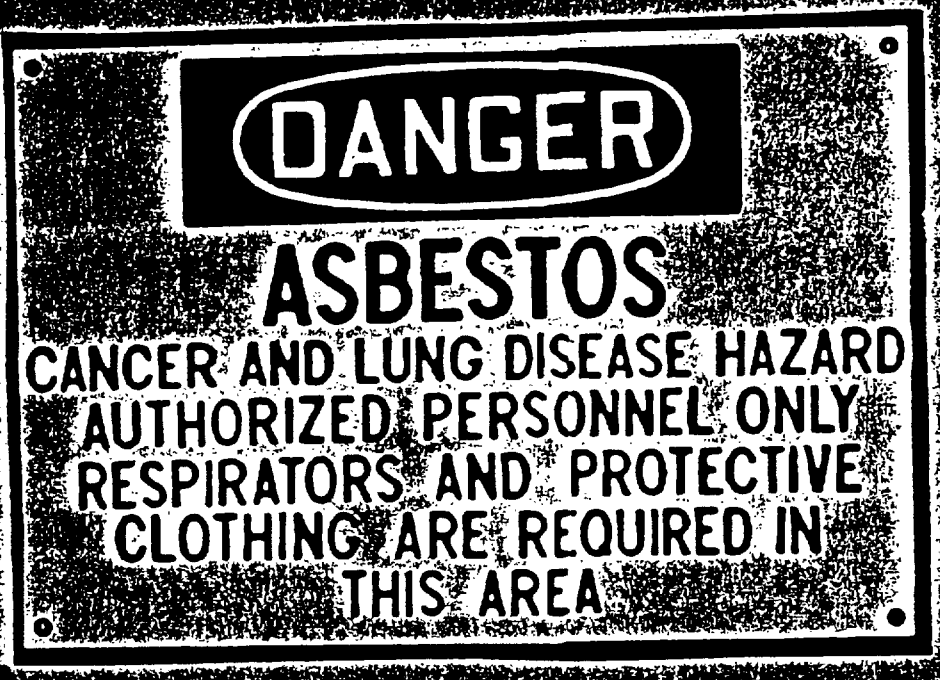
PLAINTIFF'S EXHIBIT

MON-1336

DOW THE DOW CHEMICAL COMPANY

TEXAS OPERATIONS
ASBESTOS HANDBOOK



ST0438374

REVISED,
FEBRUARY, 1987

ST0438374

THIS MANUAL IS AN UPDATED EDITION OF THE HANDBOOK PREPARED IN 1972 AND REVISED IN 1977 AND 1985. THIS EDITION WAS REVISED BY THE ASBESTOS TASK FORCE DURING THE FOURTH QUARTER OF 1986.

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SECTION I

PURPOSE

This handbook defines safe handling procedures for asbestos materials used in Texas Operations. The intent is to control personnel exposure to asbestos dust through training, asbestos maintenance programs, safe work procedures, proper use of protective equipment, and by the substitution of non-asbestos containing materials.

Asbestos has been widely used as insulation, structural wallboard, roofing material, etc. Asbestos fibers are currently in use as a mechanical reinforcing matrix in insulation, roofing paper, certain piping systems, gaskets, brake linings, clutch plates, etc. Dow Engineering Specifications were revised in 1970 to exclude asbestos-containing insulation before the enactment of Federal regulations controlling the use and handling of asbestos. It is Dow's philosophy to eliminate the use of asbestos where feasible.

The revised OSHA standards (1910.1001 and 1926.58) which became effective July 21, 1986 define the precautions, procedures and controls required for asbestos handling. These standards also define the allowable exposure levels and the manner of determining exposure levels. The National Emission Standard for Hazardous Air Pollutants (NESHAP) also established specific requirements for removal, packaging, transport and disposal of asbestos-containing materials. Violations of these regulations may result in a citation or fine or both. Dow is committed to meeting or exceeding government regulations, to protect the health of personnel.

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HEALTH & ENVIRONMENTAL SCIENCES INFORMATION CENTER
POTENTIAL HEALTH EFFECTS
ASBESTOS

DR-0027-0713 REVISED: 12/11/86

SYNONYMS
AMPHIBOLE

APPEARANCE: fibrous solid in various colors
EXPOSURE GUIDELINES: OSHA PEL is 0.2 fibers (>5 um) per cc. 8 hr. TWA
OSHA General Industry Standard 29CFR1910.1001.
OSHA Construction Standard 29CFR1926.58.
ACGIH TLV is 0.5 fibers (>5 um) per cc for amosite, Ala; 0.2 fibers (>5 um) per cc for crocidolite; 2 fibers (>5 um) per cc for chrysotile and other forms of asbestos, Ala.

POTENTIAL HEALTH EFFECTS

This section includes possible adverse effects which could occur if this material is not handled in the recommended manner. These effects apply to stated material and may not apply to dilutions or formulations of that material.

EYE
- Mechanical injury only.

SKIN
- Mechanical injury only.
- Skin absorption is unlikely due to physical properties.

INGESTION
- Single dose oral LD50 has not been determined.
- Amounts ingested incidental to industrial handling are not likely to cause injury; however ingestion of larger amounts may cause injury.

ACUTE INHALATION EFFECTS
- Excessive exposure to dust causes chronic inflammations of lung tissue and pleural membranes, as well as cancers, in both man and animals.

SUBCHRONIC EFFECTS
- Prolonged exposure to asbestos dust has been found to cause pulmonary fibrosis (asbestosis), which may be disabling and even fatal.

CHRONIC EFFECTS/CARCINOGENICITY
- Has been shown to cause cancer in humans.
- For hazard communication purposes under OSHA standard 29 CFR part 1910.1200, this chemical is listed as a carcinogen by NTP and IARC Group I.

TERATOGENIC EFFECTS
- No relevant information found.

REPRODUCTIVE EFFECTS
- No relevant information found.

MUTAGENICITY
- Some forms of asbestos have been reported to induce chromosomal changes in tissue culture.

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SECTION III

ASBESTOS TRAINING PROGRAM MINIMUM REQUIREMENTS

All employees who handle asbestos must be trained before initial assignment and annually thereafter. The OSHA asbestos standards and all training materials are available to employees upon request. Information will be presented in a manner the employee can understand.

The following items must be included in the training program:

1. The health effects associated with asbestos,

2. The relationship between smoking and exposure to asbestos in producing lung cancer,

3. Methods of recognizing asbestos,

4. The quantity, location, manner of use, release, and storage of asbestos and the specific nature of operations which could result in exposure to asbestos,

5. The engineering controls and work practices associated with the employee's job assignment,

6. The specific procedures implemented to protect employees from exposure to asbestos, such as appropriate work practices, emergency and clean-up procedures, and personal protective equipment to be used,

7. The purpose, proper use, and limitations of respirators and protective clothing,

8. The purpose and a description of the medical surveillance program required by this standard,

9. A review of the OSHA standard, including appendices.

NOTE: A video tape, "Asbestos Standards" (VT87-1130B), is available through the Television Department (phone 2620) which covers all above requirements except 4, 5 & 6. Items 4, 5, & 6 should be addressed locally by line supervision.

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SECTION IV

DEFINITIONS

ACTION LEVEL

An airborne concentration of asbestos of 0.1 fiber per cubic centimeter (f/cc) of air calculated as an eight (8)-hour time-weighted average.

ASBESTOS

Chrysotile, amosite, crocidolite, tremolite, anthophyllite, actinolite, and any of these minerals that has been chemically treated and/or altered.

AUTHORIZED PERSONNEL

Any person authorized by the employer and required by work duties to be present in regulated areas.

CLEAN ROOM

An uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

COMPETENT PERSON

One who has been trained in an EPA approved course and is capable of identifying existing asbestos hazards in the workplace and has the authority to take prompt corrective measures to eliminate them. 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

An enclosed area consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment contaminated with asbestos. The decontamination area may be adjacent and connected to the regulated area or located remotely.

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SECTION IV

DEFINITIONS

DEMOLITION

The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos.

EMPLOYEE EXPOSURE

Exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

EQUIPMENT ROOM (CHANGE ROOM)

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

A particulate form of asbestos 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

FRIABLE ASBESTOS

Any material that when broken, crushed or pulverized releases asbestos fibers.

HIGH-EFFICIENCY PARTICULATE AIR (HEPA) FILTER

A filter capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometers in diameter or larger.

MINI-ENCLOSURE

An enclosure constructed of 6-mil polyethylene sheeting to restrict access to the area where small-scale, short duration asbestos maintenance or renovation work is to be performed. The enclosure must have a contiguous change room.

NEGATIVE PRESSURE ENCLOSURE

An enclosure for large-scale long duration projects constructed of 6-mil polyethylene sheeting and equipped with a ventilation system (which discharges through a HEPA filter) capable of creating a negative pressure of 0.02 inches of water inside the enclosure. Where feasible, a decontamination area should be contiguous to the enclosure and should be the only means of egress.

PERMISSIBLE EXPOSURE LIMIT (PEL)

No employee shall be exposed to an airborne concentration of asbestos in excess of 0.2 fibers per cubic centimeter of air as an eight-hour time-weighted average (8 hr. TWA).

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SECTION IV

DEFINITIONS

REGULATED AREA

An area established by the employer to demarcate areas where airborne concentrations of asbestos exceed or can reasonably be expected to exceed the permissible exposure limit. The regulated area may take the form of a temporary enclosure, or an area demarcated to restrict access and minimize the number of employees potentially exposed to asbestos.

REMOVAL

The taking out or stripping of asbestos or materials containing asbestos.

RENOVATION

The modifying of any existing structure, or portion thereof, where exposure to airborne asbestos may result.

REPAIR

Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates where asbestos is present.

SMALL-SCALE, SHORT-DURATION ACTIVITIES

The tasks such as, but not limited to: the removal of asbestos-containing insulation on pipes prior to repair; the removal of small quantities of asbestos-containing insulation on beams or above ceilings; the replacement of an asbestos-containing gasket on a valve; the installation or removal of a small section of drywall material containing asbestos; or the installation of electrical conduits, pipe, or cable through or proximate to asbestos-containing materials.

