PITT-CONSOL CHEMICAL COMPANY

Removal, Handling, Storage and Disposal of Asbestos

A. Plant Pre-removal Procedure

The following procedures shall be followed by person involved in the removal or stripping of asbestos material:

1. Notify the Safety Director in advance, extension 48.

2. Obtain a completed work permit from Shift Supervisor for the Safety Director's approval.

3. Discuss with the Safety Director method of asbestos removal, use of required safety equipment, and use of any monitoring device.

4. Minimum safety equipment required for asbestos removal:
   a. Respirator or dust mask.
   b. Disposable coveralls and head covers.
   c. Eye protection, hard hat, and boots.

5. Notify the Safety Director when work is completed for:
   a. Post-removal inspection and monitoring.
   b. Personnel decontamination procedures.

   Note: The Shift Supervisor will be in charge during the Safety Director's absence.

B. Removal and Handling

Asbestos material should be handled in wet state, whenever practicable, to prevent the emission of asbestos fibers to the atmosphere.

Dry Removal

Dry removal of friable asbestos material is not recommended, but may be necessary in instances of unavoidable damage through the wet removal techniques. Because this material may result in heavy contamination, it requires specific EPA approval.

Wet Removal

Wet removal of asbestos is based upon the ability of water to lower the friability of the wetted material and the movement of the released fibers. Water or wetting agent will render the material less friable and more cohesive, thus reducing airborne asbestos. Fibers that are released will fall rapidly if wet.

Wet Removal Procedures

1. Isolate the work area to prevent contamination and fiber dispersal to other areas during stripping. Cover equipment and other items with polyethylene sheets if necessary to prevent them from getting wet.

2. Flag the work area and put up warning signs.

3. Wet insulation. Re-spray as required if dust occurs during removal of the material.

4. Use wetting agent if water run-off posed safety and cleanup problem, and during the winter.

5. Remove asbestos material in small sections with two-person teams, on scaffolding platform if needed. Never drop asbestos material to the ground. Transfer the material into 6-mil pre-labelled asbestos bags prior to starting the next section.

6. Clean up debris and other fallen material by wetting before placing in pre-labelled asbestos bag.

7. Keep the collected materials wet and sealed in bags during the entire operation.

8. Inspect the work area visually to insure adequate and complete removal of asbestos fibers. Additional cleanup and inspection should be conducted after 24 hours. Any settled fiber should be wetted before placing in pre-labelled asbestos bags.

9. Notify the Safety Director for post-removal inspection and monitoring.

C. Storage and Disposal

1. All asbestos material, scrap, debris, containers and asbestos-contaminated clothing should be collected in pre-labelled asbestos bags, adequately wetted and sealed.

2. Sealed bags containing asbestos material will be deposited to Asbestos Storage Pile for off-site disposal.

3. All asbestos bags should be tagged indicating the weight of each bag and the date of removal.

Subpart B—National Emission Standard for Asbestos

§ 61.20 Applicability.

The provisions of this subpart are applicable to those sources specified in ..22.

§ 61.21 Definitions.

Terms used in this subpart are defined in the act, in subpart A of this part, or in this section as follows:

(a) "Asbestos" means actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite.

(b) "Asbestos material" means asbestos or any material containing asbestos.

(c) "Particulate asbestos material" means finely divided particles of asbestos material.

(d) "Asbestos tailings" means any solid waste product of asbestos mining or milling operations which contains asbestos.

(e) "Outside air" means the air outside buildings and structures.

(f) "Visible emissions" means any emissions which are visually detectable without the aid of instruments and which contain particulate asbestos material.

(g) "Asbestos mill" means any facility engaged in the conversion or any intermediate step in the conversion of asbestos ore into commercial asbestos. Outside storage of asbestos materials is not considered a part of such facility.

(h) "Commercial asbestos" means any variety of asbestos which is produced by extracting asbestos from asbestos ore.

(i) "Manufacturing" means the combining of commercial asbestos, or in the case of woven friction products the combining of textiles containing commercial asbestos, with any other material(s), including commercial asbestos, and the processing of this combination into a product as specified in § 61.22(c).

(j) "Demolition" means the wrecking or taking out of any load-supporting structural member and any related removing or stripping of friable asbestos materials.

(k) "Friable asbestos material" means any material that contains more than 1 percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder, when dry, by hand pressure.

(l) "Control device asbestos waste" means any asbestos-containing waste material that is collected in a pollution control device.

(m) "Renovation" means the removing or stripping of friable asbestos materials used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member. Operations in which load-supporting structural members are wrecked or taken out are excluded.

[Paragraph (m) revised by 43 FR 26373, June 19, 1978]

(n) "Planned renovation" means a renovation operation, or a number of such operations, in which the amount of friable asbestos material that will be removed or stripped within a given period of time can be predicted. Operations that are individually non-scheduled are included, provided a number of such operations can be predicted to occur during a given period of time based on operating experience.

(o) "Emergency renovation" means a renovation operation that results from a sudden, unexpected event, and is not a planned renovation. Operations necessitated by non-routine failures of equipment are included.

(p) "Adequately wetted" means sufficiently mixed or coated with water or an aqueous solution to prevent dust emissions.

(q) "Removing" means taking out friable asbestos materials used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member from any building, structure, facility, or installation.

(r) "Stripping" means taking off friable asbestos materials from any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member.

[Paragraph (q) and (r) revised by 43 FR 26373, June 19, 1978]

(s) "Fabricating" means any processing of a manufactured product containing commercial asbestos, with the exception of processing at temporary sites for the construction or restoration of buildings, structures, facilities or installations.

(t) "Inactive waste disposal site" means any disposal site or portion thereof where additional asbestos-containing waste material will not be deposited and where the surface is not disturbed by vehicular traffic.

(u) "Active waste disposal site" means any disposal site other than an inactive site.

(v) "Roadways" means surfaces on which motor vehicles travel including, but not limited to, highways, roads, streets, parking areas, and driveways.

(w) "Asbestos-containing waste material" means any waste which contains commercial asbestos and is generated by a source subject to the provisions of this subpart, including asbestos mill tailings, control device asbestos waste, friable asbestos waste material, and bags or containers that previously contained commercial asbestos.

[40 FR 48292, October 14, 1975]

(x) "Structural member" means any load-supporting member, such as beams and load-supporting walls; or any non-load-supporting member, such as ceilings and non-load-supporting walls.

[42 FR 12127, March 2, 1977]

61.22 Emission standard.

(a) Asbestos mills: There shall be no visible emissions to the outside air from any asbestos mill except as provided in paragraph (f) of this section.

[39 FR 15936, May 3, 1974]

(b) Roadways: The surfacing of roadways with asbestos tailings or with asbestos-containing waste that is generated by any source subject to paragraphs (c), (d), (e) or (h), of this section is prohibited, except for temporary roadways on an area of asbestos ore deposits. The deposition of asbestos tailings or asbestos-containing waste on roadways covered with snow or ice is considered "surfacing."

(c) Manufacturing: There shall be no visible emissions to the outside air, except as provided in paragraph (f) of this section, from any of the following operations if they use commercial asbestos or from any building or structure in which such operations are conducted.

[40 FR 48292, October 14, 1975]

(1) The manufacture of cloth, cord, wicks, tubing, tape, twine, rope, thread, yarn, roving, lap, or other textile materials.

(2) The manufacture of cement products.

(3) The manufacture of fireproofing and insulating materials.

(4) The manufacture of friction products.

(5) The manufacture of paper, millboard, and felt.

(6) The manufacture of floor tile.

(7) The manufacture of paints, coatings, caulks, adhesives, sealants.

(8) The manufacture of plastics and rubber materials.

(9) The manufacture of chlorine.

(10) The manufacture of shotgun shells.

(11) The manufacture of asphalt concrete.

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

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

(ii) Written notification shall be postmarked or delivered to the Administrator at least 20 days prior to com-

mencement of demolition and shall include the information required by paragraph (d)(2) of this section, with the exception of the information required by paragraphs (d)(2) (iii), (vi), (vii), (viii), and (ix) of this section, and shall state the measured or estimated amount of friable asbestos materials which is present. Techniques of estimation shall be explained.

[Paragraph (d) revised by 43 FR 26374, June 19, 1978]

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

(i) Name of owner or operator.

(ii) Address of owner or operator.

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

[Paragraph (iii) revised by 43 FR 26374, June 19, 1978]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[4(i)–(iv) revised by 43 FR 26374, June 19, 1978]

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

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

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

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

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

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

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

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

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

[39 FR 15936, May 3, 1974; 40 FR 48292, October 14, 1975]

(e) *Spraying.* There shall be no visible emissions to the outside air from the spray-on application of materials containing more than 1 percent asbes-

tos, on a dry weight basis, used on equipment and machinery, except as provided in paragraph (f) of this section. ...terials sprayed on buildings, struc...es, structural members, pipes, ...nd conduits shall contain less than 1 ...ercent asbestos on a dry weight basis.

[Paragraph (e) revised by 43 FR 26374, June 19, 1978]

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

(2) Any owner or operator who intends to spray asbestos materials which contain more than 1 percent asbestos on a dry weight basis on equipment and machinery shall report such intention to the Administrator at least 20 days prior to the commencement of the spraying operation. Such report shall include the following information:

(i) Name of owner or operator.

(ii) Address of owner or operator.

(iii) Location of spraying operation.

(iv) Procedures to be followed to meet the requirements of this paragraph.

