XIII. APPENDIX V

MATERIAL SAFETY DATA SHEET

(a) Section I. Product Identification

The manufacturer's name, address, and regular and emergency telephone numbers (including area code) are inserted in the appropriate blocks of Section I. The company listed should be a source of detailed backup information on the hazards of the material(s) covered by the MSDS. The listing of suppliers or wholesale distributors is discouraged. The trade name should be the product designation or common name associated with the material. The synonyms are those commonly used for the product, especially formal chemical nomenclature. Every known chemical designation or competitor's trade name need not be listed.

(b) Section II. Hazardous Ingredients

The "materials" listed in Section II shall be those substances which are part of the hazardous product covered by the MSDS and individually meet any of the criteria defining a hazardous material. Thus, one component of a multicomponent product might be listed because of its toxicity, another component because of its flammability, while a third component could be included both for its toxicity and its reactivity. Note that a MSDS for a single component product must have the name of the material repeated in this section to avoid giving the impression that there are no hazardous ingredients.

Chemical substances should be listed according to their complete name derived from a recognized system of nomenclature. Where possible, avoid using common names and general class names such as "aromatic amine,"

"safety solvent," or "aliphatic hydrocarbon" when the specific name is known.

The "%" may be the approximate percentage by weight or volume (indicate basis) which each hazardous ingredient of the mixture bears to the whole mixture. This may be indicated as a range or maximum amount, ie, "10-40% vol" or "10% max wt" to avoid disclosure of trade secrets.

Toxic hazard data shall be stated in terms of concentration, mode of exposure or test, and animal used, ie, "100 ppm LC50 rat," "25 mg/kg LD50-skin-rabbit," "75 ppm LC man," or "permissible exposure from 29 CFR 1910.1000," or, if not available, from other sources of publications such as the American Conference of Governmental Industrial Hygienists or the American National Standards Institute Inc. Flammable or reactive data could be flash point, shock sensitivity, or other brief data indicating nature of the hazard.

(c) Section III. Physical Data

The data in Section III should be for the total mixture and should include the boiling point and melting point in degrees Fahrenheit (Celsius in parentheses); vapor pressure, in conventional millimeters of mercury (mm Hg); vapor density of gas or vapor (air = 1); solubility in water, in parts/hundred parts of water by weight; specific gravity (water = 1); percent volatiles (indicate if by weight or volume) at 70 degrees Fahrenheit (21.1 degrees Celsius); evaporation rate for liquids or sublimable solids, relative to butyl acetate; and appearance and odor. These data are useful for the control of toxic substances. Boiling point, vapor density, percent volatiles, vapor pressure, and evaporation are useful for designing proper ventilation equipment. This information is

also useful for design and deployment of adequate fire and spill containment equipment. The appearance and odor may facilitate identification of substances stored in improperly marked containers, or when spilled.

(d) Section IV. Fire and Explosion Data

Section IV should contain complete fire and explosion data for the product, including flash point and autoignition temperature in degrees Fahrenheit (Celsius in parentheses); flammable limits, in percent by volume in air; suitable extinguishing media or materials; special firefighting procedures; and unusual fire and explosion hazard information. If the product presents no fire hazard, insert "NO FIRE HAZARD" on the line labeled "Extinguishing Media."

(e) Section V. Health Hazard Information

The "Health Hazard Data" should be a combined estimate of the hazard of the total product. This can be expressed as a time-weighted average (TWA) concentration, as a permissible exposure, or by some other indication of an acceptable limit. Other data are acceptable, such as lowest LD50 if multiple components are involved.

Under "Routes of Exposure," comments in each category should reflect the potential hazard from absorption by the route in question. Comments should indicate the severity of the effect and the basis for the statement if possible. The basis might be animal studies, analogy with similar products, or human experiences. Comments such as "yes" or "possible" are not helpful. Typical comments might be:

> Skin Contact--single short contact, no adverse effects likely; prolonged or repeated contact, irritation, and cracking. Readily absorbed through the skin with severe systemic effects.

Eye Contact--some pain and mild transient irritation; no corneal scarring.

"Emergency and First Aid Procedures" should be written in lay language and should primarily represent first aid treatment that could be provided by paramedical personnel or individuals trained in first aid.