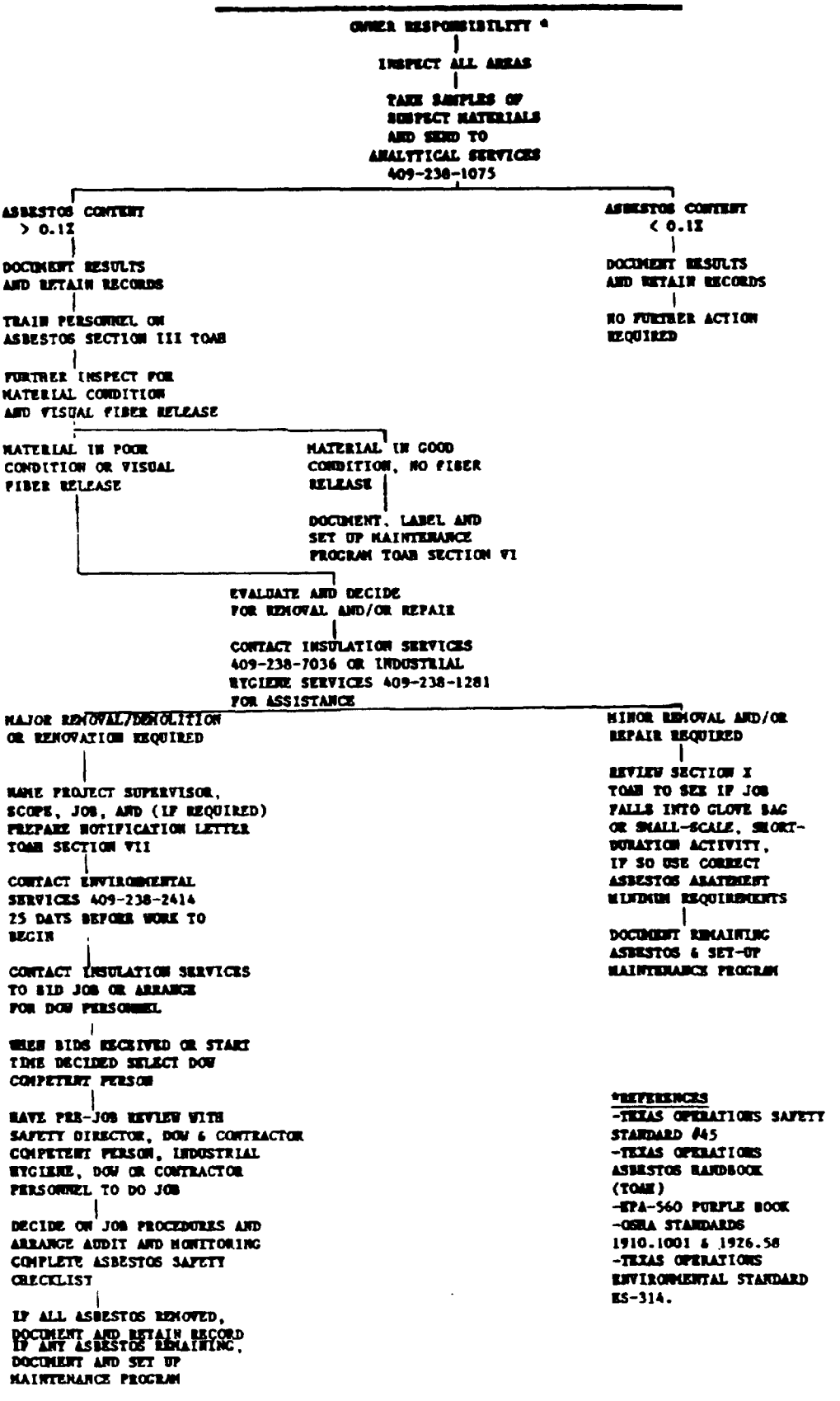
SURFACTANTS

Chemicals added to water to improve its wetting ability.

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ASBESTOS AWARENESS HANDLING REQUIREMENTS



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SECTION V

ASBESTOS AWARENESS

SUBJECT: ASBESTOS DO'S AND DON'TS

This section is provided as general guidance when working with or near asbestos-containing materials.

DO

1. Get positive identification. Sample and have analysis performed at Analytical Services, phone 1075.

2. Take sufficient samples. Some vessels, equipment, etc. may contain more than one type of insulation. Asbestos materials may be covered by refractory, siding, or insulation.

3. Consult the appropriate section of this handbook if asbestos is present. Materials containing more than 0.1% by weight must be handled as asbestos.

4. Put all asbestos waste (old insulation, transite, mastic, dust collector solids, disposable clothing, gaskets, packing, shingles, Haveg piping, furnace refractories, pump packing, pipe gaskets, brake shoes, etc.) in approved containers for disposal. The containers must be properly labeled to warn of the asbestos hazard and sent to the designated asbestos landfill.

5. Inform all personnel in the general area that asbestos work is in progress.

DO NOT

1. Use materials containing asbestos (i.e. insulation, fireproofing, transite siding, Haveg piping, weatherproofing, and cooling tower materials) where an adequate alternate exists. MAJOR MANAGER APPROVAL IS REQUIRED when using asbestos materials for matching replacement/repair of existing asbestos covered structures or equipment if a suitable alternate is known.

2. Use asbestos labeled bags for disposal of general trash because of landfill permit requirements.

3. Sandblast or hydroblast materials containing asbestos. When sandblasting or hydroblasting adjacent areas, protect the asbestos materials from overblast. Examples of items to be protected are transite walls, pipe insulation, fireproofing, etc.

4. Use compressed air to remove asbestos materials. For example, do not clean brake drums and clutch housings with compressed air. This procedure may fill the surrounding atmosphere with asbestos fibers. An acceptable method is to use an approved vacuum. Dispose of the debris in approved containers and send to the designated asbestos landfill.

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DO NOT'S

5. Eat, drink, smoke, chew gum/tobacco products, or apply cosmetics in a regulated area or a decontamination area.

6. Dry sweep asbestos materials

7. Spray asbestos-containing materials

8. Use hand-operated or power-operated tools (such as but not limited to saws, scorers, abrasive wheels and drills) without local exhaust ventilation if the use of these tools would cause asbestos exposures to personnel in excess of 0.2 fiber cc. 8 hr. TWA

9. Hang plants or pictures on structures covered with asbestos-containing materials

10. Sand asbestos-containing floor tiles

11. Damage asbestos-containing materials while moving furniture or other objects

12. Install curtains, drapes, or dividers in such a way that they damage asbestos-containing materials

13. Dust floors, ceilings, moldings or other surfaces in asbestos-contaminated environments with a dry brush

14. Use an ordinary vacuum to clean up asbestos-containing debris

15. 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

16. Remove contaminated ventilation system filters without wetting. Do not shake.

NOTE: Items 5 through 16 are directly from the OSHA Asbestos Regulations.

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SECTION V

SOME ASBESTOS-CONTAINING MATERIALS IN BUILDINGS

SUBDIVISION	GENERIC NAME	ASBESTOS (%)	DATES OF USE	BINDER/SIZING
Surfacing material	sprayed-or troweled-on	1-95	1935-1970	sodium silicat portland cemer organic binder
Preformed thermal insulating products	batts, blocks, and pipe covering			
	85% magnesia	15	1926-1949	magnesium carbonate
	calcium silicate	6-8	1949-1971	calcium silica
Textiles	cloth[a]			
	blankets(fire)[a]	100	1910-present	none
	felts:	90-95	1920-present	cotton/wool
	blue stripe	80	1920-present	cotton
	red stripe	90	1920-present	cotton
	green stripe	95	1920-present	cotton
	sheets	50-95	1920-present	cotton
	cord/rope/yarn[a]	80-100	1920-present	cotton/wool
	tubing	80-85	1920-present	cotton/wool
	tape/strip	90	1920-present	cotton/wool
	curtains[a]			
	(theatre,welding)	60-65	1945-present	cotton
Cementitious concrete-like	extrusion panels:	8	1965-1977	portland cemer
	corrugated	20-45	1930-present	portland cemer
	flat	40-50	1930-present	portland cemer
	flexible	30-50	1930-present	portland cemer
	flexible perforated	30-50	1930-present	portland cemer
	laminated (outer surface)	35-50	1930-present	portland cemer
	roof tiles	20-30	1930-present	portland cemer
	clapboard and shingles:			
	clapboard	12-15	1944-1945	portland cemer
	siding shingles	12-14	unknown-present	portland cemer
	roofing shingles	20-32	unknown-present	portland cemer
	pipe	20-15	1935-present	portland cemer
Paper products	corrugated:			
	high temperature	90	1935-present	sodium silicat
	moderate temperature	35-70	1910-present	starch
	indented	98	1935-present	cotton and organic binder
	millboard	80-85	1925-present	starch,lime,cla

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SECTION V

SOME ASBESTOS-CONTAINING MATERIALS IN BUILDINGS

SUBDIVISION	GENERIC NAME	ASBESTOS(%)	DATES OF USE	BINDER/SIZING
Roofing felts	smooth surface	10-15	1910-present	asphalt
	mineral surface	10-15	1910-present	asphalt
	shingles	1	1971-1974	asphalt
	pipeline	10	1920-present	asphalt
Asbestos-containing compounds	caulking putties	30	1930-present	linseed oil
	adhesive(cold applied)	5-25	1945-present	asphalt
	joint compound		1945-1975	asphalt
	roofing asphalt	5	unknown-present	asphalt
	mastics	5-25	1920-present	asphalt
	asphalt tile cement	13-25	1959-present	asphalt
	roof putty	10-25	unknown-present	asphalt
	plaster/stucco	2-10	unknown-present	portland cement
	spackles	3-5	1930-1975	starch,casein, synthetic resins
	sealants fire/water	50-55	1935-present	caster oil or polyisobutylene
	cement,insulation	20-100	1900-1973	clay
	cement,finishing	55	1920-1973	clay
	cement,magnesia	15	1926-1950	magnesium carbonate
Asbestos ebony products		50	1930-present	portland cement
Flooring tile and Sheet Goods	vinyl asbestos tile	21	1950-present	poly(vinyl) chloride
	asphalt/asbestos tile	26-33	1920-present	asphalt
	sheet goods/resilient	30	1950-present	dry oils
Wallcovering	vinyl wallpaper	6-8	unknown-present	-
Paints and coatings	roof coating	4-7	1900-present	asphalt
	air tight	15	1940-present	asphalt

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SECTION V

ASBESTOS AWARENESS

SUBJECT: Example pictures of past asbestos uses. Partial listing of examples that we must handle according to the guidance provided in this manual.