(3) The spray-on application of materials in which the asbestos fibers are encapsulated with a bituminous or resinous binder during spraying and which are not friable after drying is exempted from the requirements of paragraphs (e) and (e)(2) of this section.

[Para...hs (2) and (3) revised by 43 FR 26374 ...e 19, 1978]

(f) Rather than meet the no-visible-emission requirements as specified by paragraphs (a), (c), (d), (e), (h), (j), and (k) of this section, an owner or operator may elect to use the methods specified by § 61.23 to clean emissions containing particulate asbestos material before such emissions escape to, or are vented to, the outside air.

(g) Where the presence of uncombined water is the sole reason for failure to meet the no-visible-emission requirement of paragraphs (a), (c), (d), (e), (h), (j), or (k) of this section, such failure shall not be a violation of such emission requirements.

(h) Fabricating: There shall be no visible emissions to the outside air, except as provided in paragraph (f) of this section, from any of the following operations if they use commercial asbestos or from any building or structure in which such operations are conducted.

(1) The fabrication of cement building products.

(2) The fabrication of friction products, except those operations that primarily install asbestos friction materials in motor vehicles.

(3) The fabrication of cement or silicate board for ventilation hoods; ovens; electrical panels; laboratory furniture; bulkheads, partitions and ceilings for marine construction; and flow control devices for the molten metal industry.

(i) Insulating: Molded insulating materials which are friable and wet-applied insulating materials which are friable after drying, installed after the effective date of these regulations, shall contain no commercial asbestos. The provisions of this paragraph do not apply to insulating materials which are spray applied; such materials are regulated under § 61.22(e).

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

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

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

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

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

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

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

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

CAUTION
Contains Asbestos
Avoid Opening or Breaking Container
Breathing Asbestos Is Hazardous to Your Health

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

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

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

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

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

(k) Waste disposal for asbestos mills: The owner or operator of any source covered under the provisions of paragraph (a) of this section shall meet the following standard:

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

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

(3) Rather than meet the requirement of paragraph (k)(1) of this section, an owner or operator may elect to meet the following requirements in paragraphs (k)(3)(i) and (ii), or use an alternative disposal method which has received prior approval by the Administrator:

(i) There shall be no visible emissions to the outside air from the transfer of control device asbestos waste to the tailings conveyor, except as provided in paragraph (f) of this section. Such waste shall be subsequently processed either as specified in paragraph (k)(3)(ii) of this section or as specified in paragraph (j)(3) of this section.

(ii) All asbestos-containing waste material shall be adequately mixed, with a wetting agent recommended by the manufacturer of the agent to effectively wet dust and tailings, prior to deposition at a waste disposal site. Such agent shall be used as recommended for the particular dust by the manufacturer of the agent. There shall be no discharge of visible emissions to the outside air from the wetting operation except as specified in paragraph (f) of this section. Wetting may be suspended when the ambient temperature at the waste disposal site is less than −9.5°C (ca. 15°F). The ambient air temperature shall be determined by an appropriate measurement method with an accuracy of ±1°C (±2°F) and recorded at least at hourly intervals during the period that the operation of the wetting system is suspended. Records of

such temperature measurements shall be retained at the source for a minimum of) years and made available for inspec- on by the Administrator.

(l) The owner of any inactive waste disposal site, which was operated by sources covered under § 61.22 (a), (c) or (h) and where asbestos-containing waste material produced by such sources was deposited, shall meet the following standards:

(1) There shall be no visible emissions to the outside air from an inactive waste disposal site subject to this paragraph, except as provided in paragraph (l)(5) of this section.

(2) Warning signs shall be displayed at all entrances, and along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material was deposited, at intervals of 100 m (ca. 330 ft) or less, except as specified in paragraph (l)(4) of this section. Signs shall be posted in such a manner and location that a person may easily read the legend. The warning signs required by this paragraph shall conform to the requirements of 20" x 14" upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

LEGEND

ASBESTOS WASTE DISPOSAL SITE

Do Not Create Dust

Breathing Asbestos is Hazardous to Your Health

Notation

1" Sans Serif, Gothic or Block

¾" Sans Serif, Gothic or Block

14 Point Gothic

Spacing between lines shall be at least equal to the height of the upper of the two lines.

(3) The perimeter of the site shall be fenced in a manner adequate to deter access by the general public, except as specified in paragraph (l)(4) of this section.

(4) Warning signs and fencing are not required where the requirements of paragraphs (l)(5) (i) or (ii) of this section are met, or where a natural barrier adequately deters access by the general public. Upon request and supply of appropriate information, the Administrator will determine whether a fence or a natural barrier adequately deters access to the general public.

(5) Rather than meet the requirement of paragraph (l)(1) of this section, an owner may elect to meet the requirements of this paragraph or may use an alternative control method for emissions from inactive waste disposal sites which has received prior approval by the Administrator.

(i) The asbestos-containing waste material shall be covered with at least 15 centimeters (ca. 6 inches) of compacted non-asbestos-containing material, and a cover of vegetation shall be grown and maintained on the area adequate to prevent exposure of the asbestos-containing waste material; or

(ii) The asbestos-containing waste material shall be covered with at least 60 centimeters (ca. 2 feet) of compacted non-asbestos-containing material and maintained to prevent exposure of the asbestos-containing waste; or

(iii) For inactive waste disposal sites for asbestos tailings, a resinous or petroleum-based dust suppression agent which effectively binds dust and controls wind erosion shall be applied. Such agent shall be used as recommended for the particular asbestos tailings by the dust suppression agent manufacturer. Other equally effective dust suppression agents may be used upon prior approval by the Administrator. For purposes of this paragraph, waste crankcase oil is not considered a dust suppression agent.

[40 FR 48292, October 14, 1975]

§ 61.23 Air-cleaning.

If air-cleaning is elected, as permitted by §§ 61.22(f) and 61.22(d)(4)(iv), the requirements of this section must be met.

[40 FR 48292, October 14, 1975]

(a) Fabric filter collection devices must be used, except as noted in paragraphs (b) and (c) of this section. Such devices must be operated at a pressure drop of no more than 4 inches water gage, as measured across the filter fabric. The airflow permeability, as determined by ASTM method D737-69, must not exceed 30 $ft^3/min/ft^2$ for woven fabrics or 35 $ft^3/min/ft^2$ for felted fabrics, except that 40 $ft^3/min/ft^2$ for woven and 45 $ft^3/min/ft^2$ for felted fabrics is allowed for filtering air from asbestos ore dryers. Each square yard of felted fabric must weigh at least 14 ounces and be at least one-sixteenth inch thick throughout. Synthetic fabrics must not contain fill yarn other than that which is spun.

(b) If the use of fabric filters creates a fire or explosion hazard, the administrator may authorize the use of wet collectors designed to operate with a unit contacting energy of at least 40 inches water gage pressure.

(c) The administrator may authorize the use of filtering equipment other than that described in paragraphs (a) and (b) of this section if the owner or operator demonstrates to the satisfaction of the administrator that the filtering of particulate asbestos material is equivalent to that of the described equipment.

(d) All air-cleaning equipment authorized by this section must be properly installed, used, operated, and maintained. Bypass devices may be used only during upset or emergency conditions and then only for so long as it takes to shut down the operation generating the particulate asbestos material.

§ 61.24 Reporting.

The owner or operator of any existing source to which this subpart is applicable shall, within 90 days after the effective date, provide the following information to the administrator:

(a) A description of the emission control equipment used for each process;

(b) If a fabric filter device is used to control emissions, the pressure drop across the fabric filter in inches water gage.

(1) If the fabric filter device utilizes a woven fabric, the airflow permeability in $ft^3/min/ft^2$; and, if the fabric is synthetic, indicate whether the fill yarn is spun or not spun.

(2) If the fabric filter device utilizes a felted fabric, the density in oz/yd^3, the minimum thickness in inches, and the airflow permeability in $ft^3/min/ft^2$.

(c) For sources subject to §§ 61.22(j) and 61.22(k):

(1) A brief description of each process that generates asbestos-containing waste material.

(2) The average weight of asbestos-containing waste material disposed of, measured in kg/day.

(3) The emission control methods used in all stages of waste disposal.

(4) The type of disposal site or incineration site used for ultimate disposal, the name of the site operator, and the name and location of the disposal site.

(d) For sources subject to § 61.22(l):

(1) A brief description of the site.

(2) The method or methods used to comply with the standard, or alternative procedures to be used.

(e) Such information shall accompany the information required by § 61.10. The information described in this section shall be reported using the format of Appendix A of this part.

[40 FR 48292, October 14, 1975]

§ 61.25 Waste disposal sites.

In order to be an acceptable site for disposal of asbestos-containing waste material under § 61.22 (j) and (k), an active waste disposal site shall meet the requirements of this section.

(a) There shall be no visible emissions to the outside air from any active waste disposal site where asbestos-containing waste material has been deposited, except as provided in paragraph (e) of this section.

(b) Warning signs shall be displayed at all entrances, and along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material is deposited, at intervals of 100 m (ca. 330 ft) or less except as specified in paragraph (d) of this section. Signs shall be posted in such

a manner and location that a person may easily read the legend. The warning signs required by this paragraph shall conform to the requirements of 20" x 14" upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

LEGEND

ASBESTOS WASTE DISPOSAL SITE

Do Not Create Dust

Breathing Asbestos
is Hazardous to Your Health

Notation

1" Sans Serif, Gothic or Block

¾" Sans Serif, Gothic or Block

14 Point Gothic

Spacing between lines shall be at least equal to the height of the upper of the two lines.

