeter and the tip of the wedge.

6 When an agglomerate (mass of material) covers a significant portion of the field of view (approx. 1/6 or greater) reject the field and select another. (Do not include it in the number of fields counted). However, report the fact as it may have meaning to sampling or medical personnel.

7 Bundles of fibers are counted as one fiber unless both ends of a fiber crossing another can be clearly resolved.

8 For fibers that cross either one or two sides of the counting field, the following procedure is used to obtain a representative count. First, arbitrarily select a) the left and bottom sides and b) the upper and lower left corners or vertical direction as "decision aids."

Then count any fiber greater than 5 micrometers in length, but only if the fiber:

a lies entirely within the counting area or,

b crosses the left or bottom sides, or

c crosses the upper or lower left corners, or

d crosses both the top and bottom sides.

Reject and do not count all other fibers. Refer to Figures 2 through 7.

XII CALCULATIONS

A Calculation of Airborne Concentration

Asbestos fiber airborne concentration may be calculated from the following formula:

$$C = \frac{(F - B)(W)}{(A)(V)}$$

Where:

C = Airborne fiber concentration in fibers >5 $\mu m/cm^3$

F = Average fiber count in fibers >5 μm/field.

B = Average fiber count of blank(s) or control filter(s) in fibers >5 μm/field. (It is subtracted to eliminate the error or background contamination).

W = 855 mm^2 for 37 mm diameter filter (the portion of the Millipore filter which is exposed when mounted in the field monitor case, i.e., the effective filter area).

A = The area of the counting field of a calibrated reticle expressed in mm^2/field.

V = Total air volume collected through filter expressed in milliliters.

XIII PRECISION AND ACCURACY

A An accuracy and precision study of the membrane filter counting procedure for asbestos has been conducted by Conway and Holland.(12) They conducted an intra-laboratory study involving six counters. Three of the counters were experienced while the other three had only a short familiarization with the rules for fiber counting. The conclusions of the study included:

1 The precision of the procedure for filters not containing an abundance of

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fine fibers can be estimated by a standard deviation of 16.2%. This value includes variation among counters and observed interaction effects.

2 The accuracy of the procedure for similar filters may be estimated for a 100-fiber count by a standard deviation of 21.4%. This assumes that the contribution of the overall variance from the nonuniform fiber distribution is additive.

3 The fiber concentration varies significantly between angular sectors on a given filter. Where approximately 100 fibers are counted, the standard deviation of the fiber count distribution for the whole filter appears to be represented by $1.6 \cdot (n)^{\frac{1}{2}}$, rather than $(n)^{\frac{1}{2}}$ which is a property of the Poisson distribution, where (n) is the total number of fibers counted.

4 A high percentage of very fine fibers on the filter can significantly affect the standard deviations and confidence limits for counts by different counters. After combining variations in fiber concentrations over the entire filter with those for different counters it was concluded:

a For filters with a low concentration of fine fibers, the standard deviation is estimated at 21% and the 95% confidence interval is ± 43%.

b For filters with a high concentration of fine fibers, the standard deviation is estimated at 25% and the 95% confidence interval is ± 50%.

B Lynch, Kronoveter, and Leidel[13] have also reported on the precision of the method. Their intralaboratory study utilized the data from a large number of dust counts made by different methods by experienced counters over a period of years in an epidemiologic study of the asbestos products industry. They concluded that the standard deviation of counts of fibers longer than 5 micrometers on membrane filters could be estimated from the relation $\sigma = (n)^{0.591}$. Thus for counts of about 100 fibers, the standard deviation could be estimated at about 15.2% and the 95% confidence limits at ± 30.4%. These values are lower than the precision values reported by Conway and Holland.[12]

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NOTES

A Sources of personal sampler pumps

1 Mine Safety Appliance Company
201 North Braddock Avenue
Pittsburgh, PA 15208

2 National Environmental Instruments, Inc.
P.O. Box 590
Warwick, RI 02888

3 Willson Products Division
P.O. Box 622
Reading, PA 19603

B Source of clothing spring clip

Catalog number 1140
John F. McGuire Company
120 Bacon Street
Pawtucket, RI 02860

C Source of tubing-to-field monitor adaptor

Catalog number LH/L
Bection, Dickinson, & Company
Rutherford, NJ

D Source of field monitor

1 Complete monitor (plastic case, filter, pad, and caps), catalog number MAWP 037AO (50/box).

2 Filters and pads only, catalog number AAWP 03700 (100/box).

3 Monitors only, catalog number M0000 37AO (50/box), from the

Millipore Corporation
Ashby Road
Bedford, MA 01730

E Source of sealing bands

Cellulose bands, white, opaque, 41 X 25, #28 (minimum order 2500)