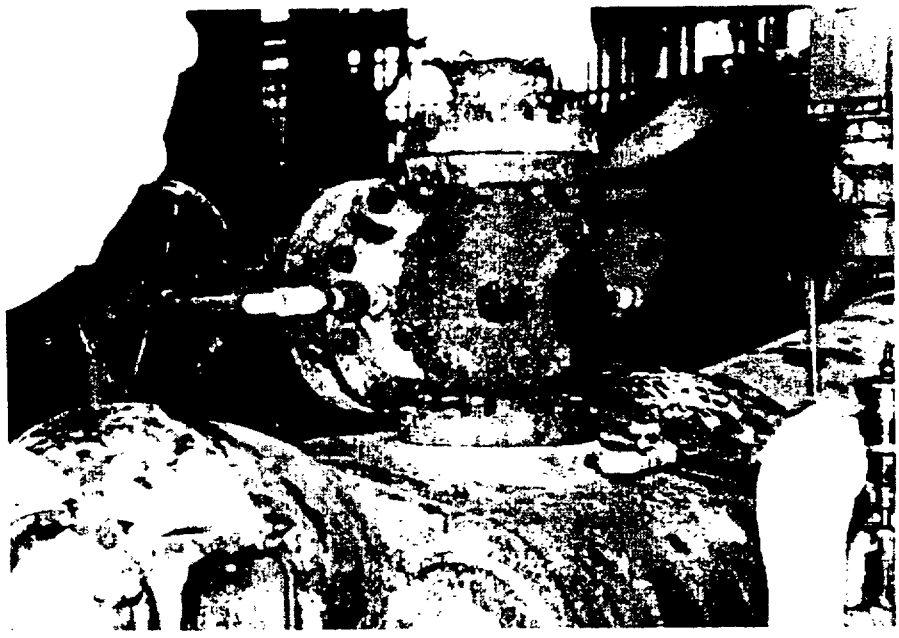


Figure 1. Many of our daily jobs involve repairing flange leaks, replacing valves, etc. The old insulation that is removed in many cases will contain asbestos.

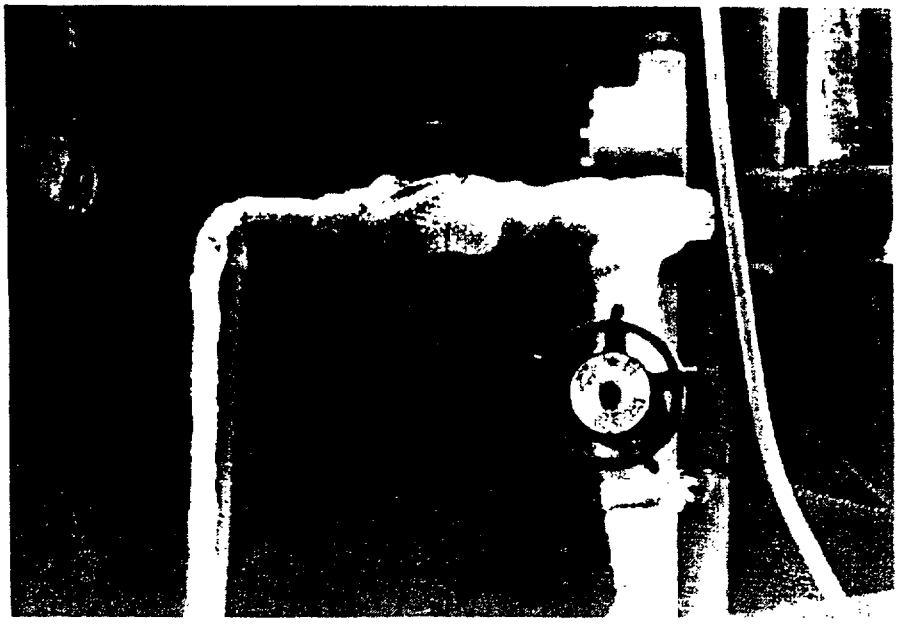


Figure 2. Asbestos insulating tape has been commonly used in the past to insulate small lines and tubing.

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SECTION V

ASBESTOS AWARENESS

SUBJECT: Example pictures of past asbestos uses. Partial listing of examples that we must handle according to the guidance provided in this manual.



Figure 3. There still remain some asbestos blankets that need disposal.



Figure 4. Also used in past years was fiberglass insulation mixed with asbestos fibers.

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SECTION V

ASBESTOS AWARENESS

SUBJECT: Example pictures of past asbestos uses. Partial listing of examples that we must handle according to the guidance provided in this manual.



Figure 5. Structural fireproofing often contained asbestos materials.



Figure 6. Asbestos insulation blocks in combinations with refractory materials exist in many of our boilers and furnaces.

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SUBJECT: Example pictures of past asbestos uses. Partial listing of examples that we must handle according to the guidance provided in this manual.

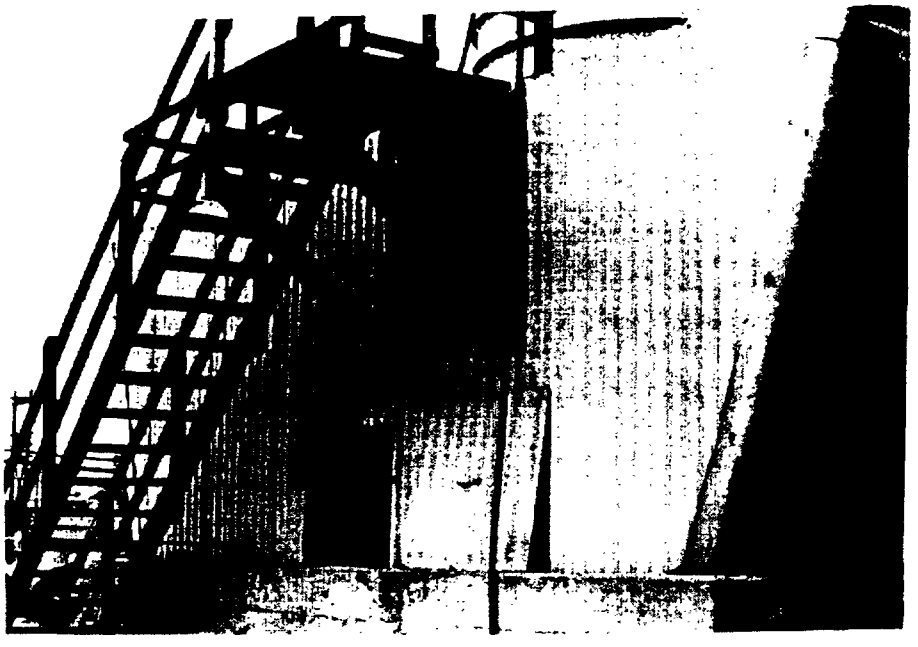


Figure 7. Transite which contains asbestos has been extensively used in the past in many applications in Texas Operations such as cooling towers, buildings, warehouses, etc. Asbestos is also present in cemesto board and asbestos siding shingles which were also used in various type buildings.

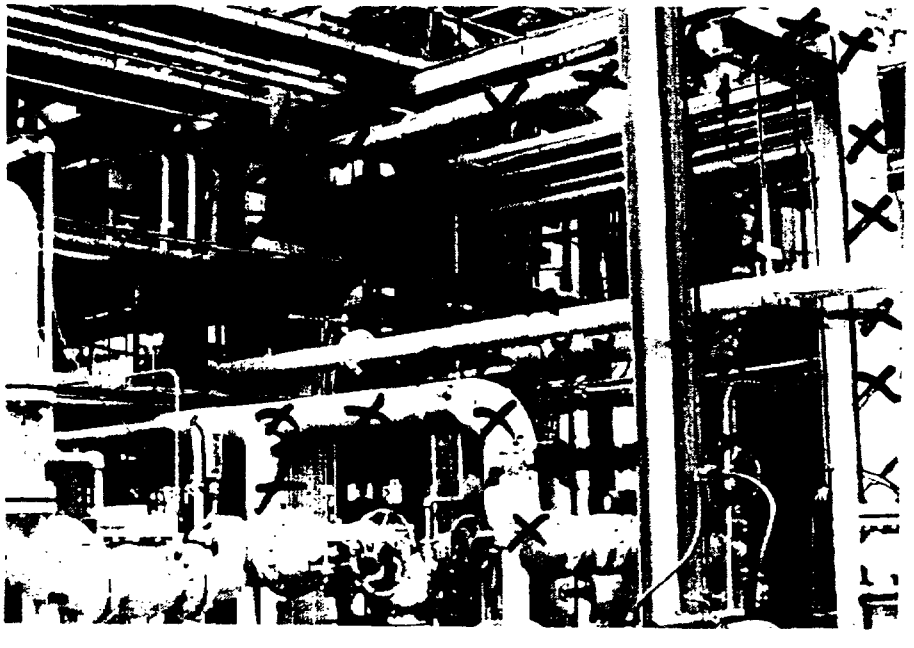
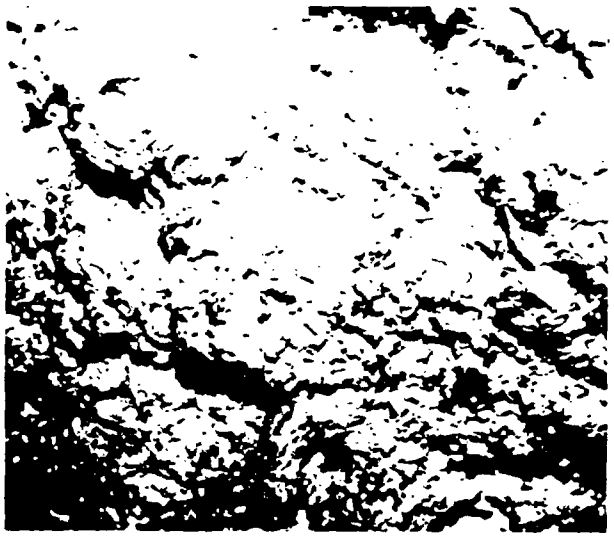


Figure 8. Our most extensive use of asbestos in the older plants was the thousands of square feet used on piping and equipment insulation.