(c) The perimeter of the disposal site shall be fenced in order to adequately deter access to the general public except as specified in paragraph (d) of this section.

(d) Warning signs and fencing are not required where the requirements of paragraph (e)(1) of this section are met, or where a natural barrier adequately deters access to the general public. Upon request and supply of appropriate information, the Administrator will determine whether a fence or a natural barrier adequately deters access to the general public.

(e) Rather than meet the requirements of paragraph (a) of this section, an owner or operator may elect to meet the requirements of paragraph (e)(1) or (e)(2) of this section, or may use an alternative control method for emissions from active waste disposal sites which has received prior approval by the Administrator.

(1) At the end of each operating day, or at least once every 24-hour period while the site is in continuous operation, the asbestos-containing waste material which was deposited at the site during the operating day or previous 24-hour period shall be covered with at least 15 centimeters (ca. 6 inches) of compacted non-asbestos-containing material.

(2) At the end of each operating day, or at least once every 24-hour period while the disposal site is in continuous operation, the asbestos-containing waste material which was deposited at the site during the operating day or previous 24-hour period shall be covered with a resinous or petroleum-based dust suppression agent which effectively binds dust and controls wind erosion. Such agent shall be used as recommended for the particular dust by the dust suppression agent manufacturer. Other equally effective dust suppression agents may be used upon prior approval by the Administrator. For purposes of this paragraph, waste crankcase oil is not considered a dust suppression agent.

[40 FR 48292, October 14, 1975]

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))

Subpart C—National Emission Standard for Beryllium

§ 61.30 Applicability.

The provisions of this subpart are applicable to the following stationary sources:

(a) Extraction plants, ceramic plants, foundries, incinerators, and propellant plants which process beryllium ore, beryllium, beryllium oxide, beryllium alloys, or beryllium-containing waste.

(b) Machine shops which process beryllium, beryllium oxides, or any alloy when such alloy contains more than 5 percent beryllium by weight.

§ 61.31 Definitions.

Terms used in this subpart are defined in the act, in subpart A of this part, or in this section as follows:

(a) "Beryllium" means the element beryllium. Where weights or concentrations are specified, such weights or concentrations apply to beryllium only, excluding the weight or concentration of any associated elements.

(b) "Extraction plant" means a facility chemically processing beryllium ore to beryllium metal, alloy, or oxide, or performing any of the intermediate steps in these processes.

(c) "Beryllium ore" means any naturally occurring material mined or gathered for its beryllium content.

(d) "Machine shop" means a facility performing cutting, grinding, turning, honing, milling, deburring, lapping, electrochemical machining, etching, or other similar operations.

(e) "Ceramic plant" means a manufacturing plant producing ceramic items.

(f) "Foundry" means a facility engaged in the melting or casting of beryllium metal or alloy.

(g) "Beryllium-containing waste" means material contaminated with beryllium and/or beryllium compounds used or generated during any process or operation performed by a source subject to this subpart.

(h) "Incinerator" means any furnace used in the process of burning waste for the primary purpose of reducing the volume of the waste by removing combustible matter.

(i) "Propellant" means a fuel and oxidizer physically or chemically combined which undergoes combustion to provide rocket propulsion.

(j) "Beryllium alloy" means any metal to which beryllium has been added in order to increase its beryllium content and which contains more than 0.1 percent beryllium by weight.

(k) "Propellant plant" means any facility engaged in the mixing, casting, or machining of propellant.

§ 61.32 Emission standard.

(a) Emissions to the atmosphere from stationary sources subject to the provisions of this subpart shall not exceed 10 grams of beryllium over a 24-hour period, except as provided in paragraph (b) of this section.

(b) Rather than meet the requirement of paragraph (a) of this section, an owner or operator may request approval from the Administrator to meet an ambient concentration limit on beryllium in the vicinity of the stationary source of 0.01 $\mu g/m^3$, averaged over a 30-day period.

(1) Approval of such requests may be granted by the Administrator provided that:

(i) At least 3 years of data is available which in the judgment of the Administrator demonstrates that the future ambient concentrations of beryllium in the vicinity of the stationary source will not exceed 0.01 $\mu g/m^3$, averaged over a 30-day period. Such 3-year period shall be the 3 years ending 30 days before the effective date of this standard.

(ii) The owner or operator requests such approval in writing within 30 days after the effective date of this standard.

(iii) The owner or operator submits a report to the Administrator within 45 days after the effective date of this standard which report includes the following information:

(a) Description of sampling method including the method and frequency of calibration.

(b) Method of sample analysis.

(c) Averaging technique for determining 30-day average concentrations.

(d) Number, identity, and location (address, coordinates, or distance and heading from plant) of sampling sites.

(e) Ground elevations and height above ground of sampling inlets.

(f) Plant and sampling area plots showing emission points and sampling sites. Topographic features significantly affecting dispersion including plant building heights and locations shall be included.

(g) Information necessary for estimating dispersion including stack height, inside diameter, exit gas temperature, exit velocity or flow rate, and beryllium concentration.

(h) A description of data and procedures (methods or models) used to de-

§ 6.

APPENDIX B

OCCUPATIONAL SAFETY AND HEALTH STANDARDS
SUBPART Z—TOXIC AND HAZARDOUS SUBSTANCES

(Excerpts from Code of Federal Regulations, Title 29, Chapter XVII, Section 1910.93 of Subpart G redesignated as 1910.1000 at 40 FR 23072, May 28, 1975; amended at 41 FR 11505, March 19, 1976; 41 FR 35184, August 20, 1976; 41 FR 46784, October 22, 1976; 42 FR 3304, January 18, 1977 (Corrections); 43 FR 2586, January 17, 1978; 43 FR 5963, February 10, 1978; 43 FR 11527, March 17, 1978; 43 FR 13563, March 31, 1978; 43 FR 19584, May 5, 1978; 43 FR 27962, June 1978; 43 FR 28472, June 30, 1978; 43 FR 45762, October 3, 1978; 43 FR 49726, October 24, 1978; 43 FR 51759, November 7, 1978; 43 FR 52952, November 14, 1978; 43 FR 57601, December 8, 1978; 44 FR 5446, January 25, 1979; 44 FR 14554, March 13, 1979; 44 FR 50338, August 28, 1979; 44 FR 60980, October 23, 1979; 44 FR 68827, November 30, 1979 (Corrections); 45 FR 35212, May 23, 1980; 45 FR 54333, August 15, 1980 (Corrections); 46 FR 6134, January 21, 1981)

Editor's Note: The effective date of the Jan. 21, 1981, amendments to section 1910.1025 was extended from Feb. 20, 1981, to March 30, 1981, in the Feb. 6 Federal Register in accordance with President Reagan's Directive.

Subpart Z—Toxic and Hazardous Substances

Sec.:

1910.1000 Air contaminants.

(a) An employee's exposure to any material listed in table Z-1, Z-2, or Z-3 of this section shall be limited in accordance with the requirements of the following paragraphs of this section.

(a) Table Z-1:

(1) *Materials with names preceded by "C"—Ceiling Values.* An employee's exposure to any material in table Z-1, the name of which is preceded by a "C" (e.g., C Boron trifluoride), shall at no time exceed the ceiling value given for that material in the table.

(2) *Other materials—8-hour time weighted averages.* An employee's exposure to any material in table Z-1, the name of which is not preceded by "C", in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average given for that material in the table.

(b) Table Z-2:

(1) *8-hour time weighted averages.* An employee's exposure to any material listed in table Z-2, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in the table.

(2) *Acceptable ceiling concentrations.* An employee's exposure to a material listed in table Z-2, shall not exceed at any time during an 8-hour shift the acceptable ceiling concentration limit given for the material in the table, except for a time period, and up to a concentration not exceeding the maximum duration and concentration allowed in the column under "acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift".

(3) *Example.* During an 8-hour work shift, an employee may be exposed to a concentration of Benzene above 25 p.p.m. (but never above 50 p.p.m.) only for a maximum period of 10 minutes. Such exposure must be compensated by exposures to concentrations less than 10 p.p.m. so that the cumulative exposure for the entire 8-hour work shift does not exceed a weighted average of 10 p.p.m.

(c) Table Z-3: An employee's exposure to any material listed in table Z-3, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in the table.

(d) Computation formulae:

(1) (i) The cumulative exposure for an 8-hour work shift shall be computed as follows:

$$E = \frac{C_1T_1 + C_2T_2 + \ldots C_nT_n}{8}$$

where:

E is the equivalent exposure for the working shift.

C is the concentration during any period of time T where the concentration remains constant.

T is the duration in hours of the exposure at the concentration C.

The value of E shall not exceed the 8-hour time weighted average limit in table

Z-1, Z-2, or Z-3 for the material involved.

(ii) To illustrate the formula prescribed in paragraph (d)(1)(i) of the section, note that isoamyl acetate has an eight hour time weighted average limit of 100 p.p.m. (table Z-1). Assume that an employee is subject to the following exposure:

Two hours exposure at 150 p.p.m.
Two hours exposure at 75 p.p.m.
Four hours exposure at 50 p.p.m.

Substituting this information in the formula, we have

$$\frac{2\times150+2\times75+4\times50}{8}=81.25 \text{ p.p.m.}$$

Since 81.25 p.p.m. is less than 100 p.p.m., the 8-hour time weighted average limit, the exposure is acceptable.