Information in the "Notes to Physician" section should include any special medical information which would be of assistance to an attending physician including required or recommended preplacement and periodic medical examinations, diagnostic procedures, and medical management of overexposed workers.

(f) Section VI. Reactivity Data

The comments in Section VI relate to safe storage and handling of hazardous, unstable substances. It is particularly important to highlight instability or incompatibility to common substances or circumstances such as water, direct sunlight, steel or copper piping, acids, alkalies, etc. "Hazardous Decomposition Products" shall include those products released under fire conditions. It must also include dangerous products produced by aging, such as peroxides in the case of some ethers. Where applicable, shelf life should also be indicated.

(g) Section VII. Spill or Leak Procedures

Detailed procedures for cleanup and disposal should be listed with emphasis on precautions to be taken to protect workers assigned to cleanup detail. Specific neutralizing chemicals or procedures should be described in detail. Disposal methods should be explicit including proper labeling of containers holding residues and ultimate disposal methods such as

"sanitary landfill," or "incineration." Warnings such as "comply with local, state, and federal anti-pollution ordinances" are proper but not sufficient. Specific procedures should be identified.

(h) Section VIII. Special Protection Information

Section VIII requires specific information. Statements such as "Yes," "No," or "If Necessary" are not informative. Ventilation requirements should be specific as to type and preferred methods. Specify respirators as to type and NIOSH or US Bureau of Mines approval class, ie, "Supplied-air," "Organic vapor canister," "Suitable for dusts not more toxic than lead," etc. Protective equipment must be specified as to type and materials of construction.

(i) Section IX. Special Precautions

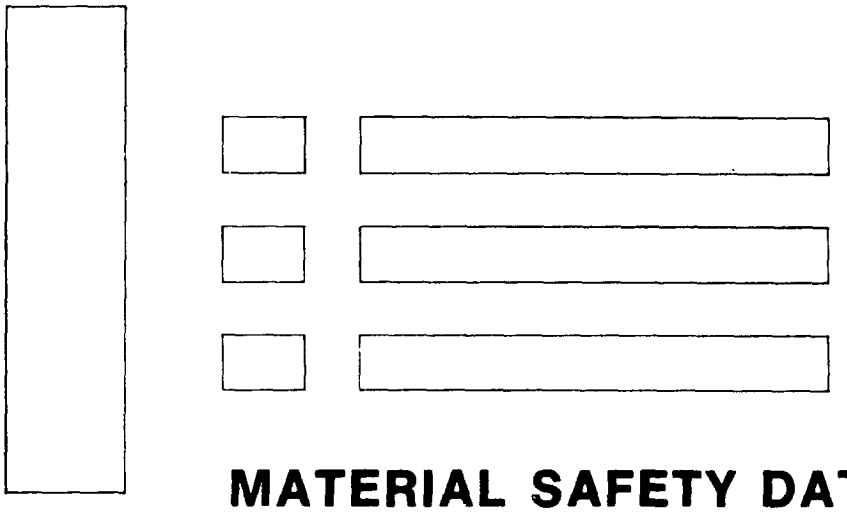
"Precautionary Statements" shall consist of the label statements selected for use on the container or placard. Additional information on any aspect of safety or health not covered in other sections should be inserted in Section IX. The lower block can contain references to published guides or in-house procedures for handling and storage. Department of Transportation markings and classifications and other freight, handling, or storage requirements and environmental controls can be noted.

(j) Signature and Filing

Finally, the name and address of the responsible person who completed the MSDS and the date of completion are entered. This will facilitate correction of errors and identify a source of additional information.

The MSDS shall be filed in a location readily accessible to workers potentially exposed to the hazardous material. The MSDS can be used as a

training aid and basis for discussion during safety meetings and training of new employees. It should assist management by directing attention to the need for specific control engineering, work practices, and protective measures to ensure safe handling and use of the material. It will aid the safety and health staff in planning a safe and healthful work environment and in suggesting appropriate emergency procedures and sources of help in the event of harmful exposure of employees.



