PLAINTIFF'S
EXHIBIT
DUP-1819

C

67

PROTECTIVE EQUIPMENT	SAFETY ENGINEERING STANDARD	
RESPIRATORY PROTECTIVE EQUIPMENT	ISSUED JAN 1964	S 2 H
	THIS PAGE REVISED FEB 1968	Page 1 of 8

1. SCOPE

This standard provides information for the selection, use, and care of respiratory protective equipment (respirators). The term "respirator" in this standard is used inclusively and applies to atmosphere-supplying and air-purifying devices that provide breathable air to the wearer within the limits of the equipment, whatever the source of air. This standard does not apply for exposure to airborne radioactive contamination for which special consideration may be necessary.

2. GENERAL

2.1 Respiratory protective equipment should not be used as a substitute for adequate exhaust ventilation or other engineering control methods.

2.2 Respiratory protective equipment shall be worn at all times where the atmosphere may be harmful to employees due to unusual conditions, and where work is necessary in contaminated or oxygen-deficient, confined areas.

2.2.1 When the air is deficient in oxygen, the symptoms range from increased volume of breathing and acceleration of pulse rate to unconsciousness and death, depending upon oxygen content and the degree of a person's activity. Unconsciousness is immediate when a man breathes pure nitrogen and death may follow in a few minutes.

2.2.2 An oxygen deficiency may indicate a hazard in addition to inert gas: eg, flammability (see 4.4), skin toxicity, or absorption through the skin, particularly hydrogen cyanide. Maximum acceptable concentrations (MAC's) of air contaminants are given in Standard S2T. Portable oxygen and toxic-gas detectors are covered in Standard S3T.

2.3 Pure oxygen shall not be used in atmosphere-supplying respirators.

2.4 Only equipment listed and approved by the U. S. Bureau of Mines shall be used, if schedules for a particular type of equipment have been established.

2.4.1 Information Circular 8281, "Respiratory Protective Devices Approved by the Bureau of Mines as of October 1, 1965," can be obtained for 25 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402. Copies of a supplemental list containing approvals since 1965 may be obtained from the Bureau of Mines, Health and Safety Research and Testing Center, 4800 Forbes Ave, Pittsburgh, Pennsylvania 15213. At the present time, the Bureau does not have approval schedules for the following equipment:

a. Filter-type respirators for protection against particulate aerosols, such as beryllium dusts and fumes, dusts impregnated with organic phosphorus insecticides (parathion), and radioactive substances.

b. Air-supplied suits.

c. Chemical cartridge respirators for respiratory protection against gases and vapors other than organic vapors.

2.4.2 A list of respirators for respiratory protection against certain pesticides may be obtained from the U. S. Department of Agriculture, Pesticide Chemicals Research Branch, Beltsville, Maryland 20705.

3. MANUFACTURERS

Names and addresses of companies to which approvals on currently available respiratory protective devices have been granted by the U. S. Bureau of Mines are given in Table 1. Companies to which approvals have been given by the U. S. Department of Agriculture for insecticide respiratory protective devices also are indicated in Table 1. The listing of a manufacturer in this standard does not mean necessarily that all of his products are approved.

4. TYPES, USE, AND LIMITATIONS

4.1 A list of the several types of respiratory protective equipment, method of operation, use, limitations, and remarks is given in Table 2. For additional information in this regard, reference should be made to:

USA Standard Safety Code for Head, Eye, and Respiratory Protection, Z2.1, United States of America Standards Institute, 10 East 40th Street, New York, New York 10016

Respiratory Protective Equipment, Data Sheet D—444, National Safety Council, 425 North Michigan Avenue, Chicago, Illinois

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions by suppliers are to be made only on approval of the local authority initiating the use of this standard.