(2) (i) In case of a mixture of air contaminants an employer shall compute the equivalent exposure as follows:

$$E_m=\frac{C_1}{L_1}+\frac{C_2}{L_2}+\ldots\frac{C_n}{L_n}$$

Where:

E_m is the equivalent exposure for the mixture.

C is the concentration of a particular contaminant.

L is the exposure limit for that contaminant, from table Z-1, Z-1, or Z-3.

The value of E_m shall not exceed unity (1).

(ii) To illustrate the formula prescribed in paragraph (d)(2)(i) of the section, consider the following exposures:

Material	Actual concentration of 8-hour exposure	8-hour time weighted average exposure limit
Acetone (Table Z-1)	500 p.p.m.	1,000 p.p.m.
2-Butanone (Table Z-1)	45 p.p.m.	200 p.p.m.
Toluene (Table Z-2)	40 p.p.m.	200 p.p.m.

Substituting in the formula, we have:

$$E_m=\frac{500}{1,000}+\frac{45}{200}+\frac{40}{200}$$

$$E_m=0.500+0.225+0.200$$

$$E_m=0.925$$

Since E_m is less than unity (1), the exposure combination is within acceptable limits.

(e) To achieve compliance with paragraph (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with § 1910.134.

Table Z-1

Substance	p.p.m.*	mg./M³*
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene dichloride, see 1,2-Dichloroethylene		
Acetylene tetrabromide	1	14
Acrolein	0.1	0.25
Acrylamide—Skin		0.3
Aldrin—Skin		0.15
Allyl alcohol—Skin	2	5
Allyl chloride	1	3
C Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	2	12
2-Aminoethanol, see Ethanolamine		
2-Aminopyridine	0.5	2
Ammonia	50	35
Ammonium sulfamate (Ammate)		15
n-Amyl acetate	100	525
sec-Amyl acetate	125	650
Aniline—Skin	5	19
Anisidine (o, p-isomers)—Skin		0.5
Antimony and compounds (as Sb)		0.5
ANTU (alpha naphthyl thiourea)		0.3
"Organic Arsenic compounds (as As)		0.5

[43 FR 19584, May 5, 1978]

Substance	p.p.m.*	mg./M³*
Arsine	0.05	0.2
Azinphos-methyl—Skin		0.2
Barium (soluble compounds)		0.5
p-Benzoquinone, see Quinone		
Benzoyl peroxide		5
Benzyl chloride	1	5
Biphenyl, see Diphenyl		
Boron oxide		15
C Boron trifluoride	1	3
Bromine	0.1	0.7
Bromoform—Skin	0.5	5
Butadiene (1, 3-butadiene)	1,000	2,200
Butanethiol, see Butyl mercaptan		
2-Butanone	200	590
2-Butoxy ethanol (Butyl Cellosolve)—Skin	50	240
Butyl acetate (n-butyl acetate)	150	710
sec-Butyl acetate	200	950
tert-Butyl acetate	200	950
Butyl alcohol	100	300
sec-Butyl alcohol	150	450
tert-Butyl alcohol	100	300
C Butylamine—Skin	5	15
C tert-Butyl chromate (as CrO_3)—Skin		0.1
n-Butyl glycidyl ether (BGE)	50	270
Butyl mercaptan	10	35
p-tert-Butyltoluene	10	60
Calcium oxide		5
Camphor		2
Carbaryl (Sevin®)		5
Carbon black		3.5
Carbon dioxide	5,000	9,000
Carbon monoxide	50	55
Chlordane—Skin		0.5
Chlorinated camphene—Skin		0.5
Chlorinated diphenyl oxide		0.5
C Chlorine	1	3
Chlorine dioxide	0.1	0.3
C Chlorine trifluoride	0.1	0.4
C Chloroacetaldehyde	1	3
α-Chloroacetophenone (phenacylchloride)	0.05	0.3
Chlorobenzene (monochlorobenzene)	75	350
o-Chlorobenzylidene malononitrile (OCBM)	0.05	0.4
Chlorobromomethane	200	1,050
2-Chloro-1,3-butadiene, see Chloroprene		
Chlorodiphenyl (42 percent Chlorine)—Skin		1
Chlorodiphenyl (54 percent Chlorine)—Skin		0.5
1-Chloro 2,3-epoxypropane, see Epichlorohydrin		
2-Chloroethanol, see Ethylene chlorohydrin		
Chloroethylene, see Vinyl chloride		
C Chloroform (trichloromethane)	50	240
1-Chloro-1-nitropropane	20	100
Chloropicrin	0.1	0.7
Chloroprene (2-chloro-1,3-butadiene)—Skin	25	90

Table Z-1—Continued

Substance	p.p.m.*	mg./M³*
Chromium, sol. chromic, chromous salts as Cr		0.5
Metal and insol. salts		1
Coal tar pitch volatiles (benzene soluble fraction) anthracene, BaP, phenanthrene, acridine, chrysene, pyrene		0.2
Cobalt, metal fume and dust		0.1
Copper fume		0.1
Dusts and Mists		1
Cotton dust (raw)		1
Crag® herbicide		15
Cresol (all isomers)—Skin	5	22
Crotonaldehyde	2	6
Cumene—Skin	50	245
Cyanide (as CN)—Skin		5
Cyclohexane	300	1,050
Cyclohexanol	50	200
Cyclohexanone	50	200
Cyclohexene	300	1,015
Cyclopentadiene	75	200
2,4-D		10
DDT—Skin		1
DDVP, Skin		1
Decaborane—Skin	0.05	0.3
Demeton® - Skin		0.1
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	50	240
1,2-diaminoethane, see Ethylenediamine		
Diazomethane	0.2	0.4
Diborane	0.1	0.1
Dibutyl phosphate	1	5
Dibutylphthalate		5
C o-Dichlorobenzene	50	300
p-Dichlorobenzene	75	450
Dichlorodifluoromethane	1,000	4,950
1,3-Dichloro-5,5-dimethyl hydantoin		0.2
1,1-Dichloroethane	100	400
1,2-Dichloroethylene	200	790
C Dichloroethyl ether—Skin	15	90
Dichloromethane, see Methylenechloride		
Dichloromonofluoromethane	1,000	4,200
C 1,1-Dichloro-1-nitroethane	10	60
1,2-Dichloropropane, see Propylene dichloride		
Dichlorotetrafluoroethane	1,000	7,000
Dieldrin—Skin		0.25
Diethylamine	25	75
Diethylamino ethanol—Skin	10	50
Diethylether, see Ethyl ether		
Difluorodibromomethane	100	860
C Diglycidyl ether (DGE)	0.5	2.8
Dihydroxybenzene, see Hydroquinone		
Diisobutyl ketone	50	290
Diisopropylamine—Skin	5	20
Dimethoxymethane, see Methylal		
Dimethyl acetamide—Skin	10	35
Dimethylamine	10	18
Dimethylaminobenzene, see Xylidene		
Dimethylaniline (N-dimethylaniline)—Skin	5	25
Dimethylbenzene, see Xylene		
Dimethyl 1,2-dibromo-2,2-dichloroethyl phosphate, (Dibrom)		3
Dimethylformamide—Skin	10	30
2,6-Dimethylheptanone, see Diisobutyl ketone		
1,1-Dimethylhydrazine—Skin	0.5	1
Dimethylphthalate		5
Dimethylsulfate—Skin	1	5
Dinitrobenzene (all isomers)—Skin		1
Dinitro-o-cresol—Skin		0.2
Dinitrotoluene—Skin		1.5
Dioxane (Diethylene dioxide)—Skin	100	360
Diphenyl	0.2	1
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate (MDI))		
Dipropylene glycol methyl ether—Skin	100	600
Diisooctyl phthalate (Di-2-ethylhexyl phthalate)		5
Endrin—Skin		0.1
Epichlorohydrin—Skin	5	19
EPN—Skin		0.5

See footnotes at end of table.