MATERIAL SAFETY DATA SHEET

I PRODUCT IDENTIFICATION	
MANUFACTURER'S NAME	REGULAR TELEPHONE NO. EMERGENCY TELEPHONE NO.
ADDRESS	
TRADE NAME	
SYNONYMS	

II HAZARDOUS INGREDIENTS		
MATERIAL OR COMPONENT	%	HAZARD DATA

III PHYSICAL DATA			
BOILING POINT, 760 MM HG		MELTING POINT	
SPECIFIC GRAVITY (H_2O=1)		VAPOR PRESSURE	
VAPOR DENSITY (AIR=1)		SOLUBILITY IN H_2O, % BY WT	
% VOLATILES BY VOL		EVAPORATION RATE (BUTYL ACETATE=1)	
APPEARANCE AND ODOR			

IV FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)		AUTOIGNITION TEMPERATURE			
FLAMMABLE LIMITS IN AIR, % BY VOL.	LOWER		UPPER		
EXTINGUISHING MEDIA					
SPECIAL FIRE FIGHTING PROCEDURES					
UNUSUAL FIRE AND EXPLOSION HAZARD					

V HEALTH HAZARD INFORMATION

HEALTH HAZARD DATA

ROUTES OF EXPOSURE

INHALATION

SKIN CONTACT

SKIN ABSORPTION

EYE CONTACT

INGESTION

EFFECTS OF OVEREXPOSURE

ACUTE OVEREXPOSURE

CHRONIC OVEREXPOSURE

EMERGENCY AND FIRST AID PROCEDURES

EYES

SKIN

INHALATION

INGESTION

NOTES TO PHYSICIAN

VI REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

INCOMPATIBILITY

HAZARDOUS DECOMPOSITION PRODUCTS

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

NEUTRALIZING CHEMICALS

WASTE DISPOSAL METHOD

VIII SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY (SPECIFY IN DETAIL)

EYE

GLOVES

OTHER CLOTHING AND EQUIPMENT

IX SPECIAL PRECAUTIONS

PRECAUTIONARY
STATEMENTS

OTHER HANDLING AND
STORAGE REQUIREMENTS

PREPARED BY

ADDRESS

DATE

XIV. APPENDIX VI

WORK PRACTICES AND ENVIRONMENT CONTROLS FOR SPECIFIC TYPES OF OPERATIONS INVOLVING FIBROUS GLASS

The following sections have been adapted from a report prepared for NIOSH on work practices and engineering controls for occupational exposure to fibrous glass [6].

Basic Manufacturing and Product Formation and Packing by Manufacturer

(a) Bonded Glass Wools

Because of the volume of process air drawn through the formation chambers for fibrous wool products, excessive dust is not a "hot end" problem in any of the basic glass wool processes. These products are typically edge-trimmed and chopped, cut, or sawed to final dimensions after oven curing the binder system. Commonly, local exhaust systems are used to capture dust at these points and occasionally to remove unbonded "lint" from the product. In some plants, these vent-through cyclone dust collectors are effective for gross dust, such as the >7.5 μm-diameter dusts associated with the onset of dermal irritation in most people, but are almost completely ineffective in removing respirable fibers.

Packing processes where mechanical pressure is applied to reduce product volume would be expected to be dusty; however, this is not substantiated by environmental data.

Practices and controls that can be used to control excessive dust levels include the following.

(1) Use of well-designed and maintained local exhaust systems with proper capture velocities at product trim points. Consideration of the inefficiencies of cyclones for capture of the respirable fraction of airborne fibers should be made in the selection of dust collection systems.

(2) A common deficiency is in disposal of collected dusts. Poorly designed equipment or inadequate procedural directions to workers servicing equipment and removing accumulated dust can result in a secondary dust hazard. Procedures and equipment should be designed with full consideration of ultimate disposal so that dust carefully collected within the plant does not become airborne again during transport to a dump site. All containers for receipt of dust or for haulage must be covered. Conveyors and screw augers used for dust removal from plants should be completely enclosed.

(3) Prevent waste from accumulating along product lines as workers remove out-of-specification material from conveyors. Conveniently placed bins encourage proper disposal and prevent trampling underfoot.

(4) Housekeeping is best accomplished with power vacuum cleaners since most dust is captured by this method. For periodic major housekeeping efforts, when overhead structures are cleaned and vacuuming is not feasible and a dustier process must be used, workers should wear respirators.