SUBCOMMITTEE NO. 28

DUPONT

NOTE — THIS DOCUMENT IS THE PROPERTY OF E. I. DU PONT DE NEMOURS AND COMPANY. THE TECHNICAL INFORMATION HEREON MAY NOT BE USED NOR REPRODUCED WITHOUT THE PERMISSION OF DU PONT

REV. OCT 1969 SUP. BY
CONFIDENTIAL

DUP 0960484

DU 040694

Respiratory Protective Devices Manual published by American Industrial Hygiene Association and American Conference of Governmental Industrial Hygienists (copies are available from Braun and Brumfield Inc, Box 1203, Ann Arbor, Michigan.)

4.2 The air-purifying respirators, ie, canister gas masks, chemical cartridge respirators, and mechanical filter respirators (Table 2C) shall not be used for rescue work, or for emergency work of any nature. This is because these respirators require at least 16 percent oxygen in the air. Other reasons for this requirement are that (a) gas masks are intended for use with no more than 2 percent of most toxic gases, and (b) chemical cartridge respirators are approved for no more than 1000 ppm by volume of organic vapor in air.

4.3 Use of canister masks that bear the label "All-Service," "All-Purpose," or "Universal" is prohibited.

4.4 Although self-contained breathing apparatus and hose mask with blower have no concentration limit in regard to toxicity, many toxic gases and vapors are flammable and the user could be exposed to a potential fire or explosion. The 2-percent concentration limits approved for toxic gas removal with canister-type masks may be within the flammable range for some gases. Standard F6J provides information and instructions for use of portable flammable vapor and gas detectors.

5. SELECTION

5.1 In general, in choosing a respirator, the following factors should be considered: (a) nature of the hazard, (b) severity of the hazard, (c) type of contaminant, (d) concentration of the contaminant, (e) period protection is required, (f) location of the contaminated area with respect to a source of respirable air, (g) expected activity of the wearer, (h) operating characteristics and limitations of the available respirators, (i) safety regulations of state or local governments (see Table 2).

5.1.1 Apparatus classified for 30-minute service time, or longer, should be used for entry into an irrespirable atmosphere. In certain cases, 15-minute units may be permitted, depending upon local conditions.

5.1.2 Duration ratings for self-contained apparatus are based upon moderate work rate. Service life of an air cylinder will be less for greater work rate.

5.1.3 Only self-contained breathing apparatus, combination air-line respirator and self-contained breathing apparatus, or hose mask with blower shall be used in oxygen-deficient atmospheres or where the contaminant is, or might be, immediately dangerous to life. The latter condition is defined as one from which a worker cannot escape uninjured without respiratory protective equipment. The air in the self-contained unit of the combination air-line respirator and self-contained breathing apparatus shall be used only for egress in event the hose-line supply of air is interrupted. The volume of this exit supply may vary for different applications, but shall be ample to allow the worker sufficient air to escape from the contaminated area. In any case, this supply shall not be less than 3 minutes.

5.1.4 An uncontaminated supply of air must be assured when using a hose mask with blower.

5.1.5 Schedule 13E of the U. S. Bureau of Mines on self-contained breathing apparatus requires a remaining service-life indicator or warning for compressed breathing air (except for self-rescue, which has a maximum rated service time of 30 minutes). Some equipment now on plants may not have these alarms. These can and should be obtained from equipment suppliers for apparatus not so equipped.

5.1.5.1 When the device is a combination self-contained breathing apparatus and air-line respirator (supplied-air respirator), either a manual or automatic valve(s) shall be provided to change to the self-contained air supply if the air-line supply fails, and to prevent the wearer breathing contaminated air from the outside atmosphere. If a manual valve is provided, it shall be easily operable and located in a position which is convenient to the wearer. If an automatic valve is provided, a warning also shall be provided to alert the wearer that he is breathing from the self-contained air supply, (1) when his normal air-line supply fails, or (2) when the self-contained air supply falls below 95 percent of its full container pressure. A quick disconnect and check valve shall be provided between the apparatus and the air-line supply hose to permit ready escape from the area, and to prevent loss of breathing air from the device or inhaling the surrounding atmosphere, respectively.

5.2 Table 3 lists the hazards and the respirators that are recommended to afford respiratory protection against them. By reference to this table, and by considering the foregoing factors, the user can determine the type of respirator that should be used.

