

# U S A E H A

## The Installation Asbestos Management Program Assessment *Checklist*

U.S. Army Environmental Hygiene Agency  
Aberdeen Proving Ground, Maryland 21010-5422

*Approved for public release; distribution unlimited.*

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THE INSTALLATION ASBESTOS MANAGEMENT  
PROGRAM ASSESSMENT CHECKLIST

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**PURPOSE**

To provide a self-assessment tool to meet the requirements of Army Regulation 200-1, Chapter 10.

**DESCRIPTION**

Part I consists of 11 checklists on asbestos management, installation survey, hazard assessment, abatement plan and design, operations and maintenance plans, training, construction, and in-house and contracted abatement.

Part II "rates" the responses to each checklist in Part I on a priority scale.

Appendix A provides an evaluation form for a quick overall assessment of an installation's asbestos management program.

Appendix B shows the full law as described in Title 29, Code of Federal Regulations (CFR), 1926.58, Safety and Health Regulations for Construction: Asbestos, tremolite, anthophyllite, and actinolite.

Appendix C presents the Office of The Surgeon General's current policy.

**AUDIENCE**

The intended audience is the Asbestos Management Control officer and the asbestos management team.

Any questions or requests for additional technical assistance may be directed to Industrial Hygiene Field Services Program personnel at DSN 584-3118 or commercial 410-671-3118.

Additional copies of this technical guide may be reproduced locally or obtained by submitting a DA Form 17 (Requisition for Publications and Blank Forms) to Commander, USAEHA, ATTN: HSHB-CM-I, Aberdeen Proving Ground, MD 21010-5422 or FAX to DSN 584-3665 or commercial 410-671-3665.

## PART I. CHECKLIST

- The installation asbestos management team may use the following checklist to--

- \* Help look for deficiencies.
  - Know how to direct resources to correct those deficiencies,
- There are 11 elements in this checklist.
- **ALL INSTALLATIONS SHOULD ANSWER THE QUESTIONS IN ELEMENTS 1-8, plus**
  - Elements 9 and 11 if the installation uses an in-house asbestos abatement team.
  - Elements 10 and 11 if the installation uses contract abatement,
  - Elements 9-11 if the installation **uses** both an in-house asbestos abatement team and contract abatement.

**ELEMENT 1. INSTALLATION ASBESTOS MANAGEMENT**

1. Does the installation have an asbestos management program? Yes\_\_ No\_\_

2a. If the answer to 1 is yea, is there a written, signed asbestos management program document? Yes\_\_ No\_\_

2b. If the answer to 2a is DO, what is the status of the written program document?  
Draft (Date: \_\_\_\_\_)  
Other \_\_\_\_\_

3a. Is there a written, signed installation asbestos management plan? Yes\_\_ No\_\_

3b. If no, is the asbestos management plan in draft? Yes\_\_ No\_\_

4a. IS there a written, signed installation asbestos abatement plan? Yes\_\_ No\_\_

4b. If no, is the asbestos abatement plan in draft? Yes\_\_ No\_\_

5. Who is the Asbestos Management Control officer?  
Name: \_\_\_\_\_  
Tide: \_\_\_\_\_  
Organization: \_\_\_\_\_  
Telephone No: \_\_\_\_\_

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**ELEMENT 1. (Con't) INSTALLATION ASBESTOS MANAGEMENT**

---

6a. Has an asbestos management **team** been established? Yes\_\_ No\_\_

6b. If yes, who are the team members?

---

Name	Title	Organization	Telephone No.
Directorate of Engineering and Housing (DEH)			
Environmental Office			
Preventive Medicine Services			
Safety Office			
Civilian Personnel Office			
Staff Judge Advocate's Office			
Public Affairs Office			

---

7. How often does **the team** meet? \_\_\_\_\_

8a. Is the team responsible for developing and implementing policy? Yes\_\_ No\_\_

8b. If **no**, who **is responsible**? \_\_\_\_\_

NOTES

**ELEMENT 2. INSTALLATION ASBESTOS SURVEY**

1a. Has an installation asbestos survey **been** performed to locate **all** the asbestos-containing building materials (ACBM)? Yes- No\_\_

1b. Was more **than one** survey performed? Yes- No\_\_

1c. If yes, how many? \_\_\_\_\_

2. Did **the** survey(s) cover:

a. AU the **buildings** on the installation? Yes\_\_ No\_\_

b. AU nonfriable ACBM? Yes\_\_ No\_\_

c. AU ACBM located on the exterior of the buildings? Yes\_\_ No\_\_

d. **All** asbestos-containing equipment located inside the building (curtains, safes, gaskets, etc.)? Yes- No-

3. If the answer to 2a is no:

a. What percentage of the **buildings** have **been** completely surveyed for asbestos? \_\_\_\_\_ %

b. Have any of the following facilities **been** surveyed for asbestos?  
(N/A = no asbestos) (N/I = not on installation)

(1) Residential housing units? Yes- No\_\_ N/A\_\_ N/I\_\_

(2) Hospital facilities? Yes- No\_\_ N/A\_\_ N/I\_\_

(3) Child development centers? Yes\_\_ No\_\_ N/A\_\_ N/I-

(4) Department of the Army-controlled schools? Yes\_\_ No\_\_ N/A\_\_ N/I\_\_

c. **Comment:** \_\_\_\_\_  
\_\_\_\_\_

4. Who performed the asbestos survey(s)?

a. **Government** personnel? Yes\_\_ No\_\_ A -

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

**ELEMENT 2. (Con't) INSTALLATION ASBESTOS SURVEY**

b . Contractor personnel? Yes\_\_ No\_\_ %\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

c. Combination (more than one survey was performed)? Yes\_\_ No\_\_

5a. Were the personnel who performed the survey accredited as asbestos "building inspectors"? Yes- No\_\_

Sb. If the answer to 5a is yes, from what organization did these personnel receive accreditation?

(1) U.S. Environmental Protection Agency (EPA)? Yes- No\_\_

Name: \_\_\_\_\_

(2) State? Yes\_\_ No\_\_

Name: \_\_\_\_\_

(3) Local government? Yes- No\_\_

Name: \_\_\_\_\_

(4) Host nation? Yes\_\_ No\_\_

Name: \_\_\_\_\_

5c. If the answer to 5a is no, did these personnel receive exemptions from their major commands (MACOMs)? Yes\_\_ No\_\_

MACOM Name: \_\_\_\_\_

6a. Is there an asbestos inspection (survey) in a report format? Yes\_\_ No\_\_

6b. If no, what format was used?

\_\_\_\_\_

**ELEMENT 2. (Con't) INSTALLATION ASBESTOS SURVEY**

- 7a. Was a description of the method(s) used to perform the survey(s) available? **Yes\_\_ No\_\_**
- 7b. Were the buildings divided into homogeneous areas? **Yes - No\_\_**
- 7c. If yes, did the report indicate how the buildings were **divided**? **Yes\_\_ No\_\_**
- 7d. Did the survey report include a list of asbestos bulk samples taken? **Yes\_\_ No\_\_**
- 7e. If the answer to 7d is yes, did the list include:
- (1) Sample numbers? **Yes\_\_ No\_\_**  
 Comment: \_\_\_\_\_  
 \_\_\_\_\_
- (2) Locations? **Yes\_\_ No -**  
 Comment: \_\_\_\_\_  
 \_\_\_\_\_
- (3) Description of the **types** of **materials sampled**? **Yes - No\_\_**  
 Comment: \_\_\_\_\_  
 \_\_\_\_\_
- (4) Description of the conditions of the materials sampled? **Yes - No\_\_**  
 Comment: \_\_\_\_\_  
 \_\_\_\_\_
- (5) The results of the analysis? **Yes\_\_ No\_\_**  
 comment: \_\_\_\_\_  
 \_\_\_\_\_
- 7f. Did the survey **report** include a building layout showing where **each** bulk sample(s) was taken? **Yes\_\_ No\_\_**
- 7g. Did the report include a list of materials containing, or **suspected** of containing, asbestos? **Yes\_\_ No\_\_**

**ELEMENT 2. (Con't) INSTALLATION ASBESTOS SURVEY**

7h. If the answer to 7g is yes, was the following information about the materials included?

- (1) Friability? Yes- No\_\_
- (2) Physical condition? Yes\_\_ No\_\_
- (3) Water damage? Yes- No\_\_
- (4) Vibration/impact damage? Yes- No\_\_
- (5) Quantity? Yes\_\_ No\_\_
- (6) Number of occupants/users potentially exposed? Yes\_\_ No\_\_
- (7) Occupant/user accessibility? Yes\_\_ No\_\_
- (8) Area/building use? Yes\_\_ No\_\_
- (9) ACBM application/use? Yes\_\_ No\_\_
- (10) Air plenum (part of) or direct **airstream** (located in the path)? Yes\_\_ No\_\_

8. How many bulk samples were taken? \_\_\_\_\_

9. Were the samples taken for the following types of materials according to Training Manual 5-612, Asbestos **Control**, or EPA recommendations?

- (1) Sprayed-on or **trowelled-on** surfacing material? Yes\_\_ No\_\_
- (2) Pipe, boiler, and tank thermal insulation? Yes\_\_ No\_\_
- (3) Other **types** of ACBM (such as floor **tiles**, siding, **wallboard**, ceiling tile and acoustical tile)? Yes\_\_ No -

10a. What laboratories analyzed the asbestos bulk **samples**?

Name: \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

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**ELEMENT 2. (Con't) INSTALLATION ASBESTOS SURVEY**

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10b. Were the **laboratories** that performed **the** analysis of the asbestos bulk **samples** accredited? Yes\_ No\_

10c. If yes, specify **from** whom the **laboratories** received accreditation:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

11. How were the bulk samples analyzed?

a. Polarized light microscopy \_\_\_\_\_ %

b. Transmission electron microscopy (TEM) \_\_\_\_\_ %

c. Scanning **electron** microscopy (SEM) \_\_\_\_\_ %

d. **Other:** \_\_\_\_\_ \_\_\_\_\_ %

12. Did the bulk sample results specify the **type** of **asbestos**? Yes\_ No\_

13. Were general air samples taken to be used, or were general **air samples** used, for asbestos hazard assessment? Yes- No\_

14a. If the answer to 13 is yes, then how many areas were sampled? \_\_\_\_\_

14b. How were the samples analyzed?

(1) **Phase contrast** microscopy (PCM) \_\_\_\_\_ %

(2) Transmission electron **microscopy** (TEM) \_\_\_\_\_ %

(3) Scanning electron microscopy (SEM) \_\_\_\_\_ %

(4) **Other:** \_\_\_\_\_ \_\_\_\_\_ %

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**ELEMENT 2. (Con't) INSTALLATION ASBESTOS SURVEY**

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15a. Was the laboratory **that** performed the analysis of the asbestos **air** samples accredited? **Yes**\_\_ **No**\_\_

15b. If yea, **specify** from whom the laboratory received accreditation:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

16a. **Was** there a written requirement to reinspect **areas that** contained ACBM? **Yes**\_\_ **No**\_\_

16b. If yea, who does the reinspection and how often **is** it required?

(1) Contractor? **Yes**\_\_ **No**\_\_

Name: \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

How often? \_\_\_\_ Months \_\_\_\_ **Years**

(2) Asbestos team **member**? **Yes**\_\_ **No**\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

How often? \_\_ Months **Years**

(3) **Area supervisor**? **Yes**\_\_ **No**\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

How often? Months \_\_\_\_ **Years**

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**ELEMENT 2. (Con't) INSTALLATION ASBESTOS SURVEY**

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(4) Other? \_\_\_\_\_ **Yes\_ No\_**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

How often?      Months \_\_\_\_ **Years**

16c. If the answer to 16a is yes, how often are the areas reinspected?

(1) By an accredited asbestos "building inspector?" \_\_\_\_\_

(2) By DEH (or equivalent)? \_\_\_\_\_

(3) By building custodian? \_\_\_\_\_

(4) By representatives of asbestos management team? \_\_\_\_\_

-Months -Years \_\_\_\_ **Not Performed**

17. Who is responsible for maintaining the installation asbestos survey?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

18. Is the installation asbestos survey updated to reflect abatement activities? **Yes\_ No\_**

NOTES

**ELEMENT 3. ASBESTOS HAZARD ASSESSMENT**

1. Was an asbestos hazard assessment performed on all the ACBM? **Yes\_\_ No\_\_**

2. If the answer to 1 is yes, is the assessment included in the asbestos management plan? **Yes\_\_ No\_\_**

3. If the answer to 2 is no, in what format is the assessment recorded?

\_\_\_\_\_

4. Who performed the asbestos assessment(s)?

a. Government personnel? **Yes\_\_ No\_\_ %\_\_**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

b. Contractor personnel? **Yes\_\_ No\_\_ %\_\_**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

c. Combination (more than one assessment was performed)? **Yes\_\_ No\_\_**

5a. Were the personnel who performed the assessment accredited as asbestos "manager planners"? **Yes\_\_ No\_\_**

5b. If the answer to 5a is yes, from what organization did these personnel receive accreditation?

(1) EPA? **Yes\_\_ No\_\_**

Name: \_\_\_\_\_

(2) State? **Yes\_\_ No\_\_**

Name: \_\_\_\_\_

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**ELEMENT 3. (Con?) ASBESTOS HAZARD ASSESSMENT**

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(3) Local government? Yes\_\_ No\_\_

Name: \_\_\_\_\_

(4) Host nation? Yes\_\_ No\_\_

Name: \_\_\_\_\_

5c If the answer to 5a is no, did these personnel receive exemptions from their MACOMs? Yes\_\_ No -

MACOM Name: \_\_\_\_\_

6. What method was used in performing the assessment?

a. EPA? Document? \_\_\_\_\_

h. Army? \_\_\_\_\_ Document? \_\_\_\_\_

c. Department of Defense? \_\_\_\_\_ Document? \_\_\_\_\_

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**ELEMENT 4. INSTALLATION ASBESTOS ABATEMENT PLAN**

1a. Is there an asbestos abatement plan covering all the ACBM? Yes\_\_ No\_\_

1b. If the answer to 1a is yes, is the plan written? Yes\_\_ No\_\_

status : \_\_\_\_\_

2. If the answer to 1a is yes, is the asbestos abatement plan included in the asbestos management plan? Yes\_\_ No\_\_

3. If the answer to 2 is no, in what form is the abatement plan recorded?  
\_\_\_\_\_

4. Who prepared the asbestos abatement plan(s)?

a. Government personnel? Yes - No -

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

b. Contractor personnel? Yes\_\_ No\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

c. Combination (more than one plan was prepared)? Yes - No\_\_

5a. Were the personnel who developed the abatement plan accredited as asbestos "management planners?" Yes\_\_ No\_\_

5b. If the answer to 5a is yes, from what organization did these personnel receive accreditation?

(1) EPA? Yes\_\_ No\_\_

Name: \_\_\_\_\_

(2) State? Yes\_\_ No\_\_

Name: \_\_\_\_\_

**ELEMENT 4. (Con't) INSTALLATION ASBESTOS ABATEMENT PLAN**

(3) Local **government**? Yes\_\_ No\_\_

Name: \_\_\_\_\_

(4) Host nation? Yes\_\_ No\_\_

Name: \_\_\_\_\_

5c. If the **answer to 5a is no**, did **these personnel receive exemptions from their MACOMs**? Yes\_\_ No\_\_

MACOM Name: \_\_\_\_\_

6. **What method was used to rank the abatement actions?**

a. EPA?  **Document?** \_\_\_\_\_

b. **Army?**  **Document?** \_\_\_\_\_

c. **Department of Defense?**  **Document?** \_\_\_\_\_

7. **Asbestos** removal or **encapsulation** abatement will **be performed** by:

a. Government **personnel?**

All

**Limited**

**None**

Name of Organization: \_\_\_\_\_

\_\_\_\_\_

Type of Abatement: \_\_\_\_\_

\_\_\_\_\_

Extent of Work: \_\_\_\_\_

\_\_\_\_\_

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**ELEMENT 4. (Con't) INSTALLATION ASBESTOS ABATEMENT PLAN**

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b . Contractor personnel?

**All**        

Limited

None

Name of Organization: \_\_\_\_\_

\_\_\_\_\_

Type of Abatement: \_\_\_\_\_

\_\_\_\_\_

Extent of Work: \_\_\_\_\_

\_\_\_\_\_

8a. What is the **date** of the current asbestos abatement plan?

\_\_\_\_\_

8b. Are there procedures to **update** the **asbestos** abatement plan?

Yes - No   

8c. How often **will** the asbestos abatement plan **be** updated?

**Annually**

Semiannually

Other

8d. Who is the final authority?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

9. **Are** there procedures in the **asbestos** management plan to review all scheduled building repairs or renovations to ensure **that** they do not involve ACBM or, if they do involve ACBM, **that** the proper precautions are taken?

Yes    No

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**ELEMENT 5. INSTALLATION ASBESTOS OPERATIONS AND .  
MAINTENANCE (O&M) PLANS**

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1. How many buildings have been **identified as** containing ACBM? \_\_\_\_\_

2. Of the buildings **identified** in 1, how many require Government personnel to perform some type of maintenance activity/operation (including janitorial)? \_\_\_\_\_

3a. Have O&M plans been written for **all operations that** may disturb ACBM or involve contact with dust from ACBM?

Yes- No\_\_

3b. If the answer to 3a is yes, which of the following elements are present? (Check all that apply.)

**Notification and labeling**

Training

Employee protection and medical surveillance

**Specialized cleanup**

Maintenance and renovation permit

Special work practices for maintenance

Special work practices for renovation

Emergency response procedures

Periodic surveillance of ACBM

**Recordkeeping**

3c. If the answer to 3a is no, for what operations have O&M **plans** been written?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. Is there an O&M plan covering **the cleanups** from incidents **that** involve a small fiber **release**?

Yes\_\_ No\_\_

**ELEMENT 5. (Con't) INSTALLATION ASBESTOS OPERATIONS AND MAINTENANCE (O&M) PLANS**

5. Is there an O&M Plan covering the cleanups from incidents that involve a large fiber release? Yes- No\_\_

6. Is there an O&M plan for the normal cleanup of areas that contain ACBM? Yes- No\_\_

7. Do all the O&M plans include training of both the maintenance personnel and the personnel who normally work in the areas? Yes- No\_\_

8. Who wrote the O&M plans?

a. Government personnel? Yes ; No\_\_ %\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

b. Contractor personnel? Yes\_\_ No\_\_ %\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

c. Combination? Yes\_\_ No\_\_

9a. Were the personnel who prepared the O&M plan accredited as asbestos "management planners?" Yes- No\_\_

9b. If the answer to 9a is yes, from what organization did these personnel receive accreditation?

(1) EPA? Yes\_\_ No\_\_

Name: \_\_\_\_\_

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**ELEMENT 5 (Con't) INSTALLATION ASBESTOS OPERATIONS AND  
MAINTENANCE (O&M) PLANS**

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- (2) State? Yes- No\_\_  
Name: \_\_\_\_\_
- (3) Local **government**? Yes- No\_\_  
Name: \_\_\_\_\_
- (4) Host nation? Yes- No\_\_  
Name: \_\_\_\_\_
- 9c. If **the** answer to 9a is no, did **these personnel** receive exemptions from **their MACOMs**? Yes- No\_\_  
MACOM Name: \_\_\_\_\_
- 10a. Are the O&M plans included in the asbestos management plan? Yes- No\_\_
- 10b. **What is the** date of the current asbestos O&M plan?  
\_\_\_\_\_
- 10c. Are there procedures to update **the** asbestos O&M plan? Yes\_\_ No\_\_
- 10d. How often **will** the asbestos O&M plan be updated?  
\_\_\_ Annually  
\_\_\_ Semiannually  
\_\_\_ other

NOTES

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**ELEMENT 6. TRAINING (Other Than In-House Abatement Team)**

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- 1. Is there a **written** training program? Yes\_\_ No\_\_
  
- 2. If the answer to 1 is yes, is the written training program included in the asbestos management plan? Yes- No\_\_
  
- 3. Does the training program include awareness training for all **employees** working in areas that contain ACBM? Yes\_\_ No\_\_
  
- 4. Does the training program include all personnel who perform maintenance where there is the potential for **disturbing** ACBM? Yes\_\_ No\_\_
  
- 5. Does the **training** program include the following:
  - a. Information on the types of asbestos? Yes\_\_ No\_\_
  - h. Information on the **health** effects of **asbestos**? Yes- No\_\_
  - c. Information on where the asbestos is located? Yes- No\_\_
  - d. Description of the **proper** methods for handling ACBM? Yes\_\_ No\_\_
  - c. Description of the types of maintenance activities that may produce asbestos fibers, including operations that are **prohibited**? Yes\_\_ No\_\_
  - f. Information on the **installation's** respiratory protection program for asbestos operations? Yes\_\_ No\_\_
  - g. Description of how to identify **potential damage to ACBM and how to report such damage and fiber release incidents**? Yes\_\_ No\_\_
  - h. Information on the **increased risk of lung cancer when the employee smokes and is exposed to asbestos**? Yes\_\_ No\_\_
  
- 6a. Are there training requirements for the **installation** asbestos management team members? Yes\_\_ No\_\_
  
- 6h. If yes, what are the requirements?
 

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**ELEMENT 7. ASBESTOS ABATEMENT- DESIGN**

1a. Who develops the design plans for abatement projects?

- (1) In-house **personnel?** \_\_\_\_\_%
- (2) Corps of Engineers personnel? \_\_\_\_\_%
- (3) contractor **personnel?** \_\_\_\_\_%
- (4) Combination of above? \_\_\_\_\_%

1b. (Optional) Why were these design resources used?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Who coordinates the plans **and** specifications for the abatement projects **with** the local, State, and **Federal** regulators, including National Emission **Standards** for **Hazardous** Air Pollutants (**NESHAP**) notification?

a. **Installation** personnel? **Yes\_\_ No\_\_**

Define: \_\_\_\_\_

\_\_\_\_\_

b. Corps of **Engineers** personnel? **Yes\_\_ No\_\_**

**Define district and/or** office: \_\_\_\_\_

\_\_\_\_\_

c. Others? **Yes\_\_ No\_\_**

**Define:** \_\_\_\_\_

\_\_\_\_\_

3. How **many** separate **asbestos** abatement projects **are** designed **each** year? \_\_\_\_\_

**ELEMENT 7. (Con't) ASBESTOS ABATEMENT DESIGN**

4. What volume of ACBM is removed per year?

a. **Nonfriable** (approx.) \_\_\_\_\_ **square feet (sq. ft.)**

b. **Friable** (approx.) \_\_\_\_\_ **sq. ft.**

c. **Friable** (approx.) \_\_\_\_\_ **line feet (lin. ft.)**

d. **Other** (approx.) \_\_\_\_\_ **sq. ft.**

5a. Does the installation require environmental and work protection levels above the local, State, and Federal requirements?

Yes- No\_\_

5b. **Define** the additional requirements.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Are **negative** air machines typically used when removing nonfriable asbestos, such as **floor** tile and mastic?

Yes\_\_ No\_\_

7. Does the installation have standing operating procedures (SOPs) concerning asbestos abatement **that** are furnished to the abatement design **team**?

Yes\_\_ No\_\_

8. Does the installation typically request changes to the designs **to** conform to the preferred method of removing ACBM?

Yes\_\_ No\_\_



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**ELEMENT 7. (Con't) ASBESTOS ABATEMENT DESIGN**

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11. **What** factors are considered when selecting personal protective equipment?
- \_\_\_ Reference of workers
- \_\_\_ Maximum possible exposures
- \_\_\_ **Other (specify)** \_\_\_\_\_
- \_\_\_\_\_
12. **Does** the installation (or installation representative) discuss the work with the abatement workers before the removal activities begin on each project? **Yes\_\_ No\_\_**
13. Are safety meetings held with the **workers** to discuss topics, such as the **dangers** of **falling**, heat exhaustion, chemical exposures, etc.? **Yes\_\_ No\_\_**
14. **Does** the installation's Preventive Medicine authority conduct **industrial** hygiene **assessments** of asbestos **abatement designs** for health hazards other **than** asbestos exposure (e.g., **solvent** exposure)? **Yes\_\_ No\_\_**

NOTES

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**ELEMENT 8. CONSTRUCTION (Demolition - Renovation)**

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1a. Who provides on-site inspection during asbestos abatement projects?

- (1) In-house personnel? \_\_\_\_\_%
- (2) Corps of Engineers personnel? \_\_\_\_\_%
- (3) Contractor personnel? \_\_\_\_\_%
- (4) Active Army personnel? \_\_\_\_\_%
- (5) Combination of above? \_\_\_\_\_%

1b. If combination, describe:

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1a. Who receives, checks and approves the required contractor submissions before each contractor abatement project?

- (1) In-house personnel? \_\_\_\_\_%
- (2) Corps of Engineers personnel? \_\_\_\_\_%
- (3) Active Army personnel? \_\_\_\_\_%
- (4) Combination of above? \_\_\_\_\_%

2b. If combination, describe:

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**ELEMENT 8. (Con't) CONSTRUCTION (Demolition - Renovation)**

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3a. **Who** performs spot checks of the contractor submissions during the duration of the abatement project?

- (1) In-house personnel? \_\_\_\_\_%
- (2) Corps of Engineers personnel? \_\_\_\_\_%
- (3) Active Army personnel? \_\_\_\_\_%
- (4) Combination of above? \_\_\_\_\_%

3b. If combination, describe:

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4a. Who collects the **quality** assurance (QA) samples during asbestos abatement **activities**?

- (1) In-house **personnel**? \_\_\_\_\_%
- (2) Corps of Engineers personnel? \_\_\_\_\_%
- (3) Contractor personnel? \_\_\_\_\_%
- (4) Active **Army personnel**? \_\_\_\_\_%
- (5) Combination of above? \_\_\_\_\_%

4b. If combination, describe:

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5a. Is a certified industrial hygienist (CIH) or other industrial hygienist required on-site during **all** (\_\_\_\_) or part (**%**) of the asbestos abatement work?

**ELEMENT 8. (Con't) CONSTRUCTION (Demolition - Renovation)**

5h. What role does the CIH fulfill during the abatement work?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5c. Who does the CIH represent?

\_\_\_\_\_  
\_\_\_\_\_

5d. If the CIH is only required during part of the abatement work, discuss these requirements.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. At what point during the abatement activities are the local, State, or Federal regulators required to visit or inspect the project? (Check all that apply.)

- Preabatement
- During abatement (how often? \_\_\_\_\_)
- Upon completion of the abatement
- Not required

When will the regulator typically visit an abatement project?

- Preabatement
- During abatement (how often? \_\_\_\_\_)
- Upon completion of the abatement
- Usually do not visit sites

8a. Are additional requirements being placed upon the installation due to asbestos abatement projects? (These include requirements for industrial hygiene services through Preventive Medicine, inspection services through DEH, etc.)

Yes\_\_ No\_\_

**ELEMENT 8. (Con't) CONSTRUCTION (Demolition - Renovation)**

8b. If yes, explain.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

9a. Does the installation currently have "open-end" asbestos abatement contractor's services available?

Yes\_\_ No\_\_

9b. If yes, is this service provided:

Through **the** Corps of Engineers?

By the installation?

By job order contract?

By other contract? Define:

\_\_\_\_\_

10a. Does the installation burn buildings **as** a means of demolition?