(5) Higher density products such as pipe insulation and high-temperature block are usually formed on subsidiary lines by hot pressing uncured fiber. Typically, product trimming is accomplished by band sawing. Well-designed and serviced local exhaust systems are

effective in reducing dust levels.

(b) Loose Fiber and Pouring and Blowing Fibrous Glass Wools

Loose industrial fiber and pouring and blowing wools are produced by fibrous glass and mineral wool industries. In the glass wool plants, blowing wools tend to be largely a reclamation product, formed from other scrap products. In many mineral wool plants, loose fiber is often a major product for uses such as acoustical tile by secondary manufacturers or as loose insulation. This production of loose fiber by mineral wool producers is often a dusty operation. Environmental data indicates extremely low respirable fiber counts for both mineral wool loose fiber products and scrap reclamation from glass and mineral wool producers. However, if dust levels are excessive, the following practices are of merit:

(1) Enclose conveyors, surge bins, tumble screens, shaker tables, rotating screens, and product blenders.

(2) Similarly, chopping stations should be enclosed where scrap is reclaimed for blowing wool.

(3) Pneumatic bag fillers also produce considerable amounts of dust, a problem compounded by the close presence of workers. Properly designed annular local exhaust systems surrounding the filling beak appreciably reduce this problem. Ram ejectors, where a measured weight of wool is compressed within an enclosure and then forced into the bag, or the screw-type filling machine are appreciably less dusty.

(4) Reclamation processes where scrap glass textile fiber is blended with glass wool after carding and garnetting are excessively dusty and require enclosure and well-designed local exhaust and dust collection systems.

(5) Good housekeeping appears to be a major contributor to maintaining low dust levels in mineral wool plants.

(c) Textile Fiber Production and Manufacture

Because of the continuous nature of the textile fiber and because of the application of water-soluble binder systems immediately after the fiber is drawn from the bushing, airborne fiber counts are low (<1.0 fiber/cc) in formation areas even in plants producing the finest continuous glass fiber (averaging 3.5 μm). Spinning, weaving, twisting, plying, and chopping operations to which fiber strand is subsequently subjected as it is processed into finished fabrics, yarns, rovings, woven rovings, or various matted (rather than woven) fabrics, also show extremely low fiber counts. In addition, high purity demands placed on these materials for some applications place a premium on good housekeeping.

Dust reduction techniques that have proven effective are local exhaust systems with typical capture velocities in the 100-250 ft/minute range. Typically, these vent through bag filters or precision drum rotary filters.

Product Installation

(a) General Applications

For installation of dry fibrous glass wools in confined spaces such as attics, workers should be furnished reusable or single-use, negative pressure respirators approved by NIOSH or MESA. Wool is charged into most blowing systems by pouring the bagged material into a hopper. Moving fingers within the hopper loosen the compressed wool. Typically, this hopper is housed in a van. Hopper-charging can be a dusty operation and

approved respirators should be furnished and their use encouraged.

Trampling of scrap and trims underfoot appears to be a significant contributor to airborne dust levels. Administrative controls that provide worthwhile reductions include furnishing plastic bags mounted on stands for workers to place trims in as they are cut. When filled, the bags are tied securely and placed in the trash.

Dust levels from self-adhering mineral fibers such as are applied by spraying for acoustical, fireproofing, and thermal insulation (asbestos replacements) can be controlled by prompt cleanup. As the cement-coated fiber is water-wetted at a mixing nozzle as it is sprayed, the installers face little airborne hazard; however, use of an approved respirator would be a good practice. The chief dust producing practice is cleanup of oversprayed areas or materials that drop during application. If cleanup is prompt while the fiber is still wetted, no fibers become airborne. If the material is dried, considerable dust can evolve. An effective measure is to stagger the work hours so the cleanup crew remains after the sprayers finish so that the material is not allowed to dry. Waste should be bagged and securely tied for final disposal. Final cleanup should be by vacuum cleaning.