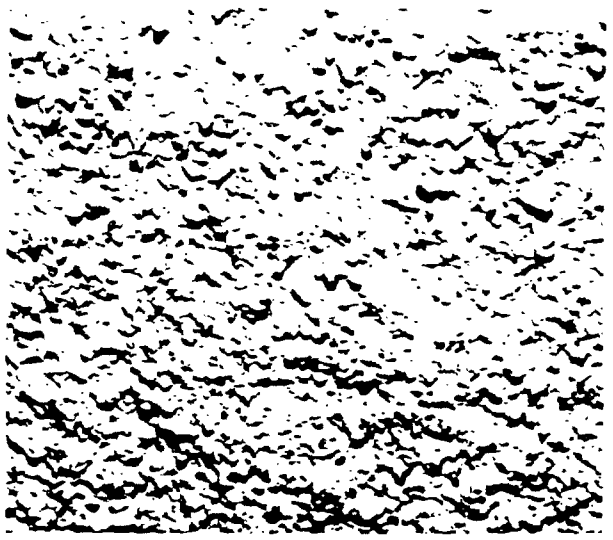
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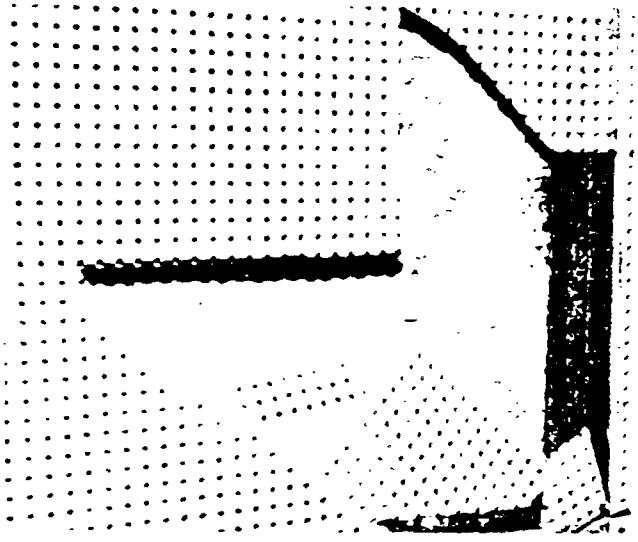
SUBJECT: Example pictures of asbestos uses. Partial testing of example that we must handle according to the guidance provided in this manual.



Friable, fluffy sprayed-on material



Friable, cementitious sprayed-on or troweled material (acoustical plaster)



Nonfriable wallboard with friable sprayed-on material behind



Pipe lagging

Figure 6 Examples of asbestos-containing materials found in buildings.

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SECTION V

ASBESTOS AWARENESS

SUBJECT: Example pictures of asbestos uses. Partial testing of example that we must handle according to the guidance provided in this manual.

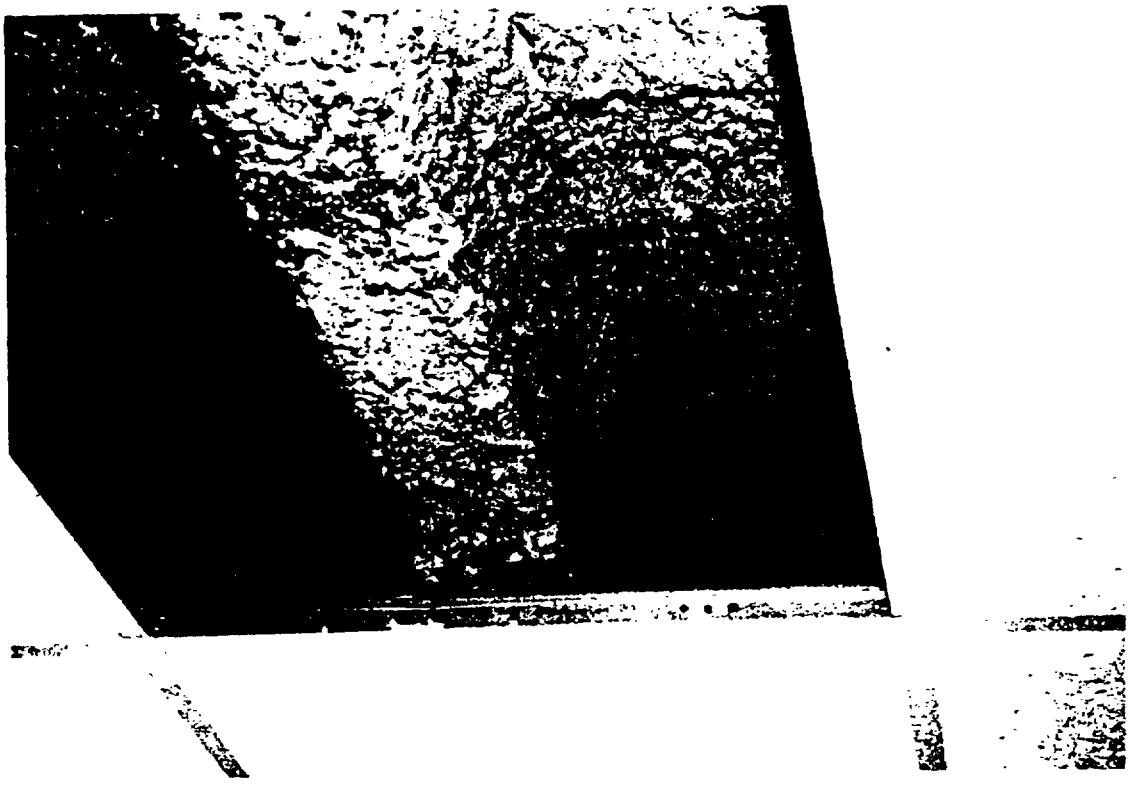


Figure 7 Asbestos-containing material located above a suspended ceiling.

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SECTION VI

ASBESTOS MAINTENANCE PROGRAM MINIMUM REQUIREMENT

An asbestos maintenance program must be initiated in all facilities that have asbestos-containing materials. Such a program shall include:

1. Inspection of buildings and process areas to determine the presence or absence of asbestos containing materials.

2. Development of an inventory of all asbestos-containing materials in the facility. The inventory may be a blueprint, diagram or written description which identifies the location and approximate amount of asbestos. Records must be maintained until the asbestos-containing materials are removed.

3. Maintenance of all labeling of asbestos-containing materials in the facility.

4. Prompt clean up of any asbestos contamination.

5. Examination of all asbestos-containing materials semi-annually to detect deterioration. If deterioration is found, Industrial Hygiene Services must be notified to assess the potential for asbestos fiber release.

6. Written procedures for handling asbestos materials during the performance of maintenance, demolition and renovation activities.

7. Training for personnel who may be required to handle asbestos-containing materials as outlined in the Training Section of this Handbook.

8. Documentation of compliance with this program.

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SECTION VII

NOTIFICATION OF DEMOLITION OR RENOVATION WORK

It is the responsibility of the superintendent/owner to contact Environmental Services (2414) 25 days prior to the start of any reportable asbestos project. Jobs to be reported are:

(1) Demolition which involves the removal of friable asbestos material.

(2) Renovation in which the cumulative amount of friable asbestos removed in a calendar year exceeds 260 linear feet on pipe or 160 square feet on other facility components.

Reference: Texas Operations Environmental Standard ES314

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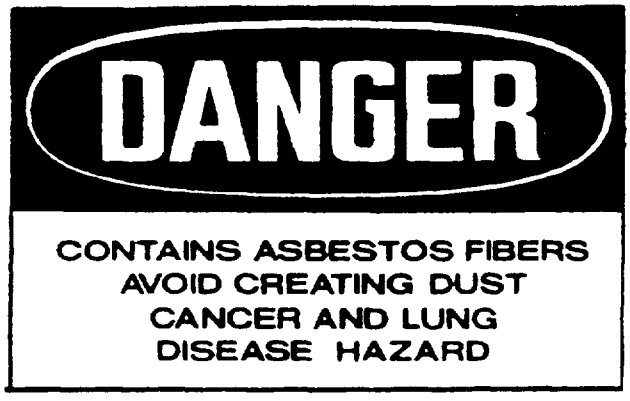
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SECTION VIII

HAZARD COMMUNICATION

1. Labels: LABELS MAY BE AFFIXED INDIVIDUALLY TO ITEMS OR A WARNING SIGN MAY BE PLACED AT THE ENTRANCE TO THE BLOCK OR AREA.

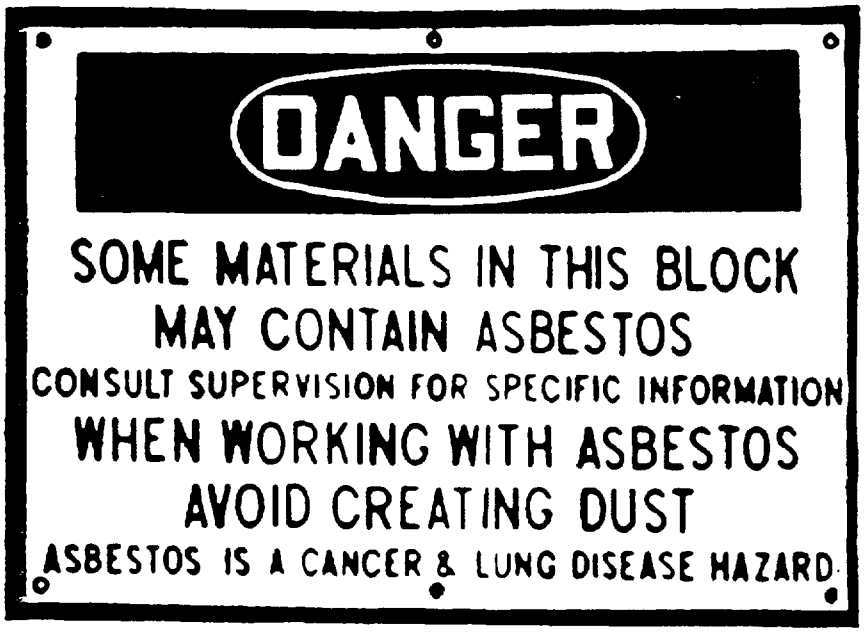
All products that contain asbestos in concentrations that exceed 0.1% by weight must be labeled. Labeling must be done in accordance with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication standard.