Yes- No\_\_

10b. If yes, who determines that the building is **free** of **all** ACBM?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

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**ELEMENT 9. IX-HOUSE ASBESTOS ABATEMENT**

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1a. How many members of the in-house abatement team are:

(1) Military? \_\_\_\_

(2) Civilian? \_\_\_\_

1b. The total number on the team is

2. Are the military personnel: (Check all that apply.)

\_\_\_ Active duty?

\_\_\_ Reserve component?

\_\_\_ National Guard?

3. Who are the team's on-site supervisors?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Is membership on the abatement team: (Check all that apply.)

\_\_\_ A full-time duty?

\_\_\_ In addition to the member's primary duties?

\_\_\_ Voluntary?

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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5. What size projects does the abatement team handle? (Check all that apply.)

Small-scale (< 3 lin. ft. or < 9 sq. ft.) emergency cleanups  
(e.g., broken pipes, damaged pipe lagging) (\_\_\_%)

Small-scale (<3 lin. ft. or <9 sq. ft.) nonemergency abatements (\_\_\_%)

Medium-sized projects (e.g., single type of pipe insulation in building) (\_\_\_%)

Large- and small-scale emergency abatements (\_\_\_%)

Large projects (e.g., all ACBM in building) (\_\_\_%)

Schools (\_\_\_%)

Hospitals (\_\_\_%)

6a. What percentage of the asbestos abatements are performed using in-house teams?

\_\_\_% (per year)

6b. Does this percentage vary greatly from year to year?

Yes\_\_ No\_\_

6c. If yes, why?

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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7a. What type of training has the abatement team received? (Check all that apply.)

- Occupational Safety and Health Administration (OSHA)-required
- EPA-required
- State-required
- Locally required
- Specific glove-bag training
- Other (specify) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7b. How many days per year are spent in **training/updating** members of the abatement team? \_\_\_\_\_

8. Who conducted the **training**? (Specify for each type of training the abatement team received.)

- a. OSHA-required \_\_\_\_\_
- b. EPA-required \_\_\_\_\_
- c. State-required \_\_\_\_\_
- d. Locally required \_\_\_\_\_
- e. Specific glove-bag **training** \_\_\_\_\_
- f. Other (specify) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

9. Who (State, local, EPA) certified the training? (Specify for each type of training applicable.)

- a. OSHA-required \_\_\_\_\_
- b. EPA-required \_\_\_\_\_
- c. state-required \_\_\_\_\_
- d. Locally required \_\_\_\_\_
- e. Specific glove-bag training \_\_\_\_\_
- f. Other (specify) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

10. What elements were included in the training? (Specify for each type of training applicable or attach copy of the course agenda. Use extra pages if necessary.)

- a. OSHA-required \_\_\_\_\_
- b. EPA-required \_\_\_\_\_
- c. State-required \_\_\_\_\_
- d. Locally required \_\_\_\_\_
- e. Specific glove-bag training \_\_\_\_\_
- f. Other (specify) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

11. Did the training course include on-the-job training? Yes - No\_\_

12. Did all the team members receive the appropriate training before the abatement work began? Yes - No\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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13. How often is this **training** conducted? (Specify for each type of **training** applicable.)

- a. OSHA-required \_\_\_\_\_
- b. EPA-required \_\_\_\_\_
- c. State-required \_\_\_\_\_
- d. Locally required \_\_\_\_\_
- e. Specific glove-bag training \_\_\_\_\_
- f. Other (specify) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

14a. Who is responsible for maintaining the **training** records?

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_

14b. **Where** are these records maintained?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

15a. (Optional) What is the **average** turnover in personnel on the **asbestos** abatement team?

\_\_\_\_\_ % per year

15b. (Optional) What is/was the **worst** month for **turnover** in personnel on the asbestos abatement team?

\_\_\_\_\_

**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

15c. (Optional) How many people left the abatement team during **that** month? \_\_\_\_\_

16a. (Optional) Are costs for training, retraining and lost productivity maintained? Yes\_\_ No\_\_

16b. (Optional) Who is responsible for **maintaining** these records?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

17a. Are **all** the **team** members enrolled in the **asbestos** medical surveillance program? Yes\_\_ No\_\_

19. As part of the **medical** surveillance, is the employee informed of the synergistic effects between smoking and exposure to **asbestos as** required in 29 **CFR 1926.58**? Yes\_\_ No\_\_

17c. How much time does Preventive Medicine Services devote to **supporting the** medical surveillance program for the abatement team (hours per month)?

17d. Who is responsible for collecting the medical **surveillance** information?

\_\_\_\_\_

18a. Who is responsible for maintaining **the** medical surveillance records?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

I 8b. Where are these records **maintained**?

\_\_\_\_\_

19. Is the asbestos exposure or potential exposure **identified** for the worker in the Health Hazard Information Module? Yes\_\_ No\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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20a. **Are all** the team members enrolled in the respiratory protection program? **Yes\_ No\_**

20b. How much time does Preventive Medicine Services devote to supporting the respiratory protection program for the abatement team (hours per month)? \_\_\_\_\_

20c. Who is responsible for doing the pulmonary function testing, which is part of the respiratory protection program?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

21a. Is respirator fit testing done semiannually for **all** team members? **Yes- No\_**

21b. If yes, by whom is the fit testing done?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

21c. If yes, is the fit **testing** done:

(1) Qualitatively?

(2) Quantitatively? **\_\_\_\_\_**

21d. If **the** answer to **21a** is no, how often is respirator fit testing done?

\_\_\_\_\_

21e. By whom?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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22a. Who is responsible for maintaining the respirator fit testing records?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

22b. Where are these records maintained?

\_\_\_\_\_

23. What abatement equipment is available for the in-house team? (Check all that apply.)

Negative air machines

High efficiency particulate air (HEPA) vacuum cleaners

Glove bags

Personal protective equipment (Specify; include respirators and National Institute for Occupational Safety and Health (NIOSH) certification numbers.)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Other (specify) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

24a. Are there **written SOPs** for the use and maintenance of:

(1) Negative air machines?

(2) **HEPA** vacuum cleaners?

(3) Glove bags?

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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24b. If yes, please provide a copy of the SOPs. (Comments should be provided on the completeness of the SOP. These comments may be attached as a separate sheet.)

25a. Is a decontamination area established adjacent to the regulated area during all but short-term abatement actions?

Yes\_\_ No\_\_

25b. Are employees required to enter and exit the regulated area through the decontamination area?

Yes\_\_ No\_\_

26a. Are the clean rooms equipped with a locker or appropriate storage container for the employees' use?

Yes\_\_ No\_\_

26b. Are shower facilities provided?

Yes\_\_ No\_\_

26c. Are shower facilities located in the same area as the abatement action?

Yes\_\_ No\_\_

27a. Are there written SOPs for the decontamination of:

(1) Personnel?

Yes\_\_ No\_\_

(2) Equipment?

Yes\_\_ No\_\_

27b. Who maintains and updates these SOPs?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

28. How much of the abatement is:

a. Enclosure? \_\_\_\_%

b. Encapsulation? \_\_\_\_%

c. Removal? \_\_\_\_%

d. Management in place? \_\_\_\_%

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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29. Describe the duties of the competent person for an asbestos abatement **project**.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

30. Who **performs** the role of the competent person (responsibilities outlined in 29 CFR 1926.58)?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

31a. What asbestos **training** courses does the competent person(s) have, and when was **this** training obtained?

Course title: \_\_\_\_\_

\_\_\_\_\_

Location: \_\_\_\_\_

Date: \_\_\_\_\_

31b. When was this training updated?

Date: \_\_\_\_\_

32a. Does the competent person(s) have **the authority** to immediately stop the asbestos abatement project?

Yes\_\_ No\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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32b. Under what conditions?

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32c. How? (Where does the competent person fit in the chain of command?)

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33a. Who (or what organization) performs the exposure monitoring required by 29 CFR 1926.58?  
(See appendix B.)

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Phone: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Phone: \_\_\_\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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33b. If an industrial hygienist from Preventive Medicine performs this exposure monitoring:

(1) Who pays for the **industrial** hygiene services?

\_\_\_\_\_

Hours per month? \_\_\_\_\_

(2) Who pays for the analytical services?

\_\_\_\_\_

Samples per month \_\_\_\_\_

Cost of samples per month \_\_\_\_\_

34. What types of exposure monitoring samples are collected during the course of the abatement project? (Check all that apply.)

Perimeter samples

Area samples inside enclosure

Personal samples

All of the above

35. How often is exposure monitoring performed for: (Please answer in number of samples per day.)

a. Glove-bag operations? \_\_\_\_\_

b. Abatement using negative enclosure and air-purifying respirators? \_\_\_\_\_

c. Abatement using negative enclosure and air-supplying respirators? \_\_\_\_\_

d. Cleanup of fiber releases \_\_\_\_\_

36a. Are QA samples being collected during the exposure monitoring?

Yes\_\_ No\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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36b. Who is responsible for monitoring field sampling?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Phone: \_\_\_\_\_

37a. Are chain-of-custody procedures being used for **the** exposure monitoring samples? Yes\_\_ No\_\_

37b. Who maintains the chain-of-custody records?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Phone: \_\_\_\_\_

38a. Is **the** air sampling equipment calibrated? Yes - No\_\_

38b. How often is the equipment calibrated?

Before and after each use

Daily

weekly

Monthly

38c. Who is responsible for calibrating the equipment?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

**Organization:** \_\_\_\_\_

**Phone:** \_\_\_\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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38d. Who maintains the records of this calibration?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Phone: \_\_\_\_\_

38e. Where are these calibration records maintained?

\_\_\_\_\_

39a. How were **the** air samples analyzed?

(1) **Phase** contrast microscopy (**PCM**) \_\_\_\_\_%

(2) Transmission electron microscopy (**TEM**) \_\_\_\_\_%

(3) Scanning electron microscopy (**SEM**) \_\_\_\_\_%

(4) Other: \_\_\_\_\_%

39b. What analytical **method** (e.g., **NIOSH 7400, etc.**) was used for sample analysis?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

40a. What laboratories analyzed the asbestos air **samples**?

Name: \_\_\_\_\_ Name: \_\_\_\_\_

Address: \_\_\_\_\_ Address: \_\_\_\_\_

\_\_\_\_\_

40b. What was the turnaround time for **the receipt** of the **sample** analysts?

\_\_\_\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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**41a.** Were the laboratories that performed the analyses of the asbestos **samples** accredited for asbestos analysis?

Yes- No\_\_

**41b.** If **yes**, specify **from** whom the **laboratories** received **accreditation**?

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

**41c.** If not accredited, do the laboratories participate in **a** round-robin?

Yes\_\_ No\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

**42a.** Who is responsible for maintaining **the** records of the results of the air sampling?

N a m e : \_\_\_\_\_

Title: \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

**42b.** Where are these records maintained?

\_\_\_\_\_

**43a.** Are the affected **employees notified** of **the results** of the **exposure** monitoring?

Yes\_\_ No\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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43b. How are the affected employees notified of the results of **the** monitoring?

(1) In w r i t i n g

(2) Posting **results** in a central location \_\_\_\_\_

(3) other (**specify**) \_\_\_\_\_

43c. Are the sampling information and results **provided** to Preventive Medicine for **inclusion** in the employees' medical records?

Yes\_\_ No\_\_

44a. Are there **written** clearance procedure.8 for use **upon** completion of the abatement?

Yes\_\_ No\_\_

44b. If **yes**, please provide **a** copy of tie **written clearance** procedures. (comments should be **provided** on the **completeness** of **the** clearance. Separate **sheets** may be attached.)

45a. Do the **clearance** procedures include: (Check **all that** apply.)

\_\_\_ Visual **inspections** for clearance?

\_\_\_ PCM sampling for **clearance**?

\_\_\_ TEM sampling for **clearance**?

45b. Is aggressive sampling **done as** part of **the** clearance **procedures**?

Yes\_\_ No\_\_

46a. Does a representative from Preventive Medicine review the **asbestos** clearance **samples** before the **area** is **returned to the** tenant?

Yes\_\_ No\_\_

46b. If no, who reviews the **clearance samples**?

Name: \_\_\_\_\_

**Organization:** \_\_\_\_\_

**Qualification for Review:** \_\_\_\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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47. Who is responsible for carrying out the clearance procedures?

a. Government personnel?

Yes\_\_ No\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

b. Contractor personnel?

Yes\_\_ No\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address : \_\_\_\_\_

\_\_\_\_\_

c. Combination?

Yes\_\_ No\_\_

48a. Who is responsible for maintaining the records of the **clearance** sampling?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

48b. Where are **these** records **maintained**?

\_\_\_\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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49. Who releases the area for normal use after **the** approval of the clearance samples?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

50a. How does the installation handle the disposal of the ACBM that has **been** removed during an abatement project?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

50b. Who is responsible for filling out the (new **NESHAP** or State) manifests?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

50c. Who is responsible for signing the manifests?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

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**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT**

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50d. Who is responsible for maintaining the records of disposal?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

51a. How is **the asbestos** waste transported to **the disposal site**?

\_\_\_\_\_

51b. **Where** is **the** disposal site located?

\_\_\_\_\_

NOTES

**ELEMENT 10. CONTRACTED ASBESTOS ABATEMENT**

1a. What percentage of the asbestos abatement work is contracted? \_\_\_%

1b. What six projects are contracted? (Check **all** that apply.)

\_\_\_ Small-scale (<3 lin. ft. or <9 sq. ft.) emergency cleanups (e.g., broken pipes, damaged pipe lagging) (\_\_\_%)

\_\_\_ Small-scale (<3 lin. ft. or <9 sq. ft.) nonemergency abatements (\_\_\_%)

\_\_\_ Medium-sized projects (e.g., single type of pipe insulation in building) (\_\_\_%)

\_\_\_ Large- and small-scale emergency abatements (\_\_\_%)

\_\_\_ Large projects (e.g., all ACBM in building) (\_\_\_%)

\_\_\_ Schools (\_\_\_%)

\_\_\_ Hospitals (\_\_\_%)

2a. Is the U.S. *Army Corps of Engineers* Guide *Specification for Military Construction* used when writing the Request for Proposal?

Yes - No\_\_

2b. If no, what reference is used? (Specify.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3a. Does a representative from DEH with asbestos expertise review the abatement statement of work proposal to ensure that good construction practices are being followed?

Yes\_\_ No\_\_

3b. Does a representative from DEH with asbestos expertise review the contractor proposals for the abatement project to ensure that good construction practices are being followed?

Yes\_\_ No\_\_

3c. Does a representative from DEH with asbestos expertise review the abatement work plan to ensure that good construction practices are being followed?

Yes\_\_ No\_\_

**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

4. As part of the contractor selection process, are the following questions considered?  
(Check all that apply.)

Is the contractor certified for asbestos abatement?

What is the contractor's record and experience?

Is the contractor insured?

Is the contractor bonded?

Are the contractor's personnel trained and updated?

5a. Is the abatement project monitored on an ongoing basis to ensure that the work plan is being followed?

Yes\_\_ No\_\_

5b. By whom?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

68. Does a representative from Preventive Medicine review the abatement contract statement of work proposal before it is issued?

Yes\_\_ No\_\_

6b. Does a representative from Preventive Medicine review the contractor proposals for the abatement project to ensure that good safety and health practices are being followed?

Yes\_\_ No\_\_

6c. Does a representative from Preventive Medicine review the abatement contract work plan before it is accepted to ensure that good safety and health practices are being followed?

Yes\_\_ No\_\_

7. Are preconstruction meetings held with the contractor to ensure that all phases of the project are understood and being conducted according to good safety and health practice?

Yes\_\_ No\_\_

8a. Is the abatement project monitored on an ongoing basis to ensure that the safety and health portion of the work plan is being followed?

Yes\_\_ No\_\_

**ELEMENT 10. (Coa't) CONTRACTED ASBESTOS ABATEMENT**

8b. By **whom**?

**Name:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

9. **How much of the abatement is:**

a. **Enclosure?** \_\_\_\_\_ %

b. **Encapsulation?** \_\_\_\_\_ %

c. **Removal?** \_\_\_\_\_ %

d. **Management in place?** \_\_\_\_\_ %

10a. **Do you issue a separate contract for oversight (act as the competent person for the Government) of the abatement contractor?**

Yes\_\_ No\_\_

10b. **If the answer to 10a is no, who performs the technical oversight of the abatement contractor?**

**The contracting officer or the contracting officer's representative**

**The abatement contractor**

**A subcontractor for the abatement contractor**

**The installation Preventive Medicine section**

**The installation DEH**

**Other (specify)** \_\_\_\_\_

\_\_\_\_\_

10c. **What are this person's qualifications?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

11a. Does the competent person (i.e., the person performing the technical oversight) have the authority to immediately stop the asbestos abatement project? Yes\_\_ No\_\_

11 b. Under what conditions?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. How often is exposure monitoring performed for: (Please answer in number of samples per day.)

- a. Glove-bag operations? \_\_\_\_\_
- b. Abatement using negative enclosure and air-purifying respirators? \_\_\_\_\_
- c. Abatement using negative enclosure and air-supplying respirators? \_\_\_\_\_
- d. Area(s) around enclosures? \_\_\_\_\_
- e. Negative air machine exhaust? \_\_\_\_\_
- f. General area samples? \_\_\_\_\_

13a. Is a fibrous aerosol monitor required in the contract? Yes\_\_ No\_\_

13b. If yes, for what purpose is the fibrous aerosol monitor used?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

14a. Are QA samples being collected during the exposure monitoring? Yes\_\_ No\_\_

14b. If yes, does an industrial hygienist from Preventive Medicine perform this exposure monitoring? Yes\_\_ No\_\_

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**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

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14c. If yes:

(1) Who pays for the industrial hygiene services?

\_\_\_\_\_

**(2)** \_\_\_\_\_ per month \_\_\_\_\_  
Who pays for the analytical services?

\_\_\_\_\_

Samples per month \_\_\_\_\_

Cost of samples per month \_\_\_\_\_

14d. Who is responsible for monitoring field sampling?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

15a. Are the chain-of-custody procedures being used for the exposure monitoring samples?

Yes\_\_ No\_\_

15b. Who maintains the chain-of-custody records?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Phone: \_\_\_\_\_

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**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

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16a. How were the air samples analyzed?

- (1) Phase contrast microscopy (PCM) \_\_\_\_\_ %
- (2) Transmission electron microscopy (TEM) \_\_\_\_\_ %
- (3) Scanning electron microscopy (SEM) \_\_\_\_\_ %
- (4) Other (specify) \_\_\_\_\_  
\_\_\_\_\_ %

16b. What analytical method (e.g., NIOSH 7400, etc.) was used for the sample analysis?

\_\_\_\_\_

17. What laboratories analyzed the asbestos air samples?

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

18. Does the person who collects the samples read the results? Yes\_\_ No\_\_

19a. Were the laboratories performing the analysis of the asbestos samples accredited for asbestos analysis? Yes\_\_ No\_\_

**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

19b. If yes, specify from whom the laboratories received accreditation:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

19c. If no, was the accreditation of the laboratory required in the contract? Yes\_\_ No\_\_

19d. If not accredited, do the laboratories participate in a round-robin? Yes- No\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

20a. Is a separate contract issued for the asbestos clearance sampling that is performed at the completion of the abatement work? Yes- No\_\_

20b. If no, who performs the asbestos clearance sampling?

\_\_\_ The abatement contractor

\_\_\_ A subcontractor for the abatement contractor

\_\_\_ The installation Preventive Medicine section

\_\_\_ The installation DEH

\_\_\_ Other (specify) \_\_\_\_\_

\_\_\_\_\_

21a. Does a representative from Preventive Medicine review the asbestos clearance samples before the area is returned to the tenant? Yes\_\_ No\_\_

**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

21b. If no, who reviews the clearance samples?

Name: \_\_\_\_\_

Organization: \_\_\_\_\_

Qualification for Review: \_\_\_\_\_

22. Are there written clearance procedures for use upon completion of the abatement? Yes - No\_\_

23a Do the clearance procedures include: (Check all that apply.)

\_\_\_ Visual inspections for clearance?

\_\_\_ PCM sampling for clearance?

\_\_\_ TEM sampling for clearance?

23b. Is aggressive sampling done as part of the clearance procedures? Yes - No\_\_

24. Who is responsible for carrying out the clearance procedures?

a. Government personnel? Yes - No -

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

b. Contractor personnel? Yes - No\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

c. **Combination?** Yes - No\_\_

25a. Are figures available for the cost of in-house projects vs. contractor projects? Yes - No\_\_

25b. Are these figures broken down for each type of abatement? Yes\_\_ No\_\_

25c. Is this breakdown of costs available? Yes\_\_ No\_\_

25d. Does this include funded and unfunded costs? Yes\_\_ No\_\_

26. Who will incur the indirect costs of:

a. Moving building occupants before the abatement?

\_\_\_\_\_  
\_\_\_\_\_

b. Arranging alternative space for the occupants during the abatement project?

\_\_\_\_\_  
\_\_\_\_\_

c. Restoring the building after the abatement project is completed?

\_\_\_\_\_  
\_\_\_\_\_

27a. Who is responsible for doing the cost effectiveness analysis of in-house asbestos abatement vs. contracted asbestos abatement?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

---

**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

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27b. Who is responsible for making the final decision on the mode of action, based on the cost effectiveness?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

28a. How does the installation handle the disposal of the ACM that has been removed during a contracted abatement project?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

28b. Who is responsible for filling out the (new NESHAP or State) manifests?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

28c. Who is responsible for signing the manifests?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

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**ELEMENT 10. (Con't) CONTRACTED ASBESTOS ABATEMENT**

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**28d. Who is responsible for maintaining the records of disposal?**

**Name:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

**29a. How is the asbestos waste transported to the disposal site?**

\_\_\_\_\_

**29b. Where is the disposal site located?**

\_\_\_\_\_

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**NOTES**

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**ELEMENT 11. OTHER**

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1. **With what aspects of asbestos abatement has the Civilian Personnel Office been involved? (Check all that apply.)**

Training

Job descriptions for asbestos abatement team members

Differential or hazard pay for abatement team members

Other (specify) \_\_\_\_\_

\_\_\_\_\_

2. **Has the Civilian Personnel Office ensured that job offers to abatement team members are contingent upon passing a physical?**

Yes - No\_\_

3a. **Has the Public Affairs Office been asked to do public relations work when asbestos abatement projects are being undertaken?**

Yes - No\_\_

3b. **If no, would their assistance have been desirable?**

Yes\_\_ No\_\_

3c. **Has the Public Affairs Office received training on asbestos and its hazards?**

Yes\_\_ No\_\_

3d. **Has the Public Affairs Office been asked to make general presentations to the public regarding asbestos?**

Yes - No\_\_

4a. **Does the installation have a Staff Judge Advocate officer?**

Yes - No\_\_

4b. **If yes, has he/she received training on asbestos?**

Yes - No\_\_

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NOTES

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## PART II. CHECKLIST ASSESSMENT

- The U.S. Army Environmental Hygiene Agency developed the asbestos management program evaluation scheme to help installations meet Federal and Army requirements and follow EPA guidance. We designed the scheme to help installation asbestos management teams prioritize the use of their limited time and resources.

- The overall program action criteria is designed to help the management team determine if action is required and how soon actions should be performed. A description of the action criteria follows:

- Priority I action - immediate mandatory action required.
- Priority II action - mandatory action required.
- Priority III action - no mandatory action required.
- Excellent - no actions needed.

- The element action criteria is **designed** to help the management team determine if action is required for each program element and in what order actions should be performed. We recommend the following order of priorities for work on elements:

- Critical elements rated Priority I action.
- Critical elements rated Priority II action.
- Noncritical elements rated Priority I action.
- Noncritical elements rated Priority II action.
- Critical elements rated Priority III action.
- Critical elements rated Priority III action.
- Excellent - no actions needed.

**ELEMENT 1. INSTALLATION ASBESTOS MANAGEMENT (CRITICAL)**

**Priority I Action**

No management team

**Priority II Action**

A team that does not include a representative from one of the following offices:

1. Directorate of Engineering and Housing (DEH) or equivalent
2. Environmental Office
3. Preventive Medicine Services
4. Safety Office

**Priority III Action**

A team that includes all of the following representatives:

1. DEH or equivalent
2. Preventive Medicine Services
3. Environmental Office
4. Safety office
5. Asbestos Management Control officer

The team meets monthly and is responsible for developing and implementing policy.