Walter H. Jelly & Company
2822 Birch Street
Franklin Park, IL 60131

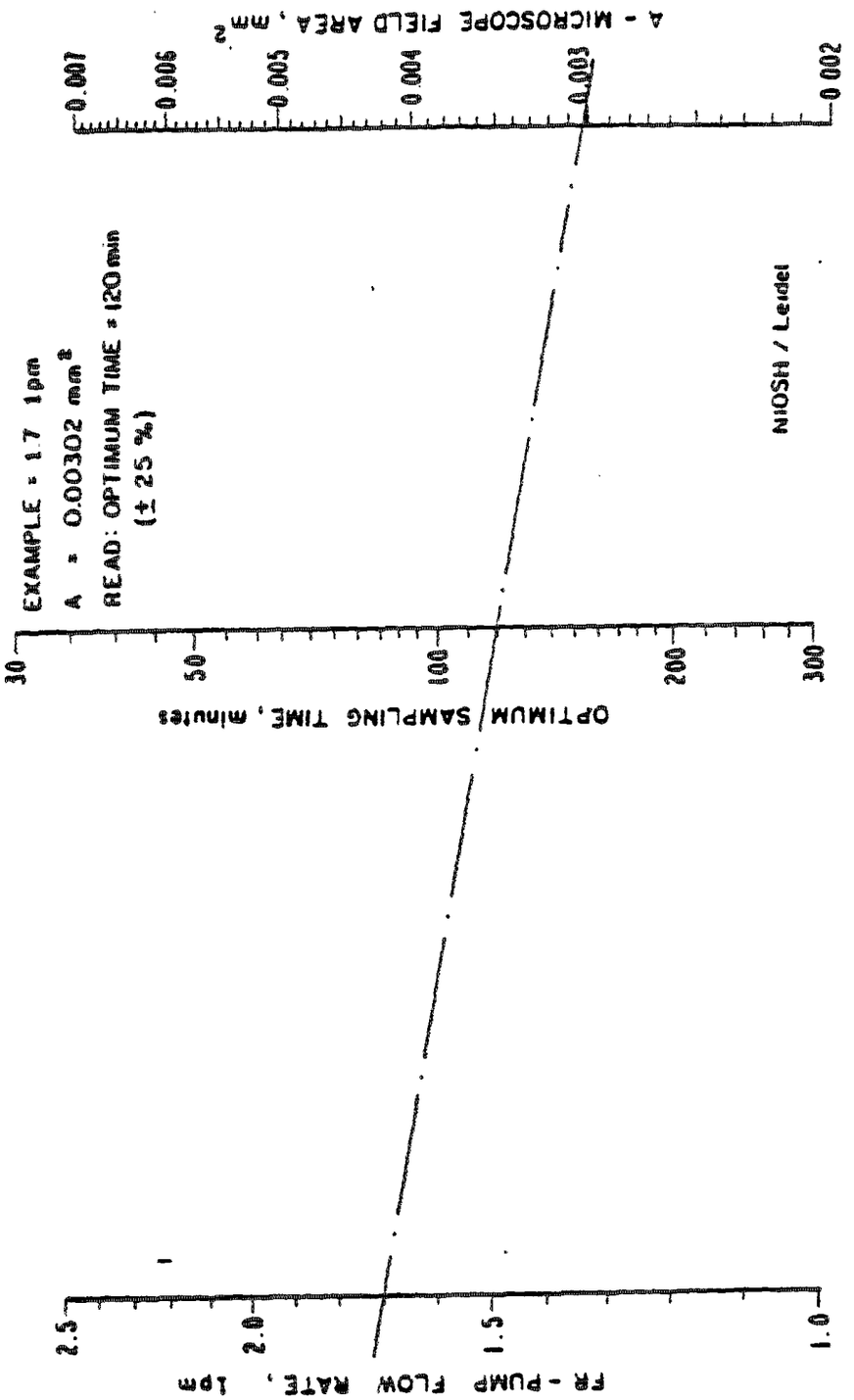


Fig. 1 - Nomogram for optimum sampling times for airborne asbestos fibers.