6. PRECAUTIONS

6.1 Purchased cylinders of breathing air should be analyzed for oxygen and carbon monoxide content before use. This analysis normally should be done by the plant (see S3T).

6.2 An extensive list of instructions in use and precautions for each type of respirator is given in the previously

CONFIDENTIAL
REV. OCT 1968

69

JUN 1975 REV.

referenced USAS Z2.1. Some precautions are given in Table 2 under headings of Limitations and Remarks.

6.3 The manufacturer's instructions or precautions of the USA Standard should be posted with the respiratory device.

6.4 All persons who may have occasion to use respiratory devices, or cause them to be used, should be properly trained in their use before circumstances require that they use them to protect their lives and the property of the Company. Also, in execution of plant disaster plans, proper training in use of respiratory protective equipment will aid in the performance of smooth and safe rescue or repair operations.

6.5 A negative pressure occurs inside the facepiece of face-fitting air-purifying respirators (Table 2C). Care must be taken to obtain an effective seal between the facepiece and face to prevent inward contaminant leakage. Also, demand-type air-supplied respirators and demand-type self-contained respirators operate under negative pressure when the wearer inhales; some inward leakage of contaminant may be possible. A pressure-demand type self-contained respirator may be used where special precautions must be taken to prevent the wearer from inhaling any trace of contaminant. (A small positive pressure is maintained at all times and, even if a leak should develop, there would be no leakage of contaminant into the facepiece.)

6.6 A proper seal cannot be established if the temple bars of eye glasses extend through the sealing edge of full-face masks.

6.6.1 All eyepieces in full-face masks approved by the Bureau of Mines will pass the ball drop test, but some plastic eyepieces may not pass the needle drop test (S4H). Current schedules of the Bureau of Mines, however, require that eyepieces shall meet the pertinent requirements for impact and penetration specified in the most recent USA Standard Safety Code for Eye Protection.

6.6.2 As a temporary measure with full-face pieces, glasses with short temple bars or without temple bars may be taped to the wearer's head. Full-face masks have been developed with systems for mounting corrective lenses inside the facepiece.

6.6.3 A half-mask facepiece should not interfere with the wearer's use of spectacles or goggles. Proper selection of equipment normally will eliminate any problem of proper fit when using a combination of half-mask facepiece and spectacles or goggles.

6.7 Conventional respirators do not constitute an absolute barrier to transmission of speech. The respirator exhalation valve usually provides a satisfactory pathway for speech transmission over short distances in relatively quiet areas. Speech transmission devices are available. (Caution: check for acceptability of electrical classification for use in hazardous areas.)

6.8 Major problems in the use of full-face masks at low temperatures are poor visibility and freezing of exhalation valves. Antifog compounds can be used to coat the inside of the eyepiece to prevent its fogging down to about 32 F. Below 0 F, however, antifog compound will not prevent severe fogging.

6.9 Hoses for air supply should be selected to resist chemicals to which they may be exposed.

7. CARE

7.1 **General.** A centralized maintenance, cleaning, and storage station should be used to care for respiratory protective equipment.

7.2 **Procedures Applicable to All Respirators**

7.2.1 *Inspection.* All respirators shall be inspected at regular intervals to make sure that they are ready to use. It is good practice to integrate the respiratory and fire-extinguisher inspection and maintenance program.

7.2.2 *Maintenance.* When it is necessary to replace worn or deteriorated parts, only those made specifically for the device should be used; and the repair work should be accomplished by trained personnel. For most plants, it is preferable that parts of this type be replaced as a unit or returned to the manufacturer for repair.

7.2.3 *Cleaning and Disinfecting.* Respiratory protective equipment, except canisters and cartridges, should be cleaned and disinfected after each use, unless assigned to individuals. Respiratory equipment can be cleaned with detergent and lukewarm water (less than 125 F) by hand brushing or agitation in a washing machine, rinsed, and dried. The quaternary ammonium salt disinfectants* are recommended for sterilizing respiratory devices. Rinse completely in clean, warm water. Assure thorough drying of mask and demand apparatus after cleaning to prevent freezing if used in cold weather.