**Excellent**

A team that includes:

1. All the representatives under the Priority 111 rating
2. Representatives from the Civilian Personnel Office, the Staff Judge Advocate's Office, and the Public Affairs Office

**ELEMENT 2. INSTALLATION ASBESTOS SURVEY (CRITICAL)**

**Priority I Action**

Any one of the following:

1. No asbestos building survey
2. An asbestos building survey performed by an asbestos "building inspector" without Asbestos Hazard Emergency Response Act (AHERA) accreditation and without MACOM exemption from accreditation
3. Samples that are not analyzed by an
4. An asbestos building survey that does not include any of the following:
  - a. Residential housing units
  - b. Hospital facilities
  - c. Child development centers (CDCs)
  - d. Department of the Army-controlled schools

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**Priority II Action**

Any one of the following:

1. An asbestos building survey performed in all of the following buildings:
  - a. Residential housing units
  - b. Hospital facilities
  - c. CDCs
  - d. Department of the Army-controlled schools
2. An asbestos building survey that does not include 100 percent of the occupied buildings
3. A written survey report that does not include any of the following:
  - a. A description of the inspection method
  - b. A list of ACBMs
  - c. The location of ACBMs (Con't)

**Priority III Action**

Any of the following:

1. An asbestos building survey that includes 100 percent of the occupied buildings
2. A written survey report that includes all of the elements listed under the Priority II criteria plus all of the following elements:
  - a. A list of asbestos sample results
  - b. A list of homogeneous areas
  - c. A description of the ACBM conditions
  - d. A building layout with sample locations

**Excellent**

Any of the following:

1. An asbestos building survey that included all of the installation's buildings
2. A written survey report that includes all of the elements listed under the Priority III criteria plus all of the following elements:
  - a. Copies of the field notes and sample sheets
  - b. Pictures of the sample locations
3. Air samples collected where he asbestos may have become airborne and results of these samples
4. An update of the building survey showing current activities

**ELEMENT 2. (Con't) INSTALLATION ASBESTOS SURVEY (CRITICAL)**

**Priority I Action**

**Priority II Action**

**Priority III Action**

**Excellent**

d. A list of personnel who performed the inspection with a copy of their credentials

e. A list of the laboratories that analyzed the samples with a copy of their credentials

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**ELEMENT 3. ASBESTOS HAZARD ASSESSMENT (CRITICAL)**

**Priority I Action**

Any one of the following:

1. No asbestos hazard assessment
2. An asbestos hazard assessment performed by an asbestos "manager planner" without AHERA accreditation and without MACOM exemption from accreditation
3. An asbestos hazard assessment that is not performed on one of the following:
  4. Residential housing units
  - b. Hospital facilities
  - c. CDCs
  - d. Department of the Army-controlled schools

**Priority II Action**

Any one of the following:

1. An asbestos hazard assessment that is not performed on 100 percent of the ACBM found in occupied buildings
2. An asbestos hazard assessment performed on all of the following:
  - a. Residential housing units
  - b. Hospital facilities
  - c. CDCs
  - d. Department of the Army-controlled schools
3. An asbestos hazard assessment method not recognized by the Army, Federal, State, local, or host nation asbestos-regulating organizations
4. No list of personnel who performed the assessment with a copy of their credentials

**Priority III Action**

Au of the following:

1. Asbestos hazard assessments performed on 100 percent of the ACBM found in occupied buildings
2. An asbestos hazard assessment method recognized by the Army, Federal, State, local, or host nation asbestos-regulating organizations

**Excellent**

Au of the following:

1. Asbestos hazard assessments performed on 100 percent of the ACBM found in all installation buildings
2. An asbestos hazard assessment that is part of the installation's abatement plan

**ELEMENT 4. INSTALLATION ASBESTOS ABATEMENT PLAN (NONCRITICAL)**

**Priority I Action**

No asbestos abatement plan

**Priority II Action**

Any one of the following:

1. No written plan
2. A written plan that is not fully implemented

**Priority III Action**

All of the following:

1. A written asbestos abatement plan that is fully implemented
2. An asbestos abatement plan that is included in the asbestos management plan
3. An asbestos abatement plan written by an accredited asbestos "manager planner"
4. An asbestos management plan that requires a review of all scheduled building repairs or renovations to ensure that proper precautions are taken

**Excellent**

All of the following:

1. A written asbestos abatement plan that is being fully implemented
2. An asbestos abatement plan that is included in the asbestos management plan
3. An asbestos abatement plan written by an accredited asbestos "manager planner"
4. An asbestos management plan that requires a review of all scheduled building repairs or renovations to ensure that proper precautions are taken
5. An abatement plan that is being updated to reflect previous abatement activities

**ELEMENT 5. INSTALLATION ASBESTOS OPERATIONS AND MAINTENANCE (O&M PLANS (CRITICAL))**

**Priority I Action**

No written O&M plans for all operations that may potentially disturb ACBM (including asbestos building surveys)

**Priority II Action**

Operation and maintenance plans that do not include any one of the following elements:

1. Notification and labeling
2. Employee protection and medical surveillance
3. Maintenance and renovation permit
4. Emergency response procedures
5. Periodic surveillance of ACBM
6. Recordkeeping

**Priority III Action**

1. Operation and maintenance plans that include all operations that potentially disturb ACBM and that include all of the following elements:

- A. Notification and labeling
  - b. Employee protection and medical surveillance
  - c. Maintenance and renovation permit
  - d. Emergency response procedures
  - e. Periodic surveillance of ACBM
  - f. Recordkeeping
2. Operation and maintenance plans that include cleanup procedures for small fiber release episodes and large fiber release episodes

**Excellent**

Operation and maintenance plans that include all items listed under the Priority III criteria as well as plans for periodic updates to reflect changes in the asbestos survey



**ELEMENT 7. ASBESTOS ABATEMENT DESIGN (CRITICAL)**

**Priority I Action**

No asbestos abatement design team

**Priority II Action**

Any one of the following:

1. A design that does not meet the requirements in 29 CFR 1926.58 or in State, local, or host nation regulations
2. A team that does not coordinate the plans and specifications for the abatement projects with the Federal, State, local, or host nation regulators
3. A team that does not discuss the work with the abatement workers before the removal activities begin on each project

**Priority III Action**

All of the following:

1. A design that meets the requirements of 29 CFR 1926.58 and of State, local, and host nation regulations
2. A team that coordinates abatement project plans and specifications with the Federal, State, local, and host nation regulators
3. A team that discusses the work with the abatement workers before the abatement activities begin on each project

**Excellent**

All of the following:

1. A team that uses recommended design resources
2. A team that coordinates the plans and specifications for the abatement projects with the Federal, State, local, and host nation regulators
3. A team that discusses the work with the abatement workers before the abatement activities begin on each project

**ELEMENT 3. CONSTRUCTION (Demolition - Renovation) (NONCRITICAL)**

**Priority I Action**

No on-site inspection and supervisory QA during asbestos abatement projects

**Priority II Action**

A team that provides only on-site inspections during asbestos abatement projects

**Priority III Action**

A team that provides on-site inspections and provides QA during asbestos abatement projects

**Excellent**

A team that provides on-site inspections, including supervisory QA requiring a CIH on-site during the asbestos abatement work

**ELEMENT 9. IN-HOUSE ASBESTOS ABATEMENT (CRITICAL)**

**Priority I Action**

Any one of the following:

1. No exposure monitoring
2. No clearance procedures
3. No competent person on-site
4. No trained personnel on the abatement team
5. No team personnel included in medical surveillance/respiratory protection programs

**Priority II Action**

Any one of the following:

1. Exposure monitoring that is not done per 29 CFR 1926.58
2. Aggressive air sampling that is not performed as part of the clearance procedures
3. Samples that are not analyzed by an accredited laboratory
4. Asbestos-containing building material, generated during abatement projects, that is not disposed of per Federal, State, local, or host nation regulations

**Priority III Action**

Any of the following:

1. Exposure monitoring done per 29 CFR 1926.58
2. Clearance procedures that include visual inspections and sampling for PCM or TEM analysis; aggressive sampling is done as part of the clearance procedures
3. Sample analysis performed by an accredited laboratory
4. Asbestos-containing building material, generated during abatement projects, that is disposed of per Federal, State, local, or host nation regulations
5. Abatement team members (including support personnel) who have received all required training (Con't)

**Excellent**

AU of the following:

1. AU the elements under the Priority 111 criteria
2. Written SOPs for both the O&M of the team's equipment and the decontamination of personnel and equipment
3. Proper records as required by all Federal, State, local, and host nation regulations; the records must include training, exposure monitoring, calibration data, sample analyses, and waste disposal

**ELEMENT 9. (Con't) IN-HOUSE ASBESTOS ABATEMENT (CRITICAL)**

**Priority I Action**

**Priority II Action**

**Priority III Action**

**Excellent**

- 6. Team members who are included in the medical surveillance and respiratory protection programs; the installation medical surveillance and respiratory protection programs meet all the requirements of 29 CFR 1926.58
- 7. A competent person who is on-site at all times, has been properly trained, and has the authority to immediately stop asbestos abatement projects
- 8. An in-house asbestos abatement team that has negative air machines, HEPA vacuum cleaners, and glove bags available for abatement work

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**ELEMENT 10. CONTRACTED ASBESTOS ABATEMENT (CRITICAL)**

Priority I Action	Priority II Action	Priority III Action	Excellent
<p>Any <b>one</b> of the following:</p> <ol style="list-style-type: none"> <li>1. A <b>contracting officer's representative and/or a contractor</b> who do not have <b>trained personnel</b></li> <li>2. Contractor <b>work plans that are not reviewed by representatives from DEH and/or Preventive Medicine</b></li> <li>3. No <b>criteria applied to the contractor selection process</b> (including previous <b>asbestos experience</b>)</li> <li>4. A <b>competent person (industrial hygiene oversight) who is subcontracted by the abatement contractor</b></li> <li>5. No <b>written clearance procedures</b></li> <li>6. <b>Asbestos-containing building material that is removed but is not disposed of according to NESHAP, State, local, and host nation regulations</b></li> <li>7. No <b>air monitoring</b></li> </ol>	<p>Any <b>one</b> of the following:</p> <ol style="list-style-type: none"> <li>1. Air monitoring <b>that is not conducted</b> wording to 29 CFR 1926.58</li> <li>2. Air monitoring <b>samples that are not analyzed by an accredited laboratory</b></li> <li>3. <b>written clearance procedures that are not properly implemented</b></li> </ol>	<p>AU of the following:</p> <ol style="list-style-type: none"> <li>1. Contractor <b>work plans that are reviewed by representatives From DEH and Preventive Medicine</b></li> <li>2. Selection criteria (including, at minimum, previous <b>asbestos experience</b>) applied to the contractor selection process</li> <li>3. A <b>competent person who is separately subcontracted</b></li> <li>4. <b>Written clearance procedures</b></li> <li>5. Air monitoring conducted according to 29 CFR 1926.58</li> <li>6. Air monitoring <b>samples analyzed by an accredited laboratory</b></li> <li>7. <b>Asbestos-containing building material, that is removed and disposed of according to NESHAP, State, local, and host nation regulations</b></li> </ol>	<p>In addition to all of the items specified under the Priority III criteria rating, a <b>written contract that allows installation personnel to perform QA sampling of the abatement project</b></p>

2-13

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**ELEMENT 11. OTHER (NONCRITICAL)**

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**Priority I Action**

No involvement by Civilian Pa-Mad Office or the Public Affairs Office

**Priority II Action**

Civilian Personnel Office involvement in training and job descriptions for asbestos abatement workers

**Priority III Action**

Civilian Personnel Office involvement to the extent mentioned in the Priority II criteria rating, and Public Affairs Office involvement in public relations during asbestos abatement projects

**Excellent**

Civilian Personnel Office involvement in training, job descriptions, differential or hazard pay, and job contingencies be to physical fitness of the worker; Public Affairs Office involvement in public relations during the asbestos abatement Projects

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APPENDIX A  
OVERALL EVALUATION RATING

**INSTALLATION ASBESTOS MANAGEMENT PROGRAM  
OVERALL EVALUATION RATING**

Record the rating of each element of your installation's asbestos management program in the appropriate column of the table below--"C" if it is a critical element, "NC" if it is a noncritical element. This will provide you with a quick overall assessment of your program and, by referring to the key on page A-3, will allow you to determine your installation's rating.

Elements		Priority I	Priority II	Priority III	Excellent
<b>Critical (C)</b>	<b>Noncritical (NC)</b>	C	NC	C	NC
1. Installation Asbestos Management	//////				
2. Installation Asbestos Survey	//////				
3. Asbestos Hazard Assessment	//////				
//////	4. Installation Asbestos Abatement Plan				
5. Installation Asbestos Operations & Maintenance (O&M) Plans	//////				
//////	6. Training (Other Than In-House Abatement Team)				
7. Asbestos Abatement Design	//////				
//////	8. Construction (Demolition-Renovation)				

(Con't)

INSTALLATION ASBESTOS MANAGEMENT PROGRAM  
 OVERALLEVALUATION RATING (Con't)

Elements		Priority I		Priority II		Priority III		Excellent	
Critical (C)	Noncritical (NC)	C	NC	C	NC	C	NC	C	NC
9. In-House Asbestos Abatement	////////////////////								
10. Contracted Asbestos Abatement	////////////////////								
////////////////////	11. Other								

Key :  
 Priority I action: Immediate **mandatory** action required.  
 Priority II **action**: Mandatory action required.  
 Priority III action: **No mandatory action required.**  
 Excellent: **No actions** needed.

A-3

APPENDIX B

29 **CFR** 1926.58

relate to asbestos exposure: the employee's representative level of exposure to asbestos, tremolite, anthophyllite, and actinolite; a description of any personal protective and respiratory equipment used, and information from previous medical examinations of the affected employee that is not otherwise available to the physician. Making this information available to the physician will aid in the evaluation of the employee's health in relation to assigned duties and fitness to wear personal protective equipment, if required.

The employer is required to obtain a written opinion from the examining physician containing the results of the medical examination; the physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of exposure-related disease; any recommended limitations on the employee or on the use of personal protective equipment; and a statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions related to asbestos, tremolite, anthophyllite, and actinolite exposure that require further explanation or treatment. This written opinion must not reveal specific findings or diagnoses unrelated to exposure to asbestos, tremolite, anthophyllite, and actinolite, and a copy of the opinion must be provided to the affected employee.

#### PART 1926—[AMENDED]

5 An authority citation is added to Subpart D of Part 1926, to read as follows:

**Authority:** Secs 4 & 6, 8 Occupational Safety and Health Act of 1970 29 U.S.C. 653, 653, 657; Sec 107 Contract Work Hours and Safety Standards Act (Construction Safety Act), 40 U.S.C. 333, and Secretary of Labor's Orders 12-71 (36 FR 8754), 8-78 (41 FR 25059), or 9-83 (48 FR 35736), as applicable. Sections 1926.55(c) and 1926.58 also issued under 29 CFR Part 1911.

6 Paragraph (c) of § 1926.55 is hereby revised to read as follows:

§ 1926.55 Gases, vapors, fumes, dusts, and mists.

(c) Paragraphs (2) and (b) of this section do not apply to the exposure of employees to airborne asbestos, tremolite, anthophyllite, or actinolite dust. Whenever any employee is exposed to airborne asbestos, tremolite, anthophyllite, or actinolite dust, the requirements of § 1926.58 of this title shall apply.

7. A new § 1926.56 is added to Subpart D to read as follows:

§ 1926.56 Asbestos, tremolite, anthophyllite, and actinolite.

(a) *Scope and application.* This section applies to all construction work as defined in 29 CFR 1910.12(b), including but not limited to the following:

(1) Demolition or salvage of structures where asbestos, tremolite, anthophyllite, or actinolite is present;

(2) Removal or encapsulation of materials containing asbestos, tremolite, anthophyllite, or actinolite;

(3) Construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain asbestos, tremolite, anthophyllite, or actinolite;

(4) Installation of products containing asbestos, tremolite, anthophyllite, or actinolite;

(5) Asbestos, tremolite, anthophyllite, and actinolite spill/emergency cleanup; and

(6) Transportation, disposal, storage, or containment of asbestos, tremolite, anthophyllite, or actinolite or products containing asbestos, tremolite, anthophyllite, or actinolite on the site or location at which construction activities are performed.

(b) *Definitions.* "Action level" means an airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals of 0.1 fiber per cubic centimeter (f/cc) of air calculated as an eight (8)-hour time-weighted average.

"Asbestos" includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that has been chemically treated and/or altered.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Authorized person" means any person authorized by the employer and required by work duties to be present in regulated areas.

"Clean room" means an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

"Competent person" means one who is capable of identifying existing asbestos, tremolite, anthophyllite, or actinolite hazards in the workplace and who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f). The duties of the competent person include at least the following: establishing the negative-pressure enclosure, ensuring its integrity, and controlling entry to and exit from the enclosure; supervising any employee exposure monitoring required by the standard; ensuring that all employees working within such an enclosure wear the appropriate personal protective equipment, are trained in the use of appropriate methods of exposure control, and use the hygiene facilities

and decontamination procedures specified in the standard, and ensuring that engineering controls in use are in proper operating condition and are functioning properly.

"Decontamination area" means an enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment contaminated with asbestos, tremolite, anthophyllite, or actinolite.

"Demolition" means the wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos, tremolite, anthophyllite, or actinolite products.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

"Employee exposure" means that exposure to airborne asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals, that would occur if the employee were not using respiratory protective equipment.

"Equipment room (change room)" means a contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

"Fiber" means a particulate form of asbestos, tremolite, anthophyllite, or actinolite, 5 micrometer or longer, with a length-to-diameter ratio of at least 3 to 1.

"High-efficiency particulate air (HEPA) filter" means a filter capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometer in diameter or larger.

"Regulated area" means an area established by the employer to demarcate an area where airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals exceed or can reasonably be expected to exceed the permissible exposure limit. The regulated area may take the form of (1) a temporary enclosure, as required by paragraph (e)(6) of this section, or (2) an area demarcated in any manner that minimizes the number of employees exposed to asbestos, tremolite, anthophyllite, or actinolite.

"Removal" means the taking out or stripping of asbestos, tremolite, anthophyllite, or actinolite or materials containing asbestos, tremolite, anthophyllite, or actinolite.

"Renovation" means the modifying of any existing structure, or portion thereof, where exposure to airborne asbestos, tremolite, anthophyllite, actinolite may result.

"Repair" means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates where asbestos, tremolite, anthophyllite, or actinolite is present.

"Tremolite, anthophyllite and actinolite" means the non-asbestos form of these minerals, and any of these minerals that have been chemically treated and/or altered.

(c) **Permissible exposure limit (PEL).** The employer shall ensure that no employee is exposed to an airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of 0.2 fiber per cubic centimeter of air as an eight (8) hour time-weighted average (TWA), as determined by the method prescribed in Appendix A of this section, or by an equivalent method.

(d) **Communication among employers.** On multi-employer worksites, an employer performing asbestos, tremolite, anthophyllite, or actinolite work requiring the establishment of a regulated area shall inform other employers on the site of the nature of the employer's work with asbestos, tremolite, anthophyllite, or actinolite and of the existence of and requirements pertaining to regulated areas.

(e) **Regulated areas—(1) General.** The employer shall establish a regulated area in work areas where airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals exceed or can reasonably be expected to exceed the permissible exposure limit prescribed in paragraph (c) of this section.

(2) **Demarcation.** The regulated area shall be demarcated in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the permissible exposure limit.

(3) **Access.** Access to regulated areas shall be limited to authorized persons or to persons authorized by the Act or regulations issued pursuant thereto.

(4) **Respirators.** All persons entering a regulated area shall be supplied with a respirator, selected in accordance with paragraph (h)(2) of this section.

(5) **Prohibited activities.** The employer shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.

(6) **Requirements for asbestos removal, demolition, and renovation operations.** (i) Wherever feasible, the employer shall establish negative-pressure enclosures before commencing removal, demolition, and renovation operations.

(ii) The employer shall designate a competent person to perform or supervise the following duties:

(A) Set up the enclosure;

(B) Ensure the integrity of the enclosure;

(C) Control entry to and exit from the enclosure;

(D) Supervise all employee exposure monitoring required by this section;

(E) Ensure that employees working within the enclosure wear protective clothing and respirators as required by paragraph (i) and (h) of this section and;

(F) Ensure that employees are trained in the use of engineering controls, work practices, and personal protective equipment;

(G) Ensure that employees use the hygiene facilities and observe the decontamination procedures specified in paragraph (j) of this section; and

(H) Ensure that engineering controls are functioning properly.

(iii) In addition to the qualifications specified in paragraph (b) of this section, the competent person shall be trained in all aspects of asbestos, tremolite, anthophyllite, or actinolite abatement, the contents of this standard, the identification of asbestos, tremolite, anthophyllite, or actinolite and their removal procedures, and other practices for reducing the hazard. Such training shall be obtained in a comprehensive course, such as a course conducted by an EPA Asbestos Training Center, or an equivalent course.

(iv) **Exception:** For small-scale, short-duration operations, such as pipe repair, valve replacement, installing electrical conduits, installing or removing drywall, roofing, and other general building maintenance or renovation, the employer is not required to comply with the requirements of paragraph (e)(6) of this section.

(f) **Exposure monitoring—(1) General.**

(i) Each employer who has a workplace or work operation covered by this standard shall perform monitoring to determine accurately the airborne concentrations of asbestos, tremolite, anthophyllite, actinolite or a combination of these minerals to which employees may be exposed.

(ii) Determinations of employee exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA of each employee.

(iii) Representative 8-hour TWA employee exposure shall be determined on the basis of one or more samples representing full-shift exposure for employees in each work area.

(2) **Initial monitoring.** (i) Each employer who has a workplace or work operation covered by this standard, except as provided for in paragraphs (f)(2)(ii) and (f)(2)(iii) of this section, shall perform initial monitoring at the initiation of each asbestos, tremolite, anthophyllite, actinolite job to accurately determine the airborne concentrations of asbestos, tremolite, anthophyllite, or actinolite to which employees may be exposed.

(ii) The employer may demonstrate that employee exposures are below the action level by means of objective data demonstrating that the product or material containing asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals cannot release airborne fibers in concentrations exceeding the action level under those work conditions having the greatest potential for releasing asbestos, tremolite, anthophyllite, or actinolite.

(iii) Where the employer has monitored each asbestos, tremolite, anthophyllite, or actinolite job, and the data were obtained during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results to satisfy the requirements of paragraph (f)(2)(i) of this section.

(3) **Periodic monitoring within regulated areas.** The employer shall conduct daily monitoring that is representative of the exposure of each employee who is assigned to work within a regulated area. **Exception:** When all employees within a regulated area are equipped with supplied-air respirators operated in the positive-pressure mode, the employer may dispense with the daily monitoring required by this paragraph.

(4) **Termination of monitoring.** If the periodic monitoring required by paragraph (f)(3) of this section reveals that employee exposures, as indicated by statistically reliable measurements, are below the action level, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

(5) **Method of monitoring.** (i) All samples taken to satisfy the monitoring requirements of paragraph (f) of this section shall be personal samples

collected following the procedures specified in Appendix A.

(II) AU samples taken to satisfy the monitoring requirements of paragraph (f) of this section shall be evaluated using the OSHA Reference Method (ORM) specified in Appendix A or an equivalent counting method.

(iii) If an equivalent method to the ORM is used, the employer shall ensure that the method meets the following criteria:

(A) Replicate exposure data used to establish equivalency are collected in side-by-side field and laboratory comparisons;

(B) The comparison indicates that 90 percent of the samples collected in the range 0.6 to 2.0 times the permissible limit have an accuracy range of plus or minus 25 percent of the ORM results with a 95 percent confidence level as demonstrated by a statistically valid protocol; and

(C) The equivalent method is documented and the results of the comparison testing are maintained.

(iv) To satisfy the monitoring requirements of paragraph (f), employers shall rely on the results of monitoring analysis performed by laboratories that have instituted quality assurance programs that include the elements prescribed in Appendix A:

(6) Employee notification of monitoring results. (i) The employer shall notify affected employees of the monitoring results that represent that employee's exposure as soon as possible following receipt of monitoring results.

(ii) The employer shall notify affected employees of the results of monitoring representing the employee's exposure in writing either individually or by posting at a centrally located place that is accessible to affected employees.

(7) Observation of monitoring. (i) The employer shall provide affected employees an opportunity to observe any monitoring of employee exposure to asbestos, tremolite, anthophyllite, or actinolite conducted in accordance with this section.

(ii) When observation of the monitoring of employee exposure to asbestos, tremolite, anthophyllite, or actinolite requires entry into an area where the use of protective clothing or equipment is required, the observer shall be provided with and be required to use such clothing and equipment and shall comply with all other applicable safety and health procedures.

(g) Methods of compliance.—(1) Engineering controls and work practices. (I) The employer shall use one or any combination of the following control methods to achieve compliance

with the permissible exposure limit prescribed by paragraph (c) of this section:

(A) Local exhaust ventilation equipped with HEPA filter dust collection systems;

(B) General ventilation systems;

(C) Vacuum cleaners equipped with HEPA filters;

(D) Enclosure or isolation of processes producing asbestos, tremolite, anthophyllite, or actinolite dust;

(E) Use of wet methods, wetting agents, or removal encapsulants to control employee exposures during asbestos, tremolite, anthophyllite, or actinolite handling, mixing, removal, cutting, application, and cleanup;

(F) Prompt disposal of wastes contaminated with asbestos, tremolite, anthophyllite, or actinolite in leak-tight containers; or

(G) Use of work practices or other engineering controls that the Assistant Secretary can show to be feasible.

(ii) Wherever the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the limit prescribed in paragraph (c), the employer shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with the requirements of paragraph (h) of this section.

(2) Prohibitions. (i) High-speed Abrasive disc saws that are not equipped with appropriate engineering controls shall not be used for work related to asbestos, tremolite, anthophyllite, or actinolite.

(ii) Compressed air shall not be used to remove asbestos, tremolite, anthophyllite, or actinolite or materials containing asbestos, tremolite, anthophyllite, or actinolite unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

(iii) Materials containing asbestos, tremolite, anthophyllite, or actinolite shall not be applied by spray methods.

(3) Employee rotation. The employer shall not use employee rotation as a means of compliance with the exposure limit prescribed in paragraph (c) of this section.

(h) Respiratory protection.—(1) General. The employer shall provide respirators, and ensure that they are used, where required by this section. Respirators shall be used in the following circumstances:

(I) During the interval necessary to install or implement feasible engineering and work practice controls;

(ii) In work operations such as maintenance and repair activities, or other activities for which engineering end work practice controls are not feasible;

(iii) In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the exposure limit; and

(iv) In emergencies.

(2) Respirator selection. (i) Where respirators are used, the employer shall select and provide, at no cost to the employee, the appropriate respirator as specified in Table D-4, and shall ensure that the employee uses the respirator provided.

(ii) The employer shall select respirators from among those jointly approved as being acceptable for protection by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 30 CFR Part 11.

(iii) The employer shall provide a powered, air-purifying respirator in lieu of any negative-pressure respirator specified in Table D-4 whenever:

[A] An employee chooses to use this type of respirator; and

[B] This respirator will provide adequate protection to the employee.

TABLE D-4.—RESPIRATORY PROTECTION FOR ASBESTOS, TREMOLITE, ANTHOPHYLLITE, AND ACTINOLITE FIBERS

Airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals	Required respirator
Not in excess of 2 f/cc (10 X PEL)	1. Half-mask air-purifying respirator equipped with high-efficiency filters.
Not in excess of 10 f/cc (50 X PEL)	1. Full facepiece air-purifying respirator equipped with high-efficiency filters.
Not in excess of 20 f/cc (100 X PEL)	1. Any powered air-purifying respirator equipped with high efficiency filters. 2. Any supplied-air respirator operated in continuous flow mode.
Not in excess of 200 f/cc (1000 X PEL)	1. Full facepiece supplied-air respirator operated in pressure demand mode.
Greater than 200 f/cc (> 1000 X PEL) or unknown concentration	1. Full facepiece supplied air respirator operated in pressure demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus.

NOTE: a. Respirators designed for higher environmental concentrations may be used at lower concentrations.  
b. A high-efficiency filter means a filter that is at least 99.97 percent efficient against micro-dispersed particles of 0.3 micrometers in diameter or larger.

(3) Respirator program. (I) Where respiratory protection is used, the employer shall institute a respirator program in accordance with 29 CFR 1910.134(b), (d), (e), and (f).

(ii) The employer shall permit each employee who uses a filter respirator to

change the filter elements whenever an increase in breathing resistance is detected and shall maintain an adequate supply of filter elements for this purpose.

(iii) Employees who wear respirators shall be permitted to leave work areas to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

(iv) No employee shall be assigned to tasks requiring the use of respirators if, based on his or her most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or of other employees will be impaired by the use of a respirator. Such employee shall be assigned to another job or given the opportunity to transfer to a different position the duties of which he or she is able to perform with the same employer, in the same geographical area, and with the same seniority, status, and rate of pay he or she had just prior to such transfer, if such a different position is available.

(4) *Respirator fit testing.* (i) The employer shall ensure that the respirator issued to the employee exhibits the least possible facepiece leakage and that the respirator is fitted properly.

(ii) Employers shall perform either quantitative or qualitative face fit tests at the time of initial fitting and at least every 6 months hereafter for each employee wearing a negative-pressure respirator. The qualitative fit tests may be used only for testing the fit of half-mask respirators where they are permitted to be worn, and shall be conducted in accordance with Appendix C. The tests shall be used to select facepieces that provide the required protection as prescribed in Table 1.

(1) *Protective clothing—(1) General.* The employer shall provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employees exposed to airborne concentrations of asbestos, tremolite, anthophyllite, actinolite or a combination of these minerals that exceed the permissible exposure limit prescribed in paragraph (c) of this section.

(2) *Laundering.* (i) The employer shall ensure that laundering of contaminated clothing is done so as to prevent the release of airborne asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the exposure limit prescribed in paragraph (c) of this section.

(ii) Any employer who gives contaminated clothing to another person

for laundering shall inform such person of the requirement in paragraph (i)(2)(i) of this section to effectively prevent the release of airborne asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the exposure limit prescribed in paragraph (c) of this section.