Table Z-1-Continued

Substance	p.p.m.[a]	mg./M³ [b]
1,2 Epoxypropane, see Propyleneoxide		
2,3-Epoxy-1-propanol, see Glycidol		
Ethanethiol, see Ethylmercaptan		
Ethanolamine	3	6
2-Ethoxyethanol—Skin	200	740
2-Ethoxyethyl acetate (Cellosolve acetate)—Skin	100	540
Ethyl acetate	400	1,400
Ethyl acrylate—Skin	25	100
Ethyl alcohol (ethanol)	1,000	1,900
Ethylamine	18	18
Ethyl sec-amyl ketone (5-methyl-3-heptanone)	25	130
Ethyl benzene	100	435
Ethyl bromide	200	890
Ethyl butyl ketone (3-Heptanone)	80	230
Ethyl chloride	1,000	2,600
Ethyl ether	400	1,200
Ethyl formate	100	300
C Ethyl mercaptan	10	25
Ethyl silicate	100	850
Ethylene chlorohydrin—Skin	5	16
Ethylenediamine	10	25
C Ethylene glycol dinitrate and or Nitroglycerin—Skin	[d] 0.2	1
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate		
Ethylene imine—Skin	0.5	1
Ethylene oxide	50	90
Ethylidine chloride, see 1,1-Dichloroethane		
N-Ethylmorpholine—Skin	20	94
Ferbam		15
Ferrovanadium dust		1
Fluoride (as F)		2.5
Fluorine	0.1	0.2
Fluorotrichloromethane	1,000	5,600
Formic acid	5	9
Furfural—Skin	5	20
Furfuryl alcohol	50	200
Glycerol (2,3-Epoxy-1-propanol)	50	150
Glycol monoethyl ether, see 2-Ethoxyethanol		
Guthion ® see Azinphosmethyl		
Hafnium		0.5
Heptachlor—Skin		0.5
Heptane (n-heptane)	500	2,000
Hexachloroethane—Skin	1	10
Hexachloronaphthalene—Skin		0.2
Hexane (n-hexane)	500	1,800
2-Hexanone	100	410
Hexone (Methyl isobutyl ketone)	100	410
sec-Hexyl acetate	50	300
Hydrazine—Skin	1	1.3
Hydrogen bromide	3	10
C Hydrogen chloride	5	7
Hydrogen cyanide—Skin	10	11
Hydrogen peroxide (90%)	1	1.4
Hydrogen selenide	0.05	0.2
Hydroquinone		2
C Iodine	0.1	1
Iron oxide fume		10
Isoamyl acetate	100	525
Isoamyl alcohol	100	360
Isobutyl acetate	150	700
Isobutyl alcohol	100	300
Isophorone	25	140
Isopropyl acetate	250	950
Isopropyl alcohol	400	980
Isopropylamine	5	12
Isopropyl ether	500	2,100
Isopropyl glycidyl ether (IGE)	50	240
Ketene	0.5	0.9
Lindane—Skin		0.5
Lithium hydride		0.025
L.P.G. (liquified petroleum gas)	1,000	1,800
Magnesium oxide fume		15
Malathion—Skin		15
Maleic anhydride	0.25	1
C Manganese		5
Mesityl oxide	25	100
Methanethiol, see Methyl mercaptan		
Methoxychlor		15
2-Methoxyethanol, see Methyl cellosolve		
Methyl acetate	200	610
Methyl acetylene (propyne)	1,000	1,650
Methyl acetylene-propadiene mixture (MAPP)	1,000	1,800
Methyl acrylate—Skin	10	35
Methylal (Dimethoxymethane)	1,000	3,100
Methyl alcohol (methanol)	200	260
Methylamine	10	12

Table Z-1-Continued

Substance	p.p.m.[a]	mg./M³ [b]
Methyl amyl alcohol, see Methyl isobutyl carbinol		
Methyl (n-amyl) ketone (2-Heptanone)	100	465
C Methyl bromide—Skin	20	80
Methyl butyl ketone, see 2-Hexanone		
Methyl cellosolve—Skin	25	80
Methyl cellosolve acetate—Skin	25	120
Methyl chloroform	350	1,900
Methylcyclohexane	500	2,000
Methylcyclohexanol	100	470
o-Methylcyclohexanone—Skin	100	460
Methyl ethyl ketone (MEK), see 2-Butanone		
Methyl formate	100	250
Methyl iodide—Skin	5	28
Methyl isobutyl carbinol—Skin	25	100
Methyl isobutyl ketone, see Hexone		
Methyl isocyanate—Skin	0.02	0.05
C Methyl mercaptan	10	20
Methyl methacrylate	100	410
Methyl propyl ketone, see 2-Pentanone		
C α Methyl styrene	100	480
C Methylene bisphenyl isocyanate (MDI)	0.02	0.2
Molybdenum: Soluble compounds		5
Insoluble compounds		15
Monomethyl aniline—Skin	2	9
C Monomethyl hydrazine—Skin	0.2	0.35
Morpholine—Skin	20	70
Naphtha (coal tar)	100	400
Naphthalene	10	50
Nickel carbonyl	0.001	0.007
Nickel, metal and soluble cmpds, as Ni		1
Nicotine—Skin		0.5
Nitric acid	2	5
Nitric oxide	25	30
p-Nitroaniline—Skin	1	6
Nitrobenzene—Skin	1	5
p-Nitrochlorobenzene—Skin		1
Nitroethane	100	310
C Nitrogen dioxide	5	9
Nitrogen trifluoride	10	29
C Nitroglycerin—Skin	0.2	2
Nitromethane	100	250
1-Nitropropane	25	90
2-Nitropropane	25	90
Nitrotoluene—Skin	5	30
Nitrotrichloromethane, see Chloropicrin		
Octachloronaphthalene—Skin		0.1
Octane		
Oil mist, mineral		5
Osmium tetroxide		0.002
Oxalic acid		1
Oxygen difluoride	0.05	0.1
Ozone	0.1	0.2
Paraquat—Skin		0.5
Parathion—Skin		0.1
Pentaborane	0.005	0.01
Pentachloronaphthalene—Skin		0.5
Pentachlorophenol—Skin		0.5
Pentane	1,000	2,950
2-Pentanone	200	700
Perchloromethyl mercaptan	0.1	0.8
Perchloryl fluoride	3	13.5
Petroleum distillates (naphtha)	500	2,000
Phenol—Skin	5	19
p-Phenylene diamine—Skin		0.1
Phenyl ether (vapor)	1	7
Phenyl ether-biphenyl mixture (vapor)	1	7
Phenylethylene, see Styrene		
Phenyl glycidyl ether (PGE)	10	60
Phenylhydrazine—Skin	5	22
Phosdrin (Mevinphos ®)—Skin		0.1
Phosgene (carbonyl chloride)	0.1	0.4
Phosphine	0.3	0.4
Phosphoric acid		1
Phosphorus (yellow)		0.1
Phosphorus pentachloride		1
Phosphorus pentasulfide		1
Phosphorus trichloride	0.5	3
Phthalic anhydride	2	12
Picric acid—Skin		0.1
Pival ® (2-Pivalyl-1,3-indandione)		0.1
Platinum (Soluble Salts) as Pt		0.002
Propane	1,000	1,800
n-Propyl acetate	200	840
Propyl alcohol	200	500
n-Propyl nitrate	25	110
Propylene dichloride	75	350
Propylene imine—Skin	2	5
Propylene oxide	100	240
Propyne, see Methylacetylene		
Pyrethrum		5

Table Z-1-Continued

Substance	p.p.m.[a]	mg./M³ [b]
Pyridine	5	15
Quinone	0.1	0.4
Rhodium, Metal fume and dusts, as Rh		0.1
Soluble salts		0.001
Ronnel		15
Rotenone (commercial)		5
Selenium compounds (as Se)		0.2
Selenium hexafluoride	0.05	0.4
Silver, metal and soluble compounds		0.01
Sodium fluoroacetate (1080)—Skin		0.05
Sodium hydroxide		2
Stibine	0.1	0.5
Stoddard solvent	500	2,900
Strychnine		0.15
Sulfur dioxide	5	13
Sulfur hexafluoride	1,000	6,000
Sulfuric acid		1
Sulfur monochloride	1	5
Sulfur pentafluoride	0.025	0.25
Sulfuryl fluoride	5	20
Systox, see Demeton ®		
2,4,5T		10
Tantalum		5
TEDP—Skin		0.2
Tellurium		0.1
Tellurium hexafluoride	0.02	0.2
TEPP—Skin		0.05
C Terphenyls	1	9
1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloroethane—Skin	5	35
Tetrachloromethane, see Carbon tetrachloride		
Tetrachloronaphthalene—Skin		2
Tetraethyl lead (as Pb)—Skin		0.075
Tetrahydrofuran	200	590
Tetramethyl lead (as Pb)—Skin		0.075
Tetramethyl succinonitrile—Skin	0.5	3
Tetranitromethane	1	8
Tetryl (2,4,6-trinitrophenylmethylnitramine)—Skin		1.5
Thallium (soluble compounds)—Skin as Tl		0.1
Thiram		5
Tin (inorganic cmpds, except oxides		2
Tin (organic cmpds)		0.1
C Toluene-2,4-diisocyanate	0.02	0.14
o-Toluidine—Skin	5	22
Toxaphene, see Chlorinated camphene		
Tributyl phosphate		5
1,1,1-Trichloroethane see Methyl chloroform		
1,1,2-Trichloroethane—Skin	10	45
Titanium dioxide		15
Trichloromethane, see Chloroform		
Trichloronaphthalene—Skin		5
1,2,3-Trichloropropane	50	300
1,1,2-Trichloro 1,2,2-trifluoroethane	1,000	7,600
Triethylamine	25	100
Trifluoromonobromomethane	1,000	6,100
2,4,6-Trinitrophenol, see Picric acid		
2,4,6-Trinitrophenylmethylnitramine, see Tetryl		
Trinitrotoluene—Skin		1.5
Triorthocresyl phosphate		0.1
Triphenyl phosphate		3
Turpentine	100	560
Uranium (soluble compounds)		0.05
Uranium (insoluble compounds)		0.25
C Vanadium: V_2O_5 dust		0.5
V_2O_5 fume		0.1
Vinyl benzene, see Styrene		
Vinylcyanide, see Acrylonitrile		
Vinyl toluene	100	480
Warfarin		0.1
Xylene (xylol)	100	434
Xylidine—Skin	5	25
Yttrium		1
Zinc chloride fume		1
Zinc oxide fume		5
Zirconium compounds (as Zr)		5

[a] Parts of vapor or gas per million parts of contaminated air by volume at 25° C. and 760 mm. Hg pressure.

[b] Approximate milligrams of particulate per cubic meter of air.

(No footnote "c" is used to avoid confusion with ceiling value notations.)

[d] An atmospheric concentration of not more than 0.02 p.p.m., or personal protection may be necessary to avoid headache.