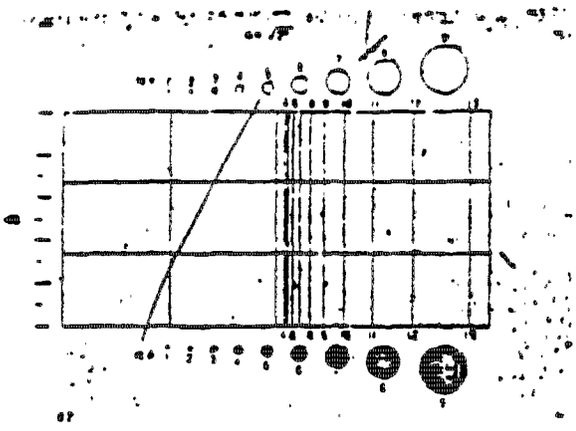


Figure 2. COUNT, fiber crosses both top and bottom sides.

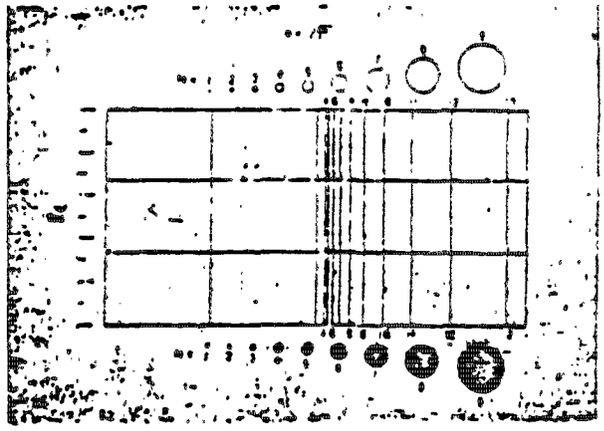


Figure 3. COUNT as one fiber.

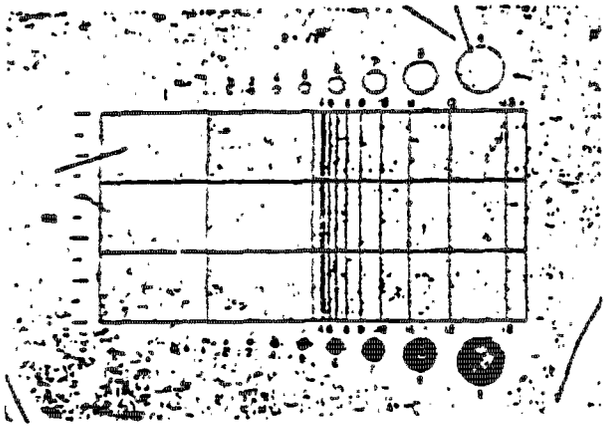


Figure 4. COUNT, fiber crosses left side.

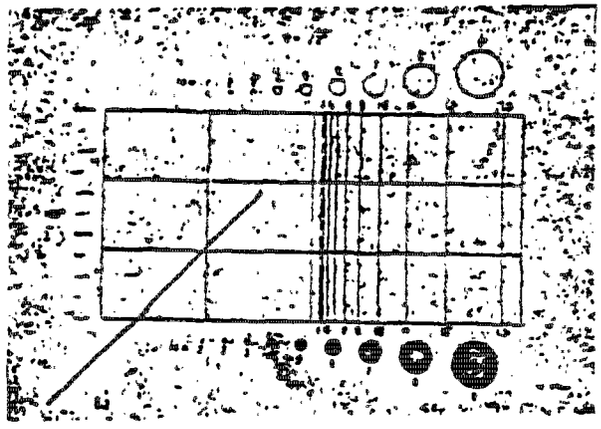


Figure 5. COUNT, fiber crosses bottom side.