3" x 5" Vinyl Asbestos Hazard Labels

Dow Stock #01-03372

White "Danger" on red oval on a black field - - Black block lettering



14" x 20" Asbestos Hazard Labeling - Area Sign

Dow Stock #01-03374-010

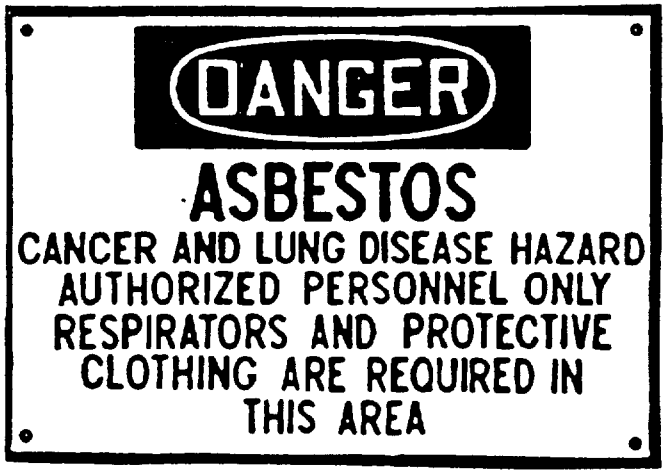
White "Danger" on a red oval on a black field - Black block lettering

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2. Regulated Area Sign:

Warning signs must be posted to demarcate a regulated area and must be posted at such a distance that an employee may read the signs and take necessary protective steps before entering the regulated area.



14" x 20" Asbestos Hazard Sign

Dow Stock #01-03374

White "Danger" on a red oval on a black field - Black block lettering

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3. All containers used for disposal of asbestos waste must have an approved label. Special purpose, 6 mil, polyethylene bags with the appropriate label are available through Dow Stock #17-30522.

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SECTION IX

PACKAGING OF ASBESTOS WASTE FOR DISPOSAL

1. The recommended container is a 6-mil thick polyethylene bag. These bags are available through Dow Stock #17-30522. Other acceptable containers are polyethylene lined cardboard containers or polyethylene lined metal containers (drums, dempster boxes, or dino boxes).

2. Polyethylene bags labeled with an approved asbestos label must be used only for bagging asbestos waste.

3. When using bags, minimize the amount of void space or air in the bags to minimize their bursting during stacking and disposal.

4. All containers used for asbestos waste must be sealed to make them leak-tight.

5. Torn bags must be rebagged (double bagged) rather than repaired by taping.

6. Disposable clothing worn during asbestos removal, packaging, and disposal must be placed into properly labeled polyethylene bags and disposed of as asbestos waste.

7. An open-top fiber or steel drum containing a polyethylene liner may be used to accumulate small quantities of bagged and sealed asbestos waste (brake shoes, brake dust, garlock gaskets, etc.). The drum must have an approved warning label, be labeled for asbestos waste use only, and the top must be kept on except during deposit of waste.

8. All dempsters used for unbagged asbestos waste must contain a disposable polyethylene liner obtained from, or approved by, Environmental Operations.

9. Dempster boxes must not be filled higher than the top of the walls.

10. Dempster liners must be lapped over and secured for temporary closure whenever the job is discontinued for a prolonged period (overnight, holiday, weekend).

11. Dempster liners must be securely closed before transport of the dempsters; the sides and ends are to be lapped over and then secured. Proper lapping and sealing procedures are provided in instructions by Environmental Operations.

12. Tie-downs for dempster liners must be not attached to the dempster boxes.

13. All dempster boxes used for asbestos waste packaging and transport, and all packages of asbestos waste (including dempster liners) must be labeled with an OSHA-approved label.

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SECTION X

ASBESTOS GASKET AND PACKING HANDLING MINIMUM REQUIREMENTS

STORAGE FACILITY

Preformed gaskets, packing and gasket fabrication materials will be stored in a clean storage area. The storage area will be cleaned regularly with a HEPA filter vacuum to prevent accumulation of debris.

REMOVAL

If the gasket or packing to be removed is not adhered to the seating surfaces and can be removed by hand without breaking apart, remove and package for disposal according to Section IX of this manual. If the gasket or packing is adhered to the seating surfaces so that mechanical means are used and this operation creates particles in the air or surrounding area, then as a minimum, the asbestos abatement minimum requirements for glove bags or small-scale short-duration jobs shall be used.

Spiral-wound gasket removal shall comply with the glove bag or small-scale short-duration minimum requirements if wet methods cannot be used.

CUTTING

GENERAL:

1. Employees who work with asbestos must receive training in asbestos hazards before the initial assignment and annually thereafter.
2. Personnel in the general area must be notified that asbestos work is in progress.
3. A specific job procedure must exist and be followed.

SAFETY:

1. Safety equipment required by the job location must be worn.
2. An approved respirator must be worn during cutting and cleanup. Employee must have completed the mandatory fit test within the last 6 months. Contact (409) 238-3536 for information.
3. Disposable coveralls with attached boots and hoods must be worn for cutting and cleanup operations. Coverall boots may be worn over shoes or inside rubber boots. If monitoring shows the potential asbestos exposure levels are consistently below 0.1 fiber/cc on an 8 hour TWA, disposable coveralls need not be worn.
4. Vacuum and local exhaust ventilation systems must be equipped with HEPA filters.

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SECTION X

ASBESTOS GASKET AND PACKING HANDLING MINIMUM REQUIREMENTS

SAFETY:

5. Personnel monitoring must be done at the beginning of each job unless personnel wear supplied air respirators, or previous personnel monitoring of similar jobs shows 8 hour TWA exposure potentials less than 0.1 fiber/cc. Contact Industrial Hygiene Services (409) 238-1281 for information.
6. Local exhaust ventilation must be provided for hand operated or power operated tools (such as but not limited to saws, scorers, abrasive wheels, and drills). The efficiency of local exhaust ventilation systems must be verified by Industrial Hygiene Services.

WORK AREA:

1. Gasket fabrication area must be identified as an asbestos handling area.
2. Gasket cutting table will be fabricated such that asbestos material or dust cannot collect or contaminate the table.
3. Work area must be cleaned after each job. Vacuum to remove any loose material or dust. Dispose of any scrap material in a sealed plastic bag with the proper asbestos label and clean unused fabrication material for storage.
4. Dispose of coveralls and gloves using labeled plastic bags.
5. After area is clean, vacuum work clothes and remove and clean respirators for storage.

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SECTION X

ASBESTOS ABATEMENT MINIMUM REQUIREMENTS

GLOVE BAGS.

GENERAL:

1. Employees who work with asbestos must receive training in asbestos hazards before the initial assignment and annually thereafter.
2. A specific job procedure must be written before beginning the job.

SAFETY:

1. Safety equipment required by the job location must be worn.
2. An approved respirator must be worn during material removal and cleanup. Employee must have completed the mandatory fit test within the last 6 months. Contact 3536 for information.
3. Vacuum equipment must be equipped with a HEPA filter.
4. Water for wetting must contain a surfactant.

REMOVAL:

1. The glove bag must be fitted to the pipe or structure where asbestos work is to be done. Insert the necessary tools into the bag. Attach bag to the pipe or structure and seal all openings with tape. The bottom seam of the bag must also be reinforced with tape to prevent leakage from the bag that may result from a defect in the bottom seam.
2. An opening must be made in the bag away from the work area. A spray nozzle must be inserted through this opening and the area to be worked sprayed until it is thoroughly wetted. Continue wetting dry material as it is exposed. Dry material in the bottom of the bag must be wetted. Wetting of materials may be eliminated if water is not compatible with the process or materials or equipment may be seriously damaged.
3. After removal of the layer of asbestos containing materials, the pipe or surface must be cleaned with a wire brush and wet wiped until no traces of asbestos containing material can be seen.
4. Exposed asbestos must be encapsulated at terminations.
5. Tools must be wetted and cleaned. Place the tools such that they may be removed after the bag is twisted and sealed.
6. A vacuum hose must be inserted through the opening used for wetting and used to remove any air from the bag that may contain asbestos fibers. The bag must be squeezed as close to the top as possible, twisted and sealed with tape to keep the asbestos materials safely in the bottom of the bag.
7. Remove the bag from the work area and remove tools.
8. The top portion of the bag and the opening used for wetting must be resealed with tape.
9. Disposal of the glove bag must be in an approved container.

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SECTION X

ASBESTOS ABATEMENT MINIMUM REQUIREMENTS

SMALL-SCALE SHORT-DURATION PROJECTS WHEN GLOVE BAGS ARE NOT USED.

GENERAL:

1. Employees who work with asbestos must receive training in asbestos hazards before the initial assignment and annually thereafter.
2. Personnel in the general area must be notified that asbestos work is in progress.
3. A specific job procedure must be written before beginning the job.

SAFETY:

1. Safety equipment required by the job location must be worn.
2. An approved respirator must be worn during material removal and cleanup. Employee must have completed the mandatory fit test within the last 6 months. Contact (409) 238-3536 for information.
3. Disposable coveralls with attached boots and hoods must be worn during cleanup and removal operations. Coverall boots may be worn over work shoes or inside rubber boots.
4. Vacuum and local exhaust ventilation systems must be equipped with HEPA filters.
5. Personnel monitoring must be done at the beginning of each job unless personnel wear supplied air respirators, or previous personnel monitoring of similar jobs shows 8 hour TWA exposure potentials less than 0.1 fiber/cc. Contact Industrial Hygiene Services (409) 238-1281 for information.
6. Water for wetting must contain a surfactant.
7. Local exhaust ventilation must be provided for hand operated or power operated tools (such as but not limited to, saws, scorers, abrasive wheels, and drills) if the use of these tools would cause potential exposure levels to equal or exceed 0.2 fibers/cc 8 hour TWA. The efficiency of local exhaust ventilation systems must be verified by Industrial Hygiene Services.

REGULATED AREA:

1. A regulated area must be established and asbestos warning signs posted to restrict access to authorized personnel only.
2. Area must be cleaned of existing asbestos contamination and other debris.
3. Portable objects must be removed to prevent contamination.
4. Coverings must be placed over remaining objects and underneath the work area. Scaffold landings must be covered. Materials must not be dropped to the ground. Pre-job planning must include provisions for keeping deteriorated material in place after jacketing is removed.
5. Mini-enclosures or negative pressure enclosures must be used for jobs whenever feasible if the potential exposure level may equal or exceed 0.2 fibers/cc 8 hour TWA (local exhaust ventilation or other engineering controls methods may eliminate the need for enclosures.)