(3) *Contaminated clothing.* Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and be labeled in accordance with paragraph (k) of this section.

(4) *Protective clothing for removal, demolition, and renovation operations.*

(i) The competent person shall periodically examine work suits worn by employees for rips or tears that may occur during performance of work.

(ii) When rips or tears are detected while an employee is working within a negative-pressure enclosure, rips and tears shall be immediately mended, or the worksuit shall be immediately replaced.

(j) *Hygiene facilities and practices—*

(1) *Ceneml.* (i) The employer shall provide clean change areas for employees required to work in regulated areas or required by paragraph (i)(l) of this section to wear protective clothing.

*Exception:* In lieu of the change area requirement specified in paragraph (j)(1)(i), the employer may permit employees engaged in small scale, short duration operations, as described in paragraph (e)(6) of this section, to clean their protective clothing with a portable HEPA-equipped vacuum before such employees leave the area where maintenance was performed.

(ii) The employer shall ensure that change areas are equipped with separate storage facilities for protective clothing and street clothing, in accordance with section 1910.141(e).

(iii) Whenever food or beverages are consumed at the worksite and employees are exposed to airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the permissible exposure limit, the employer shall provide lunch areas in which the airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals are below the action level.

(2) *Requirements for removal, demolition, and renovation operations—*

(i) *Decontamination area.* Except for small scale, short duration operations, as described in paragraph (e)(6) of this section, the employer shall establish a decontamination area that is adjacent and connected to the regulated area for the decontamination of employees contaminated with asbestos, tremolite,

anthophyllite, or actinolite. The decontamination area shall consist of an equipment room, a shower area, and clean room in series. The employer shall ensure that employees enter and exit the regulated area through the decontamination area.

(ii) *Clean room.* The clean room shall be equipped with a locker or appropriate storage container for each employee's use.

(iii) *Shower area.* Where feasible, shower facilities shall be provided which comply with 29 CFR 1910.141(d)(3). The showers shall be contiguous both to the equipment room and the clean change room, unless the employer can demonstrate that this location is not feasible. Where the employer can demonstrate that it is not feasible to locate the shower between the equipment room and the clean change room, the employer shall ensure that employees:

(A) Remove asbestos, tremolite, anthophyllite, or actinolite contamination from their work suits using a HEPA vacuum before proceeding to a shower that is not contiguous to the work area; or

(B) Remove their contaminated work suits, don clean work suits, and proceed to a shower that is not contiguous to the work area.

(iv) *Equipment room.* The equipment room shall be supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective clothing and equipment.

(v) *Decontamination area entry procedures.* (A) The employer shall ensure that employees:

(1) Enter the decontamination area through the clean room;

(2) Remove and deposit street clothing within a locker provided for their use; and

(3) Put on protective clothing and respiratory protection before leaving the clean room.

(B) Before entering the enclosure, the employer shall ensure that employees pass through the equipment room.

(vi) *Decontamination area exit procedures.* (A) Before leaving the regulated area, the employer shall ensure that employees remove all gross contamination and debris from their protective clothing.

(B) The employer shall ensure that employees remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers.

(c) The employer shall ensure that employees do not remove their respirators in the equipment room.

(D) The employer shall ensure that employees shower prior to entering the clean room.

(E) The employer shall ensure that, after showering, employees enter the clean room before changing into street clothes.

(k) *Communication of hazards to employees*—(1) *Signs.* (i) Warning signs that demarcate the regulated area shall be provided and displayed at each location when airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals may be in excess of the exposure limit prescribed in paragraph (c) of this section. Signs shall be posted at such a distance from such a location that an employee may read the signs and take necessary protective steps before entering the area marked by the signs.

(ii) The warning signs required by paragraph (k)(1)(i) of this section shall bear the following information:

DANGER  
ASBESTOS  
CANCER AND LUNG DISEASE  
HAZARD  
AUTHORIZED PERSONNEL ONLY  
RESPIRATORS AND PROTECTIVE  
CLOTHING ARE REQUIRED IN THIS  
AREA

(iii) Where minerals in the regulated area are only tremolite, anthophyllite or actinolite, the employer may replace the term "asbestos" with the appropriate mineral name.

(2) *Labels.* (i) Labels shall be affixed to all products containing asbestos, tremolite, anthophyllite, or actinolite and to all containers containing such products, including waste containers. Where feasible, installed asbestos, tremolite, anthophyllite, or actinolite products shall contain a visible label.

(ii) Labels shall be printed in large, bold letters on a contrasting background.

(iii) Labels shall be used in accordance with the requirements of 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard, and shall contain the following information:

DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE  
HAZARD

(iv) Where minerals to be labeled are only tremolite, anthophyllite and actinolite, the employer may replace the term "asbestos" with the appropriate mineral name.

(c) Labels shall contain a warning statement against breathing airborne asbestos, tremolite, anthophyllite, or actinolite fibers.

(4) The provisions for labels required by paragraphs (k)(2)(i)–(k)(2)(iv) do not apply when:

(A) asbestos, tremolite, anthophyllite, or actinolite fibers have been modified by a bonding agent, coating, binder, or other material, provided that the manufacturer can demonstrate that, during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these mineral fibers in excess of the action level will be released, or

(B) asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals is present in a product in concentrations less than 0.1 percent by weight.

(3) *Employee information and training.* (i) The employer shall institute a training program for all employees exposed to airborne concentrations of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of the action level and shall ensure their participation in the program.

(ii) Training shall be provided prior to or at the time of initial assignment, unless the employee has received equivalent training within the previous 12 months, and at least annually thereafter.

(iii) The training program shall be conducted in a manner that the employee is able to understand. The employer shall ensure that each such employee is informed of the following:

(A) Methods of recognizing asbestos, tremolite, anthophyllite, and actinolite;

(B) The health effects associated with asbestos, tremolite, anthophyllite, or actinolite exposure;

(C) The relationship between smoking and asbestos, tremolite, anthophyllite, and actinolite in producing lung cancer;

(D) The nature of operations that could result in exposure to asbestos, tremolite, anthophyllite, and actinolite, the importance of necessary protective controls to minimize exposure including, as applicable, engineering controls, work practices, respirators, housekeeping procedures, hygiene facilities, protective clothing, decontamination procedures, emergency procedures, and waste disposal procedures, and any necessary instruction in the use of these controls and procedures;

(E) The purpose, proper use, fitting instructions, and limitations of

respirators as required by 29 CFR 1910.134;

(F) The appropriate work practices for performing the asbestos, tremolite, anthophyllite, or actinolite Job; and

(C) Medical surveillance program requirements.

(H) A review of this standard, including appendices.

(4) *Access to training materials.* (i) The employer shall make readily available to all affected employees without cost all written materials relating to the employee training program, including a copy of this regulation.

(ii) The employer shall provide to the Assistant Secretary and the Director, upon request, all information and training materials relating to the employee information and training program.

(1) *Housekeeping*—(1) *Vacuuming.* Where vacuuming methods are selected, HEPA filtered vacuuming equipment must be used. The equipment shall be used and emptied in a manner that minimizes the reentry of asbestos, tremolite, anthophyllite, or actinolite into the workplace.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing consigned for disposal shall be collected and disposed of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers.

(m) *Medical surveillance*—(1) *General*—(i) *Employees covered.* The employer shall institute a medical surveillance program for all employees engaged in work involving levels of asbestos, tremolite, anthophyllite, actinolite or a combination of these minerals, at or above the action level for 30 or more days per year, or who are required by this section to wear negative pressure respirators.

(ii) *Examination by a physician.* (A) The employer shall ensure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and are provided at no cost to the employee and at a reasonable time and place.

(B) Persons other than such licensed physicians who administer the pulmonary function testing required by this section shall complete a training course in spirometry sponsored by an appropriate academic or professional institution.

(2) *Medical examinations and consultations*—(1) *Frequency.* The employer shall make available medical examinations and consultations to each employee covered under paragraph

(m)(1)(i) of this section on the following scheduler:

(A) Prior to assignment of the employee to an area where negative-pressure respirators are worn:

(B) When the employee is assigned to an area where exposure to asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals may be at or above the action level for 30 or more days per year, a medical examination must be given within 10 working days following the thirtieth day of exposure:

(C) And at least annually thereafter.

(D) If the examining physician determines that any of the examinations should be provided more frequently than specified, the employer shall provide such examinations to affected employees at the frequencies specified by the physician.

(E) **Exception:** No medical examination is required of any employee if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(i) **Content.** Medical examinations made available pursuant to paragraphs (m)(2)(i)(A)-(m)(2)(i)(C) of this section shall include:

(A) A medical and work history with special emphasis directed to the pulmonary, cardiovascular, and gastrointestinal systems.

(B) On initial examination, the standardized questionnaire contained in Appendix D, Part 1, and, on annual examination, the abbreviated standardized questionnaire contained in Appendix D, Part 2.

(C) A physical examination directed to the pulmonary and gastrointestinal systems, including a chest roentgenogram to be administered at the discretion of the physician, and pulmonary function tests of forced vital capacity (FVC) and forced expiratory volume at one second (FEV<sub>1</sub>). Interpretation and classification of chest roentgenograms shall be conducted in accordance with Appendix E.

(D) Any other examinations or tests deemed necessary by the examining physician.

(3) **Information provided to the physician.** The employer shall provide the following information to the examining physician:

(i) A copy of this standard and Appendix D, E, and F;

(ii) A description of the affected employee's duties as they relate to the employee's exposure;

(iii) The employee's representative exposure level or anticipated exposure level;

(iv) A description of any personal protective and respiratory equipment used or to be used; and

(v) Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.

(4) **Physician's written opinion.** (i) The employer shall obtain a written opinion from the examining physician. This written opinion shall contain the results of the medical examination and shall include:

(A) The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos, tremolite, anthophyllite, or actinolite;

(B) Any recommended limitations on the employee or on the use of personal protective equipment such as respirators; and

(C) A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos, tremolite, anthophyllite, or actinolite exposure.

(ii) The employer shall instruct the physician not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to asbestos, tremolite, anthophyllite, or actinolite.

(iii) The employer shall provide a copy of the physician's written opinion to the affected employee within 30 days from its receipt.

(n) **Recordkeeping—(1) Objective data for exempted operations.** (i) Where the employer has relied on objective data that demonstrate that products made from or containing asbestos, tremolite, anthophyllite, or actinolite are not capable of releasing fibers of asbestos, tremolite, anthophyllite, or actinolite or a combination of these minerals, in concentrations at or above the action level under the expected conditions of processing, use, or handling to exempt such operations from the initial monitoring requirements under paragraph (f)(2) of this section, the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.

(ii) The record shall include at least the following information:

(A) The product qualifying for exemption;

(B) The source of the objective data;

(C) The testing protocol, results of testing, and/or analysis of the material for the release of asbestos, tremolite, anthophyllite, or actinolite;

(D) A description of the operation exempted and how the data support the exemption; and

(E) Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption.

(iii) The employer shall maintain this record for the duration of the employer's reliance upon such objective data.

(2) **Exposure measurements.** (i) The employer shall keep an accurate record of all measurements taken to monitor employee exposure to asbestos, tremolite, anthophyllite, or actinolite as prescribed in paragraph (f) of this section.

**Note:** The employer may utilize the services of competent organizations such as industry trade associations and employee associations to maintain the records required by this section.

(ii) This record shall include at least the following information:

(A) The date of measurement;

(B) The operation involving exposure to asbestos, tremolite, anthophyllite, or actinolite that is being monitored;

(C) Sampling and analytical methods used and evidence of their accuracy;

(D) Number, duration, end results of samples taken;

(E) Type of protective devices worn, if any; and

(F) Name, social security number, and exposure of the employees whose exposures are represented.

(iii) The employer shall maintain this record for at least thirty (30) years, in accordance with 29 CFR 1910-M.

(3) **Medical surveillance.** (i) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance by paragraph (m) of this section, in accordance with 29 CFR 1910.20.

(ii) The record shall include at least the following information:

(A) The name and social security number of the employee;

(B) A copy of the employee's medical examination results, including the medical history, questionnaire response, results of any tests, and physician's recommendations.

(C) Physician's written opinions;

(D) Any employee medical complaints related to exposure to asbestos, tremolite, anthophyllite, or actinolite; and

(E) A copy of the information provided to the physician as required by paragraph (m) of this section.

(iii) The employer shall ensure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with 29 CFR 1910.20.

(4) **Training records.** The employer shall maintain all employee training records for one year beyond the last date of employment by that employer.

(5) **Availability.** (i) The employer, upon written request, shall make all records required to be maintained by this section available to the Assistant Secretary and the Director for examination and copying.

(ii) The employer, upon request, shall make any exposure records required by paragraphs (f) and (n) of this section available for examination and copying to affected employees, former employees, designated representatives, and the Assistant Secretary, in accordance with 29 CFR 1910.20(a)-(e) and (g)-(i).

(iii) The employer, upon request, shall make employee medical records required by paragraphs (m) and (n) of this section available for examination and copying to the subject employee, anyone having the, specific written consent of the subject employee, and the Assistant Secretary, in accordance with 29 CFR 1910.20.

(6) **Transfer of records.** (i) The employer shall comply with the requirements concerning transfer of records set forth in 29 CFR 1910.20 (h).

(ii) Whenever the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director at least 90 days prior to disposal and, upon request, transmit them to the Director.

(D) **Dates—(1) Effective date.** This section shall become effective [insert date 30 days from publication in the Federal Register]. The requirements of the asbestos standard issued in June 1972 (37 FR 11318), as amended, and published in 29 CFR 1910.1001 (1985) remain in effect until compliance is achieved with the parallel provisions of this standard.

(2) **Start-up dates.** (i) The requirements of paragraphs (c) through (n) of this section, including the engineering controls specified in paragraph (g)(1) of this section, shall be complied with by [insert date 210 days from publication in the Federal Register].

(p) **Appendices.** (1) Appendices A, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

(2) Appendices B, F, G, H, and I to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

#### Appendix A to § 1926.58—OSHA Reference Method—Mandatory

This mandatory appendix specifies the procedure for analyzing air samples for asbestos, tremolite, anthophyllite, and actinolite and specifies quality control procedures that must be implemented by laboratories performing the analysis. The sampling and analytical methods described below represent the elements of the available monitoring methods (such as the NIOSH 7400 method) which OSHA considers to be essential to achieve adequate employee exposure monitoring while allowing employers to use methods that are already established within their organizations. All employers who are required to conduct air monitoring under paragraph (f) of the standard are required to utilize analytical laboratories that use this procedure, or an equivalent method, for collecting and analyzing samples.

#### Sampling and Analytical Procedure

1. The sampling medium for air samples shall be mixed cellulose ester filter membrane. These shall be designated by the manufacturer as suitable for  $\bullet$  bcltor tremolite, anthophyllite, and actinolite counting. See below for rejection of blanks.

2. The preferred collection device shall be the 25-mm diameter cassette with an open-faced 60-mm extension cowl. The 37-mm cassette may be used if necessary but only if written justification for the need to use the 37-mm filter cassette accompanies the sample results in the employee's exposure monitoring record.

3. An air flow rate between 0.5 liter/min and 2.5 liters/min shall be selected for the 25-mm cassette. If the 37-mm cassette is used, an air flow rate between 1 liter/min and 2.5 liters/min shall be selected.

4. Where possible, a sufficient  $\bullet$  lrvolume for each air sample shall be collected to yield between 100 and 1,200 fibers per square millimeter on the membrane filter. If a filter darkens in appearance or if loose dust is seen on the filter, a second sample shall be started.

5. Ship the samples in a rigid container with sufficient packing material to prevent dislodging the collected fibers. Packing material that has a high electrostatic charge on its  $\bullet$  &ua (e.g., expanded polystyrene) cannot be used because such material can cause loss of fibers to the sides of the cassette.

6. Calibrate each personal  $\bullet$  nmping pump before and  $\bullet$  ftm use with a representative filter cassette installed between the pump and the calibration devices.

7. Personal samples shall be taken in the "breathing zone" of the employee (i.e., attached to or near the collar or lapel near the worker's face).

8. Fiber counts shall be made by positive phase contrast using a microscope with an  $\bullet$  10  $\bullet$  eyepiece and  $\bullet$  40 to 45X objective for a total magnification of approximately 400 X and a numerical  $\bullet$  ponun of 0.65 to 0.75. The microscope shall also be fitted with a green or blue filter.

9. The microscope shall be fitted with a Walton-Beckett eyepiece graticule calibrated

for a field diameter of 100 micrometers (+/- 2 micrometers).

10. The phase-shift detection limit of the microscope shall be about 3 degrees measured using the HSE phase shift test slide as outlined below.

- Place the test slide on the microscope stage and center it under the phase objective.
- Bring the blocks of grooved lines into focus.

**Note.**—The slide consists of seven sets of grooved lines (ca. 20 grooves to each block) in descending order of visibility from sets 1 to 7, seven being the least visible. The requirements for asbestos, tremolite,

anthophyllite, and  $\bullet$  ctinolite counting are that the microscope optics must resolve the grooved lines in MI 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 and 7 must be invisible. Sets 4 and 5 must be at least partially visible but may vary slightly in visibility between microscopes. A microscope that fails to meet these requirements has either too low or too high a resolution to be used for asbestos, tremolite, anthophyllite,  $\bullet$  ctinolite counting.

c. If the image deteriorates, clean and adjust the microscope optics. If the problem persists, consult the microscope manufacturer.

11. Each set of samples in will include 10 percent blanks or a minimum of 2 blanks. The blank results shall be  $\bullet$  vtraged and subtracted from the analytical results before reporting. Any samples represented by  $\bullet$  blank having a fiber count in excess of 7 fibers/100 fields shall be rejected.

12. The samples shall be mounted by the acetone/triacetin method or a method with an equivalent index of refraction and similar clarity.

13. Observe the following counting rules.

a. Count only fibers equal to or longer than 5 micrometers. Measure the length of curved fibers along the curve.

b. Count all particles at asbestos, tremolite, anthophyllite, and  $\bullet$  ctinolite that have a length-to-width ratio (aspect ratio) of 3:1 or greater.

c. Fibers lying entirely within the boundary of the Walton-Beckett graticule field shall receive a count of 1. Fibers crossing the boundary once, having one end within the circle, shall receive the count of one half (1/2). Do not count any fiber that crosses the graticule boundary more than once. Reject and do not count any other fibers even though they may be visible outside the graticule area.

d. Count bundles of fibers as one fiber unless individual fibers can be identified by observing both ends of an individual fiber.

e. Count enough graticule fields to yield 100 fibers. Count a minimum of 20 fields; stop counting at 100 fields regardless of fiber count.

14. Blind counts shall be conducted at the rate of 10 percent.

#### Quality Control Procedures

1. Intralaboratory program. Each laboratory and/or each company with more than one microscopist counting slides shall establish a statistically designed quality assurance program involving blind counts  $\bullet$  nd

comparisons between microscopists to monitor the variability of counting by each microscopist and between microscopists. In a company with more than one laboratory, the program shall include all laboratories, and shall also evaluate the laboratory-to-laboratory variability.

2. Interlaboratory program. Each laboratory analyzing asbestos, tremolite, anthophyllite, and actinolite samples for compliance determination shall implement an interlaboratory quality assurance program that as a minimum includes participation of at least two other independent laboratories. Each laboratory shall participate in round robin testing at least once every 6 months with at least one of the other laboratories in its interlaboratory quality assurance group. Each laboratory shall submit slides typical of its own workload for use in this program. The round robin shall be designed and results analyzed using appropriate statistical methodology.

3. All individuals performing asbestos, tremolite, anthophyllite, and actinolite analysis must have taken the NIOSH course for sampling and evaluating airborne asbestos, tremolite, anthophyllite, and actinolite dust or an equivalent course.

4. When the use of different microscopes contributes to differences between counters and laboratories, the effect of the different microscope shall be evaluated and the microscope shall be replaced, as necessary.

5. Current results of these quality control programs shall be posted in each laboratory to keep the microscopists informed.

#### Appendix B to § 1926.58—Detailed Procedure for Asbestos Tremolite, Anthophyllite, and Actinolite Sampling and Analysis—Non-Mandatory

This appendix contains a detailed procedure for sampling and analysis and includes those critical elements specified in Appendix A. Employers are not required to use this procedure, but they are required to use Appendix A. The purpose of Appendix B is to provide a detailed step-by-step sampling and analysis procedure that conforms to the elements specified in Appendix A. Since this procedure may also standardize the analysis and reduce variability, OSHA encourages employers to use this appendix.

#### Asbestos, Tremolite, Anthophyllite, and Actinolite Sampling and Analysis Method

Technique: Microscopy, Phase Contrast.  
Analyte: Fibers (Manual Count).

Sample Preparation: Acetone/triacetin method.

Calibration: Phase-shift detection limit about 3 degrees.

Range: 100 to 1300 fibers/mm<sup>2</sup> filter area.

Estimated Limit of Detection: 7 fibers/mm<sup>2</sup> filter area.

Sampler: Filter (0.8–1.2 µm mixed cellulose ester membrane, 25-mm diameter).

Flow Rate: 0.5 l/min to 2.5 l/min (25-mm cassette); 1.0 l/min to 2.5 l/min (37-mm cassette).

Sample Volume: Adjust to obtain 100 to 1300 fibers/mm<sup>2</sup>.

Shipping: Routine.

Sample Stability: Indefinite.

Blanks: 10% of samples (minimum 2)

Standard Analytical Error: 0.25.

Applicability: The working range is 0.02 f/cc (1920-L) to 10.25 f/cc (400-L air sample). The method gives an index of airborne asbestos, tremolite, anthophyllite, and actinolite fibers but may be used for other materials such as fibrous glass by inserting suitable parameters into the counting rules. The method does not differentiate between asbestos, tremolite, anthophyllite, and actinolite and other fibers. Asbestos, tremolite, anthophyllite, and actinolite fibers less than ca. 0.25 µm diameter will not be detected by this method.

Interferences: Any other airborne fibers may interfere since all particles meeting the counting criteria are counted. Chain-like particles may appear fibrous. High levels of nonfibrous dust particles may obscure fibers in the field of view and raise the detection limit.

#### Reagents

1. Acetone.
2. Triacetin (glycerol triacetate), reagent grade.

#### Special Precautions

Acetone is an extremely flammable liquid and precautions must be taken not to ignite it. Heating of acetone must be done in a ventilated laboratory fume hood using a flameless, spark-free heat source.

#### Equipment

1. Collection device: 25-mm cassette with 50-mm extension cowl with cellulose ester filter, 0.8 to 12 mm pore size and backup pad.

Note.—Analyze representative filters for fiber background before use and discard the filter lot if more than 5 fibers/100 fields are found.

2. Personal sampling pump, greater than or equal to 0.5 L/min, with flexible connecting tubing.

3. Microscope, phase contrast, with green or blue filter, 8 to 10X eyepiece, and 40 to 45X phase objective (total magnification ca 400X); numerical aperture = 0.65 to 0.75.

4. Slides, glass, single-frosted, pre-cleaned, 25 x 75 mm.

5. Cover slips, 25x25 mm, no. 1 1/2 unless otherwise specified by microscope manufacturer.

6. Knife, # 1 surgical steel, curved blade.

7. Tweezers.

8. Flask, Guth-type, insulated neck, 250 to 500 mL (with single-holed rubber stopper and elbow-jointed glass tubing, 16 to 22 cm long).

9. Hotplate, spark-free, stirring type; heating mantle; or infrared lamp and magnetic stirrer.

10. Syringe, hypodermic, with 22-gauge needle.

11. Craticula, Walton-Beckett type with 100 µm diameter circular field at the specimen plane (area = 0.00785 mm<sup>2</sup>), (Type C-221).

Note.—The craticula is custom-made for each microscope.

12. HSE/NPL phase contrast test slide.

Mark II.

13. Telescope, ocular phase-ring centering.

14. Stage micrometer (0.01 mm divisions).

#### Sampling

1. Calibrate each personal sampling pump with a representative sampler in line.

2. Fasten the sampler to the worker's lapel as close as possible to the worker's mouth. Remove the top cover from the end of the cowl extension (open face) and orient face down. Wrap the joint between the extender and the monitor's body with shrink tape to prevent air leaks.

3. Submit at least two blanks (or 10% of the total samples, whichever is greater) for each set of samples. Remove the caps from the field blank cassettes and store the caps and cassettes in a clean area (bag or box) during the sampling period. Replace the caps in the cassettes when sampling is completed.

4. Sample at 0.5 L/min or greater. Do not exceed 1 mg total dust loading on the filter. Adjust sampling flow rate, Q (L/min), and time to produce a fiber density, E (fibers/mm<sup>2</sup>), of 100 to 1300 fibers/m<sup>2</sup> (3.65 x 10<sup>4</sup> to 5 x 10<sup>5</sup> fibers per 25-mm filter with effective collection area (A<sub>e</sub> = 385 mm<sup>2</sup>) for optimum counting precision (see step 21). Calculate the minimum sampling time, t<sub>min</sub> (min) at the action level (one-half of the current standard), L (f/cc) of the fibrous aerosol being sampled:

$$t_{min} = \frac{(Ac)(E)}{(Q)(L)10^3}$$

5. Remove the field monitor at the end of sampling, replace the plastic top cover and small end caps, and store the monitor.

6. Ship the samples in a rigid container with sufficient packing material to prevent jostling or damage. NOTE Do not use polystyrene foam in the shipping container because of electrostatic forces which may cause fiber loss from the sampler filter.

#### Sample Preparation

Note.—The object is to produce samples with a smooth (non-grainy) background in a medium with a refractive index equal to or less than 1.48. The method below collapses the filter for easier focusing and produces permanent mounts which are useful for quality control and interlaboratory comparison. Other mounting techniques meeting the above criteria may also be used, e.g., the nonpermanent field mounting technique used in P & CAM 239.

7. Ensure that the glass slides and cover slips are free of dust and fibers.

8. Place 40 to 60 ml of acetone into a Guth-type flask. Stopper the flask with a single-hole rubber stopper through which a glass tube extends 5 to 8 cm into the flask. The portion of the glass tube that exits the top of the stopper (8 to 10 cm) is bent downward in an elbow that makes an angle of 20 to 30 degrees with the horizontal.

9. Place the flask in a stirring hotplate or wrap in a heating mantle. Heat the acetone gradually to its boiling temperature (ca. 58°C).

Caution.—The acetone vapor must be generated in a ventilated fume hood away from all open flames and spark sources. Alternate heating methods can be used, providing no open flame or sparks are present.

10. Mount either the whole sample filter or a wedge cut from the sample filter on a clean glass slide.

a. Cut wedges of cm. 25 percent of the filter area with a curved-blade steel surgical knife using a rocking motion to prevent tearing.

b. Place the filter or wedge dust slide up, on the slide. Static electricity will usually keep the filter on the slide until it is cleared.

c. Hold the glass slide supporting the filter approximately 1 to 2 cm from the glass tube port where the acetone vapor is escaping from the heated flask. The acetone vapor stream should cause a condensation spot on the glass slide ca. 2 to 3 cm in diameter. Move the glass slide gently in the vapor stream. The filter should clear in 2 to 6 sec. If the filter curls, distorts, or is otherwise rendered unusable, the vapor stream is probably not strong enough. Periodically wipe the outlet port with tissue to prevent liquid acetone dripping onto the filter.

d. Using the hypodermic syringe with a 22-gauge needle, place 1 to 2 drops of triacetin on the filter. Gently lower a clean 25-mm square cover slip down onto the filter at a slight angle to reduce the possibility of forming bubbles. If too many bubbles form or the amount of triacetin is insufficient, the cover slip may become detached within a few hours.

e. Glue the edger of the cover slip to the glass slide using a lacquer or nail polish.