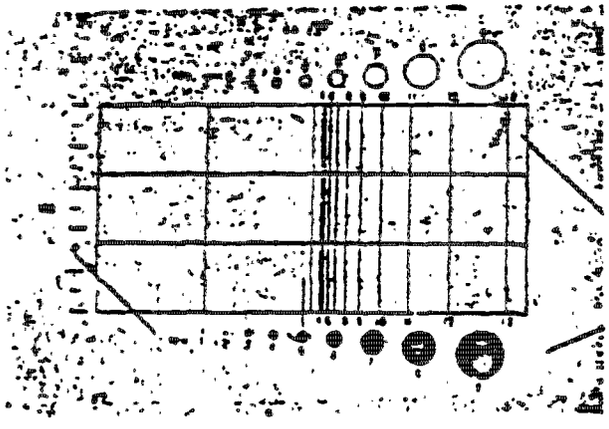


Figure 6. COUNT, fiber crosses lower left corner.

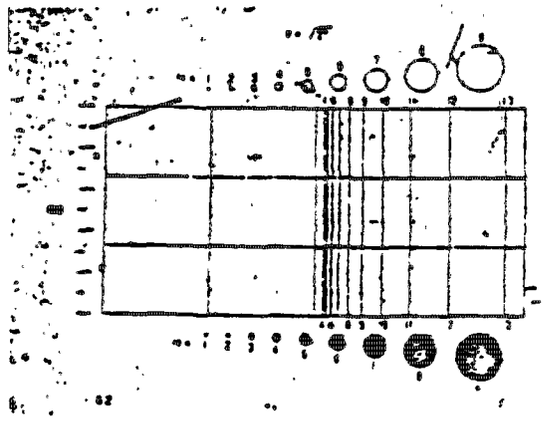


Figure 7. COUNT, fiber crosses upper left corner.

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RESPIRATORY PROTECTION

1. GENERAL

1.01 This practice describes the selection and use of respirators where air quality is a potential hazard. This practice also describes procedures to be followed to ensure that the user is medically qualified, instructed and trained in the proper use of respirators and that the respiratory equipment utilized is properly fitted, OSHA approved, and maintained and repaired in accordance with OSHA requirements.

1.02 The telephone company Occupational Safety and Health coordinator is normally responsible for establishing and administering the company's respiratory program. Specific responsibilities include:

1. Investigating all situations where there is a possibility of exposing employees to harmful airborne contaminants and determining requirements for the use of respiratory protection.

2. Conducting periodic surveys of work areas to assure that appropriate respirators are used, when and if required.

1.03 Both supervisors and craftpeople shall be instructed in the proper use of respirators by a competent person.

2. PRECAUTIONS

2.01 Respiratory protective masks have distinct limitations. The most prominent being:

1. They do nothing to reduce the hazard in the atmosphere.

2. If the device fails to provide adequate protection, there may be an immediate exposure to the hazard.

2.02 Airborne contaminants can enter the body in three ways:

1. Through the respiratory system when air is inhaled during the breathing process.

2. Through the digestive system where it can be absorbed and picked up by the bloodstream.

3. Through skin absorption.

2.03 Respiratory protective equipment can efficiently eliminate air contaminants from entering the body via the inhalation and digestive systems.

2.04 The proper use of protective clothing, and personal caution on the part of the employee, will reduce the possibility of skin absorption when dealing with air contaminants.

2.05 Direct skin contact with chemical agents should be avoided to prevent skin irritation or the possibility of systemic poisoning.

3. RESPIRATOR SELECTION

3.01 Three types of environments may be encountered which could require the use of respirators:

a. Gas and vapor contaminants (carbon monoxide, ammonia, etc.).

b. Particulates.

c. Combination Particulate and Gas and Vapor contaminants. See figure 1.

3.02 Proper selection of respirators shall be made according to the guidance of American National Standard Practices for Respiratory Protection Z88.2-1969.

4. MEDICAL CLEARANCE

4.01 Employees shall not be permitted to perform work in areas requiring the use of respiratory equipment without medical clearance to determine whether they are able to do the work and use the equipment. A list should be maintained of those employees who are qualified to use respiratory equipment.

5. TRAINING AND INSPECTION

5.01 To insure the safe use of any respirator, it is essential that every user be instructed in its selection, how it works, its capabilities and how it is serviced.