7.2.4 *Storage.* All respiratory protective equipment should be stored in a clean, cool, dry place, out of direct sunlight, under conditions of moderate temperature (see Chemox mask in Table 2B).

* Willson Germi-Cloth; American Optical Co, No. 101 and 102 Germicidal Detergent; Pulmosan Sanitizer; MSA Cleaner Sanitizer

CONFIDENTIAL

7.3 Special Procedures for Maintaining, Cleaning, Disinfecting, and Storing Respirators

7.3.1 Self-Contained Breathing Apparatus. In demand-type (Table 2B), the cylinder pressure should be checked periodically and brought to rated pressure if necessary. (Minimum pressure is 1600 psi at 70 F.) Recharge after each use, following manufacturer's instructions. Follow manufacturer's instructions on tightness tests for self-contained respirators and hydrostatic testing of compressed-air cylinders.

7.3.2 Hose Masks. Check the blower periodically for proper operation. Check hose for wear and tear after each use and steam clean when necessary. Keep hose capped when not in use to prevent entrance of dust or other contaminants.

7.3.3 Air-Line Respirators. The facepiece should be serviced after each use, as for all other respirators. The flow control valves should be inspected after each use and cleaned and repaired, if necessary. Air-line hose should be checked for wear and tear after each use and be steam cleaned when necessary. See Standard S1H on air-supply system.

7.3.4 Self-Rescuers. Frequent inspection is the most important phase of the maintenance program with this type of equipment because the equipment is seldom used but always must be ready.

7.3.5 Chemical Cartridge Respirators. Chemical cartridges should be changed when the wearer detects the odor or irritating effect of the contaminant. In plants with centralized maintenance stations, cartridges sometimes are discarded after a given period of use (based upon group experience); but, in most cases, the wearer is responsible for discarding and replacing cartridges in his respirator. Particular care should be exercised in the storage of chemical cartridges because usually they deteriorate if exposed to excess moisture and to gaseous air contaminants. Cartridges should not be stored in the area where it is necessary for the workmen to use chemical cartridge respirators.

7.3.6 Mechanical Filter Respirators. Mechanical filters of the "throw-away" type should be discarded when the breathing resistance becomes bothersome to the wearer. Some mechanical filter respirators use reclaimable filters, in which case the filters are cleaned when the respirator is being serviced.

JUN 1975 REV.

CONFIDENTIAL

71

REV. JUN 1965

CONFIDENTIAL

TABLE 1 — MANUFACTURERS OF APPROVED RESPIRATORY DEVICES*

** Acme Protection Equipment Co, 1201 Kalamazoo Street, South Haven, Michigan 49090
** American Optical Co, Southbridge, Massachusetts 01551
Bausch & Lomb, Inc, P. O. Box 478, Rochester, New York 14602
Binks Manufacturing Co, 3114 Carroll Avenue, Chicago, Illinois 60612
E D Bullard Co, 2680 Bridgeway, Sausalito, California 94965
Cesco Safety Products, Inc (formerly Chicago Eye Shield Co), 2727 West Roscoe Street, Chicago, Illinois 60618
H S Cover, Station A, South Bend, Indiana 46614
Davis Emergency Equipment Co, Inc, 45 Halleck St, Newark, New Jersey 07104
The DeVilbiss Co, Toledo, Ohio 43601
The Firewel Co, Inc, Subsidiary of The Ara Corporation, 3695 Broadway, Buffalo, New York 14225
The Fyr-Fyter Co, 221 Crane Street, Dayton, Ohio 45401
Glendale Optical Co, Inc, 130 Crossways Park Drive, Woodbury, New York 11797
Globe Safety Products, Inc (formerly Globe Industries, Inc), 125 Sunrise Place, Dayton, Ohio 45407
Metallizing Engineering Co, Inc, 1101 Prospect Avenue, Westbury, New York 11590
** Mine Safety Appliances Co, 201 North Braddock Avenue, Pittsburgh, Pennsylvania 15208
* Mine Safety Appliances Co, Ltd, Queenslie Industrial Estate, Glasgow E. 3, Scotland
Minnesota Mining and Manufacturing Co, 2501 Hudson Road, St Paul, Minnesota 55101
Pangborn Corporation, Hagerstown, Maryland 21740
** Pulmosan Safety Equipment Corp, 30-48 Linden Place, Flushing, New York 11354
Rite Hardware Manufacturing Co, 540 West Chevy Chase Drive, Glendale, California 91209
Safeline Products, Post Office Box 550, Putnam, Connecticut 06260
* Scott Air-Pak, Ltd, 2254 South Sheridan Way, Clarkson, Ontario, Canada
* Scott Aviation Corporation, Lancaster, New York 14086
U S Divers Co, 3323 West Warner Avenue, Santa Ana, California 92700
W W Sly Manufacturing Co, 4735 Train Avenue, Cleveland, Ohio 44102
Welsh Manufacturing Co, 9 Magnolia Street, Providence, Rhode Island 02909
** Willson Products Division, The Electric Storage Battery Co (formerly Willson Products Division, Roy-O-Vac Co, and Willson Products, Inc), P. O. Box 622, Reading, Pennsylvania 19603