Note.—If clearing is slow, the slide preparation may be heated on a hotplate (surface temperature WC) for 15 min to hasten clearing. Counting may proceed immediately after clearing and mounting are completed.

#### Calibration and Quality Control

11. Calibration of the Walton-Beckett graticule. The diameter,  $d_g$  (mm), of the circular counting area and the disc diameter must be specified when ordering the graticule.

a. Insert any available graticule into the eyepiece and focus so that the graticule lines are sharp and clear.

b. Set the appropriate interpupillary distance and if applicable, reset the binocular head adjustment so that the magnification remains constant.

c. Install the 40 to 45 X phase objective.

d. Place a stage micrometer on the microscope object stage and focus the microscope on the graduated lines.

e. Measure the magnified grid length,  $L_g$  (um), using the stage micrometer.

f. Remove the graticule from the microscope and measure its actual grid length,  $L_g$  (mm). This can best be accomplished by using a stage fitted with verniers.

g. Calculate the circle diameter,  $d_g$  (mm), for the Walton-Beckett graticule:

$$d_g = \frac{L_g \times D}{L_g}$$

Example: If  $L_g = 100 \text{ um}$ ,  $L_g = 2.83 \text{ mm}$  and  $D = 100 \text{ um}$ , the "  $d_g = 2.71 \text{ mm}$ ."

h. Check the field diameter,  $D$  (acceptable range  $100 \text{ mm} \pm 2 \text{ mm}$ ) with a stage micrometer upon receipt of the graticule from the manufacturer. Determine field area ( $\text{mm}^2$ ).

12. Microscope adjustments. Follow the manufacturer's instructions and also the following:

4. Adjust the light source for even illumination across the field of view at the condenser iris.

Note.—Kohler illumination is preferred, where available.

b. Focus on the particulate material to be examined.

c. Make sure that the field iris is in focus, entered on the sample, and open only enough to fully illuminate the field of view.

d. Use the telescope ocular supplied by the manufacturer to ensure that the phase rings (annular diaphragm and phase-shifting elements) are concentric.

13. Check the phase-shift detection limit of the microscope periodically.

a. Remove the HSE/NPL phase-contrast test slide from its shipping container and center it under the phase objective.

b. Bring the blocks of grooved lines into focus.

Note.—The slide consists of seven sets of grooves (ca. 20 grooves to each block) in descending order of visibility from sets 1 to 7. The requirements for counting are that the microscope optics must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 to 7 must be invisible. Sets 4 and 5 must be at least partially visible but may vary slightly in visibility between microscopes. A microscope which fails to meet these requirements has either too low or too high a resolution to be used for asbestos, tremolite, anthophyllite, and actinolite counting.

c. If the image quality deteriorates, clean the microscope optics and, if the problem persists, consult the microscope manufacturer.

14. Quality control of fiber counts.

a. Prepare end mount field blanks along with the field samples. Report the counts on each blank. Calculate the mean of the field blank counts and subtract this value from each sample count before reporting the results.

Note 1.—The identity of the blank filters should be unknown to the counter until all counts have been completed.

Note 2.—If a field blank yields fiber counts greater than 7 fibers/100 fields, report possible contamination of the samples.

b. Perform blind recounts by the same counter on 10 percent of filters counted (slides relabeled by a person other than the counter).

15. Use the following test to determine whether a pair of counts on the same filter should be rejected because of possible bias. This statistic estimates the counting repeatability at the 95% confidence level.

Discard the sample if the difference between the two counts exceeds  $1.7(F)S$ , where  $F$  = average of the two counts and  $S$  = relative standard deviation, which should be derived by each laboratory based on historical in-house data.

Note.—If a pair of counts is rejected as a result of this test, recount the remaining samples in the set and the new counts against the first counts. Do not discard all rejected paired counts.

16. Enroll each new counter in a training course that compares performance of counters on a variety of samples using this procedure.

Note.—To ensure good reproducibility, all laboratories engaged in asbestos, tremolite, anthophyllite, and actinolite counting are required to participate in the Proficiency Analytical Testing (PAT) Program and should routinely participate with other asbestos, tremolite, anthophyllite, and actinolite fiber counting laboratories in the exchange of field samples to compare performance of counters.

#### Measurement

17. Place the slide on the mechanical stage of the calibrated microscope with the Center of the filler under the objective lens. Focus the microscope on the plane of the filter.

18. Regularly check phase-ring alignment and Kohler illumination.

19. The following are the counting rules:

a. Count only fibers longer than 5 um. Measure the length of curved fibers along the curve.

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

c. For fibers that cross the boundary of the graticule field do the following:

1. Count any fiber longer than 5 um that lies entirely within the graticule area.
2. Count a  $\frac{1}{2}$  fiber if a fiber with only one end lying within the graticule area.
3. Do not count any fiber that crosses the graticule boundary more than once.
4. Reject end do not count all other fibers.
- d. Count bundles of fibers as one fiber unless individual fibers can be identified by observing both ends of a fiber.

a. Count enough graticule fields to yield 100 fibers. Count a minimum of 20 fields. Stop at 100 fields regardless of fiber count.

20. Start counting from one end of the filter end progress along a radial line to the other end, shift either up or down on the filter, and continue in the reverse direction. Select fields randomly by looking away from the eyepiece briefly while advancing the mechanical stage. When an agglomerate covers ca.  $\frac{1}{4}$  or more of the field of view, reject the field and select another. Do not report rejected fields in the number of total fields counted.

Note.—When counting a field, continuously own a range of focal planes by moving the fine focus knob to detect very fine fibers which have become embedded in the filter. The small-diameter fibers will be very faint but are an important contribution to the total count.

**Calculations**

21. Calculate and report fiber density on the filter,  $E$  (fibers/mm<sup>2</sup>); by dividing the total fiber count,  $F$ ; minus the mean field blank count  $B$ , by the number of fields,  $n$ ; and the field area,  $A_f$  (0.00786mm<sup>2</sup> for a properly calibrated Walton-Beckett graticule):

$$E = \frac{F - B}{(n)(A_f)} \text{ fibers/mm}^2$$

22. Calculate the concentration,  $C$  (f/cc), of fibers in the air volume sampled,  $V$  (L), using the effective collection area of the filter,  $A_c$  (385 mm<sup>2</sup> for a 4.2-mm filter):

$$C = \frac{(E)(A_c)}{V(10^3)}$$

**Note.**—Periodically check and adjust the value of  $A_c$ , if necessary.

**Appendix C to § 1926.56—Qualitative and Quantitative Fit Testing Procedures—Mandatory**

**Qualitative Fit Test Protocols**

**1. Isoamyl Acetate Protocol**

**A. Odor threshold screening.**

1. Three 1-liter glass jar with metal lids (e.g. Mason or Bell jars) are required.

2. Odor-free water (e.g. distilled or spring water) at approximately 25 °C shall be used for the solutions.

3. The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution 14 prepared by adding 1 cc of pure IAA to 800 cc of odor free water in a 1-liter jar and shaking for 30 seconds. This solution shall be prepared new at hut weekly.

4. The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well ventilated but shall not be connected to the same recirculating ventilation system.

5. The odor test solution is prepared in a second jar by placing 0.4 cc of the stock solution into 500 cc of odor free water using a dean dropper or pipette. Shake for 30 seconds and allow to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution may be used for only one day.

6. A test blank is prepared in a third jar by adding 500 cc of odor free water.

7. The odor test and test blank jars shall be labelled 1 and 2 for jar identification. If the labels are put on the lids they can be periodically peeled, dried off and switched to maintain the integrity of the test.

8. The following instructions shall be typed on a card and placed on the table in front of the two test jars (1-4.1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of

these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

9. The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

10. If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test may not be used.

11. If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

**B. Respirator Selection.**

1. The test subject shall be allowed to pick the most comfortable respirator from a selection including respirators of various sizes from different manufacturers. The selection shall include at least five sizes of elastomeric half facepieces, from at least two manufacturers.

2. The selection process shall be conducted in a room separate from the fit-test chamber to prevent odor fatigue. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine a

"comfortable" respirator. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, as it is only a review.

3. The test subject should understand that the employee is being asked to select the respirator which provides the most comfortable fit. Each respirator represents 4 different size and shape and, if fit properly and used properly will provide adequate protection.

4. The test subject holds each facepiece up to the face and eliminates those which obviously do not give a comfortable fit. Normally, selection will begin with a half-mask and if a good fit cannot be found, the subject will be asked to test the full facepiece respirators. (A small percentage of users will not be able to wear any half-mask.)

5. The more comfortable facepieces are noted: the most comfortable mask is donned and worn at least five minutes to assess comfort. All donning and adjustments of the facepiece shall be performed by the test subject without assistance from the test conductor or other person. Assistance in assessing comfort can be given by discussing the points in #6 below. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include reviewing the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

- Positioning of mask on nose.

- Room for eye protection.
- Room to talk.
- Positioning mask on face and cheeks.

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

- Chin properly placed.
- Strap tension.
- Fit across nose bridge.
- Distance from nose to chin.
- Tendency to slip.
- Self-observation in mirror.

8. The test subject shall conduct the conventional negative and positive-pressure fit checks before conducting the negative- or positive-pressure test the subject shall be told to "seal" the mark by rapidly moving the head from side-to-side and up and down, while taking 4 few deep breaths.

9. The test subject is now ready for testing.

10. After passing the fit test, the test subject shall be questioned again regarding the comfort of the respirator. If it becomes uncomfortable, another model of respirator shall be tried.

11. The employee shall be given the opportunity to select a different facepiece and be retested if the chosen facepiece becomes increasingly uncomfortable at any time.

**C. Fit test.**

1. The fit test chamber shall be similar to a clear 55 gal drum liner suspended inverted over a 4 foot diameter frame, so that the top of the chamber is about 6 inches above the test subject's head. The inside top center of the chamber shall have 4 small hook attached.

2. Each respirator used for the fitting and testing shall be equipped with organic vapor cartridges or offer protection against organic vapors. The cartridges or masks shall be changed at least weekly.

3. After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

4. A copy of the following test exercises and rainbow passage shall be taped to the inside of the test chamber:

**Test Exercises**

- i. Breathe normally.
- ii. Breathe deeply. Be certain breaths are deep and regular.
- iii. Turn head all the way from one side to the other. Inhale on each side. Be certain movement is complete. Do not bump the respirator against the shoulders.
- iv. Nod head up-and-down. Inhale when head is in the full up position (looking toward ceiling). Be certain motions are complete and made about every second. Do not bump the respirator on the chest.
- v. Talking. Talk aloud and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements, and thus be useful to satisfy this requirement.

Alternative passages which serve the same purpose may also be used.

- vi. Jogging in place.
- vii. Breathe normally.

#### Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

5. Each test subject shall wear the respirator for at least 10 minutes before starting the fit test.

6. Upon entering the test chamber, the test subject shall be given a 6 inch by 5 inch piece of paper towel or other porous absorbent single ply material, folded in half and wetted with three-quarters of one cc of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber.

7. Allow two minutes for the IAA test concentration to be reached before starting the fit-test exercises. This would be an appropriate time to talk with the test subject, to explain the fit test, the importance of cooperation, the purpose for the head exercises, or to demonstrate some of the exercises.

8. Each exercise described in 24 above shall be performed for at least one minute.

9. If at any time during the test, the subject detects the banana-like odor of IAA, the test has failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

10. If the test is failed, the subject shall return to the selection room and remove the respirator, repeat the odor sensitivity test, select and put on another respirator, return to the test chamber, and again begin the procedure described in the c(4) through c(8) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait about 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

11. If a person cannot pass the fit test described above wearing a half-mask respirator from the available selection, full facepiece models must be used.

12. When a respirator is found that passes the test, the subject breaks the face seal and takes a breath before exiting the chamber. This is to assure that the reason the test subject is not smelling the IAA is the good fit of the respirator facepiece seal and not olfactory fatigue.

13. When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test. To keep the area from becoming contaminated, the used towels shall be kept in a self-sealing bag so there is no significant IAA concentration buildup in the test chamber during subsequent tests.

14. At least two facepieces shall be selected for the IAA test protocol. The test

subject shall be given the opportunity to wear them for one week to choose the one which is more comfortable to wear.

15. Persons who have successfully passed this fit test with a half-mask respirator may be assigned the use of the test respirator in atmospheres with up to 10 times the PEL of asbestos. In atmospheres greater than 10 times, and less than 100 times the PEL (up to 1a, ppm), the subject must pass the IAA test using a full face negative pressure respirator. (The concentration of the IAA inside the test chamber must be increased by ten times for QLF of the full facepiece.)

16. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

17. If hair growth or apparel interferes with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, or self-contained breathing

18. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respirator diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

19. Qualitative fit testing shall be repeated at least every six months.

20. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the test subject has a:

- (1) Weight change of 20 pounds or more.
- (2) Significant facial scarring in the area of the facepiece seal.
- (3) Significant dental changes: i.e., multiple extractions without prosthesis, or acquiring dentures.
- (4) Reconstructive or cosmetic surgery, or
- (5) Any other condition that may interfere with facepiece sealing.

#### D. Recordkeeping.

A summary of all test results shall be maintained in each office for 3 years. The summary shall include:

- (1) NUN of test subject.
- (2) Date of testing.
- (3) Name of the test conductor.
- (4) Respirators selected (indicate manufacturer, model, size and approval number).
- (5) Testing agent.

#### II. Saccharin Solution Aerosol Protocol

##### A. Respirator Selection.

Respirators shall be selected as described in section IB (respirator selection) above, and each respirator shall be equipped with a particulate filter.

##### B. Taste Threshold Screening.

1. An enclosure shall be used for threshold screening (to determine if the individual can taste saccharin) and for fit testing. The enclosure shall be approximately 12 inches in diameter by 14 inches tall with at least the front clear to allow free movement of the head when a respirator is worn.

2. The test enclosure shall have a three-quarter inch hole in front of the test subject's

nose and mouth area to accommodate the nebulizer nozzle.

3. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

4. During the threshold screening test, the test subject shall don the test enclosure and breathe with open mouth with tongue extended.

5. Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

6. The threshold check solution consists of 0.25 grams of sodium saccharin USP in water. It can be prepared by putting 1 cc of the test solution (see C 7 below) in 100 cc of water.

7. To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then is released and allowed to fully expand.

8. Ten squeezes of the nebulizer bulb are repeated rapidly and then the test subject is asked whether the saccharin can be tasted.

9. If the first response is negative, ten more squeezes of the nebulizer bulb are repeated rapidly and the test subject is again asked whether the saccharin can be tasted.

10. If the second response is negative ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin can be tasted.

11. The test conductor will take note of the number of squeezes required to elicit a taste response.

12. If the saccharin is not tasted after 30 squeezes (step 10), the saccharin test cannot be performed on the test subject.

13. If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

14. Correct use of the nebulizer means that approximately 1 cc of liquid is used at a time in the nebulizer body.

15. The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least every four hours.

#### C. Fit test.

1. The test subject shall don and adjust the respirator without the assistance of any person.

2. The test subject uses the same enclosure described in section II B.

3. Each test subject shall wear the respirator for at least 10 minutes before the fit test.

4. The test subject shall don the enclosure while wearing the respirator selected in section IB above. This respirator shall be properly adjusted and equipped with a particulate filter.

5. The test subject may not eat, drink (except plain water), or chew gum for 15 minutes before the test.

6. A second DeVilbiss Model 40 Inhalation Medication Nebulizer is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

7. The fit test solution is prepared by adding 83 gram. of sodium saccharin to 100 cc of warm water.

a. As before, the test subject shall breathe with mouth open and tongue extended.

8. The nebulizer is inserted into the hole in the front of the enclosure and the fit test solution is sprayed into the enclosure using the same technique as for the taste threshold screening and the same number of squeezes required to elicit a taste response in the screening. (See B8 through B10 above.)

10. After generation of the aerosol read the following instructions to the test subject. The test subject shall perform the exercises for one minute each.

- i. Breathe normally.
- ii. Breathe deeply. Be certain breaths are deep and regular.
- iii. Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against the shoulders.
- iv. Nod head up-and-down. Be certain motions are complete. Inhale when head is in the full up position (when looking toward the ceiling). Do not bump the respirator on the chest.
- v. Talking. Talk aloud and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements, and thus be useful to satisfy this requirement. Alternative passages which serve the same purpose may also be used.
- vi. Jogging in place.
- vii. Breathe normally.

#### Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

11. At the beginning of each exercise, the aerosol concentration shall be replenished using one-half the number of squeezes as initially described in C9.

12. The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected.

13. If the saccharin is detected the fit is deemed unsatisfactory and a different respirator shall be tried.

14. At least two facepieces shall be selected by the IAA test protocol. The test subject shall be given the opportunity to wear them for one week to choose the one which is more comfortable to wear.

15. Successful completion of the test protocol shall allow the use of the half mask tested respirator in contaminated atmospheres up to 10 times the PEL of asbestos. In other words this protocol may be used to assign protection factors no higher than ten.

16. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

17. If hair growth or apparel interfere with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, or self-contained breathing apparatus.

18. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respirator diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

19. Qualitative fit testing shall be repeated at least every six months.

20. In addition, because the sealing of the respirator may be affected qualitative fit testing shall be repeated immediately when the test subject has a:

- (1) Weight change of 20 pounds or more.
- (2) Significant facial scarring in the area of the facepiece seal.
- (3) Significant dental changes; i.e., multiple extractions without prothesis, or acquiring dentures.
- (4) Reconstructive or cosmetic surgery, or
- (5) Any other condition that may interfere with facepiece sealing.

#### D. Recordkeeping.

A summary of all test results shall be maintained in each office for 3 years. The summary shall include:

- (1) Name of test subject.
- (2) Date of testing.
- (3) Name of test conductor.
- (4) Respirators selected (indicate manufacturer, model, size and approval number).
- (5) Testing agent.

#### III. Irritant Fume Protocol

A. Respirator selection. Respirators shall be selected as described in section IB above, except that each respirator shall be equipped with a combination of high-efficiency end acid-gas cartridges.

#### B. Fit test.

1. The test subject shall be allowed to smell a weak concentration of the irritant smoke to familiarize the subject with the characteristic odor.

2. The test subject shall properly don the respirator selected as above, wear it for at least 10 minutes before starting the fit test.

3. The test conductor shall review this protocol with the test subject before testing.

4. The test subject shall perform the conventional positive pressure and negative pressure fit checks (see ANSI Z88.2 1980). Failure of either check shall be cause to select an alternate respirator.

5. Break both ends of 8 ventilation smoke tube containing 0.1 tannic oxchloride, such as the MSA part #5645, or equivalent. Attach a short length of tubing to mm end of the smoke tube. Attach the other end of the smoke tube to a low pressure air pump set to deliver 200 milliliters per minute.

a. Advise the test subject that the smoke can be irritating to the eyes and instruct the subject to keep the eyes closed while the test is performed.

7. The test conductor shall direct the stream of irritant smoke from the tube

towards the face seal area of the test subject. The person conducting the test shall begin with the tube at least 12 inches from the facepiece and gradually move to within one inch, moving around the whole perimeter of the mask.

8. The test subject shall be instructed to do the following exercises while the respirator is being challenged by the smoke. Each exercise shall be performed for one minute.

- i. Breathe normally.
- ii. Breathe deeply. Be certain breaths are deep and regular.
- iii. Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against the shoulders.
- iv. Nod head up-and-down. Be certain motions are complete and made every second. Inhale when head is in the full up position (looking toward ceiling). Do not bump the respirator against the chest.
- v. Talking. Talk aloud and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements, and thus be useful to satisfy this requirement. Alternative passages which serve the same purpose may also be used.

#### Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a balling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach his friends say he is looking for the pot of gold at the end of the rainbow.

vi. Jogging in Place.

vii. Breathe normally.

9. The test subject shall indicate to the test conductor if the irritant smoke is detected. If smoke is detected, the test conductor shall stop the test. In this case, the tested respirator is rejected and another respirator shall be selected.

10. Each test subject passing the smoke test (i.e., without detecting the smoke) shall be given a sensitivity check of smoke from the same tube to determine if the test subject reacts to the smoke. Failure to evoke a response shall void the fit test.

11. Steps B4, B9, B10 of this fit test protocol shall be performed in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by the test agents.

12. At least two facepieces 0.1 bal km selected by the IAA test protocol. The test subject shall be given the opportunity to wear them for one week to choose the one which is more comfortable to wear.

13. Respirators successfully tested by the protocol may be used in contaminated atmospheres up to ten times the PEL of asbestos.

14. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

15. If hair growth or apparel interfere with a satisfactory fit then they shall be altered Or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, Or s&contained breathing apparatus.

16. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respirator diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

17. Qualitative fit testing shall be repeated at least every six months.

18. In addition, because the sealing of the reepitator may be affected, qualitative fit testing shall be repeated immediately when the test subject has a:

- (1) Weight change of 20 pounds or more.
- (2) Significant facial scarring in the area of the facepiece seal.
- (3) Significant dental changes- i.e., multiple extractions without prothesis, or acquiring dentures.
- (4) Reconstructive or cosmetic surgery, or
- (5) Any other condition that may interfere with facepiece sealing.

C. Recordkeeping.

A summary of all test results shall be maintained in each office for 3 years. The summary shall include:

- (1) Name of test subject
- (2) Date of testing.
- (3) Name of test conductor.
- (4) Respirators selected (indicate manufacturer, model, size and approval number).
- (5) Testing agent.

Quantitative Fit Test Procedures

1. General.

a. The method applies to the negative-pressure nonpowered air-purifying respirators only.

b. The employer shall assign one individual who shall assume the full responsibility for implementing the respirator quantitative fit test program.

2. Definition.

a. "Quantitative Fit Test" means the measurement of the effectiveness of a respirator seal in excluding the ambient atmosphere. The test is performed by dividing the measured concentration of challenge agent in a test chamber by the measured concentration of the challenge agent inside the respirator facepiece when the normal air purifying element has been replaced by an essentially perfect purifying element.

b. "Challenge Agent" means the air contaminant introduced into a test chamber so that its concentration inside and outside the respirator may be compared.

c. "Test Subject" means the person wearing the respirator for quantitative fit testing.

d. "Normal Standing Position" means standing erect and straight with arms down along the sides and looking straight ahead.

e. "Fit Factor" means the ratio of challenge agent concentration outside with respect to the inside of a respirator inlet covering (facepiece or enclosure).

3. Apparatus.

a. *Instrumentation.* Corn oil, sodium chloride or other appropriate aerosol generation, dilution and measurement systems shall be used for quantitative fit test.

b. *Test chamber.* The test chamber shall be large enough to permit all test subjects to freely perform all required exercises without distributing the challenge agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the challenge agent is effectively isolated from the ambient air yet uniform in concentration throughout the chamber.

c. When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high-efficiency particulate filter supplied by the same manufacturer.

d. The sampling instrument shall be selected so that a strip chart record may be made of the test showing the rise and fall of challenge agent concentration with each inspiration and expiration at fit factors of at least 2,000.

e. The combination of substitute air-purifying elements (if any), challenge agent, and challenge agent concentration in the test chamber shall be such that the test subject is not exposed in excess of PEL to the challenge agent at any time during the testing process.

f. The sampling port on the test specimen respirator shall be placed and constructed so that there is no detectable leak around the port, a free air flow is allowed into the sampling line at all times and so there is no interference with the fit or performance of the respirator.

g. The test chamber and test set-up shall permit the person administering the test to observe one test subject inside the chamber during the test.

h. The equipment generating the challenge atmosphere shall maintain the concentration of challenge agent constant within a 10 percent variation for the duration of the test.

i. The time lag (interval between an event and its being recorded on the strip chart) of the instrumentation may not exceed 2 seconds.

j. The tubing for the test chamber atmosphere and for the respirator sampling port shall be the same diameter, length and material. It shall be kept as short as possible. The smallest diameter tubing recommended by the manufacturer shall be used.

k. The exhaust flow from the test chamber shall pass through a high-efficiency filter before release to the room.

l. When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

4. Procedural Requirements

a. The fitting of half-mask respirators should be started with those having multiple sizes and a variety of interchangeable cartridges and canisters such as the MSA Comfo II-M, Norton M, Survivair M, A-O M, or Scott-M. Use either of the tests outlined below to assure that the facepiece is properly adjusted.

(1) *Positive pressure test.* With the exhaust port(s) blocked, the negative pressure of slight inhalation should remain constant for several seconds.

(2) *Negative pressure test.* With the intake port(s) blocked the negative pressure slight

inhalation should remain constant for several seconds.

b. An a facepiece is adjusted, the test subject shall wear the facepiece for at least 5 minutes before conducting a qualitative test by using either of the methods described below and using the exercise regime described in 5.a., b., c., d. and e.

(i) *Isoamyl acetate test.* When using organic vapor cartridges, the test subject who can smell the odor should be unable to detect the odor of isoamyl acetate squirted into the air near the most vulnerable portions of the facepiece seal. In a location which is separated from the test area, the test subject shall be instructed to close her/his eyes during the test period. A combination cartridge or canister with organic vapor end high-efficiency filters shall be used when available for the particular mask being tested. The test subject shall be given an opportunity to smell the odor of isonmyl acetate before the test is conducted.

(2) *Irritant fume test.* When using high-efficiency filters, the test subject should be unable to detect the odor of irritant fume (stannic chloride or titanium tetrachloride ventilation smoke tubes) squirted into the air near the most vulnerable portions of the facepiece seal. The test subject shall be instructed to close her/his eyes during the test period.

c. The test subject may enter the quantitative testing chamber only if she or he has obtained a satisfactory fit as stated in 4.b. of this Appendix.

d. Before the subject enters the test chamber, a reasonably stable challenge agent concentration shall be measured in the test chamber.

e. Immediately after the subject enters the test chamber, the challenge agent concentration inside the respirator shall be measured to ensure that the peak Penetration does not exceed 5 percent for a half-mask and 1 percent for a full facepiece.

f. A stable challenge agent concentration shall be obtained prior to the actual start of testing.

(1) Respirator restraining straps may not be overtightened for testing. The straps shall be adjusted by the wearer to give a reasonably comfortable fit typical of normal use.

5. *Exercise Regime.* Prior to entering the test chamber, the test subject shall be given complete instructions as to her/his part in the test procedures. The test subject shall perform the following exercises. In the order given, for each independent test.

a. *Normal Breathing (NE).* In the normal standing position, without talking, the subject shall breathe normally for at least one minute.

b. *Deep Wreathing (DB).* In the normal standing position the subject shall do deep breathing for at least one minute pausing so as not to hyperventilate.

c. *Turning head side to side. (SS).* Standing in place the subject shall slowly turn his/her head from side between the extreme positions to each side. The head shall be held at each extreme position for at least 5 seconds. Perform for at least three complete cycles.

d. *Moving head up and down (UD).* Standing in place, the subject shall slowly move his/her head up and down between the extreme position straight up and the extreme position straight down. The head shall be held at each extreme position for at least 5 seconds. Perform for at least three complete cycles.

e. *Reading (R).* The subject shall read out slowly and loud so as to be heard clearly by the test conductor or monitor. The test subject shall read the "rainbow passage" at the end of this section.

f. *Crimoche (C).* The test subject shall grimace, smile, frown, and generally contort the face using the facial muscles. Continue for at least 15 seconds.

g. *Bend over and touch toes (B).* The test subject shall bend at the waist and touch toes and return to upright position. Repeat for at least 30 seconds.

h. *Jogging in place (J).* The test subject shall perform jog in place for at least 30 seconds.

i. *Normal Breathing (NE).* Same as exercise a.

