

OFFICE MEMO

BROWN & ROOT, INC.

TO: Safety Supervisors
FROM: Fred J. Salmon
SUBJECT: Respiratory Protection

DATE: January 14, 1976

The attached guidelines are for you to use in complying with the OSHA standards in recordkeeping and maintaining of its respiratory protection.

If you have any questions regarding this, please call Carl D. Richardson at (713) 676-3781.


Fred J. Salmon, Manager
Safety Department

FJS:bg

Attachment

PLAINTIFF'S
EXHIBIT
B&R-55

JAN 21 1976

BROWN & ROOT, INC.

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RESPIRATORY PROTECTION PROGRAM

I. PURPOSE

- A. This program provides the procedures for proper selection, use and care of respiratory equipment. The adherence to this program will provide maximum protection to the employee and will meet the respiratory protection requirements of the Occupational Safety and Health Act of 1971.
- B. This program shall not be used as a substitute for generally accepted engineering control measures against air contaminants.

II. GENERAL

- A. Respirators shall be worn at all times where work is necessary in contaminated or oxygen deficient areas.
- B. The employee shall use the provided respiratory protection in accordance with instructions and training received.
- C. Persons shall not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work when utilizing the equipment. Brown & Root's pre-employment physical will give sufficient information to make this evaluation.

III. APPROVED RESPIRATORS

- A. In order to assure the maximum amount of respiratory protection, NIOSH/MESA certified respirators shall be used. (Appendix A)

- B. Certified respirators shall only be used for the purpose for which they were originally intended and shall not be modified in any way.
- C. Respirators purchased on or before September 30, 1974 and meeting the Bureau of Mines Schedules are approved for use until the following dates:

<u>TYPE OF RESPIRATOR</u>	<u>TERMINAL USE DATE</u>
SELF-CONTAINED	March 31, 1979
GAS MASK	March 31, 1977
SUPPLIED AIR	March 31, 1980
DUST, FUMES, MIST	March 31, 1976
CHEMICAL CARTRIDGE	March 31, 1976

- D. Respirators purchased after June 30, 1975, shall meet the requirements of Chapter I, Title 30, Code of Federal Regulations Part II (Appendix A).
- E. A general listing of the several types of respiratory protective equipment along with methods of operation, use and limitations is given in Table I.

IV. USE AND LIMITATIONS

- A. The air-purifying respirators (Table 1c) shall not be used for rescue work, or for emergency work of any nature. Reasons for this requirement are that:
1. These respirators do not supply oxygen and therefore do not protect against possible oxygen deficiencies.
 2. Gas masks are intended for use with no more than 2% by volume of most toxic gases.

3. Chemical cartridges respirators are intended for use in a toxic gas range having from 0.05 per cent to 0.1 per cent maximum.

B. Canisters and cartridges shall be specifically selected for the toxic gas and concentration to be encountered. Canister masks that bear the label "All-Service", "All-Purpose", "Universal" or similar notations shall not be used. Refer to Table 3 for gas canister coding and selection.

V. SELECTION

A. In selecting a respirator, the following factors shall be considered:

1. Nature of the hazard.
2. Extent of the hazard.
3. Contaminant(s) present.
4. Concentration of the contaminant(s)
5. Characteristics and limitations of the available respirators.
6. Expected activity of the worker.

B. Tables 1 & 2 shall be considered in selecting a respirator.

C. Units rated for at least 30-minutes service time shall be used for entry into an irrespirable atmospheres.

D. Fifteen-minute units shall be used only for emergency egress and not for rescue work or re-entry.

E. Only the following respiratory protective apparatus shall be used in oxygen-deficient atmospheres or where the contaminant is, or might be immediately dangerous to life:

1. Self-contained breathing apparatus
2. Combination air-line respirator and self-contained breathing apparatus, or
3. Hose mask with blower.

- F. Self-contained breathing apparatus shall have a "remaining service-life" indicator or warning for compressed breathing air (except for self rescue).
- G. When the device is a combination self-contained breathing apparatus and air-line respirator, either a manual or automatic valve shall be provided to change to the self-contained air supply if the air line supply fails.
- H. All employee's in areas where the contaminant levels are expected to be higher than the level designated for an air-purify respirator, will be provided with an air-line respirator.