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Small Scale
Asbestos Abatement Minimum Requirements
Page 2

REMOVAL:

1. The materials must be wet down before, during, and after removal to prevent airborne emissions. Materials must be thoroughly wetted, but not to the point that they crumble and turn to mush. Wetting of material may be eliminated if water is not compatible with the process, or materials/equipment may be seriously damaged, or local exhaust ventilation reduces the potential exposure limit below 0.2 fibers/cc 8 hour TWA.
2. Material must be removed and placed into labeled polyethylene bags or containers approved by Environmental Operations. Bags or containers must be lowered to the ground, not dropped.
3. The surface from which asbestos has been removed must be wetted and cleaned.
4. Exposed asbestos must be encapsulated at terminations.
5. After asbestos removal, a thorough inspection and cleanup of the area must be conducted. Pick up and dispose of coverings and double bag contaminated or broken bags. Vacuum the work area as required.
6. All items removed from the regulated area must be decontaminated.
7. Disposable coveralls, exposed area of skin and respirator must be vacuumed and boots must be decontaminated each time before exiting the regulated area.
8. Disposable coveralls must be disposed of in a sealed asbestos waste bag.
9. Work clothes must be vacuumed off.
10. All materials used to establish the regulated area must be removed.
11. Bags or containers must be transported to the dempster or collection area.

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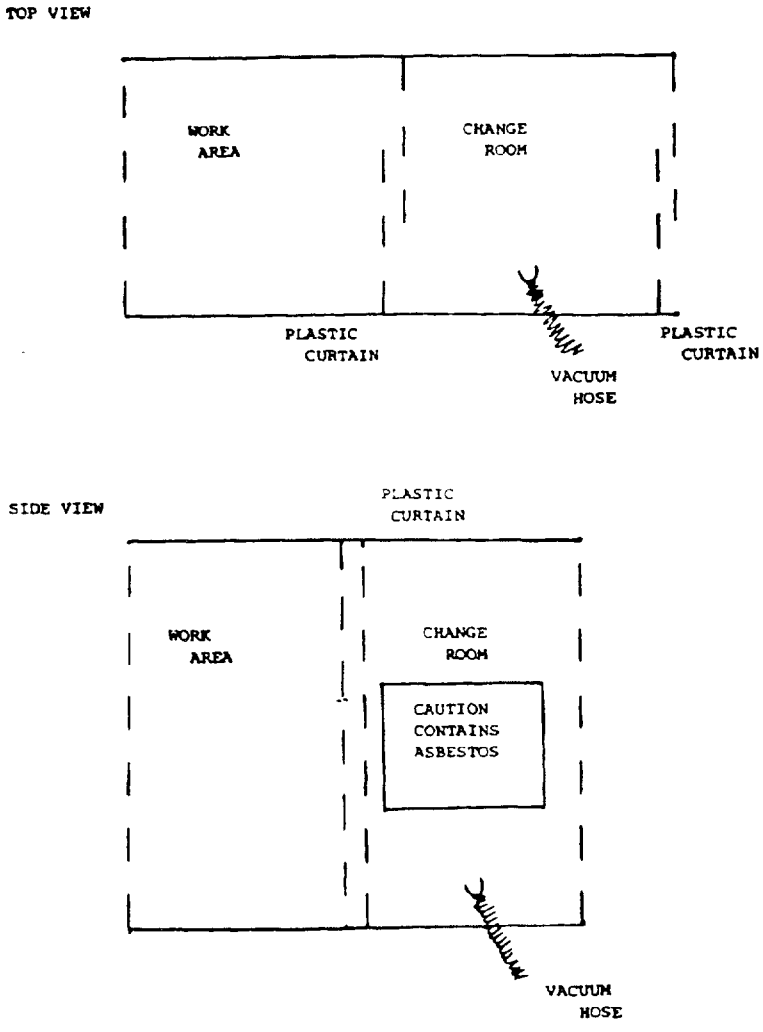
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SECTION X

CONSTRUCTION OF MINI-ENCLOSURE
(SMALL-SCALE, SHORT-DURATION JOB)

1. AFFIX 6-MIL THICK POLYETHYLENE SHEETING TO WALLS WITH SPRAY ADHESIVE AND TAPE.
2. COVER THE FLOOR WITH PLASTIC AND SEAL TO THE PLASTIC ON THE WALLS.
3. SEAL ALL PENETRATIONS SUCH AS PIPES OR ELECTRICAL CONDUIT WITH TAPE.
4. CONSTRUCT A SMALL CHANGE ROOM OF 6 MIL THICK POLYETHYLENE PLASTIC CONTIGUOUS TO THE MINI-ENCLOSURE. THE WORKER USES THE CHANGE ROOM TO VACUUM OFF HIS PROTECTIVE COVERALLS AND REMOVE THEM BEFORE LEAVING THE WORK AREA.

SCHEMATIC OF MINI-ENCLOSURE



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SECTION X

ASBESTOS ABATEMENT MINIMUM REQUIREMENTS

LARGE SCALE, LONG DURATION PROJECTS.

GENERAL:

1. The Superintendent/owner must contact Environmental Services (2414) a minimum of 25 days prior to starting asbestos removal work and specify a project supervisor.
2. The project supervisor must provide a written Safe Work procedure specific for each job which includes as a minimum the Safe Work procedures listed below.
3. The project supervisor must meet with the industrial hygienist, safety director for the area, and personnel performing the job to discuss the Safe Work procedure and arrange for audit and monitoring.
4. The project supervisor must arrange to have a "Competent Person" for the job. If work is contracted, the contractor must also provide a "Competent Person" to supervise the job.
5. Employees who work with asbestos must receive training in asbestos hazards before the initial assignment and annually thereafter.
6. Personnel in the general area must be notified that asbestos work is in progress.

SAFETY:

1. Safety equipment required by the job location must be worn.
2. An approved respirator must be worn during material removal and cleanup. Employee must have completed the mandatory fit test within the last 6 months. Contact (409) 238-3536 for information.
3. Disposable coveralls with attached boots and hoods must be worn during cleanup and removal operations. Coverall boots may be worn over work shoes or inside rubber boots.
4. "Street clothes" must not be worn underneath disposable coveralls.
5. If work clothing is worn underneath, it must be left in the "dirty room" of the decontamination facilities. Contaminated clothing for laundering must be contained in a sealed asbestos waste bag and laundered in a manner which will minimize the release of asbestos fibers. Personnel laundering asbestos contaminated clothing must be informed of this requirement.
6. Vacuum and local exhaust ventilation systems must be equipped with HEPA filters.
7. Personnel monitoring must be done at the beginning of each job unless glove bags are used or personnel wear supplied air respirators or previous personnel monitoring of similar jobs shows 8 hour TWA exposure potentials less than 0.1 fibers/cc. Contact Industrial Hygiene Services (409) 238-1281 for information.
8. A decontamination area must be provided. It must be contiguous to the regulated area if feasible. Egress to the regulated area must be through the decontamination area.
9. Water for wetting must contain a surfactant.
10. Local exhaust ventilation must be provided for hand operated or power operated tools, such as but not limited to, saws, scorers, abrasive wheels, and drills if the use of these tools would cause potential exposure levels to equal or exceed 0.2 fibers/cc 8 hour TWA. The efficiency of local exhaust ventilation systems must be verified by Industrial Hygiene Services.
11. An Asbestos Safety Checklist must be completed for each job.

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SECTION X

Large Scale
Asbestos Abatement Minimum Requirements
Page 2

REGULATED AREA:

1. A regulated area must be established and asbestos warning signs posted to restrict access to authorized personnel only.
2. Area must be cleaned of existing asbestos contamination and other debris.
3. Portable objects must be removed to prevent contamination.
4. Coverings must be placed over remaining objects and underneath the work area. Scaffold landings must be covered. Materials must not be dropped to the ground. Pre-job planning must include provisions for keeping deteriorated material in place after jacketing is removed.
5. Glove bags, mini-enclosures or negative pressure enclosures must be used for jobs whenever feasible if the potential exposure level may equal or exceed 0.2 fibers/cc 8 hour TWA (local exhaust ventilation or other engineering controls methods may eliminate the need for enclosures).

REMOVAL:

1. The materials must be wet down before, during, and after removal to prevent airborne emissions. Materials must be thoroughly wetted, but not to the point that they crumble and turn to mush. Wetting of materials may be eliminated if water is not compatible with the process, or materials/equipment may be seriously damaged, or local exhaust ventilation reduces the potential exposure limit below 0.2 fibers/cc 8 hour TWA.
2. Material must be removed and placed into labeled polyethylene bags or containers approved by Environmental Operations. Bags or containers must be lowered to the ground, not dropped.
3. The surface from which asbestos has been removed must be wetted and cleaned.
4. Exposed asbestos must be encapsulated at terminations.
5. After asbestos removal, a thorough inspection and cleanup of the area must be conducted. Pick up and dispose of coverings and double bag contaminated or broken bags. Vacuum work area as required.
6. All items removed from the regulated area must be decontaminated.
7. All materials used to establish the regulated area must be removed.
8. Bags or containers must be transported to the dempster or collection area.