Few applications in which the manmade fibrous minerals are installed as insulation by manufacturers of such products as appliances, vehicles, or mobile homes require special procedures because of dust levels. Such manufacturers, for economic reasons, often minimize handling by ordering material prepared to the exact dimensions or form required for their product, thus reducing handling and, incidentally, dust producing manipulation. In industries where material is received in bulk, typically

the insulation is sheared in a central preparation shop where local exhaust could be used to control any excessive dust levels. In the appliance industry, handling of insulation for self-cleaning ovens produces some worker complaints about "fly." These appliances utilize a high temperature cycle to "burn off" oven spatters. For this application, special binder formulations with no lubricant are used. The lower binder content apparently makes the product dustier to handle. Because of its higher temperature stability, mineral wool is required for high temperature (>232 C) applications such as boilers, chemical plants, and power plants. Installers working in these areas complain of excessive dust while forming the material around ducts and pipes. Some manufacturers prescore high density board for this application so that it bends more readily, a practice claimed to reduce the dust levels appreciably.

(b) Shipboard Applications

The man-made fibrous minerals are replacing asbestos in some shipboard applications. In addition to the dust problems associated with installation in confined spaces, periodic refurbishment of ships requires removal and replacement of old insulation ("tear-out"). Destruction of binder systems by heat and age embrittlement creates dust problems. Among the procedures and practices that could be used are:

(1) Prefabrication of material in shops under adequate local exhaust to reduce cutting and fitting in confined quarters.

(2) Prewetting of materials to be torn out.

(3) Isolation of areas where "tear-out" is taking place with curtains and portable partitions.

(4) Exclusion of all personnel not involved in the operation in the "tear-out" areas.

(5) Use of portable exhaust blowers and dust collectors with sucker hoses or approved respirators if ventilation equipment cannot be used.

(6) Immediate disposal of scrap fiber in plastic bags or other containers not requiring re-handling of loose scrap. Dust should be vacuumed.

Glass Reinforced Plastic Product Manufacture

In the manufacture of products containing fibrous glass reinforced plastic, worker exposure to fibrous glass dusts occurs in three areas--in mat, woven roving and glass cloth preparation areas where roll fabrics are cut to the proper shape for the product, in sprayup areas where roving is chopped in 3.8 to 5.1-cm (1.5 to 2-inch) fibers simultaneously with application of catalyzed resins, and in finishing areas where flashing is removed and imperfections ground. Sprayup does not create a dust problem because the fiber is wetted by the gun and because the monomers used with the resin, frequently styrene, require downdraft or sidedraft local ventilation for worker protection.

(a) Good Practices and Controls

(1) Perform cutting operations on perforated downdraft tables. Provide plastic bags for immediate collection of small remnants to prevent foot trampling. Capture velocities should be 61 to 76 meter/minute (200-250 ft/minute).

(2) Bandsaws in finishing areas should be equipped with local exhaust systems. Portable sabre saws are also available with high velocity, low volume capture attachments.

(3) Grinding should be performed within a properly designed and adequately serviced sidedraft or downdraft booth. Small parts may be finished on exhaust tables. For large assemblies such as tanks, extractor hoods are available for portable disc sanders and grinders. Typical effective slot velocities are 3,048 to 7,620 meters/minute (10,000 to 25,000 ft/minute.

Small Diameter Fiber (less than 3.5 μm) Production and Use

For any operation where excessive small diameter fiber dust levels are encountered, the following techniques are useful:

(a) Where loose small diameter fiber is changed into either paper-making pulpers or in acid leaching tanks to form refractory fiber, approved respirators are recommended. In paper making, a procedure of simply fitting all pulpers with lids, charging the pulper with the rotor nonoperational, then adding water and beginning the pulping process after closure of the lid is effective in reducing dust levels.

(b) Slitting and sawing operations, where small diameter fiber papers are trimmed to final product dimensions, should be equipped with properly designed and well maintained slot exhaust systems, vented through dust collectors.

(c) For manufacturers packing small diameter fiber into filtration media, workers pleat or form the fiber on tables. If excessive dust is a problem, these operations should be performed on downdraft tables with

capture velocities of 61 to 76 meters/minute (200-250 ft/minute). Trim and waste should be immediately placed into plastic bags or other containers not requiring re-handling of loose scrap to avoid trampling underfoot.

(d) All subsequent forming and cutting of refractory materials manufactured from small diameter fiber should be done under adequate local exhaust systems.