VI. PRECAUTIONS

- A. Some precautions are given in Table I under "Limitations".
An extensive list of instructions in use and precautions for each type of respirator is given in ANSI Z88.2, Practices for Respiratory Protection.
- B. An effective seal between the facepiece and face to prevent inward leakage must be obtained. Air-purifying respirators along with demand-type respirators operate under negative pressure when the wearer inhales, thus some inward leakage of contaminant may be possible.
- C. If the temple bars of eye glasses extend through the sealing edge of full-face masks, a proper seal cannot be obtained.
 - 1. 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.

2. The wearer's use of spectacles or goggles should not interfere with a half-mask facepiece. .

- D. A heavy beard or sideburn may interfere with obtaining a proper seal. Where the use of respirators is required, restrictions on facial hair shall be established.
- E. Respirators usually provide a satisfactory pathway for speech transmission over short distances in relatively quiet areas. An alternate form of communication between workers shall be established where respirators are used in noisy areas.
- F. To prevent face pieces from fogging up in low temperatures, anti-fog compounds should be used to coat the inside of the eyepiece.
- G. Hoses for air supply should be selected to resist chemicals to which they may be exposed.
- H. Pure oxygen shall not be used in supplied-air respirators.
- I. Although self-contained breathing apparatus have no concentration limit, many toxic gases & vapors are flammable. Working in or near the flammable range of a gas or vapor is prohibited. Brown & Root, Inc. Hazardous Tank Entry procedures shall be observed.

VII. RESPIRATOR CARE

- A. A centralized maintenance, cleaning and storage station shall be used to care for respiratory protective equipment.
- B. Procedures applicable to all respirators:

1. INSPECTION:

- a) All air-purifying respirators in use shall be inspected and recorded on a weekly basis (Form A).
- b) Self-contained breathing apparatus shall be inspected and recorded monthly. This is to be done before each use and during periods of storage.

2. MAINTENANCE:

- a) When replacing worn or deteriorated parts, only those made specifically for the device shall be used; and the repair work shall be recorded (Form A).
- b) A record should be kept on maintenance of air-purifying filters including dates of filter media replacement (Form B).

3. CLEANING AND DISINFECTING:

- a) Respirators issued for the exclusive use of one worker should be cleaned after each day's use, or more often if necessary. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use.

4. STORAGE

- a) Respirators shall be stored in a convenient, clean, and sanitary location; preferably the carton in which it came in or protective plastic bags.

C. Special procedures for maintaining, cleaning, disinfecting and storing respirators:

1. Self-contained breathing apparatus

Cylinder pressure should be checked at least monthly and brought to rated pressure if necessary. SCBA shall be recharged after each use.

2. Hose masks

Check the blower at least monthly for proper operation. Check hose wear and tear after each use and steam clean when necessary. Keep hose capped when not in use to prevent entrance of contaminants.

3. Air-line respirators

The complete system should be checked after each use.

4. Self-rescuers

Frequent inspection is the most important phase of the maintenance program with this type of equipment, for it must always be ready even though seldom used.

5. Chemical cartridge respirators

Cartridges shall be changed when the wearer detects an odor or the irritating effect of the contaminant. Where the expected contaminant has no odor or irritating effect, (e.g. carbon monoxide) a new cartridge shall be installed in the respirator at the start of each day of use. In most cases the wearer is responsible for discarding and replacing cartridges in his respirator. Respirators issued to

individuals should be marked with the individuals name or badge number.

6. Mechanical filter respirators

Filters of the "throw-away" type should be discarded when the breathing resistance becomes bothersome to the wearer. Some mechanical filter respirators use recleanable filters, in which case the filters are cleaned at the same time the respirator is being serviced.

VIII. TRAINING

- A. The worker shall be instructed and trained in the proper use of respirators and their limitations. For safe use of any respirator, it is essential that the worker be properly instructed in its selection, use and maintenance.
- B. Every respirator wearer shall receive fitting instructions including demonstrations and practice in how the respirator shall be worn and how to determine if it fits properly.
- C. A record of this training shall be kept in the "safety meeting log" file.

IX. AIR QUALITY

- A. Air supply and air compressors for abrasive-blasting respirators
 - 1. Air supply shall be free of harmful quantities of dust, mists or noxious gases (Table 4).
 - 2. The air from the regular compressed air line of the plant or compressor units may be used for the

abrasive-blasting respirator if:

- a) A trap and carbon filter is installed that will remove oil, water, particulates and odor and is regularly maintained. A record of the maintenance of these filters should be kept (Form B).
- b) A pressure reducing diaphragm or valve is installed to reduce the pressure to requirements of the particular type of abrasive blasting respirator.
- c) An automatic control is provided to either sound an alarm or shut down the compressor in case of overheating.
- d) Periodic checks should be made to determine if low amounts of carbon monoxide is being emitted to the worker. (CO tubes and/or CO badges could be utilized here)

B. Air supply and air compressors for other air supplied respirators

- 1. Air supply shall be free of harmful quantities of contaminants (Table 4).
- 2. Compressed oxygen shall not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen must never be used with air-line respirators.