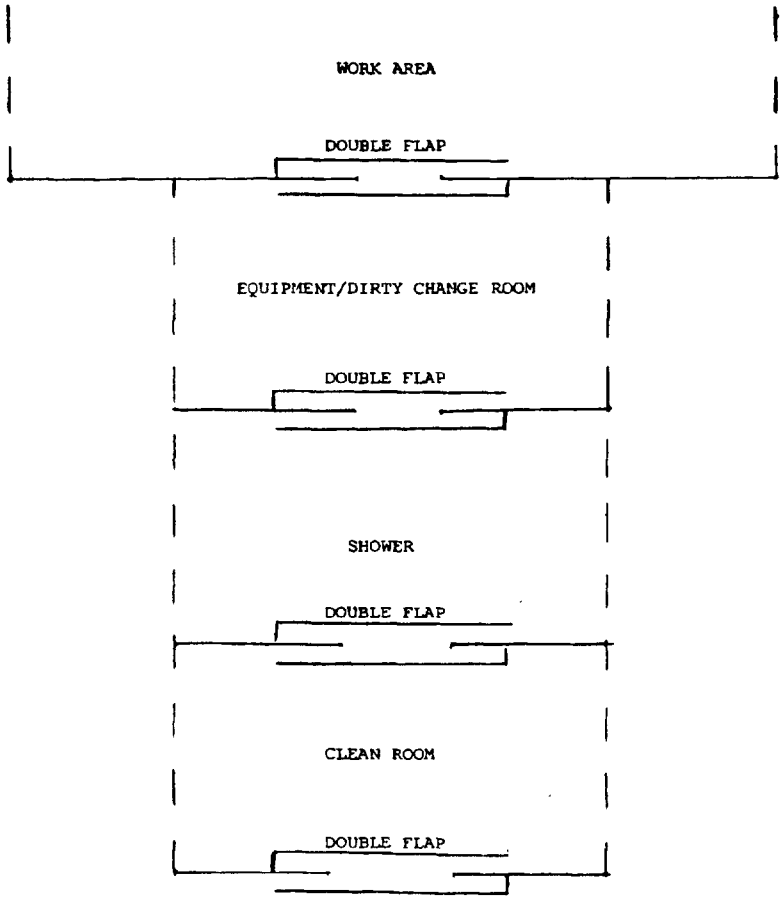
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SECTION X

TYPICAL DECONTAMINATION AREA

LAYOUT



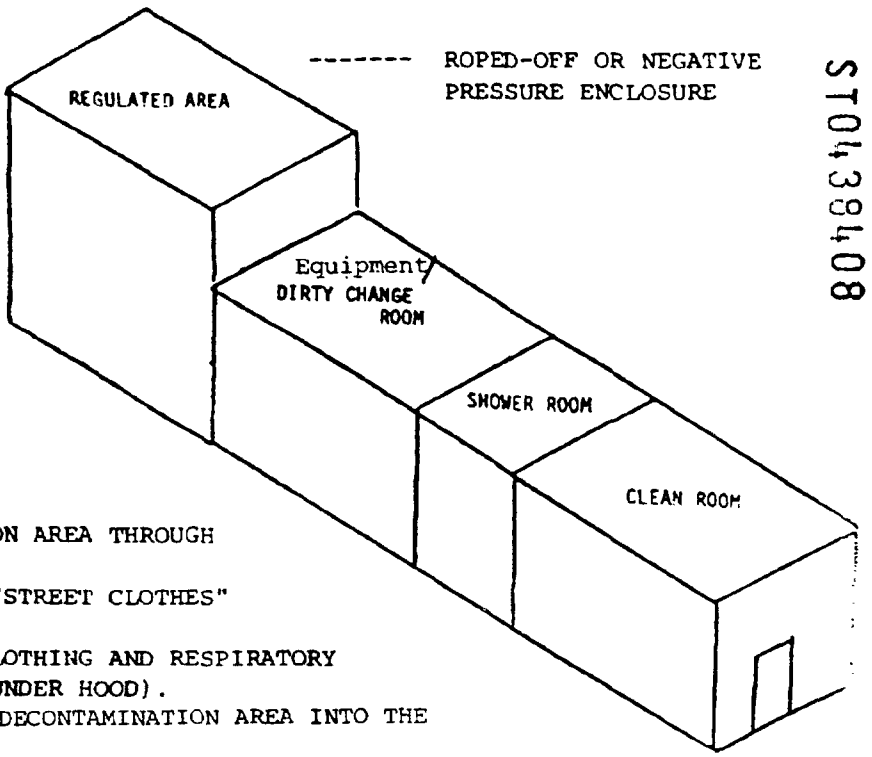
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SECTION X

DECONTAMINATION AREA

(CONTIGUOUS TO WORK AREA)



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ENTRY

1. ENTER DECONTAMINATION AREA THROUGH CLEAN ROOM.
2. REMOVE AND DEPOSIT "STREET CLOTHES" IN LOCKER.
3. PUT ON PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION (STRAPS UNDER HOOD).
4. PROCEED THROUGH THE DECONTAMINATION AREA INTO THE REGULATED AREA.

EXIT

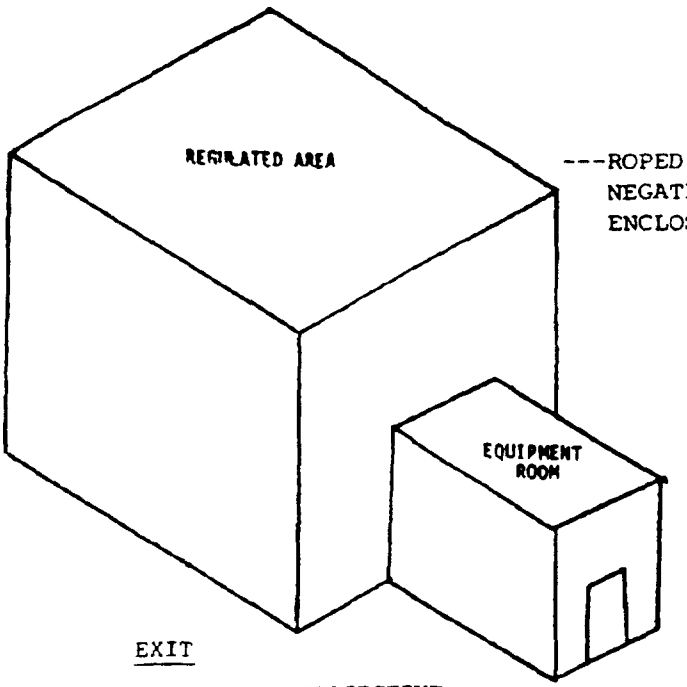
1. REMOVE GROSS CONTAMINATION FROM SUIT.
2. REMOVE PROTECTIVE CLOTHING IN EQUIPMENT/DIRTY CHANGE ROOM AND DEPOSIT IN LABELED IMPERMEABLE BAGS.
3. WEAR RESPIRATOR INTO SHOWER AREA.
4. SHOWER BEFORE ENTERING CLEAN ROOM.
5. PUT ON STREET CLOTHES.
6. EXIT DECONTAMINATION AREA.

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SECTION X

DECONTAMINATION AREA

(At a Remote Location)



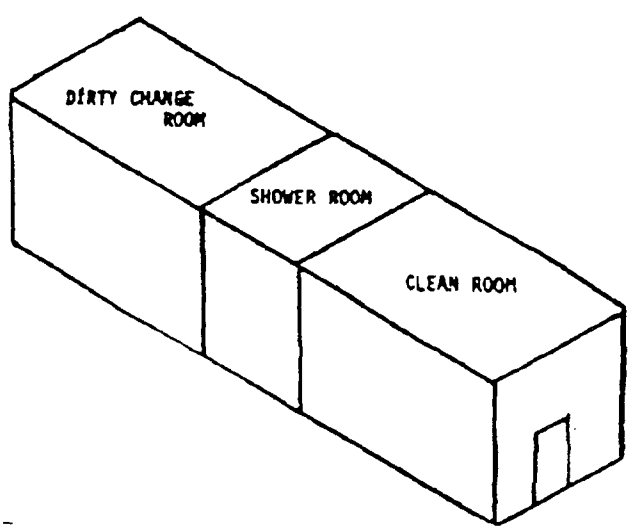
---ROPED OFF OR NEGATIVE PRESSURE ENCLOSURE

EXIT

1. VACUUM PROTECTIVE ---- CLOTHING AND EQUIPMENT.
2. REMOVE CONTAMINATED CLOTHING.
3. PUT ON CLEAN SUIT AND PROCEED TO DECONTAMINATION AREA WEARING RESPIRATOR.
4. DEPOSIT CLOTHING IN DIRTY CHANGE ROOM.
5. WEAR RESPIRATOR INTO SHOWER AREA.
6. SHOWER BEFORE ENTERING CLEAN ROOM.
7. EXIT DECONTAMINATION AREA.

ENTRY

1. ENTER DECONTAMINATION AREA THROUGH CLEAN ROOM.
2. REMOVE AND DEPOSIT "STREET CLOTHES" IN LOCKER.
3. PUT ON PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION (STRAPS UNDER HOOD).
4. PROCEED TO WORK SITE AND ENTER ENCLOSURE/REGULATED AREA THROUGH EQUIPMENT ROOM.

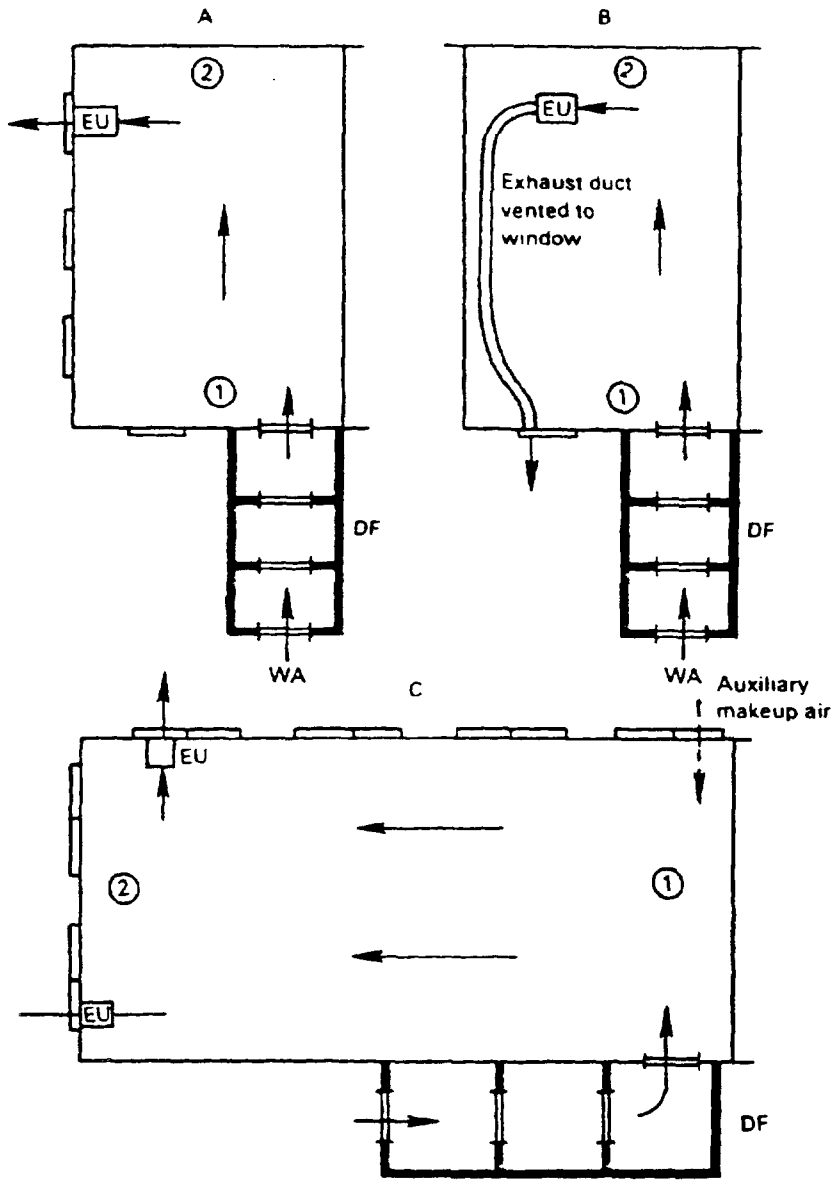


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SECTION X

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.