#### *Rainbow Passage*

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

6. The test shall be terminated whenever any single peak penetration exceeds 5 percent for half-masks and 1 percent for full facepieces. The test subject may be refitted and retested. If two of the three required tests are terminated, the fit shall be deemed inadequate. (See paragraph 4.h.).

#### *7. Calculation of Fit Factors.*

a. The fit factor determined by the quantitative fit test equals the average concentration inside the respirator.

b. The average test chamber concentration is the arithmetic average of the test chamber concentration at the beginning and of the end of the test.

c. The average peak concentration of the challenge agent inside the respirator shall be the arithmetic average peak concentrations for each of the nine exercises of the test which are computed as the arithmetic average of the peak concentrations found for each breath during the exercise.

d. The average peak concentration for an exercise may be determined graphically if there is not a great variation in the peak concentrations during a single exercise.

8. *Interpretation of Test Results.* The fit factor measured by the quantitative fit testing shall be the lowest of the three protection factors resulting from three independent tests.

#### *9. Other Requirements.*

a. The test subject shall not be permitted to wear a half-mask or full facepiece mask if the minimum fit factor of 100 or 1,000, respectively, cannot be obtained. If hair growth or apparel interfere with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is not attained, the test subject must use a positive-pressure respirator such as powered air-purifying respirators, supplied air respirator, or self-contained breathing apparatus.

b. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.

c. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respirator disease or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.

d. The test subject shall be given the opportunity to wear the assigned respirator for one week. If the respirator does not provide a satisfactory fit during actual use, the test subject may request another QNFT which shall be performed immediately.

e. A respirator fit factor card shall be issued to the test subject with the following information:

(1) Name.

(2) Date of fit test.

(3) Protection factors obtained through each manufacturer, model and approval number of respirator tested.

(4) Name and signature of the person that conducted the test.

f. Filters used for qualitative or quantitative fit testing shall be replaced weekly, whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media. Organic vapor cartridges/canisters shall be replaced daily or sooner if there is any indication of breakthrough by the test agent.

10. In addition, because the sealing of the respirator may be affected, quantitative fit testing shall be repeated immediately when the test subject has a:

(1) Weight change of 20 pounds or more.

(2) Significant facial scarring in the area of the facepiece seal.

(3) Significant dental changes: i.e., multiple extractions without prosthesis, or acquiring dentures.

(4) Reconstructive or cosmetic surgery, or

(5) Any other condition that may interfere with facepiece sealing.

#### *11. Recordkeeping.*

A summary of all test results shall be maintained for 3 years. The summary shall include:

(1) Name of test subject.

(2) Date of testing.

(3) Name of the test conductor.

(4) Fit factors obtained from every respirator tested (indicate manufacturer, model, size and approval number).

#### **Appendix D to § 1926.58—Medical Questionnaires; Mandatory**

This mandatory appendix contains the medical questionnaires that must be administered to all employees who are exposed to asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals above the action level, and who will therefore be included in their employer's medical surveillance program. Part 1 of the appendix contains the Initial Medical Questionnaire, which must be obtained for all new hires who will be covered by the medical surveillance requirements. Part 2 includes the abbreviated Periodical Medical Questionnaire, which must be administered to all employees who are provided periodic medical examinations under the medical surveillance provisions of the standard.

BILLING CODE 4510-26-M



D. Are you suffering from or have you ever suffered from:

- a. Epilepsy (or fits, seizures, convulsions)?
- b. Rheumatic fever?
- c. Kidney disease?
- d. Bladder disease?
- e. Diabetes?
- f. Jaundice?

19. CHEST COLDS AND CHEST ILLNESSES

19A. If you get a cold, does it usually go to your chest? (Usually means more than 1/2 the time) 1. Yes \_\_\_ 2. No \_\_\_  
3. Don't get colds \_\_\_

20A. During the past 3 years, have you had any chest illnesses that have kept you off work, indoors at home, or in bed? 1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 20A:

B. Did you produce phlegm with any of these chest illnesses? 1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

C. In the last 3 years, how many such illnesses with (increased) phlegm did you have which lasted a week or more? Number of illnesses \_\_\_  
No such illnesses \_\_\_

21. Did you have any lung trouble before the age of 16? 1. Yes \_\_\_ 2. No \_\_\_

22. Have you ever had any of the following?

22A. Attacks of bronchitis? 1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 22A:

B. Was it confirmed by a doctor? 1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

C. At what age was your first attack? Age in Years \_\_\_  
Does Not Apply \_\_\_

22B. Pneumonia (include bronchopneumonia)? 1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 22B:

B. Was it confirmed by a doctor? 1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

C. At what age did you first have it? Age in Years \_\_\_  
Does Not Apply \_\_\_

23A. Hay Fever?

1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 23A:

B. Was it confirmed by a doctor?

1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

C. At what age did it start?

Age in Years \_\_\_  
Does Not Apply \_\_\_

23A. Have you ever had chronic bronchitis?

1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 23A:

B. Do you still have it?

1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

C. Was it confirmed by a doctor?

1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

D. At what age did it start?

Age in Years \_\_\_  
Does Not Apply \_\_\_

24A. Have you ever had emphysema?

1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 24A:

B. Do you still have it?

1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

C. Was it confirmed by a doctor?

1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

D. At what age did it start?

Age in Years \_\_\_  
Does Not Apply \_\_\_

25A. Have you ever had asthma?

1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 25A:

B. Do you still have it?

1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

C. Was it confirmed by a doctor?

1. Yes \_\_\_ 2. No \_\_\_  
3. Does Not Apply \_\_\_

D. At what age did it start?

Age in Years \_\_\_  
Does Not Apply \_\_\_

E. If you no longer have it, at what age did it stop?

Age stopped \_\_\_  
Does Not Apply \_\_\_

26. Have you ever had:

A. Any other chest illness?

1. Yes \_\_\_ 2. No \_\_\_

If yes, please specify \_\_\_\_\_

H. Please specify cause of death: \_\_\_\_\_

COUGH

17A. Do you usually have a cough (I want a cough with first smoke or on first going out of door. Exclude clearing of throat.) (If no, skip to question 20C) 1. Yes \_\_\_ 2. No \_\_\_

B. Do you usually cough no more than 4 or 5 times a day 4 or more days out of the week? 1. Yes \_\_\_ 2. No \_\_\_

C. Do you usually cough at all on getting up or first thing in the morning? 1. Yes \_\_\_ 2. No \_\_\_

D. Do you usually cough at all during the rest of the day or at night? 1. Yes \_\_\_ 2. No \_\_\_

IF YES TO ANY OF ABOVE (17A, B, or D), ANSWER THE FOLLOWING. IF NO TO ALL, CHECK [YES] NOT APPLY AND SKIP TO 18A

E. Do you usually cough like this on most days for 3 consecutive months or more during the year? 1. Yes \_\_\_ 2. No \_\_\_

F. For how many years have you had the cough? Number of years Does not apply

18A. Do you usually bring up phlegm from your chest? (Count phlegm with the first smoke or on first going out of door. Exclude phlegm from the nose. Count swallowed phlegm.) (If no, skip to 19C) 1. Yes \_\_\_ 2. No \_\_\_

B. Do you usually bring up phlegm like this as much as twice a day 4 or more days out of the week? 1. Yes \_\_\_ 2. No \_\_\_

C. Do you usually bring up phlegm at all on getting up or first thing in the morning? 1. Yes \_\_\_ 2. No \_\_\_

D. Do you usually bring up phlegm at all during the rest of the day or at night? 1. Yes \_\_\_ 2. No \_\_\_

IF YES TO ANY OF THE ABOVE (18A, B, C, or D), ANSWER THE FOLLOWING. IF NO TO ALL, CHECK [YES] NOT APPLY AND SKIP TO 18A

E. Do you bring up phlegm like this on most days for 3 consecutive months or more during the year? 1. Yes \_\_\_ 2. No \_\_\_

B. Any chest operations? 1. Yes \_\_\_ 2. No \_\_\_

If yes, please specify \_\_\_\_\_

C. Any chest injuries? 1. Yes \_\_\_ 2. No \_\_\_

If yes, please specify \_\_\_\_\_

27A. Has a doctor ever told you that you had heart trouble? 1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 27A: B. Have you ever had treatment for heart trouble in the past 10 years? 1. Yes \_\_\_ 2. No \_\_\_ 3. Does Not Apply \_\_\_

28A. Has a doctor ever told you that you had high blood pressure? 1. Yes \_\_\_ 2. No \_\_\_

IF YES TO 28A: B. Have you had any treatment for high blood pressure (hypertension) in the past 10 years? 1. Yes \_\_\_ 2. No \_\_\_ 3. Does Not Apply \_\_\_

29. When did you last have your chest X-rayed? (Year) 25 \_\_\_ 26 \_\_\_ 27 \_\_\_ 28 \_\_\_

30. Where did you last have your chest X-rayed (if known)? \_\_\_\_\_ what was the outcome? \_\_\_\_\_

FAMILY HISTORY

31. Were either of your natural parents ever told by a doctor that they had a chronic lung condition such as:

FATHER 1. Yes 2. No 3. Don't Know MOTHER 1. Yes 2. No 3. Don't Know

A. Chronic Bronchitis? \_\_\_\_\_

B. Emphysema? \_\_\_\_\_

C. Asthma? \_\_\_\_\_

D. Lung cancer? \_\_\_\_\_

E. Other chest conditions \_\_\_\_\_

F. Is parent currently alive? \_\_\_\_\_

G. Please Specify Age if Living Age at Death Don't Know

**F. For how many years have you had trouble with phlegm?**

Number of years  
Does not apply

1. Yes — 2. No —

**EPISODES OF COUGH AND PHLEGM**

34A. Have you had periods or episodes of (in-circled) cough and phlegm lasting for 3 weeks or more each year?  
(For persons who usually have cough and/or phlegm)

If YES TO 34A

B. For how long have you had at least 1 such episode per year?

Number of years  
Does not apply

1. Yes — 2. No —

**WHEEZING**

35a. Does your chest ever sound wheezy or whistling

1. When you have a cold?  
2. Occasionally apart from colds?  
3. Most days or nights?

If YES TO 1, 2, or 3 in 35A

B. For how many years has this been present?

Number of years  
Does not apply

1. Yes — 2. No —

**36A. Have you ever had an attack of wheezing that has made you feel short of breath?**

If YES TO 36A

B. How old were you when you had your first such attack?

Age in years  
Does not apply

C. Have you had 2 or more such episodes?

1. Yes — 2. No —  
3. Does not apply

D. Have you ever required medicine or treatment for the(s) attack(s)?

1. Yes — 2. No —  
3. Does not apply

**BREATHLESSNESS**

37. If disabled from walking by any condition other than heart or lung disease, please describe and proceed to question 39A.

Nature of condition(s)

38A. Are you troubled by shortness of breath when hurrying on the level or walking up a slight hill?

1. Yes — 2. No —

**IF YES TO 38A**

B. Do you have to walk slower than people of your age on the level because of breathlessness?

1. Yes — 2. No —  
3. Does not apply

C. Do you ever have to stop for breath when walking at your own pace on the level?

1. Yes — 2. No —  
3. Does not apply

D. Do you ever have to stop for breath after walking about 100 yards (or after a few minutes) on the level?

1. Yes — 2. No —  
3. Does not apply

E. Are you too breathless to leave the house or breathless on dressing or climbing one flight of stairs?

1. Yes — 2. No —  
3. Does not apply

**TOBACCO SMOKING**

39A. Have you ever smoked cigarettes? (No means less than 20 packs of cigarettes or 12 oz. of tobacco in a lifetime or less than 1 cigarette a day for 1 year.)

If YES TO 39A

B. Do you now smoke cigarettes (as of one month ago)

1. Yes — 2. No —  
3. Does not apply

Age in years  
Does not apply

C. How old were you when you first started regular cigarette smoking?

Age in years  
Does not apply

D. If you have stopped smoking cigarettes completely, how old were you when you stopped?

Age stopped  
Check if still smoking  
Does not apply

E. How many cigarettes do you smoke per day now?

Cigarettes per day  
Does not apply

F. On the average of the entire time you smoked, how many cigarettes did you smoke per day?

Cigarettes per day  
Does not apply

G. Do or did you inhale the cigarette smoke?

1. Does not apply  
2. Not at all  
3. Slightly  
4. Moderately  
5. Deeply

39A. Have you ever smoked a pipe regularly? (Yes means more than 12 oz. of tobacco in a lifetime.)

1. Yes — 2. No —

**60A. Have you ever smoked a pipe regularly? (Yes means more than 12 oz. of tobacco in a lifetime.)**

1. Yes — 2. No —

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11. RECENT MEDICAL HISTORY

13A. Do you consider yourself to be in good health? Yes  No   
 If NO, state reason \_\_\_\_\_

13B. In the past year, have you developed:

	<u>Yes</u>	<u>No</u>
Epilepsy?	_____	_____
Rheumatic fever?	_____	_____
Kidney disease?	_____	_____
Bladder disease?	_____	_____
Diabetes?	_____	_____
Jaundice?	_____	_____
Cancer?	_____	_____

14. CHEST COLDS AND CHEST ILLNESSES

14A. If you get a cold, does it usually go to your chest? (Usually means more than 1/2 the time)  
 1. Yes  2. No   
 3. Don't get colds

15A. During the past year, have you had any chest illnesses that have kept you off work, indoors at home, or in bed?  
 1. Yes  2. No   
 3. Does Not Apply   
 IF YES TO 15A:

15B. Did you produce phlegm with any of these chest illnesses?  
 1. Yes  2. No   
 3. Does Not Apply

15C. In the past year, how many such illnesses with (increased) phlegm did you have which lasted a week or more?  
 Number of illnesses \_\_\_\_\_  
 No such illnesses \_\_\_\_\_

16. RESPIRATORY SYSTEM

In the past year have you had:

	<u>Yes or No</u>	<u>Further Comment on Positive Answers</u>
Asthma	_____	
Bronchitis	_____	
Hay Fever	_____	
Other Allergies	_____	

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	<u>Yes or No</u>	<u>Further Comment on Positive Answers</u>
Pneumonia		
Tuberculosis		
Chest Surgery	- -	
Other Lung Problems	- -	
Heart Disease	- -	
Do you have:		

	<u>Yes or No</u>	<u>Further Comment on Positive Answers</u>
Frequent colds	- -	
Chronic cough		
Shortness of breath when walking or climbing one flight of stairs	_____	
Do you:		
Wheeze	_____	
Cough up phlegm	_____	
Smoke cigarettes	_____	Packs per day _____ How many years _____

Date \_\_\_\_\_

Signature \_\_\_\_\_

**Appendix E to § 1926.58—Interpretation and Classification of Chest Roentgenograms—Mandatory**

(a) Chest roentgenograms shall be interpreted and classified in accordance with a professionally accepted classification system and recorded on a Roentgenographic Interpretation Form, \* Form CSD/NIOSH (M) 2A.

(b) Roentgenograms shall be interpreted and classified only by a B-reader, a board eligible/certified radiologist, or an experienced physician with known expertise in pneumoconiosis.

(c) All interpreters, whenever interpreting chest roentgenograms made under this section, shall have immediately available for reference a complete set of the ILO-U/C International Classification of Radiographs for Pneumoconiosis, 1960.

**Appendix F to 1926.58—Work Practices and Engineering Controls for Major Asbestos Removal, Renovation, and Demolition Operations—Non-Mandatory**

This is a non-mandatory appendix designed to provide guidelines to assist employers in complying with the requirements of 29 CFR 1926.58. Specifically, this appendix describes the equipment, methods, and procedures that should be used in major asbestos removal projects conducted to abate a recognized asbestos hazard or in preparation for building renovation or demolition. These projects require the construction of negative-pressure temporary enclosures to contain the asbestos material and to prevent the exposure of bystanders and other employees at the worksite. Paragraph (e)(6) of the standard requires that "[w]henever feasible, the employer shall establish negative-pressure enclosures before commencing asbestos removal, demolition, or renovation operations." Employers should also be aware that, when conducting asbestos removal projects, they may be required under the National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61, Subpart M, or EPA regulations under the Clean Water Act.

Construction of a negative-pressure enclosure is a simple but time-consuming process that requires careful preparation and execution; however, if the procedures below are followed, contractors should be assured of achieving a temporary barricade that will protect employees and others outside the enclosure from exposure to asbestos and minimize to the extent possible the exposure of workers inside the barrier as well.

The equipment and materials required to construct these barriers are readily available and usually installed and used in addition to

an enclosure around the removal site, the standard requires employers to provide hygiene facilities that ensure that their asbestos-contaminated employees do not leave the work area with asbestos on their persons or clothing; the construction of these facilities is also described below. The steps in the process of preparing the asbestos removal site, building the enclosure, constructing hygiene facilities, removing the asbestos-containing material, and restoring the site include:

- (1) Planning the removal project;
- (2) Procuring the necessary materials and equipment;
- (3) Preparing the work area;
- (4) Removing the asbestos-containing material;
- (5) Cleaning the work area; and
- (6) Disposing of the asbestos-containing waste.

**Planning the Removal Project**

The planning of an asbestos removal project is critical to completing the project safely and cost-effectively. A written asbestos removal Plan should be prepared that describes the equipment and procedures that will be used throughout the project. The asbestos abatement plan will aid not only in executing the project but also in complying with the reporting requirements of the USEPA asbestos regulations (40 CFR 61, Subpart M), which call for specific information such as a description of control methods and control equipment to be used and the disposal sites the contractor proposes to use to dispose of the asbestos-containing materials.

The asbestos abatement plan should contain the following information:

- A physical description of the work area;
- A description of the approximate amount of material to be removed;
- A schedule for turning off and sealing existing ventilation systems;
- Personnel hygiene procedures;
- Labeling procedures;
- A description of personal protective equipment and clothing to be worn by employees;
- A description of the local exhaust ventilation systems to be used;
- A description of work practices to be observed by employees;
- A description of the methods to be used to remove the asbestos-containing material;
- The wetting agent to be used;
- A description of the sealant to be used at the end of the project;
- An air monitoring plan;
- A description of the method to be used to transport waste material; and
- The location of the dump site.

**Materials and Equipment Necessary for Asbestos Removal**

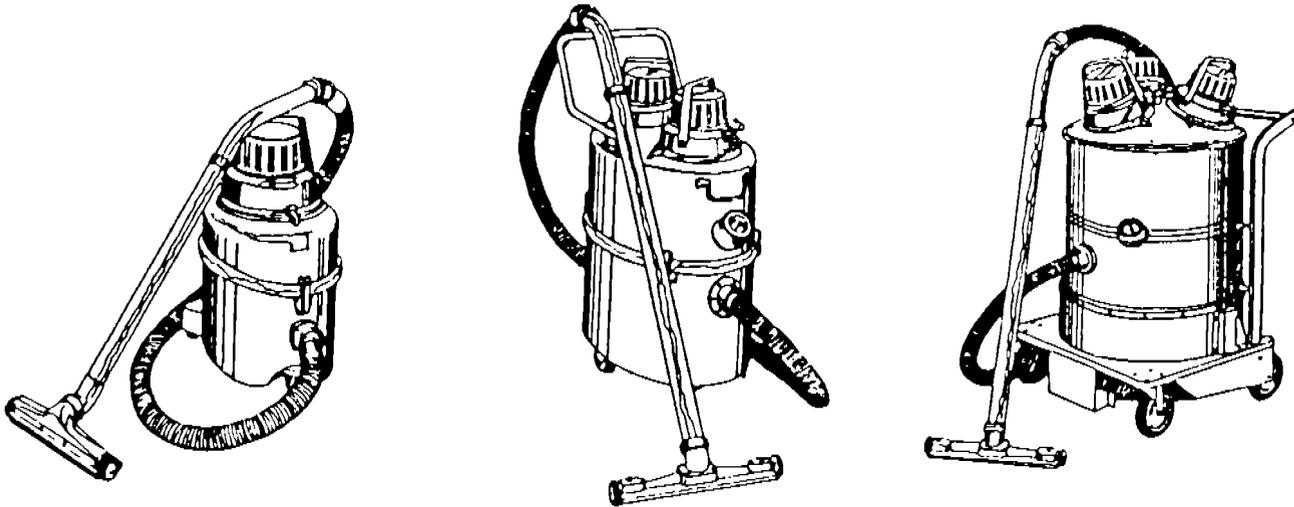
Although individual asbestos removal projects vary in terms of the equipment required to accomplish the removal of the material, some equipment and materials are common to most asbestos removal operations. Equipment and materials that should be available at the beginning of each project are: (1) rolls of polyethylene sheeting; (2) rolls of gray duct tape or clear plastic tape; (3) HEPA filtered vacuum(s); (4) HEPA-filtered portable ventilation system(s); (5) a wetting agent; (6) an airless sprayer; (7) a portable shower unit; (8) appropriate respirators; (9) disposable coveralls; (10) signs and labels; (11) pre-printed disposal bags; and (12) a manometer or pressure gauge.

**Rolls of Polyethylene Plastic and Tape.** Rolls of polyethylene plastic (6 mil in thickness) should be available to construct the asbestos removal enclosure and to seal windows, doors, ventilation systems, wall penetrations, and ceilings and floors in the work area. Gray duct tape or clear plastic tape should be used to seal the edges of the plastic and to seal any holes in the plastic enclosure. Polyethylene plastic sheeting can be purchased in rolls up to 12-20 feet in width and up to 100 feet in length.

**HEPA-Filtered Vacuum.** A HEPA-filtered vacuum is essential for cleaning the work area after the asbestos has been removed. Such vacuums are designed to be used with a HEPA (High Efficiency Particulate Air) filter, which is capable of removing 99.97 percent of the asbestos particles from the air. Various sizes and capacities of HEPA vacuums are available. One manufacturer, Nilisk of America, Inc., produces three models that range in capacity from 5.25 gallons to 17 gallons (see Figure F-1). All of these models are portable, and all have hoses capable of reaching out-of-the-way places, such as areas above ceiling tiles, behind pipes, etc.

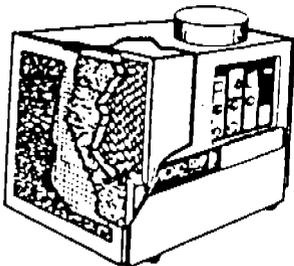
**Exhaust Air Filtration System.** A portable ventilation system is necessary to create a negative pressure within the asbestos removal enclosure. Such units are equipped with a HEPA filter and are designed to exhaust and clean the air inside the enclosure. More exhausting it to the outside of the enclosure (See Figure F-2). Systems are available from several manufacturers. One supplier, Micro-Trap, Inc., has two ventilation units that range in capacity from 600 cubic feet per minute (CFM) to 1,700 CFM. According to the manufacturer's literature, Micro-Trap units filter particles of 0.3 micron in size with an efficiency of 99.99 percent. The number and capacity of units required to ventilate an enclosure depend on the size of the area to be ventilated.

\* Mention of trade names or commercial products does not constitute endorsement or recommendation for use.



Source: Product Catalog, Asbestos Control Technologies, Inc., Maple Shade, N.J., 1985.

Figure f-1. HEPA Filtered Vacuums



Source: Product Catalog, Asbestos Control Technologies, Inc., Maple Shade, N.J., 1985.

Figure f-2. Portable Exhaust Ventilation System with HEPA Filter

**Wetting Agents.** Wetting agents (surfactants) are added to water (which is then called amended water) and used to soak asbestos-containing materials; amended water penetrates more effectively than plain water and permits more thorough soaking of the asbestos-containing materials. Wetting the asbestos-containing material reduces the number of fibers that will break free and become airborne when the asbestos-containing material is handled or otherwise disturbed. Asbestos-containing materials should be thoroughly soaked before removal is attempted; the dislodged material should feel spongy to the touch. Wetting agents are generally prepared by mixing 1 to 3 ounces of wetting agent to 5 gallons of water.

One type of asbestos, amosite, is relatively resistant to soaking, either with plain or amended water. The work practices of choice when working with amosite containing material are to soak the material as much as possible and then to bag it for disposal immediately after removal, so that the material has no time to dry and be ground into smaller particles that are more likely to liberate airborne asbestos.

In a very limited number of situations, it may not be possible to wet the asbestos-containing material before removing it. Examples of such rare situations are: (1)

Removal of asbestos material from a "live" electrical box that was oversprayed with the material when the rest of the area was sprayed with asbestos-containing coating; and (2) removing asbestos-containing insulation from a live steam pipe. In both of these situations, the preferred approach would be to turn off the electricity or steam, respectively, to permit wet removal methods to be used. However, where removal work must be performed during working hours, i.e., when normal operations cannot be disrupted, the asbestos-containing material must be removed dry. Immediate bagging is then the only method of minimizing the amount of airborne asbestos generated.

**Airless Sprayer.** Airless sprayers are used to apply amended water to asbestos-containing materials. Airless sprayers allow the amended water to be applied in a fine spray that minimizes the release of asbestos fibers by reducing the impact of the spray on the material to be removed. Airless sprayers are inexpensive and readily available.

**Portable Shower.** Unless the site has available a permanent shower facility that is contiguous to the removal area, a portable shower system is necessary to permit employees to clean themselves after exposure to asbestos and to remove any asbestos contamination from their hair and bodies. Taking a shower prevents employees from leaving the work area with asbestos on their clothes and thus prevents the spread of asbestos contamination to areas outside the asbestos removal area. This measure also protects members of the families of asbestos workers from possible exposure to asbestos. Showers should be supplied with warm water and a drain. A shower water filtration system to filter asbestos fibers from the shower water is recommended. Portable shower units are readily available, inexpensive, and easy to install and transport.

**Respirators.** Employees involved in asbestos removal projects should be provided with appropriate NIOSH-approved respirators. Selection of the appropriate respirator should be based on the

concentration of asbestos fibers in the work area. If the concentration of asbestos fibers is unknown, employees should be provided with respirators that will provide protection against the highest concentration of asbestos fibers that can reasonably be expected to exist in the work area. For most work within an enclosure, employees should wear helmet-mask dual-filter cartridge respirators. Disposable lace mask respirators (single-use) should not be used to protect employees from exposure to asbestos fibers.

**Disposable Coveralls.** Employees involved in asbestos removal operations should be provided with disposable impervious coveralls that are equipped with hood and boot cover. Such coveralls are typically made of Tyvek. The coverall has a zipper front and elastic wrists and ankles.

**Signs and Labels.** Before work begins, a supply of signs to demarcate the entrance to the work area should be obtained. Signs are available that have the wording required by the final OSHA standard. The required labels are also commercially available as press-on labels and pre-printed on the 6-mil polyethylene plastic bags used to dispose of asbestos-containing waste material.