TABLE 2 — TYPES OF RESPIRATORY PROTECTIVE EQUIPMENT

Table 2A — Air-Supplied Suit

Method of Operation	Air supply from supplied-air breathing apparatus. See Standard S1H on air-distribution system.
Use	Operating or repair work where there is exposure to substances that are irritating or corrosive to the skin and mucuous membranes, but where the atmosphere is not immediately dangerous to life.
Limitations	The wearing of an impervious suit for any extended period is extremely fatiguing and dangerous unless it is well ventilated. The suit must be impervious to the substance encountered.
Remarks	No U. S. Bureau of Mines approval. For additional information, see Fleming, A. J., D'Alonzo, C. A., and Zapp, J. A., "Modern Occupational Medicine," Chapter 7, "Protective Clothing for the Chemical Industry," Lea and Febiger, Philadelphia, 1960.
	A Ranque-Hilsch vortex tube worn as a portable refrigerator can satisfactorily cool compressed air for personnel wearing industrial protective clothing. The vortex tube is light and small, and can be strapped to the belt where it does not interfere with physical movement. The tube operates on 20-25 cfm of compressed air at 80 - 100 psi and delivers 15-18 cfm of air cooled 50-60 F below the inlet air temperature. The tube can be reversed and used as a heater.

* Approvals on currently available respiratory protective devices which have been granted by U. S. Bureau of Mines
** Approval given by U. S. Department of Agriculture for certain pesticides
1 Supply alarms described in 5.1.5