[Sec. 1910.1000(e), Table Z-1]

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Table Z-2

Material	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift. Concentration	Maximum duration
[illegible]	10 p.p.m	25 p.p.m	50 p.p.m	10 minutes.
...yllium and beryllium compounds (Z37.29-1970).	2 μg./M³	5 μg./M³	25 μg./M³	30 minutes.
Cadmium fume (Z37.5-1970)	0.1 mg./M³	0.3 mg./M³		
Cadmium dust (Z37.5-1970)	0.2 mg./M³	0.6 mg./M³		
...bon disulfide (Z37.3-1968)	20 p.p.m	30 p.p.m	100 p.p.m	Do.
...bon tetrachloride (Z37.17-1967)	10 p.p.m	25 p.p.m	200 p.p.m	5 minutes in any 4 hours.
...lene dibromide (Z37.31-1970)	20 p.p.m	30 p.p.m	50 p.p.m	5 minutes.
Ethylene dichloride (Z37.21-1969)	50 p.p.m	100 p.p.m	200 p.p.m	5 minutes in any 3 hours.
Formaldehyde (Z37.16-1967)	3 p.p.m	5 p.p.m	10 p.p.m	30 minutes.
...rogen fluoride (Z37.28-1969)		do		
...oride as dust (Z37.28-1969)	2.5 mg./M³			
...d and its inorganic compounds (Z37.11-1969).	0.2 mg./M³			
...lethyl chloride (Z37.23-1969)	100 p.p.m	200 p.p.m	300 p.p.m	5 minutes in any 3 hours.
...ethylene Chloride (Z37.3-1969)	500 p.p.m	1,000 p.p.m	2,000 p.p.m	5 minutes in any 2 hours.
...no (alkyl) mercury (Z37.30-1969)	0.01 mg./M³	0.04 mg./M³		
...ne (Z37.15-1969)	100 p.p.m	200 p.p.m	600 p.p.m	5 minutes in any 3 hours.
Trichloroethylene (Z37.19-1967)	do	do	300 p.p.m	5 minutes in any 2 hours.
Tetrachloroethylene (Z37.22-1967)	do	do	do	5 minutes in any 3 hours.
...ns (Z37.12-1967)	200 p.p.m	300 p.p.m	500 p.p.m	10 minutes.
...ogen sulfide (Z37.2-1966)	20 p.p.m	30 p.p.m	50 p.p.m	10 minutes once only if no other measurable exposure occurs.
Mercury (Z37.8-1971)		1 mg./10M³		
...mic acid and chromates (Z37.7-1971)		do		

...cupational exposures to benzene are subject to the requirements of Section 1910.1028 except as specifically exempted by ... 1910.1028(a)(2). Exposures exempted by Section 1910.1028(a)(2) are covered by this Section 1910.1000.

...ntry on lead returned to table at 44 FR 14554, March 13, 1979]

Table Z-3—Mineral Dusts

Substance	Mppcf	Mg/M³
...lica:		
Crystalline:		
... (respirable)	250	10mg/M³
	%SiO₂+5	%SiO₂+2
... (total dust)		30mg/M³
		%SiO₂+2
Cristobalite: Use ½ the ...lue calculated from the ...unt or mass formulae for ...tartz.		
...ridymite: Use ½ the value calculated from the formulae for quartz.		
...morphous, including natural ... ...omaceous earth	20	80mg/M³
		%SiO₂
...ilicates (less than 1% crystalline silica):		
Mica	20	
...apstone	20	
...lc (non-asbestos form)	20	
...lc (fibrous). Use asbestos ...limit		
Tremolite (see talc, fibrous)		
Portland cement	50	
...raphite (natural)	15	
... dust (respirable fraction ... than 5% SiO₂)		2.4mg/M³ or
For more than 5% SiO₂		10mg/M³
		%SiO₂+2
...e or Nuisance Dust:		
...spirable fraction	15	5mg/M³
...al dust	50	15mg/M³

Note: Conversion factors—
...ppcf ×35.3 = million particles per cubic meter
= particles per c.c.

* ...illions of particles per cubic foot of air, based on ... per samples counted by light-field techniques.
* ...e percentage of crystalline silica in the formula ...se amount determined from air-borne samples, except in those instances in which other methods have been ...own to be applicable.
* ...oth concentration and percent quartz for the appli... of this limit are to be determined from the fraction ... a ...ze-selector with the following characteristics: ... containing < 1% quartz; if > 1% quartz, use quartz ...m

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 Mg./M³ in the table for coal dust is 4.5 Mg/M³.

§ 1910.1001 Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) *Ceiling concentration.* No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineering controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of

this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by paragraphs (d)(1)(i), (ii), or (iii) of this section, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by paragraph (d)(1) of this section, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in paragraphs (d)(2)(ii) or (iii) of this section, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in paragraph (d)(2)(iii) of this section, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2-1969, which is incorporated by reference herein.

(b) See §1910.6 concerning the availability of ANSI Z88.2-1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his 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 other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in paragraph (d)(4)(iii)(a) of this section to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400–450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (e) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring*—(i) samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by paragraph (f)(1) of this section, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) *Caution signs and labels.* (1) *Caution signs.* (i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by paragraph (g)(1)(i) of this section shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

[Sec. 1910.1001(g)(1)(ii)]

Legend	Notation
Asbestos	1" Sans Serif, Gothic or Block.
ust Hazard	¾" Sans Serif, Gothic or Block.
d Breathing Dust	¼" Gothic.
ar Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any wo lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos bers, or to their containers, except that o label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, andling, storage, disposal, processing, or ansportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by paragraph (g)(2)(i) of this section shall be printed in letters of sufficient size and contrast as to be readily isible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

.. *Housekeeping*—(1) *Cleaning.* All ...ternal surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their spersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipent, and asbestos-contaminated cloth-g, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concenations of asbestos fibers in excess of the posure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of least 20 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and ealth, and to authorized representatives of either.

(2) *Access.* Employee exposure records required by this paragraph shall be proded upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.20 (a)-(e) and (g)-(i).

[45 FR 35212, May 23, 1980]

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* 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.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* Records of the medical examinations required by this paragraph shall be provided upon request to employees, designated representatives, and Assistant Secretary in accordance with 29 CFR 1910.20(a)-(e) and (g)-(i). These records shall also be provided upon the request to the Director of NIOSH. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

[45 FR 35212, May 23, 1980; 45 FR 54333, August 15, 1980]

§ 1910.1002 Coal tar pitch volatiles; interpretation of term.

As used in Sec. 1910.1000 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum, wood, and other organic matter.

§ 1910.1003 4-Nitrobiphenyl.

(a) *Scope and application.* (1) This section applies to any area in which 4-Nitrobiphenyl, Chemical Abstracts Service Registry Number 92933 is manufactured, processed, repackaged, released, handled, or stored, but shall not apply to transshipment in sealed containers, except for the labeling requirements under paragraphs (e) (2), (3), and (4) of this section.

(2) This section shall not apply to solid or liquid mixtures containing less than 0.1 percent by weight or volume of 4-Nitrobiphenyl.

(b) *Definitions.* For the purposes of this section: (1) "Absolute filter" is one capable of retaining 99.97 percent of a mono disperse aerosol of 0.3 μm particles.

(2) "Authorized employee" means an employee whose duties require him to be in the regulated area and who has been specifically assigned by the employer.

(3) "Clean change room" means a room where employees put on clean clothing and/or protective equipment in an environment free of 4-Nitrobiphenyl. The clean change room shall be contiguous to and have an entry from a shower room, when the shower room facilities are otherwise required in this section.

(4) "Closed system" means an operation involving 4-Nitrobiphenyl where containment prevents the release of 4-Nitrobiphenyl into regulated areas, nonregulated areas, or the external environment.

(5) "Decontamination" means the inactivation of 4-Nitrobiphenyl or its safe disposal.

(6) "Director" means the Director, National Institute for Occupational Safety and Health, or any person directed by him or the Secretary of Health, Education, and Welfare to act for the Director.

APPENDIX C

Pitt-Consol Chemicals
Conoco Inc.
191 Doremus Avenue
Newark, NJ 07105
(201) 344-3800

Date:

U.S. Environmental Protection Agency
Air Facilities Branch
26 Federal Plaza, Room 802
New York, New York 10007

Re: Asbestos Removal - Notification

Dear Sirs:

This letter is to inform you of our intention to remove asbestos-containing pre-cast insulation from existing equipment on _____(1). This removal is necessary to _____(2) and will generate approximately _____(3) of insulation.

(1) Fill in inclusive date.
(2) Fill in why?, repair steam tracer, make tie-ins, etc.
(3) Insert unit measure of insulation to be removed, e.g., 300 feet of 1-inch thick insulation on 2-inch pipe or 180 square feet of 2-inch thick insulation on 10 feet diameter tank.

It should be noted that we require our personnel and contractors to use the wet method for asbestos removal discussed in 40 CFR 61 and 29 CFR 1910.1001. All insulation containing asbestos material, scrap, debris and asbestos-contaminated clothing will be stored wet in sealed pre-labelled asbestos bags until shipment. We plan to continue to notify you at least 10 days prior to any shipment.

Please contact us if you have any questions.