#### Preparing the Work Area

Preparation for constructing negative-pressure enclosure should begin with the removal of all movable objects from the work area, e.g., desks, chairs, rugs, and light fixtures, to ensure that these objects do not become contaminated with asbestos. When movable objects are contaminated or are suspected of being contaminated, they should be vacuumed with a HEPA vacuum and cleaned with amended water, unless they are made of material that will be damaged by the wetting agent; wiping with plain water is recommended in those cases where amended water will damage the object. Before the asbestos removal work begins, objects that

<sup>1</sup> Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

cannot be removed from the work area should be covered with a 6-mil-thick polyethylene plastic sheeting that is securely taped with duct tape or plastic tape to achieve an air-tight seal around the object.

#### Constructing the Enclosure

When all objects have either been removed from the work area or covered with plastic, all penetrations of the floor, walls, and ceiling should be sealed with 6-mil polyethylene plastic and tape to prevent airborne asbestos from escaping into areas outside the work area or from lodging in cracks around the penetrations. Penetrations that require sealing are typically found around electrical conduits, telephone wires, and water supply and drain pipes. A single entrance to be used for access and egress to the work area should be selected, and all other doors and windows should be sealed with tape or be covered with 6-mil polyethylene plastic sheeting and securely taped. Covering windows and unnecessary doors with a layer of polyethylene before covering the walls provides a second layer of protection and saves time in installation because it reduces the number of edges that must be cut and taped. All other surfaces such as support columns, ledges, pipes, and other surfaces should also be covered with polyethylene plastic sheeting and taped before the walls themselves are completely covered with sheeting.

Next a thin layer of spray adhesive should be sprayed along the top of all walls surrounding the enclosed work area, close to the wall-ceiling interface, and a layer of polyethylene plastic sheeting should be stuck to this adhesive and taped. The entire inside surfaces of all wall areas are covered in this manner, and the sheeting over the walls is extended about the floor area until it meets in the center of the area, where it is taped to form a single layer of material encasing the entire room except for the ceiling. A final layer of plastic sheeting is then laid over the plastic-covered floor area and up the walls to a height of 2 feet or so; this layer provides a second protective layer of plastic sheeting over the floor, which can then be

removed and disposed of daily after the asbestos-containing material that has dropped to the floor has been bagged and removed.

#### Building Hygiene Facilities

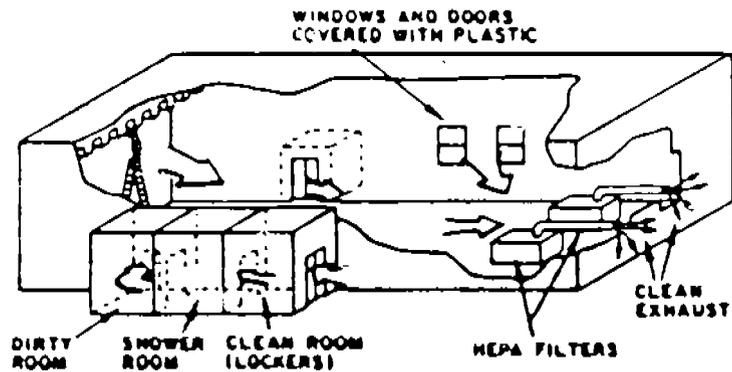
Paragraph (j) of the final standard mandates that employers involved in asbestos removal, demolition, or renovation operations provide their employees with hygiene facilities to be used to decontaminate asbestos-exposed workers, equipment, and clothing before such employees leave the work area. These decontamination facilities consist of:

- (1) A clean change room;
- (2) A shower; and

(3) An equipment room.

The clean change room is an area in which employees remove their street clothes and don their respirators and disposable protective clothing. The clean room should have hooks on the wall or be equipped with lockers for the storage of workers' clothing and personal effects. Extra disposable coveralls and towels can also be stored in the clean change room.

The showers should be contiguous with both the clean and dirty change rooms (see Figure F-3) and should be used by all workers leaving the work area. The shower should also be used to clean asbestos-contaminated equipment and materials, such as the outside of asbestos waste bags and hand tools used in the removal process.



Source: EPA 1982, Asbestos Waste Management Guidance (EPA/630-SW-85-007)

Figure F-3. Cutaway View of Enclosure and Hygiene Facilities

The equipment room (also called the dirty change room) is the area where workers remove their protective coveralls and where equipment that is to be used in the work area can be stored. The equipment room should be lined with 6-mil-thick polyethylene plastic sheeting in the same way as was done in the

work area enclosure. Two layers of 6-mil polyethylene plastic sheeting that are not taped together from a double flap or barrier between the equipment room and the work area and between the shower and the clean change room (see Figure F-4).

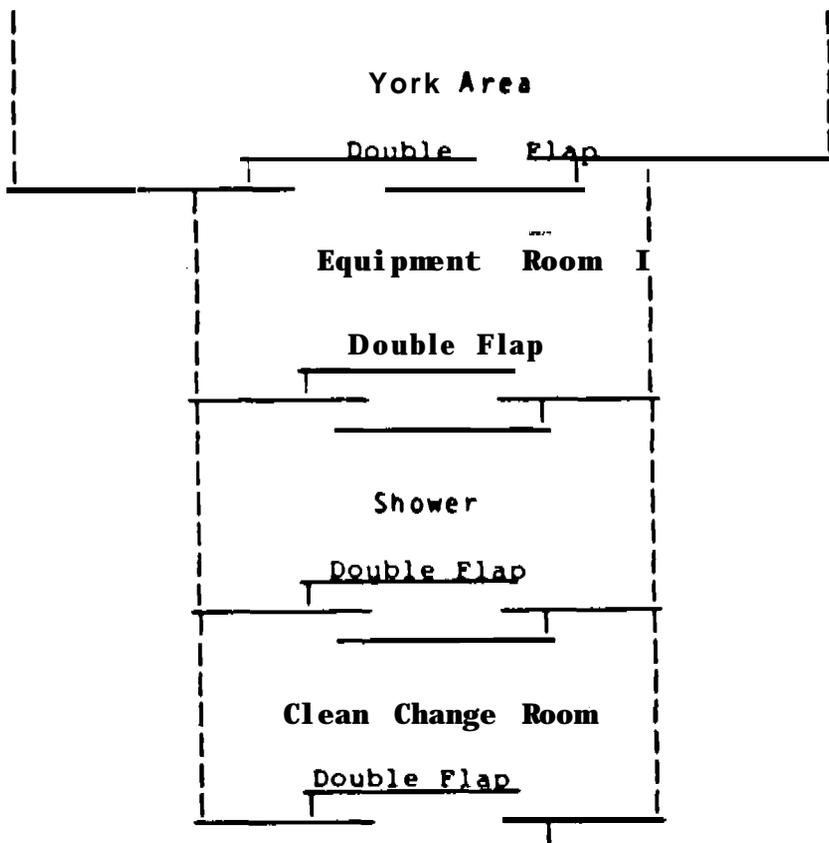


Figure F-4. Typical Hygiene Facility Layout

When feasible, the clean change room, shower, and equipment room should be contiguous and adjacent to the negative-pressure enclosure surrounding the removal area. In the overwhelming number of cases, hygiene facilities can be built contiguous to the negative-pressure enclosure. In some cases, however, hygiene facilities may have to be located on another floor of the building where removal of asbestos-containing materials is taking place. In these instances, the hygiene facilities can in effect be made to be contiguous to the work area by constructing a polyethylene plastic "tunnel" from the work area to the hygiene facilities.

Such a tunnel can be made even in cases where the hygiene facilities are located several floors above or below the work area: the tunnel begins with a double flap door at the enclosure, extends through the exit from the floor, continues down the necessary number of flights of stairs and goes through a double-flap entrance to the hygiene facilities, which have been prepared as described above. The tunnel is constructed of 2-inch by 4-inch lumber or aluminum struts and covered with 6-mil-thick polyethylene plastic sheeting.

In the instances when there is not enough space to permit any hygiene facilities

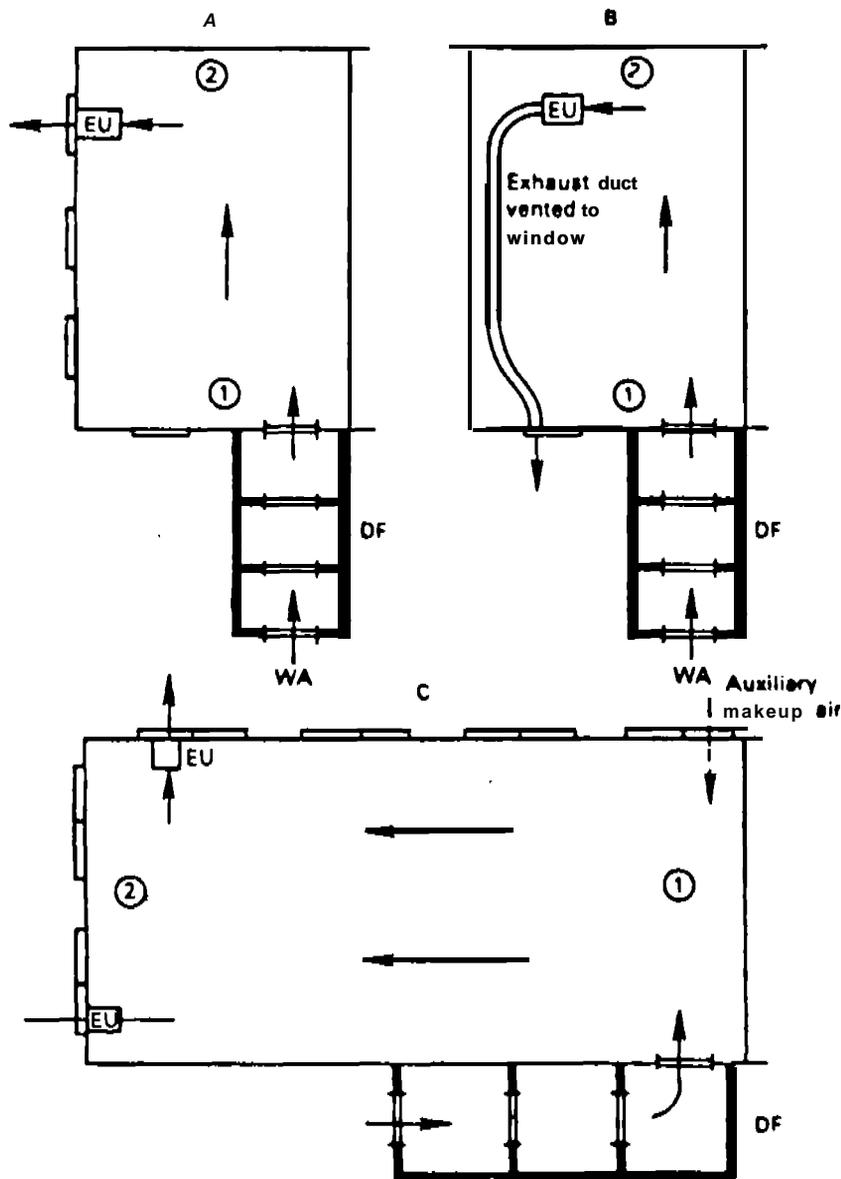
to be built at the work site, employees should be directed to change into a clean disposable worksuit immediately after exiting the enclosure (without removing their respirators) and to proceed immediately to the shower. Alternatively, employees could be directed to vacuum their disposable coveralls with a HEPA-filtered vacuum before proceeding to a shower located a distance from the enclosure.

The clean room, shower, and equipment room must be sealed completely to ensure that the sole source of air flow through these areas originates from uncontaminated areas outside the asbestos removal, demolition, or renovation enclosure. The shower must be drained properly after each use to ensure that contaminated water is not released to uncontaminated areas. If waste water is inadvertently released, it should be cleaned up as soon as possible to prevent any asbestos in the water from drying and becoming airborne in areas outside the work area.

#### *Establishing Negative Pressure Within the Enclosure*

After construction of the enclosure is completed, a ventilation system(s) should be installed to create a negative pressure within the enclosure with respect to the area outside the enclosure. Such ventilation systems must be equipped with HEPA filters to prevent the release of asbestos fibers to the environment outside the enclosure and should be operated 24 hours per day during the entire project until the final cleanup is completed and the results of final air samples are received from the laboratory. A sufficient amount of air should be exhausted to create a pressure of  $-0.02$  inches of water within the enclosure with respect to the area outside the enclosure.

These ventilation systems should exhaust the HEPA-filtered clean air outside the building in which the asbestos removal, demolition, or renovation is taking place (see Figure F-5). If access to the outside is not available, the ventilation system can exhaust the HEPA-filtered asbestos-free air to an area within the building that is as far away as possible from the enclosure. Care should be taken to ensure that the clean air is released either to an asbestos-free area or in such a way as not to disturb any asbestos-containing materials.



Source: EPA 1985. Guidance for Controlling Asbestos-Containing materials in Buildings (EPA 800/5-85-024).

Figure 7-4. Examples of Negative Pressure Systems. DF, Decontamination Facility; EU, Exhaust Unit; WA, Worker Access; A, Single-room work area with multiple windows; B, Single-room work area with single window near entrance; C, Large single-room work area with windows and auxiliary makeup air source (dotted arrow). Arrows denote direction of air flow. Circled numbers indicate progression of removal sequence.

A manometer or pressure gauge for measuring the negative pressure within the enclosure should be installed and should be monitored frequently throughout all work shifts during which asbestos removal, demolition, or renovation takes place. Several types of manometers and pressure gauges are available for this purpose.

All asbestos removal, renovation, and demolition operations should have a program

for monitoring the concentration of airborne asbestos and asbestos samples should be collected inside the enclosure (approximately four samples for 5000 square feet of enclosure area). At least two samples should be collected outside the work area, one at the entrance to the clean change room and one at the exhaust of the portable ventilation system. In addition, several breathing zone

samples should be collected from those workers who can reasonably be expected to have the highest potential exposure to asbestos.

#### Removing Asbestos Materials

Paragraph (c)(6)(ii) requires that employers involved in asbestos removal, demolition, or renovation operations designate 4 competent persons to:

- (1) Set up the enclosure;
- (2) Ensure the integrity of the enclosure;
- (3) Control entry to and exit from the enclosure;
- (4) Supervise all employee exposure monitoring required by this section;
- (5) Ensure the use of protective clothing and equipment;
- (6) Ensure that employees are trained in the use of engineering controls, work practices, and personal protective equipment;
- (7) Ensure the use of hygiene facilities and the observance of proper decontamination procedures; and
- (8) Ensure that engineering controls are functioning properly.

The competent person will generally be a Certified Industrial Hygienist, an industrial hygienist with training and experience in the handling of asbestos, or a person who has such training and experience as a result of on-the-job training and experience.

Ensuring the integrity of the enclosure is accomplished by inspecting the enclosure before asbestos removal work begins and prior to each work shift throughout the entire period work is being conducted in the enclosure. The inspection should be conducted by locating all areas where air might escape from the enclosure; this is best accomplished by running a hand over all seams in the plastic enclosure to ensure that no seams are ripped and the tape is securely in place.

The competent person should also ensure that all unauthorized personnel do not enter the enclosure and that all employees and other personnel who enter the enclosure have the proper protective clothing and equipment. He or she should also ensure that all employees and other personnel who enter the enclosure use the hygiene facilities and observe the proper decontamination procedures (described below).

Proper work practices are necessary during asbestos removal, demolition, and renovation to ensure that the concentration of asbestos fibers inside the enclosure remains as low as possible. One of the most important work practices is to wet the asbestos-containing material before it is disturbed. After the asbestos-containing material is thoroughly wetted, it should be removed by scraping (as in the case of sprayed-on or troweled-on ceiling material) or removed by cutting the metal band or wire mesh that support the asbestos-containing material on boilers or pipes. Any residue that remains on the surface of the object from which asbestos is being removed should be wire brushed and wet wiped.

Bagging asbestos waste material promptly after its removal is another work practice control that is effective in reducing the airborne concentration of asbestos within the

enclosure Whenever possible, the asbestos should be removed and placed directly into bags for disposal rather than dropping the material to the floor and picking up all of the material when the removal is complete. If a significant amount of time elapses between the time that the material is removed and the time it is bagged, the asbestos material is likely to dry out and generate asbestos-laden dust when it is disturbed by people working within the enclosure. Any asbestos-

contaminated supplies and equipment that cannot be decontaminated should be disposed of in pre-labeled bags; items in this category include plastic sheeting, disposable work clothing, respirator cartridges, and contaminated wash water.

A checklist is one of the most effective methods of ensuring adequate surveillance of the integrity of the asbestos removal enclosure. Such a checklist is shown in Figure F-6. Filling out the checklist at the beginning

of each shift in which asbestos removal is being performed will serve to document that all the necessary precautions will be taken during the asbestos removal work. The checklist contains entries for ensuring that:

- The work area enclosure is complete;
- The negative-pressure system is in operation;
- Necessary signs and labels are used;

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### Asbestos Removal, Renovation, and Demolition Checklist

Date: \_\_\_\_\_ Location: \_\_\_\_\_

Supervisor \_\_\_\_\_ Project # \_\_\_\_\_  
Work Area (sq. ft.) \_\_\_\_\_

	Yes	No
I. Work site barrier		
Floor covered	_____	_____
Walls covered	_____	_____
Area ventilation off	_____	_____
All edges sealed	_____	_____
Penetrations sealed	_____	_____
Entry curtain6	_____	_____
II. Negative Air Pressure		
HEPA Vac _____ Ventilation system _____		
Constant operation	_____	_____
Negative pressure achieved	_____	_____
III. Signs		
Work area entrance	_____	_____
Bags labeled	_____	_____
IV. Work Practices		
Removed material promptly bagged	_____	_____
Material worked wet	_____	_____
HEPA vacuum used	_____	_____
No smoking	_____	_____
No eating, drinking	_____	_____
Work area cleaned after completion	_____	_____
Personnel decontaminated each departure	_____	_____
V. Protective Equipment		
Disposable clothing used one time	_____	_____
Proper NIOSH-approved respirators	_____	_____
VII. Showers		
On site	_____	_____
Functioning	_____	_____
Soap and towels	_____	_____
Used by all personnel	_____	_____

Figure P-6. Checklist

- Appropriate work practices are used;
- Necessary protective clothing and equipment are used; and
- Appropriate decontamination procedures are being followed.

#### *Cleaning the Work Area*

After all of the asbestos-containing material is removed and bagged, the entire work area should be cleaned until it is free of all visible asbestos dust. All surfaces from which asbestos has been removed should be cleaned by wire brushing the surfaces, HEPA vacuuming these surfaces, and wiping them with amended water. The inside of the plastic

enclosure should be vacuumed with 4 HEPA vacuum and wet wiped until there is no visible dust in the enclosure. Particular attention should be given to small horizontal surfaces such as pipes, electrical conduits, lights, and support tracks for drop ceilings. All such surfaces should be free of visible dust before the final air samples are collected.

Additional sampling should be conducted inside the enclosure after the cleanup of the work area has been completed. Approximately four area samples should be collected for each 5000 square feet of enclosure area. The enclosure should not be

dismantled unless the final samples show asbestos concentrations of less than the final standard's action level. EPA recommends that a clearance level of 0.01 f/cc be achieved before cleanup is considered complete.

A clearance checklist is an effective method of ensuring that all surfaces are adequately cleaned and the enclosure is ready to be dismantled. Figure F-7 shows a checklist that can be used during the final inspection phase of asbestos abatement, removal, or renovation operations.

BILLING CODE 4310-28-M

Final Inspection of Asbestos Removal, Renovation, and Demolition Projects

Date: \_\_\_\_\_
Project: \_\_\_\_\_
Location: \_\_\_\_\_
Building: \_\_\_\_\_

CHECKLIST:

Table with 4 columns: Residual dust on, Yes, No, Yes, No. Rows include: a. Floor, b. Horizontal surfaces, c. Pipes, d. Ventilation equipment, e. Horizontal surfaces, f. Pipes, g. Ducts, h. Register, i. Lights.

FIELD NOTES:

Record any problems encountered here.

Multiple horizontal lines for field notes.

FINAL AIR SAMPLE RESULTS: \_\_\_\_\_

Figure F-7. Clearance Checklist

**Appendix C to § 1926.58—Work Practices and Engineering Controls for Small-Scale, Short-Duration Asbestos Renovation and Maintenance Activities—Non-Mandatory**

This appendix is not mandatory. In that construction industry employers may choose to comply with all of the requirements of OSHA's final rule for occupational exposure to asbestos in the construction industry, § 1926.58. However, employers wishing to be exempted from the requirements of paragraphs (e)(6) and (f)(2)(ii)(B) of § 1926.58 shall comply with the provisions of this appendix when performing small-scale, short-duration renovation or maintenance activities. OSHA anticipates that employers in the electrical, carpentry, utility, plumbing, and interior construction trades may wish to avail themselves of the final standard's exemptions for small-scale, short-duration renovation and maintenance operations.

*Definition of Small-Scale, Short-Duration Activities*

For the purposes of this appendix, small-scale, short-duration renovation and maintenance activities are tasks such as, but not limited to:

- Removal of asbestos-containing insulation on pipes;
- Removal of small quantities of asbestos-containing insulation on beams or above ceilings;
- Replacement of an asbestos-containing gasket on a valve;
- Installation or removal of a small section of drywall;
- Installation of electrical conduits through or proximate to asbestos-containing materials.

Evidence in the record [see the Summary and Explanation section of the preamble for paragraph (g), Methods of Compliance, for specific citations] suggests that the use of certain engineering and work practice controls is capable of reducing employee exposures to asbestos to levels below the final standard's action level (0.1 f/cc). Several controls and work practices, used either singly or in combination, can be employed effectively to reduce asbestos exposures during small maintenance and renovation operations. These include:

- Wet methods;
- Removal methods;

- Use of glove bags;
- Removal of entire asbestos insulated pipes or structures;
- Use of mini-enclosures;

• Enclosure of asbestos materials; and  
 • Maintenance programs.  
 This appendix describes these controls and work practices in detail.

*Preparation of the Area Before Renovation or Maintenance Activities*

The first step in preparing to perform a small-scale, short-duration asbestos renovation or maintenance task, regardless of the abatement method that will be used, is the removal from the work area of all objects that are movable to protect them from asbestos contamination. Objects that cannot be removed must be covered completely with a 6-mil-thick polyethylene plastic sheeting before the task begins. If objects have already been contaminated, they should be thoroughly cleaned with a High Efficiency Particulate Air (HEPA) filtered vacuum or be wet wiped before they are removed from the work area or completely encased in the plastic.

*Wet Methods*

Whenever feasible, and regardless of the abatement method to be used (e.g., removal, enclosure, use of glove bags), wet methods must be used during small-scale, short duration maintenance and renovation activities that involve disturbing asbestos-containing materials. Handling asbestos materials wet is one of the most reliable methods of ensuring that asbestos fibers do not become airborne, and this practice should therefore be used whenever feasible. As discussed in the Summary and Explanation section of the preamble for paragraph (g), Methods of Compliance, wet methods can be used in the great majority of workplace situations. Only in cases where asbestos work must be performed on live electrical equipment, on live steam lines, or in other areas where water will seriously damage materials or equipment may dry removal be performed. Amended water or another wetting agent should be applied by means of an airless sprayer to minimize the extent to which the asbestos-containing material is disturbed.

Asbestos-containing materials should be wetted from the initiation of the maintenance

or renovation operation and wetting agents should be used continually throughout the work period to ensure that any dry asbestos-containing material exposed in the course of the work is wet and remains wet until final disposal.

*Removal of Small Amount of Asbestos-Containing Materials*

Several methods can be used to remove small amounts of asbestos-containing materials during small-scale, short-duration renovation or maintenance tasks. These include the use of glove bags, the removal of an entire asbestos-covered pipe or structure, and the construction of mini-enclosures. The procedures that employers must use for each of these operations if they wish to avail themselves of the final rule's exemptions are described in the following section.

*Glove Bags*

As discussed in the Summary and Explanation section of the preamble for paragraph (g), Methods of Compliance, evidence in the record indicates that the use of glove bags to enclose the work area during small-scale, short-duration maintenance or renovation activities will result in employee exposures to asbestos that are below the final standard's action level of 0.1 f/cc. This appendix provides requirements for glove bag procedures to be followed by employers wishing to avail themselves of the standard's exemptions for each activity. OSHA has determined that the use of these procedures will reduce the 8 hour time weighted average (TWA) exposures of employees involved in these work operations to levels below the action level and will thus provide a degree of employee protection equivalent to that provided by compliance with all provisions of the final rule.

*Glove Bag Installation.* Glove bags are approximately 40-inch-wide times 64-inch-long bags fitted with arms through which the work can be performed (see Figure C-1(A)). When properly installed and used, they permit workers to remain completely isolated from the asbestos material removed or replaced inside the bag. Glove bags can thus provide a flexible, easily installed, and quickly dismantled temporary small work area enclosure that is ideal for small-scale asbestos renovation or maintenance jobs.

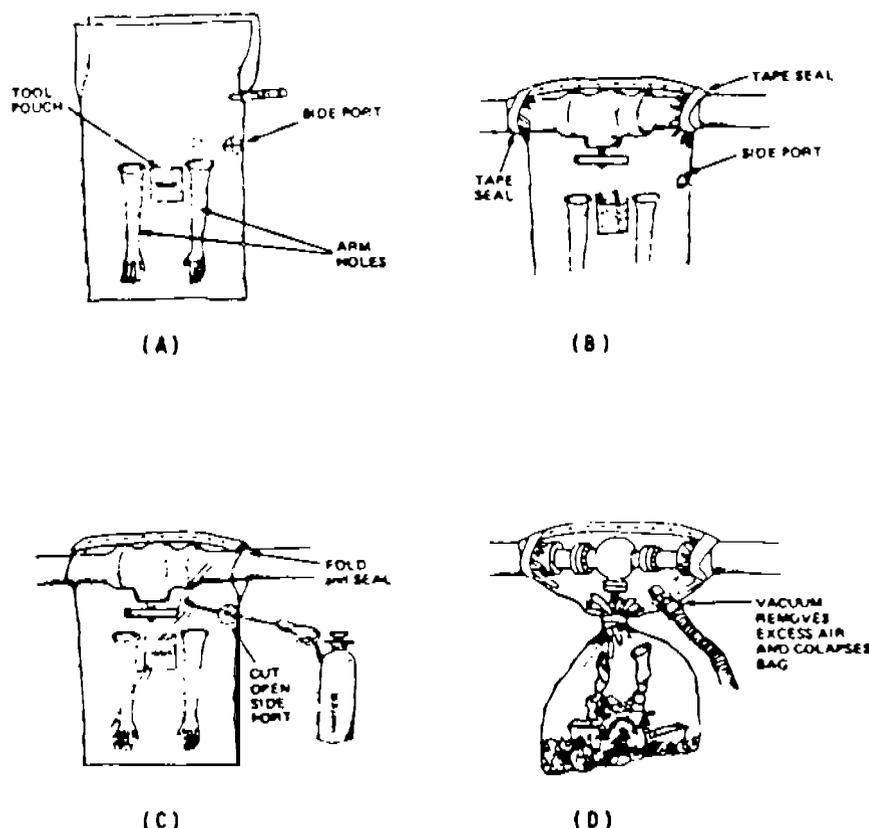


Figure G-1. Diagrams Showing Proper Use of Glove Bags in Scale, Short-Duration Maintenance and Renovation Operations.