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SECTION X

ASBESTOS ABATEMENT MINIMUM REQUIREMENTS

AUTOMOTIVE CLUTCH AND BRAKE REPAIR

GENERAL:

1. Employees who work with asbestos must receive training in asbestos hazards before the initial assignment and annually thereafter.
2. Do NOT use compressed air to remove asbestos materials or dust from brake drums or clutch housings.
3. Place polyethylene sheeting underneath the work area.

SAFETY REQUIREMENTS:

1. Safety equipment required by the job location must be worn.
2. An approved respirator must be worn during material removal and clean up. Employees must have completed the mandatory fit test within the last 6 months. Call 409-238-3536 for information.
3. Barricade area with yellow tape or rope to limit access.

REMOVAL

1. Two methods can be used to reduce exposure to asbestos fibers. The Enclosed Cylinder/HEPA Vacuum System Method and a wetting method.

   A. The Enclosed Cylinder/HEPA Filter Vacuum System Method consists of three components.

   * A wheel-shaped cylinder designed to cover and enclose the wheel assembly
   * A compressed-air hose and nozzle that fits into a port in the cylinder, and
   * A HEPA-filter vacuum used to evacuate airborne dust generated within the cylinder by the compressed air.

   B. The wetting method consists of spraying water containing a surfactant to loosen the asbestos containing residue and to capture the resulting airborne particles in the water mist.

   * Begin spraying the asbestos-containing parts at a sufficient distance to ensure that the asbestos particles are not dislodged by the velocity of the water spray.

   * When the asbestos particles are thoroughly wetted, the spray will be brought closer to the parts and the parts will be sprayed as necessary to remove grease and other material.

   * The parts must then be wiped with disposal rags or towels which must be placed in a labelled plastic bag and sealed while they are still wet.

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2. Replaced brake shoes or pads, clutch plates, disposable rags or towels, polyethylene sheeting and other contaminated materials for disposal must be handled as asbestos waste.

3. When the job is completed, a thorough inspection must be made to ensure all asbestos contaminated materials have been picked up. Vacuum work area as required.

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SECTION XI

ASBESTOS SAFETY CHECKLIST

JOB DESCRIPTION_____ DATE_____
LOCATION _____

PRE-JOB REQUIREMENTS:

1. Environmental Services contacted (ph 409 238-2414)? Yes__ No__
   Name:_____ Date: _____
   Dow Project Supervisor: _____
2. Safe Work Procedure Written? Yes____ No____ Date:_____
3. Project Review Held?
   Industrial Hygienist: _____ Date:_____
   Safety Director:_____ Date:_____
   Dow Competent Person:_____ Date:_____
   Contractor Competent Person:_____ Date:_____
   Craftsmen:_____ Date:_____
   Safe Work Procedure Approved: Yes____ No____
   Hygiene Monitoring Required: Yes____ No____
   Audit Required: Yes____ No____
   Auditor Assigned_____ Phone:_____

JOB REQUIREMENTS:

1. Safe Work Procedure Reviewed: Yes____ No____
2. Regulated Area Established and Signs Posted: Yes____ No____
   Negative pressure enclosure established: Yes____ No____
   Decontamination Area Established: Yes____ No____
3. Personnel Trained: Yes____ No____
4. Block Personnel Informed: Yes____ No____
5. Auditor Notified: Yes____ No____
6. Amended Water Available To Control Dust: Yes____ No____
7. Has packaging of asbestos debris been decided upon? Yes____ No____
8. Has Disposal Of Asbestos Debris Been Arranged: Yes____ No____
9. Arrangements For Clean-up Made: Yes____ No____
10. Safety Equipment Required:
    __ Safety equipment required by the location
    __ Approved respirator __current fit test __clean shaven
    __ Disposable coveralls with hood and boots __ gloves

11. Arrangements for laundering work clothes Yes ___ No___
12. Vacuum cleaners and local exhaust ventilation systems equipped with HEPA filters Yes____ No____

    Note: Work may commence when Safe Work Permit issued.
13. Final cleanup complete Yes____ No____
14. Job complete: Dow Project Supervisor:_____ Date:_____
15. Send completed checklist to Industrial Hygiene Services B-101.

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SECTION XII

ASBESTOS ABATEMENT
AUDIT CHECKLIST

Job Description_____ Date:_____

Location:_____ Removal by:_____
Company Name

1.	Regulated Area Established and Signs Posted:	YES___ NO___
	Polyethylene or other coverings over floor & objects:	YES___ NO___
2.	Decontamination Area Established:	YES___ NO___
	Contiguous_____ Remote:_____ Location:_____	
	Entry to work area only through decontamination area	YES___ NO___
3.	Negative Pressure Enclosure Established:	YES___ NO___
	Floor Covered	YES___ NO___
	Walls Covered	YES___ NO___
	Area Ventilation OFF	YES___ NO___
	All Edges Sealed	YES___ NO___
	Penetrations Around Pipes and Conduit Sealed	YES___ NO___
	Entry Curtains	YES___ NO___
	Negative Pressure Achieved (-0.02" water)	YES___ NO___
4.	Protective Equipment:	
	Disposable Coveralls with Hood and Boots	YES___ NO___
	Coveralls Unzipped, Torn, or Cut	YES___ NO___
	Coveralls Used One Time	YES___ NO___
	Approved Respirator	YES___ NO___
	Type Used	_____
	Clean Shaven	YES___ NO___
	Straps Under Hood	YES___ NO___
	Safety Equipment Required by Location:	
	Hard Hat	YES___ NO___
	Safety Glasses	YES___ NO___
	Goggles	YES___ NO___

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SECTION XII

ASBESTOS ABATEMENT
AUDIT CHECKLIST

5. Work Practices:

Material Worked Wet	YES___ NO___
Material Kept Wet Until Bagged & Sealed	YES___ NO___
Material Too Wet, Mushy	YES___ NO___
Insulation Broken Intentionally	YES___ NO___
Material Dropped to Ground	YES___ NO___
Removed Material Promptly Bagged	YES___ NO___
Bags Torn or Left Open	YES___ NO___
Visible Emissions	YES___ NO___
HEPA Filtered Vacuum Used	YES___ NO___
Smoking, Eating, Drinking, Chewing, Cosmetics	YES___ NO___
Personnel Decontaminated Each Departure	YES___ NO___
Shower Used by All Personnel	YES___ NO___
Exposed Asbestos at Terminations Sealed with Encapsulant	YES___ NO___
Work Area Cleaned After Completion	YES___ NO___

6. Personnel Monitoring

Initial Monitoring	YES___ NO___
Contractor_____ Dow_____	
Daily Monitoring	YES___ NO___
Area Monitoring	YES___ NO___

COMMENTS:_____

_____

_____

_____

_____

SIGNATURE: _____
Industrial Hygienist/Safety Director

cc: Project Supervisor
Area Owner
Safety Director
Industrial Hygienist
Manager, Industrial Hygiene Services

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APPENDIX A
APPROVED EQUIPMENT

The equipment listed below has been approved for the specific use, but is not necessarily the only equipment available. Equipment which is not listed should not be purchased unless it fulfills some specific need which is not fulfilled by listed items and has been specifically approved by the Texas Operations Protective Equipment Committee. For information call 5034. Personnel should be fitted with a respirator before ordering. Call 3536 for information.

I. Respiratory Protection for Asbestos Fibers

Airborne Asbestos Concentration	Approved/Required Respirator	Supply Source	Stock Number Respirator	Cartridge
≤ 2 fibers/cc	Half-mask			
	MSA Comfo II	Stores		
	Small		01-04122	01-04252
	Medium		01-04124	01-04252
	Large		01-04126	01-04252
	Wilson 6100	Stores		
	Small		01-04280	01-04285
	Medium		01-04282	01-04285
	Large		01-04284	01-04285
	A.O. Star 5 (American Optical)			
	Small	Safety	01-04173-000	01-040680-
	Medium	Shoe	01-04173-010	01-040680-
	Large	Dist.	01-04173-020	01-040680-
≤ 10 fibers/cc	Full facepiece/cartridge			
	Scott-O-Vista	Stores	01-04335	01-04196
	A. O. Star 7	Stores	01-04190	01-04068-5
	Racal/Be3/P3	Stores	01-04800	01-04810
≤ 20 fibers/cc	Positive pressure respirator:			
	Full face powered air-purifying respirator			
	MSA	Stores	01-04128	01-04132
	Racal BE7/P3		01-04805	01-04810
	Full Face Mask Supplied Air:			
	Scott-O-Vista	Stores	01-4630	NA
	MSA	Stores	01-04130	NA
	Racal Dual-Air	Vallen	01-04808	NA

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II. Respiratory Protection for a Combination of Chemical and Asbestos

Airborne Asbestos Concentration	Approved/Required Respirator	Supply Source	Respirator	Stock Number Cartridge*
≤ 2 fibers/cc	Half-mask A. O. Star 5	Safety Shoe Distributors (233-0605)		R53AGHE R510VHE R530VAHE
	Wilson	Stores 6100		01-042860VAGHE
≤ 10 fibers/cc	Full-Facepiece A. O. Star 7	Safety Shoe Distributors	R7700	R53AGHE R510VHE R530OVAHE
	Scott-O-Vista	Vallen	80217001	642AGHE** 642OVHE** 642OVAGHE**

*AGHE - Acid Gas Cartridge & High Efficiency Filter
OVHE - Organic Vapor Cartridges & High Efficiency Filter
OVAGHE - Organic Vapor and Acid Gas & High Efficiency Filter

III. Clothing: The following list of protective clothing has been shown to be impervious to asbestos fibers.

Tyvek Disposable Paper Coveralls with attached Hood and Boots

Small	01-03551-001
Medium	01-03552-001
Large	01-03553-001
Extra Large	01-03554-001

**To use these cartridges an adaptor must be used. Vallen order number is 802451[illegible].

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