Training of respirator users and their supervisors shall be done by qualified instructors. Training should include, but not be limited to, the following:

a. Instruction in the nature of the hazard, whether acute, chronic, or both, and an appraisal of what may happen if the respirator is not used.

b. A discussion of why this is the proper type of respirator for the particular purpose.

c. Thoroughly review the capabilities of the respirator, its construction; operating principles and limitations.

d. Instruction in the care of the respirator, cleaning methods, inspection prior to use, changing canisters and filters, and proper storage.

e. Instruction and training in actual use of the respirator (especially a respirator for emergency use) and close and frequent supervision to assure that it continues to be properly used.

f. Classroom and field training to recognize and cope with emergency situations.

5.02 The trainee should be provided an opportunity to handle the respirator, have it fitted properly, test its facepiece-to-face seal, wear it in normal air, and wear it in a test atmosphere.

5.03 All training courses should be fully documented as to the dates of training, information covered, names of trainees, and names of the instructors.

5.04 All respiratory protection devices including those kept for emergencies shall be inspected monthly. (Those used daily shall be cleaned and inspected daily.)

5.05 The inspection shall include a check of the tightness of connections and the condition of the facepiece, headbands, valves, connecting tube, gasket and canisters and proper component labeling conspiciously designed on each component of the complete respirator assembly. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration.

5.06 A complete record shall be kept of inspection dates and findings. Leak testing shall be done by both of the following methods:

a. Positive pressure test - close the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal.

b. Negative pressure test - close off the inlet opening of the canister or cartridge by covering with the palm of the hand or by replacing the seal, inhale gently so that the facepiece collapses slightly and no inward leakage of air is detected; the tightness of the respirator is satisfactory.

5.07 Each respirator permanently assigned to an individual should be durably marked to indicate to whom it was assigned. This mark shall not affect the respirator performance in any way. The date of issuance should be recorded.

5.08 Providing respiratory protection for individuals wearing corrective glasses is a serious problem. A proper seal cannont be established if the temple bars of eye glasses extend through the sealing edge of the full facepiece. As a temporary measure, glasses with short temple bars or without temple bars may be taped to the wearer's head. Wearing of contact lenses in contaminated atmospheres with a respirator shall not be allowed.

6. REPAIR, CLEANING & STORAGE

6.01 Repair or replacement of parts shall be done by trained persons within the affected operation - with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. All replaceable parts for a particular brand of respirator must be purchased from the original manufacturer.

6.02 Respirators shall be regularly cleaned and disinfected.

6.03 Those issued for the exclusive use of one worker shall be cleaned after each day's use, or more often if necessary. Those used by more than one worker shall be cleaned and sanitized after each use. Daily cleaning shall include:

a. Immerse facepieces thoroughly in a sanitizer (sanitize means cleaning and disinfecting). Heavy soil may also require use of a small hand brush and a mild detergent solution. Rinse with clean, warm water.

b. Air dry and store in a clean, protected location.

6.04 At least once every six (6) months, all respirators shall be cleaned, and sanitized according to the following procedure:

a. Remove any filters, cartridges.

b. Wash facepiece in cleaner-sanitizer.

c. Rinse completely in clean, warm water, not exceeding 120 F.

d. Air dry in a clean area.

e. Clean other respirator parts as recommended by the manufacturer.

f. Inspect valves, headstraps, and other parts; replace with new parts if defective.

g. Insert filters, cartridges, make sure seal is tight.

h. Place in plastic bag or container for storage.

i. Never use oil as lubricant on self-contained respiratory protection.

6.05 After inspection, cleaning, and necessary repair, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators placed at stations and work areas for emergency use should be quickly accessible at all times and should be stored in compartments built for the purpose. The compartments shall be clearly marked, to identify the type of equipment (i.e.: Dust Respirators, Chemical Masks). Routinely used respirators shall be placed in plastic bags. Respirators should not be stored in such places as lockers or tool boxes unless they are in carrying cases or cartons. Storage compartments shall be routinely checked to determine that respirators are available for use.

6.06 Respirators shall be placed or stored so that the facepiece and exhalation valve will rest in a normal position.

GUIDE FOR SELECTING RESPIRATORY DEVICES