Then bags are single use control devices that are disposed of at the end of each job. The bags are made of transparent 8-mil-thick polyethylene plastic with arms of Tyvek material (the same material used to make the disposable protective suits used in major asbestos removal, renovation, and demolition operations and in protective gloves). Glove bags are readily available from safety supply stores or specialty asbestos removal supply houses. Glove bags come pre-labeled with the asbestos warning label prescribed by OSHA and EPA for bags used to dispose of asbestos waste.

**Glove Bag Equipment and Supplies.** Supplies and materials that are necessary to use glove bags effectively include:

- (1) Tape to seal the glove bag to the area from which asbestos is to be removed;
- (2) Amended water or other wetting agents;
- (3) An airless sprayer for the application of the wetting agent;

\* Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

(4) Bridging encapsulant (a paste-like substance for coating asbestos) to seal the rough edges of any asbestos-containing materials that remain within the glove bag at the points of attachment after the rest of the asbestos has been removed;

(5) Tools such as razor knives, nips, and wire brushes (or other tools suitable for cutting wire, etc.);

(6) A HEPA filter-equipped vacuum for evacuating the glove bag (to minimize the release of asbestos fibers) during removal of the bag from the work area and for cleaning any material that may have escaped during the installation of the glove bag; and

(7) HEPA-equipped dual cartridge respirators for use by the employee involved in the removal of asbestos with the glove bag.

**Glove Bag Work Practices.** The proper use of glove bags requires the following steps:

- (1) Glove bags must be installed so that they completely cover the pipe or other structure where asbestos work is to be done. Glove bags are installed by cutting the sides of the glove bag to fit the size of the pipe from which asbestos is to be removed. The glove

bag is attached to the pipe by folding the open edges together and securely sealing them with tape. All openings in the glove bag must be sealed with duct tape or equivalent material. The bottom seam of the glove bag must also be sealed with duct tape or equivalent to prevent any leakage from the bag that may result from a defect in the bottom seam (Figure G-1(B)).

(2) The employee who is performing the asbestos removal with the glove bag must don a half mask dual-cartridge HEPA-filtered respirator. Respirators should be worn by employees who are in close contact with the glove bag and who may thus be exposed as a result of small gaps in the seams of the bag or holes punched through the bag by a razor knife or a piece of wire mesh.

(3) The removed asbestos material from the pipe or other surface that has fallen into the enclosed bag must be thoroughly wetted with a wetting agent (applied with an airless sprayer through the pre-cut port provided in most glove bags or applied through a small hole cut in the bag) (Figure G-1(C)).

(4) Once the asbestos material has been thoroughly wetted, it can be removed from the pipe, beam or other surface. The choice of tool to use to remove the asbestos-containing material depends on the type of material to be removed. Asbestos-containing materials are generally covered with painted canvas and/or wire mesh. Painted canvas can be cut with a razor knife and peeled away from the asbestos-containing material underneath. Once the canvas has been peeled away, the asbestos-containing material underneath may be dry. In which case it should be re-sprayed with a wetting agent to ensure that it generates as little dust as possible when removed. If the asbestos-containing material is covered with wire mesh, the mesh should be cut with nips, tin snips, or other appropriate tool.

A wetting agent should be used to spray any layer of asbestos that is exposed beneath the surface of the stripped underlying structure, and the inside of the glove bag.

(5) After removal of the layer of asbestos-containing material, the pipe or surface from which asbestos has been removed must be thoroughly cleaned with a wire brush and wet wiped with wetting agent until no traces of the asbestos-containing material can be seen.

(6) Any asbestos containing insulation edges that have been exposed as a result of the removal or maintenance activity must be encapsulated with bridging encapsulant to ensure that the edges do not release asbestos fibers to the atmosphere after the glove bag has been removed.

(7) When the asbestos removal and encapsulation have been completed, a vacuum hose from a HEPA filtered vacuum must be inserted into the glove bag through the port to remove any asbestos in the bag that may contain asbestos fibers. When the air has been removed from the bag, the bag should be squeezed tightly (as close to the top as possible), twisted, and sealed with tape, to keep the asbestos materials safely in the bottom of the bag. The HEPA vacuum can

than be removed from the bag and the glove

bag itself can be removed from the work area to be disposed of properly (Figure C-1(D)).

(2) Covering the floor with plastic and sealing the plastic covering the floor to the plastic on the walls.

(3) Sealing any penetrations such as pipes or electrical conduits with tape; and

(4) Constructing a small change room (approximately 3 feet square) made of 6-mil-thick polyethylene plastic supported by 2-inch by 4-inch lumber (the plastic should be attached to the lumber supports with staples or spray adhesive and tape).

The change room should be contiguous to the mini enclosure, and is necessary to allow the worker to vacuum off his protective coveralls and remove them before leaving the work area. While inside the enclosure, the worker should wear Tyvek<sup>1</sup> disposable coveralls and use the appropriate HEPA filtered dual cartridge respiratory protection.

The advantages of mini-enclosures are that they limit the spread of asbestos contamination, reduce the potential exposure of bystanders and other workers who may be working in adjacent areas, and are quick and easy to install. The disadvantage of mini-enclosures is that they may be too small to contain the equipment necessary to create a negative pressure within the enclosure; however, the double layer of plastic sheeting will serve to restrict the release of asbestos fibers to the area outside the enclosure.

*Removal of Entire Structures*

When pipes are insulated with asbestos-containing materials, removal of the entire pipe may be more protective, easier, and more cost-effective than stripping the asbestos insulation from the pipe. Before such a pipe is cut, the asbestos-containing insulation must be wrapped with 6-mil polyethylene plastic and securely sealed with duct tape or equivalent. This plastic covering will prevent asbestos fibers from becoming airborne as a result of the vibration created by the power saws used to cut the pipe. If possible, the pipes should be cut at locations that are not insulated to avoid disturbing the asbestos. If a pipe is completely insulated with asbestos-containing materials, small sections should be stripped using the glove-bag method described above before the pipe is cut at the stripped sections.

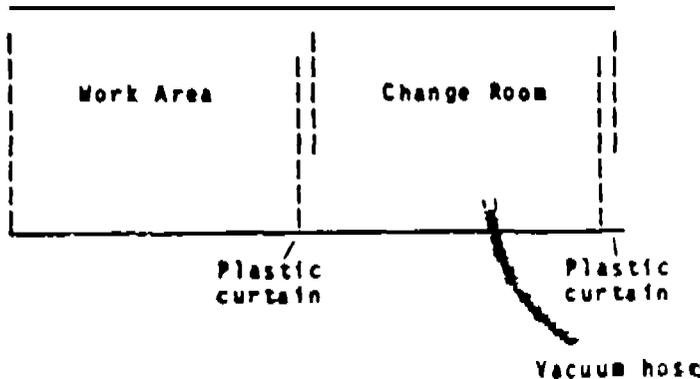
*Enclosure*

The decision to enclose rather than remove asbestos-containing material from an area depends on the building owner's preference, i.e., for removal or containment. Owners consider such factors as cost effectiveness, the physical configuration of the work area, and the amount of traffic in the area when determining which abatement method to use.

If the owner chooses to enclose the structure rather than to remove the asbestos-containing material insulating it, a solid structure (airtight walls and ceilings) must be built around the asbestos covered pipe or structure to prevent the release of asbestos-containing materials into the area beyond the enclosure and to prevent disturbing these

<sup>1</sup> Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Top View



Side View

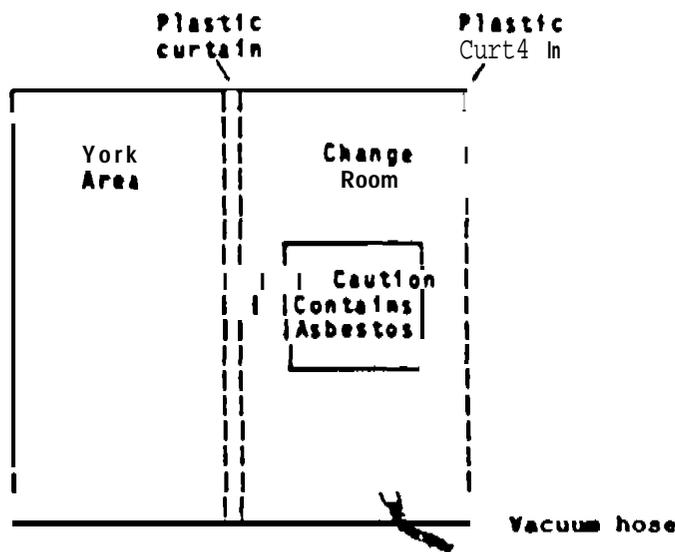


Figure G-2. Schematic of Mini-enclosure

*Mini-Enclosures*

In some instances, such as removal of asbestos from a small ventilation system or from a short length of duct, a glove bag may not be either large enough or of the proper shape to enclose the work area. In such cases, a mini-enclosure can be built around the area where small-scale, short-duration asbestos maintenance or renovation work is to be performed (Figure G-2). Such an

enclosure should be constructed of 6-mil-thick polyethylene plastic sheeting and can be small enough to restrict entry to the asbestos work area to one worker.

In a small utility closet when asbestos-containing duct covering is to be removed.

The enclosure is constructed by:

- (1) Affixing plastic sheeting to the walls with spray adhesive and tape;

materials by casual contact during future maintenance operations.

Such 4 permanent [i.e., for the life of the building] enclosure should be built of new construction materials and should be impact resistant and airtight. Enclosure walls should be made of tongue-and-groove boards, boards with spine joints, or gypsum boards having taped seams. The underlying structure must be able to support the weight of the enclosure. (Suspended ceilings with laid in panels do not provide airtight enclosures and should not be used to enclose structures covered with asbestos-containing materials.) All joints between the walls and ceiling of the enclosure should be caulked to prevent the escape of asbestos fibers. During the installation of enclosures, tools that are used (such as drills or rivet tools) should be equipped with HEPA-filtered vacuums. Before constructing the enclosure, all electrical conduits, telephone lines, recessed lights, and pipes in the area to be enclosed should be moved to ensure that the enclosure will not have to be re-opened later for routine or emergency maintenance. If such lights or other equipment cannot be moved to a new location for logistic reasons, or if moving them will disturb the asbestos-containing materials, removal rather than enclosure of the asbestos-containing materials is the appropriate control method to use.

#### Maintenance Program

An maintenance program must be initiated in all facilities that have asbestos-containing materials. Such a program should include:

- Development of an inventory of all asbestos-containing materials in the facility;
- Periodic examination of all asbestos-containing materials to detect deterioration;
- Written procedures for handling asbestos materials during the performance of small-scale, short-duration maintenance and renovation activities;
- Written procedures for asbestos disposal;
- Written procedures for dealing with asbestos-related emergencies.

Members of the building's maintenance engineering staff (electricians, heating/air conditioning engineers, plumbers, etc.) who may be required to handle asbestos-containing materials should be trained in safe procedures. Such training should include at a minimum:

- Information regarding types of asbestos and its various uses and forms;
- Information on the health effects associated with asbestos exposure;
- Descriptions of the proper methods of handling asbestos-containing materials, and
- Information on the use of HEPA-equipped dual cartridge respiratory and other personal protection during maintenance activities.

#### Prohibited Activities

The training program for the maintenance engineering staff should describe methods of handling asbestos-containing materials as well as routine maintenance activities that are prohibited when asbestos-containing materials are involved. For example, maintenance staff employees should be instructed:

- Not to drill holes in materials;
- Not to hang plants or pictures on structures covered with asbestos-containing materials;
- Not to sand asbestos-containing floor tile;
- Not to damage asbestos-containing materials while moving furniture or other objects;
- Not to install curtains, drapes, or dividers in such a way that they damage asbestos-containing materials;
- Not to dust floors, ceilings, moldings or other surfaces in asbestos-contaminated environments with a dry brush or sweep with a dry broom;
- Not to use an ordinary vacuum to clean up asbestos-containing debris;
- Not to remove ceiling tiles below asbestos-containing materials without wearing the proper respiratory protection, clearing the area of other people, and observing asbestos removal waste disposal procedures;
- Not to remove ventilation system filters dry; and
- Not to shake ventilation system filters.

#### Appendix H to § 1926.56—Substance Technical Information for Asbestos, Non-Mandatory

##### I. Substance Identification

A. Substance: "Asbestos" is the name of a class of magnesium-silicate minerals that occur in fibrous form. Minerals that are included in this group are chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos.

B. Asbestos, tremolite, anthophyllite, and actinolite are used in the manufacture of heat-resistant clothing, automotive brake and clutch linings, and a variety of building materials including floor tiles, roofing felt, ceiling tiles, asbestos-cement pipe and sheet, and fire-resistant drywall. Asbestos, tremolite, anthophyllite and actinolite are also present in pipe and boiler insulation materials, and in sprayed-on materials located on beams, in crawlspaces, and between walls.

C. The potential for an asbestos-containing product to release breathable fibers depends on its degree of friability. Friable means that the material can be crumbled with hand pressure and is therefore likely to emit fibers. The fibrous or fluffy sprayed-on materials used for fireproofing, insulation, or sound proofing are considered to be friable, and they readily release airborne fibers if disturbed. Materials such as vinyl-asbestos floor tile or roofing felt are considered nonfriable and generally do not emit airborne fibers unless subjected to sanding or sawing operations. Asbestos-cement pipe or sheet can emit airborne fibers if the materials are cut or sawed, or if they are broken during demolition operations.

D. Permissible Exposure: Exposure to airborne asbestos, tremolite, anthophyllite, and actinolite fibers may not exceed 0.2 fibers per cubic centimeter of air (0.2 f/cc) averaged over the 8-hour workday.

##### II. Health Hazard Data

A. Asbestos, tremolite, anthophyllite, and actinolite can cause disabling respiratory

disease and various types of cancers if the fibers are inhaled. Inhaling or ingesting fibers from contaminated clothing or skin can also result in these diseases. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.

B. Exposure to asbestos, tremolite, anthophyllite and actinolite has been shown to cause lung cancer, mesothelioma, and cancer of the stomach and colon. Mesothelioma is a rare cancer of the thin membrane lining of the chest and abdomen. Symptoms of mesothelioma include shortness of breath, pain in the walls of the chest, and/or abdominal pain.

##### III Respirators and Protective Clothing

A. Respirators: You are required to wear a respirator when performing tasks that result in asbestos, tremolite, anthophyllite and actinolite exposure that exceeds the permissible exposure limit (PEL) or 0.2 f/cc. These conditions can occur while your employer is in the process of installing engineering controls to reduce asbestos, tremolite, anthophyllite and actinolite exposure, or where engineering controls are not feasible to reduce asbestos, tremolite, anthophyllite and actinolite exposure. Air-purifying respirators equipped with a high-efficiency particulate (HEPA) filter can be used where airborne asbestos, tremolite, anthophyllite and actinolite fiber concentrations do not exceed 2 f/cc; otherwise, air-supplied, positive-pressure, full facepiece respirators must be used. Disposable respirators or dust masks are not permitted to be used for asbestos, tremolite, anthophyllite and actinolite work. For effective protection, respirators must fit your face and head snugly. Your employer is required to conduct fit tests when you are first assigned a respirator and every 6 months thereafter. Respirators should not be loosened or removed in work situations where their use is required.

B. Protective Clothing: You are required to wear protective clothing in work areas where asbestos, tremolite, anthophyllite, and actinolite fiber concentrations exceed the permissible exposure limit (PEL) of 0.2 f/cc to prevent contamination of the skin. Where protective clothing is required, your employer must provide you with clean garments. Unless you are working on a large asbestos, tremolite, anthophyllite, or actinolite removal or demolition project, your employer must provide a change room and separate lockers for your street clothes and contaminated work clothes if you are working on a large asbestos, tremolite, anthophyllite, and actinolite removal or demolition project, and where it is feasible to do so, your employer must provide a clean room, shower, and decontamination room contiguous to the work area. When leaving the work area, you must remove contaminated clothing before proceeding to the shower. If it is not adjacent to the work area, you must vacuum your clothing before proceeding to change the room and shower. To prevent inhaling fibers in contaminated change rooms and showers, leave your respirator on until you leave the shower and enter the clean change room.

**IV. Disposal Procedures and Cleanup**

A. Wastes that are generated by processes where asbestos, tremolite, anthophyllite, and actinolite is present include:

1. Empty asbestos, tremolite, anthophyllite, and actinolite shipping containers.
2. Process wastes such as cuttings, trimmings, or reject materials.
3. Housekeeping waste from sweeping or vacuuming.
4. Asbestos fireproofing or insulating material that is removed from buildings.
5. Asbestos-containing building products removed during building renovation or demolition.

6. Contaminated disposable protective clothing.

B. Empty shipping bags can be flattened under exhaust hoods and packed into airtight containers for disposal. Empty shipping drums are difficult to clean and should be sealed.

C. Vacuum logs or disposable paper filters should not be cleaned, but should be sprayed with a fine water mist and placed into a labeled waste container.

D. Process waste and housekeeping waste should be wetted with water or a mixture of water and surfactant prior to packaging in disposable containers.

E. Asbestos-containing material that is removed from buildings must be disposed of in leak-tight 6-mil thick plastic bags, plastic-lined cardboard containers, or plastic-lined metal containers. These wastes, which are removed while wet, should be waled in containers before they dry out to minimize the release of asbestos, tremolite, anthophyllite, and actinolite fibers during handling.

**V. Access IO Information**

A. Each year, your employer is required to inform you of the information contained in this standard and appendices for asbestos. In addition, your employer must instruct you in the proper work practices for handling asbestos-containing materials, and the correct use of protective equipment.

B. Your employer is required to determine whether you are being exposed to asbestos. You or your representative has the right to observe employee measurements and to record the results obtained. Your employer is required to inform you of your exposure, and, if you are exposed above the permissible limit, he or she is required to inform you of the actions that are being taken to reduce your exposure to within the permissible limit.

C. Your employer is required to keep records of your exposures and medical examinations. These exposure records must be kept for at least thirty (30) years. Medical records must be kept for the period of your employment plus thirty (30) years.

D. Your employer is required to release your exposure and medical records to your physician or designated representative upon your written request.

**Appendix 1 to § 1926.55—Medical Surveillance Guidelines for Asbestos, Tremolite, Anthophyllite, and Actinolite, Non-Mandatory**

**1. Route of Entry**

Inhalation ingestion.

**II. Toxicology**

Clinical evidence of the adverse effects associated with exposure to asbestos, tremolite, anthophyllite, and actinolite, is present in the form of several well-conducted epidemiological studies of occupationally exposed workers, family contacts of workers, and persons living near □ rton, tremolite, anthophyllite, and actinolite mines. These studies have shown a definite association between exposure to asbestos, tremolite, anthophyllite, and actinolite and an increased incidence of lung cancer, pleural and peritoneal mesothelioma, gastrointestinal cancer, and asbestosis. The latter is a disabling fibrotic lung disease that is caused only by exposure to asbestos. Exposure to asbestos, tremolite, anthophyllite, and actinolite has also been associated with an increased incidence of esophageal, kidney, laryngeal, pharyngeal, and buccal cavity cancers. As with other known chronic occupational diseases, disease associated with asbestos, tremolite, anthophyllite, and actinolite generally appears about 20 years following the first occurrence of exposure. There are no known acute effects associated with exposure to asbestos, tremolite, anthophyllite, and actinolite.

Epidemiological studies indicate that the risk of lung cancer among exposed workers who smoke cigarettes is greatly increased over the risk of lung cancer among non-exposed smokers or exposed nonsmokers. These studies suggest that cessation of smoking will reduce the risk of lung cancer for a person exposed to asbestos, tremolite, anthophyllite, and actinolite but will not reduce it to the same level of risk as that existing for an exposed worker who has never smoked.

**III. Signs and Symptoms of Exposure-Related Disease**

The signs and symptoms of lung cancer or gastrointestinal cancer induced by exposure to asbestos, tremolite, anthophyllite, and actinolite are not unique, except that a chest X-ray of an exposed patient with lung cancer may show pleural plaques, pleural calcification, or pleural fibrosis. Symptoms characteristic of mesothelioma include shortness of breath, pain in the walls of the chest, or abdominal pain. Mesothelioma has a much longer latency period compared with lung cancer (40 years versus 15-20 years), and mesothelioma is therefore more likely to be found among workers who were first exposed to asbestos at an early age. Mesothelioma is □ lmyefatal.

Asbestosis is pulmonary fibrosis caused by the accumulation of asbestos fibers in the lungs. Symptoms include shortness of breath, coughing, fatigue, and vague feelings of sickness. When the fibrosis worsens, shortness of breath occurs even at rest. The diagnosis of asbestosis is based on a history of exposure to □ rbestos, the presence of characteristic radiologic changes, and inspiratory crackles (rales), and other clinical features of fibrotic lung disease. Pleural plaques and thickening are observed on X-rays taken during the early stages of the disease. Asbestosis is often a progressive disease even in the □ bsence of continued exposure, although this □ pper may be highly

individualized characteristic. In severe cases, death may be caused by respiratory or cardiac failure.

**IV. Surveillance and Preventive Considerations**

As noted above, exposure to asbestos, tremolite, anthophyllite, and actinolite has been linked to an increased risk of lung cancer, mesothelioma, gastrointestinal cancer, and asbestosis among occupationally exposed workers. Adequate screening tests to determine an employee's potential for developing chronic diseases, such as □ r cancer, □ r asbestos, tremolite, anthophyllite, and actinolite do not presently exist. However, some tests, particularly chest X-rays and pulmonary function tests, may indicate that an employee has been overexposed to asbestos, tremolite, anthophyllite and actinolite. Increasing his or her risk of developing exposure related chronic diseases. It is important for the physician to become familiar with the operating conditions in which occupational exposure to asbestos, tremolite, anthophyllite, and actinolite is likely to occur. This is particularly important in evaluating medical and work histories and in conducting physical examinations. When an active employee has been identified as having been overexposed to asbestos, tremolite, anthophyllite, and actinolite, measures taken by the employer to eliminate or mitigate further exposure should also lower the risk of serious long-term consequences.

The employer is required to institute a medical surveillance program for all employees who are or will be exposed to asbestos, tremolite, anthophyllite, and actinolite at or above the action level (0.1 fiber per cubic centimeter of air) for 30 or more days per year and for all employees who are assigned to wear a negative-pressure respirator. All examinations and procedures must be performed by or under the supervision of a licensed physician, at a reasonable time and place, and at no cost to the employee.

Although broad latitude is given to the physician in prescribing specific tests to be included in the medical surveillance program, OSHA requires inclusion of the following elements in the routine examination:

(i) Medical and work histories with special emphasis directed to symptoms of the respiratory system, cardiovascular system, and digestive tract.

(ii) Completion of the respiratory disease questionnaire contained in Appendix D.

(iii) A physical examination including a chest roentgenogram and pulmonary function test that includes measurement of the employee's forced vital capacity (FVC) and forced expiratory volume at one second (FEV<sub>1</sub>).

(iv) Any laboratory or other test that the examining physician deems by sound medical practice to be necessary.

The employer is required to make the prescribed tests available at least annually to those employees covered, more often than specified if recommended by the examining physician, and upon termination of employment.

The employer is required to provide the physician with the following information: A copy of this standard and appendices; 4 description of the employee's duties as they relate to asbestos exposure; the employee's representative level of exposure to asbestos, tremolite, anthophyllite, and actinolite; 4 description of any personal protective and respiratory equipment used; and information from previous medical examinations of the affected employee that is not otherwise available to the physician. Making this information available to the physician will aid in the evaluation of the employee's health

in relation to assigned duties and fitness to wear personal protective equipment, if required.

The employer is required to obtain a written opinion from the examining physician containing the results of the medical examination; the physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of exposure-related disease; recommended limitations on the employee or on the use of personal protective equipment; and a statement that the employee has been

informed by the physician of the results of the medical examination and of any medical conditions related to asbestos, tremolite, anthophyllite, and actinolite exposure that require further explanation or treatment. This written opinion must not reveal specific findings or diagnoses unrelated to exposure to asbestos, tremolite, anthophyllite, and actinolite, and a copy of the opinion must be provided to the affected employee.

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APPENDIX C

OFFICE OF THE SURGEON GENERAL POLICY MEMO

(TO BE PUBLISHED)

APPENDIX D

REFERENCES

Army Regulation 200-1, Environmental Protection and Enhancement: Chapter 10, Asbestos Management Plan, 23 April 1990.

Technical Bulletin Medical (**TB MED**) 513, Occupational and Environmental Health Guidelines for the Evaluation and Control of Asbestos Exposure, 15 December 1986.

Technical Manual (**TM**) 5-612 (Draft), Asbestos Control, 18 June 1987.

Title 29, Code of Federal Regulations (**CFR**), Part 1910.1001, Occupational Safety and Health Standards (General Industries) : Asbestos.

Title 23, CFR, Part 1926.58, Safety and Health Regulations for Construction: Asbestos, tremolite, anthophyllite, and actinolite.

Title 40, CFR, Part 61, National Emission Standards **for** Hazardous Air Pollutants (**NESHAP**), Subpart M, National Emission Standard **for** Asbestos.

Title 40, CFR, Part 763, Asbestos, Subpart E, Asbestos-Containing Materials in Schools.

U.S. Army Environmental Protection Agency (EPA), Pesticides and Toxic Substances, 2T-2003, Managing Asbestos in Place, A Building Owner's Guide to Operations and Maintenance Programs for **Asbestos-Containing Materials**, July 1990.

U.S. Environmental Protection Agency (EPA), 560/5-85-024, Guidance for Controlling Asbestos-Containing Material in Buildings, June 1985.

U.S. Army Corps of Engineers; Guide Specification for Military Construction, CECS-02080, **Asbestos** Abatement, March 1992.

Memorandum, Office of The Surgeon General, **HQDA (SGPS-PSP)**, 19 January 1989, subject: **Army** Medical Department (**AMEDD**) Role Supporting Asbestos Abatement/Asbestos Management Programs.

APPENDIX E  
GLOSSARY OF ABBREVIATIONS

ACBM . . . . .	asbestos-containing building materials
AHERA . . . . .	Asbestos Hazard <b>Emergency</b> Response Act
C . . . . .	critical
CDC(s) . . . . .	Child Development Centers
CFR . . . . .	Code of Federal Regulations
CIH . . . . .	certified industrial hygienist
DEH . . . . .	Directorate of Engineering and Housing
EPA . . . . .	U.S. Environmental Protection Agency
HEPA . . . . .	high efficiency particulate air
lin. ft. . . . .	linear feet
MACOM(s) . . . . .	major <b>command(s)</b>
N/A . . . . .	no asbestos
NC . . . . .	noncritical
NESHAP . . . . .	National <b>Emission</b> Standards for Hazardous <b>Air</b> Pollutants
N/I . . . . .	not on installation
NIOSH . . . . .	National Inetitute for Occupational Safety and Health
o&M. . . . .	operations and maintenance
OSHA . . . . .	Occupational Safety and Health Administration
PCM . . . . .	phaee contrast microscopy
QA . . . . .	quality assurance
SEM . . . . .	scanning electron microscopy
SOP(s) . . . . .	standing operating procedure(s)
sq. ft. . . . .	<b>square</b> feet
TEM . . . . .	<b>transmission</b> electron microscopy

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