DU 040698

Table 28 – Atmosphere supplying Respirators

	Self-Contained Type		Supplied-Air Respirator				
	Recirculating	Demand Type	With Blower (Type A Supplied-Air Respirator)	Without Blower (Type B Supplied-Air Respirator)	Air-Line Respirator (Type C Supplied-Air Respirator)		
					Continuous Flow Air-Line Resp	Abrasive Blasting Resp	Demand Class Air-Line Resp
Method of operation	In Chemox exhaled water vapor reacts with a granular chemical to liberate O_2 in a canister. CO_2 also is removed. Purified breath is inhaled through breathing bag.	Air from 2000 psi cylinders supplied to facepiece. Breath exhaled to atmosphere.	Respirable air is forced through a large-diameter flexible hose by a hand blower to a full facepiece. (U. S. Bureau of Mines has schedule with electric motor on blower.)	Respirable air is drawn through a large flexible hose by wearer's breathing effort.	Pressurized air supplied through a small-diameter hose to half-mask facepiece, full facepiece, or a loose fitting helmet or hood.		Source of air attached by small hose to demand valve actuated by slight negative pressure when wearer inhales.
Use	Required under conditions immediately dangerous to life and distances over 200 ft from a source of respirable air. Protection for limited periods.		Up to 300 ft of travel from source of respirable air. Protection provided for an unlimited period.	Nonemergency work, up to 75 ft of travel from source of respirable air. Protection provided for an unlimited period.	Limits set by manufacturer for air supply hose length and range of air pressure. Protection for unlimited periods.	Desirable to protect head and face from flying particles (abrasive blasting, spraying of metals or paint).	
Limitations	No environmental limitation in regard to toxicity or on O_2 content. Absorption through the skin or skin irritations are possible limitations. Extensive training in use and care is required. Fatiguing due to weight.		No limitation in regard to toxicity or on oxygen content. Absorption through the skin or skin irritation are possible limitations. Worker must return to fresh air by retracing entry route. An uncontaminated supply of fresh air must be assured.	See limitations for Type A at left. Not for emergency work. Not approved in any situation where inhalation resistance exceeds 2.5 in. H_2O or where exhalation resistance exceeds 1 in. H_2O. Hose inlet shall be fitted with a fine (200) mesh SST screen, and shall be fastened in a zone of clean fresh air.	When used alone, this device is limited to concentrations of gases or vapors that are not immediately dangerous to life, or from which the wearer can escape unharmed without the aid of the respirator. Not to be worn in oxygen-deficient atmosphere. Travel is limited by the length of the air-supply hose. Route must be retraced. Absorption through the skin or skin irritation are possible limitations. Combination air-line respirator and self-contained breathing apparatus may be used in an irrespirable atmosphere. (See 5.1.3)	Bulky to wear	
Remarks	Chemox approved for either 30 min or 1 hr. Must be started in fresh air. Store at temperatures above freezing. Caution: Chemox canister is hot after use. For safe disposal of used canister, punch a ½ in. dia hole on each of 2 opposite sides and place in bucket of water until gas (O_2) evolution stops. The resulting solution is KOH. Do not get liquid on skin or clothing. Note: Other recirculating types approved up to 2 hr.	Bureau approved for 30 min only. Scott Air Pak is an example.	Blower must permit free entrance of air when it is not operating. Helper should be assigned with no other duties than to observe the man in the hazardous atmosphere, attend to the life line and, in emergency, operate the blower. A blower operator also should be provided. A body harness is required to handle the hose line and the life line, which always should be worn as a rescue device (see 7.3.2).	See remarks for Type A at left regarding helper and harness.	Nonkinkable hose should be used if operating pressure is greater than 5 psi (see 7.3.3).		
					Air-supply hose can be attached to the wearer and detached rapidly in an emergency. See Standard SIH on air-distribution system.	Air supplied to hood covering the whole head and sometimes the torso.	Helmets or hoods are not used with this respirator. See Standard SIH on air-distribution system.

CONFIDENTIAL
DUP 0960489
DUP 040699
JUN 1975
REV. JUL 1975

CONFIDENTIAL REV. ~~1961~~ June 1975 ~~1970~~ SUP. BY

TABLE 2C Air Purifying Respirators
(Not for use in oxygen-deficient atmospheres or where the contaminant is, or might be, immediately dangerous to life)