Very truly yours,

Harry D. Garrison
Plant Manager

cc:

APPENDIX D

Pitt-Consol Chemicals
Conoco Inc.
191 Doremus Avenue
Newark, NJ 07105
(201) 344-3800

Date:

U.S. Environmental Protection Agency
Air Facilities Branch
26 Federal Plaza, Room 802
New York, New York 10007

Re: Asbestos Removal - Annual Notification

Dear Sirs:

This letter is to inform you that we anticipate the removal of asbestos-containing pre-cast insulation from existing equipment during the next year. We currently do not have any planned removals. However, historically,we have found it necessary to remove some of this insulation due to routine maintenance, e.g., valve replacement, replacement of steam leaks, making tie-ins, repairing steam tracers, etc.. We do not anticipate any single removals of nearly 260 feet of pipe insulation or 160 square feet of flat insulation; however, because we accumulate this material prior to disposal, there is a chance we may ship more than this amount at one time. Note that we plan to continue to notify you at least 10 days prior to any shipment. Also, we will notify you of any significant removals (greater than 260 feet of pipe or 160 square feet of flat insulation) in advance if possible, i.e., it is not an emergency removal.

It should be noted that we require both our personnel and any contractors which we employ to use the wet method for asbestos removal discussed in 40 CFR 61 and 29 CFR 1910.1001. After removal all asbestos-containing material, asbestos-contaminated clothing and debris are stored wet in sealed pre-labeled plastic bags until shipment.

Please contact us if you have any questions.

Harry D. Garrison
Plant Manager

bc: RHD, WFR, AVG, HP

APPENDIX E

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF ENVIRONMENTAL QUALITY
SOLID WASTE ADMINISTRATION
32 EAST HANOVER STREET, TRENTON, N. J. 08625

JACK STANTON
DIRECTOR

LINO F. PEREIRA
ADMINISTRATOR
SOLID WASTE MANAGEMENT

Re: Disposal of Asbestos Waste

Dear Sir:

Pursuant to inquiries regarding the disposal of asbestos ceiling materials from school buildings in particular and asbestos waste in general, the Solid Waste Administration, after consultation with the U.S. Environmental Protection Agency, requires the following steps be taken when landfilling this material:

1. Only landfills registered to accept industrial waste (I.D. #27) are to be used for disposal.

2. All wastes are to be immediately wetted before being deposited in a temporary container for transfer to a landfill facility. Said container must be closed between fillings and closed during transfer to the landfill site (in case of a "dumpster") OR the material is to be immediately wetted and placed into a suitable permanent container such as metal drums or "fiber pak" and transferred to the landfill.

3. A registered solid waste hauler shall be used to transfer such wastes.

4. A separate excavation is to be prepared at the landfill site, the asbestos material deposited, and immediately covered.

5. The presence of a County Health Officer and/or an inspector from the Solid Waste Administration Enforcement Section may be required as necessary to oversee the final disposition.

6. A report will be submitted by each generator (e.g., a school district) to the Bureau of Hazardous Waste, Solid Waste Administration, ten (10) days prior to disposal as per the National Emission Standards for Hazardous Air Pollutants, 40 CFR 61, Subpart B, Section 61.20 through 61.25, indicating the quantities of asbestos material, the hauler identification, and the landfill site into which it is to be emptied. Also, a copy of the report must be sent to: U.S. Environmental Protection Agency, Air Facilities Branch, 26 Federal Plaza, Room 802, New York, New York 10007, Attention: EPA Region II, Asbestos Technical Advisor (212) 264-3059.

Since asbestos is classified as a hazardous waste when it is airborne, the Solid Waste Administration requires compliance with the above procedure pursuant to the hazardous waste provisions of N.J.A.C. 7:26-1 et seq.

Very truly yours,

Lino F. Pereira

Lino F. Pereira
Administrator

hjg

GUIDANCE DOCUMENT

Sprayed-on Asbestos Containing Materials in Buildings

The purpose of this document is to inform public officials about problems which may exist as a result of the presence of asbestos in sprayed-on coatings used in buildings and structures under their supervision or control.

I. BACKGROUND

A potential problem exists with sprayed-on coatings which contain asbestos materials. Such coatings have been widely used, in schools, in other public places, and in areas of human habitation. This type of coating has the potential to release asbestos fibers into the air on a continuing basis. Exposure to asbestos can result in serious human health effects (see Section III). The use of asbestos coating constitutes an unnecessary exposure to asbestos fibers for members of the general population. New applications of such asbestos containing materials is especially unnecessary in light of the fact that today, equally effective, non-asbestos containing materials and alternate construction techniques are readily available.

II. IDENTIFICATION

A. One type of friable sprayed-on asbestos ceiling has the appearance of light gray fluffy cotton-like texture. The thickness of the mat-like material varies, and is usually about 1/2 to 1 inch thick. The material is spongy to the touch and readily flakes (friable) off upon disturbance and is usually accompanied with a limited plaster binder which also crumbles and flakes off. Such ceilings, even when undisturbed, can readily release asbestos fibers as the ceiling ages. (THIS SHOULD NOT BE CONFUSED WITH CEILING TILES.)

B. In addition to sprayed-on asbestos, this Department has discovered that, in certain cases, paints containing significant percentages of asbestos as a constituent have been used to coat ceilings and walls. Surfaces sprayed with this material have the appearance of stucco or textured cement. This type of asbestos bearing material also has the potential to release fibers into the air.

III. HEALTH EFFECTS OF ASBESTOS EXPOSURE

Asbestos is a generic term used to describe a number of naturally occurring, fibrous, hydrated mineral silicates. Asbestos is widely recognized as a human carcinogen based on studies of asbestos workers. Asbestos produces a form of cancer known as mesothelioma. It also produces a non-malignant scarring of the lungs known as asbestosis. It has been classified as a hazardous air pollutant by the United States Environmental Protection Agency. Extensive medical studies and research of occupational exposure have confirmed the hazardous nature and

carcinogenic effect of asbestos on humans. Recent medical research in this area indicates that brief, high level exposure, as well as long-term, low level exposure, leads to an increased risk of lung cancer. This fact, coupled with the variability of individual response to any carcinogenic agent, makes it impossible to prescribe a safe exposure level for asbestos. Typically no immediate effects are observed, as asbestos related diseases generally have a latency period of from 10 to 20 years.

Exposure to asbestos fibers is not limited to those who come into direct contact with sources. Studies of the families of asbestos factory workers indicate a higher than normal incidence of lung cancer. This has been linked to fibers brought into the home on the clothing of the workers. This has been acknowledged by the federal government in the occupational health standard which requires separate work and street clothes for workers with high exposure to asbestos materials. Once transported into the home, asbestos becomes entrained in the air and in a sense, 24-hour exposure occurs. These family studies suggest that the very young are the most susceptible to the induction of cancer. Here, these facts are especially critical because in our schools and other public buildings, we are dealing with high numbers of young recipients. Every reasonable effort must be made to eliminate such unnecessary human exposure.

IV. NECESSARY ACTION

1. It must be emphasized that immediate action is required only in those cases identified according to Section II.

2. If the sprayed-on surface material has been identified according to Section II, the first step is to determine if asbestos is present, in significant quantities, in the material in question. A definitive laboratory analysis should be undertaken. A list of some companies having the capability to conduct asbestos analysis is attached. (It should be noted that the State of New Jersey Department of Environmental Protection does not have the facilities to do asbestos analysis.)

3. Warning! Except for taking the sample for analysis, the sprayed-on surface material should not be disturbed in any way. If possible, the affected area should be closed or activity in the area reduced until the laboratory results are obtained and any necessary corrective actions are completed.

4. Should the laboratory analysis of the sprayed-on surface material prove to be negative (i.e., less than 1% asbestos on a dry weight basis)*, no further action is required.

5. Should the laboratory analysis of the sprayed-on surface material confirm the presence of asbestos, further

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* Federal rules (40 CFR 6.1(c)) provide that spray-on asbestos materials used to insulate or fireproof buildings structures, pipes, and conduits shall contain less than 1% asbestos on a dry weight basis.

REMOVAL PROCEDURE FOR SPRAY-ON ASBESTOS CONTAINING MATERIAL

The following removal procedure has been formulated after review of applicable federal regulations (40 CFR 60, Subpart B National Emission Standard for Asbestos). Any person responsible for a renovation operation involving the removal of asbestos-bearing material is hereby advised to review said regulations in order to insure compliance therewith.

1. The removal area should be sealed off in total or in working sections, closed doors should be double sealed with tape and plastic, large areas such as hallways should be sealed by hanging plastic or vinyl tarps and sealing with tape.

2. Just prior to actual removal, spray the asbestos containing material with the following mixture of water and surficant until saturated.

1 fluid ounce of surficant to 5 gallons water

Surficant: 50% polyoxyethylene Ester
50% polyoxyethylene Ether

3. The asbestos containing material and/or substrate (plaster board) is manually removed and placed in a sealable type container for transport to a sanitary landfill. Closable type dumpsters may be used as long as the asbestos containing material is completely wet.

4. All walls and floors in the removal area are then steam cleaned and/or vacuumed to remove any remaining residue.

5. All wastes including sealing tape, plastic tarps, vacuum wastes, and workmens clothing are to be deposited in the sealable container, sealed, and disposed of along with the asbestos containing material in sanitary landfill and immediately covered with fill dirt.

The Solid Waste Management Administration, Chemical and Hazardous Materials Section must be notified (609-292-7645) prior to disposal in a New Jersey landfill. Information on approvable landfills can also be obtained from the Solid Waste Management Administration at the same number.

6. Workers involved in asbestos removal should be equipped with:

a. OSHA approved mask respirator.

b. Disposable clothing, including gloves and foot covering.

information is needed in order to evaluate the urgency of the situation and to determine what is the best way to solve the problem:

a. Percentage of asbestos in sprayed-on surface material (results of laboratory test).

b. Age physical condition area and thickness of the sprayed-on material (is visible flaking of the material evident?).

c. Physical disturbance which has or may occur as a result of, for example, low ceiling which are readily accessible.

d. Function of affected area (e.g., classroom, cafeteria, gymnasium, hallway corridors, library, boiler and/or incinerator rooms).

6. In general, these factors are considered as follows:

a. If the coating contains a high percentage of asbestos, can be or is physically disturbed, is in a degraded state and is in an area of considerable activity, then there is the potential for significant exposure to asbestos fibers. This combination of conditions calls for immediate action in terms of either closing off the area, sealing the material to secure the asbestos fibers or removal of the material.

b. If the coating is secure, such that no visible flaking is observed, then emergency corrective action is probably not warranted. In this case, all information should be used in arriving at an appropriate schedule for the proper corrective action. A consultant may be engaged for guidance in this regard.

7. If closing down the affected areas is not feasible, the sprayed-on surface material may be covered, as an interim solution, with plastic sheets and sealed with tape. Utmost care should be taken while fixing the cover so as not to disturb the sprayed-on surface material.

8. Where the removal of the asbestos-containing sprayed-on surface material is warranted, it is important to note the following: Removal of asbestos material must be carried out according to the procedures outlined in the attached bulletin entitled "Removal and Disposal of Asbestos Bearing Material." To insure the safe removal and disposal of the asbestos material, this work should be done only by qualified asbestos workers and contractors. Removal of the asbestos material without following the proper procedures may make the problem worse!

In additon, the workers must remove the disposable clothing prior to leaving the site and it is strongly recommended that they be advised to shower prior to eating.

The removal of sprayed asbestos containing materials from such structural members as ceiling and/or walls is considered a renovation by the U.S. Environmental Protection Agency (National Emission Standards for Hazardous Air Pollutants Section 61.22(d)(2)) and as such a report must be sent in duplicate for each site location addressed to:

U.S. Environmental Protection Agency, Region II
Director, Enforcement Division
Attention: Marcus Kantt
Room 802, Federal Office Building
26 Federal Plaza
New York, New York 10007

This report must be sent at least 10 days prior to the commencement of removal, and in accordance with 40 CFR 61.22(d)(2) must contain the following information:

1. Name of owner or operator.

2. Address of owner or operator.

3. Description of the building, structure, facility, or installation to be demolished or renovated, including the site, age, and prior use of the structure, and the approximate amount of friable asbestos material used for insulation and fireproofing.

4. Address or location of the building, structure, facility, or installation.

5. Scheduled starting and completion dates of demolition or renovation.

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

7. Procedures to be employed to assure no visible emission of asbestos containing waste materials during the disposal operation.

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

LABORATORY FACILITIES

The following companies have indicated that they are capable of conducting asbestos analysis. Companies and/or contractors on these lists should not be construed to be an endorsement by this Department. Testing firms are included merely on the basis of an affirmative response to telephone inquiries which asked whether or not the companies were capable of:

1. asbestos determination analysis

2. percent asbestos by dry weight in a given sample

All those listed have requested that the sample be placed into a "Zip-lock" plastic bag and mailed to their address in a cardboard tube. (Telephone contact should be made before sending samples to determine other sampling requirements.)

1.) Bott Environmental Engineering, Inc.
1 Plymouth Meeting Mall
Plymouth Meeting, Pennsylvania 19462
Attention: Mr. Ronald Neu

Telephone Number: 215-825-3800 Extension 372
Analysis turnaround time - 10 to 20 days

Cost $60/sample analyzed

2.) Clayton Environmental Consultants
25711 Southfield Road
Southfield, Michigan 48075
Attention: Mr. Robert Soule

Telephone Number: 313-424-8860
Analysis turnaround time - 5 to 10 days

Cost $23/sample analyzed

3.) McCrone Associates
2820 South Michigan Avenue
Chicago, Illinois 60616

Telephone Number: 312-842-7100
Analysis turnaround time - 10 to 15 days
Recommend sending sample by UPS or Air Freight Carrier

Cost $100/sample analyzed

Cherry Hill, New Jersey 08003
Attention: Saleem Choudhary

Telephone Number: 609-424-4440
Analysis turnaround time - 3 to 5 days

Cost $50/sample analyzed

5.) Structure Probe, Inc.
P.O. Box 342
Westchester, Pennsylvania 19380
Attention: Thomas Nightingale

Telephone Number: 215-436-5400
Analysis turnaround time - 3 to 5 days

Cost $75/sample analyzed

6.) William R. Bradley and Associates
57 Homestead Road
Tenafly, New Jersey 07670

Telephone Number: 201-567-7929
Analysis turnaround time - 2 weeks

Cost $50/sample analyzed

7.) John H. Banks Laboratories Inc.
49 Cannonball Road
Pompton Lakes, New Jersey 07442
Attention: Dave Miller

Telephone Number: 201-839-5450
Analysis turnaround time - 24 to 48 hours

Cost $50/sample analyzed

APPENDIX F

Pitt-Consol Chemicals
Conoco Inc.
191 Doremus Avenue
Newark, NJ 07105
(201) 344-3800

Date:

Bureau of Hazardous and Chemical Wastes
Solid Waste Administration
32 East Hanover Street
Trenton, New Jersey 08625

Re: Asbestos Disposal - Notification

Gentlemen:

Pitt-Consol Chemical Company wish to inform you of our intended disposal of approximately (Quantity) C.Y./# of asbestos material removed from (Source: Pipe, Tank, etc.) insulation. This material is stored at 191 Doremus Avenue, Newark, New Jersey 07105 and will be hauled by (Transporter: Name & Address), (EPA No.) on (Date) 1981. The material is wetted and sealed in pre-labelled asbestos bags and will be disposed of at (Landfill: Name & Address), (EPA No.). This landfill is approved to handle industrial waste No. 27.

Please contact us if you have any questions.

Very truly yours,

cc: US EPA
Air Facilities Branch
26 Federal Plaza, Room 802
New York, New York 10007
File: Asbestos (RCRA)

APPENDIX G

ANALYSIS PLAN FOR PROPER HANDLING, TREATMENT, STORAGE AND DISPOSAL OF WASTES

1. Any waste suspected to be hazardous under EPA criteria will be classified by:

   a. Using analyses of like wastes or
   b. Testing suspected hazard by EPA Methodology

2. Wastes deemed hazardous will be tested for other parameters which could effect proposed disposition. All informations pertinent to that waste will be compiled on a "Waste Data Sheet".

3. Sampling and Analysis will be by the procedures designated on the waste data sheet.

4. Appropriate analyses will be invoked or repeated when the waste is available for sampling (i.e. when a vessel needs to be cleaned out) and:

   a. when there is a process change which might significantly change a waste product.
   b. when there appears to be a difference between the waste and the description on the Waste Data Sheet, or
   c. when a reasonable period of time has passed since the last analysis (this will be based on degree of hazard, volume, disposal cycle and effect on the disposal methods used.)

5. No waste suspected to be hazardous will be shipped without a waste analysis.

6. No hazardous waste will be shipped without a manifest prepared by the Environmental Engineer or Senior Process Engineer and signed by the Plant Manager or Acting Plant Manager.

Waste Data Sheet No. 1 (By Laboratory)

1. Waste Name: _____
2. Process Creating Waste: _____
3. Sample Date: _____
4. Waste Properties: _____
   1. Type (organic, inorganic, both): _____
   2. Number of phases: _____
   3. Physical State (solid, liquid, etc.): _____
   4. Density: _____
   5. pH: _____
   6. Flash Point (p.m.): _____

Composition: (See attached Waste Data Sheet No. 2)

1. Organics, Wt. % _____
2. Water, Wt. % _____
3. Solids, Wt. % _____
4. Ash, Wt. % _____
5. Metals,

	ppm	Not Present	Not Expected to be Present
As			
Ba			
Cd			
Cr			
Pb			
Hg			
Se			
Ag			
Zn			
Cu			
Fe			
Other			

6. Inorganics:

Sulfides			

7. Sampling and Analysis Techniques

Parameter	Sample Method	Analytical Method

Waste Data Sheet No. 2 (By Laboratory)

Waste Name: _____

Date: _____

Time: _____

Sample Number: _____

DME _____

Anisole _____

Phenol _____

Ortho Cresol _____

M & P Cresols _____

2,6 Xylenol _____

Unid. Anisoles _____

2,4+2,5 Xylenols _____

3,5 Xylenol _____

2,3 Xylenol _____

3,4 Xylenol _____

2,4,6 Tri M Phenol _____

2,3,6 Tri M Phenol _____

2,3,5+2,4,5 Tri M Phenols _____

2,3,4+3,4,5 Tri M Phenols _____

Penta M Benzene _____

2,3,5,6+2,3,4,6 Tetra M Phenols _____

2,3,4,5 Tetra Phenol _____

Unids. _____

Penta M Phenol _____

Hexa M Benzene _____

Polymers or Residue _____

Color or Hazen _____

Methanol _____

H_2O _____

Specific Gravity _____

FP _____

PH _____

Phenyl Disulfide _____

Tolyl Disulfides _____

Xylyl Disulfides _____

Active Sulfur _____