	Chemical-Filter Type			Mechanical-Filter Type Respirators	Combination Chemical and Mechanical Filter Respirators
	Canister Gas Mask	Chemical Cartridge Respirators	Self-Rescue (Mouthpiece) Respirators		
Method of operation	Toxic gases or vapors removed from inspired air by absorption, chemical reaction, or cartridge by the granular fill of the canister or cartridge. Exhaled breath goes to atmosphere.			Respirators remove particulate matter such as dust, fumes, or mist, from inspired air by capture on the filter, which is usually a fibrous pad.	Some gas mask canisters contain special filters which provide respiratory protection against particulate matter, as well as against gases and vapors. Some chemical cartridge respirators contain filters for the same purpose.
Use	Provides respiratory protection against single or combination of 2 or more gases and vapors.		For escape only. Provides greatest protection consistent with size of device.	Designed to provide respiratory protection against a single specific dust, fume, or mist, a single class such as toxic dusts or a combination of several classes of particulate matter such as dusts, fumes, and mists. It offers no protection against gases or vapors.	For particulate matter, gases and vapors in concentration within capacity of the device.
Limitations	See 4.2 to 4.4. Cannot be used in atmospheres irritating to the skin.			Practical limit of concentration is determined by time required to plug filter, but these respirators should not be used in high concentrations of particulate matter. Not to be used when flying particles may cause injury, for which condition the abrasive blasting respirator should be used. See Table 2B. Does not protect against oxygen deficiency and toxic vapors or gases.	The limitations of the combination are generally the same as for each type of respirator given on the left. The limitation of dust filters in regard to protection against gases and vapors in mechanical filter type is modified by the protection afforded by the chemical filter respirator against gases and vapors. See 4.2 to 4.4.
	See 4.2 to 4.4. Limited to use in atmospheres containing at least 16% oxygen and not more than 2% of most toxic gases (3% of ammonia).	See 4.2 to 4.4. Limited to concentrations not in excess of 1000 ppm by vol (0.1%) organic vapor in air and to atmospheres containing at least 16% by vol oxygen. Cannot be used in atmospheres irritating to the skin or eyes.			
Remarks	Canisters are color coded for identification.	See 7.3 5.	The only Bureau of Mines approved self-rescue type is MSA self-rescue for carbon monoxide.	See 7 3 6. U S Dept of Agriculture approves respiratory devices for certain insecticides. See 2.4.2. Fineness of the particles to be filtered out of the air controls the fineness of the filtering element, and nature of the toxicity hazard is a governing factor in selection of equipment.* U. S. Bureau of Mines approves mechanical filter respirators according to the following classification: (1) **Pneumoconiosis – Producing and Nuisance – Dust Respirators (2) ***Toxic – Dust Respirators (not significantly more toxic than lead) (3) ***Dust Respirators (not significantly more toxic than lead) (4) Fume Respirators (not significantly more toxic than lead)	

* Dust – Dispersoids or particulate matter, smaller than 100 microns, formed when solid materials are disintegrated by such processes as crushing, grinding, and abrading.
Fume – Solid dispersoids formed when vapors are condensed from heated metals and other substances.
Mists – Liquid dispersoids formed when liquid is disintegrated as in spray, coating, and atomizing.
** All approved under 3 and some under 4 are approved for 1 and 2.
*** Some approved under 4 are approved for protection of dusts that are not significantly more toxic than lead.

DUPONT

DUP 0960490

DU 040700

TABLE 3 — SELECTION OF RESPIRATORY PROTECTIVE DEVICE

Hazard	Respirator
Oxygen deficiency	Self contained breathing apparatus Hose mask with blower Combination air-line respirator and self-contained breathing apparatus
Gaseous contaminant	
Immediately dangerous to life (see 5.1.3)	Self-contained breathing apparatus Hose mask with blower Combination air-line respirator and self-contained breathing apparatus
Not immediately dangerous to life	Air-line respirator Hose mask without blower Chemical-cartridge respirator
Particulate contaminant	
Immediately dangerous to life (see 5.1.3)	Self-contained breathing apparatus Hose mask with blower Combination air-line respirator and self-contained breathing apparatus
Not immediately dangerous to life	Mechanical filter respirator Air-line respirator Abrasive-blasting respirator Hose mask without blower
Combination gaseous and particulated contaminant	
Immediately dangerous to life (see 5.1.3)	Self-contained breathing apparatus Hose mask with blower Combination air-line respirator and self-contained breathing apparatus
Not immediately dangerous to life	Air-line respirator Hose mask without blower Combination chemical and mechanical filter respirators

Note: The self-contained breathing apparatus, combination air-line respirator and self-contained breathing apparatus, and hose mask with blower would give respiratory protection against any of the hazards listed, but these devices are not included in the list of respirators that could be used in the less hazardous situations.

REV. OCT 1970 SUP. BY _____

CONFIDENTIAL