3. Breathing air may be supplied to respirators from cylinders or air compressors.
4. The compressor that is supplying the air shall be equipped with necessary safety and standby devices. A breathing-air type compressor shall be used. Compressors shall be constructed and situated so as to avoid entry of contaminated air into the system. Suitable in-line air purifying sorbent beds and filters shall be installed to further assure breathing air quality. A receiver of sufficient capacity shall be installed in the system enabling the respirator wearer to escape from a contaminated atmosphere in the event of compressor failure. An alarm shall also be installed to indicate imminent compressor failure and/or over-heating. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm to insure that the air supply meets the specifications in Table 4.
5. Caution shall be taken when connecting to plant air line systems with an inert gas back up system (e.g. Nitrogen). If this is the case, then the plant compressed air system shall not be used for breathing or for the ventilation of confined spaces.

C. Air receivers

1. General requirements

- a) Application. This sub-section applies to compressed air receivers, and other equipment

used in providing and utilizing compressed air for performing operations such as cleaning, drilling, hoisting, and chipping. However, it will not deal with the special problems created by using compressed air to convey materials nor the problems created when men work in compressed air such as tunnels and caissons. Further, this sub-section is not intended to apply to compressed air machinery and equipment used on transportation vehicles such as steam railroad cars, electric railway cars, and automotive equipment.

b) New and existing equipment

(i) All new air receivers installed after the effective date of these regulations shall be constructed in accordance with the 1968 edition of the A.S.M.E. Boiler and Pressure Vessel Code Section VIII.

(ii) All safety valves used shall be constructed, installed, and maintained in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII Edition 1968.

2. Installation and equipment requirements

a) Installation. Air receivers shall be so installed that all drains, handholes and manholes therein are easily accessible. Air receivers should be supported with sufficient clearance

to permit a complete external inspection and to avoid corrosion of external surfaces. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place. The receiver should be located as close to the compressor or aftercooler as is possible in order to keep the discharge pipe short.

b) Drains and traps

A drain pipe and valve shall be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water. Adequate automatic traps may be installed in addition to drain valves. The drain valve on the air receiver shall be opened frequently in order that the air receiver can be completely drained to prevent the accumulation of excessive amounts of liquid in the receiver.

c) Gages and valves

(i) Every air receiver shall be equipped with an indicating pressure gage readily visible and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by no more than 10 percent.

(ii) No valve of any type shall be placed between the air receiver and its safety valves.

(iii) Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located, and installed so that they cannot be readily rendered inoperative by any means, including the elements.

(iv) All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.

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RESPIRATORY PROTECTION PROGRAM FOR
SANDBLASTING OPERATIONS

- A. Only certified respiratory protective equipment shall be used for protection of personnel against dust produced during abrasive-blasting operations. (Appendix A)
- B. Abrasive-blasting respirators shall be worn by all abrasive- blasting operators:
 - 1. When working inside of blast-clean rooms,
 - 2. When using silica sand in manual blasting operations where the nozzle and blast are not physically separated from the operator in an exhaust ventilated enclosure,
 - 3. Where concentrations of toxic dust dispersed by the abrasive blasting may exceed the limits set in paragraph 1919.93 OSHA and the nozzle and blast are not physically separated from the operator in an exhaust-ventilated enclosure.
- C. Particulate filter respirators, commonly referred to as dust-filter respirators, properly fitted, may be used for short, intermittent, or occasional dust exposure such as clean-up, dumping of dust collectors, or unloading shipments of sand at a receiving point, when it is not feasible to control the dust by enclosure, exhaust ventilation, or other means. Respirators used shall be certified for protection against the specific type of dust.
 - 1. Dust-filter respirators may be used to protect the operator of outside abrasive-blasting operations where non-silica

abrasives are used on materials having low toxicities.

2. Dust-filter respirators shall not be used for continuous protection where silica sand is used as the blasting abrasive, or toxic materials are blasted.

D. Operators shall be equipped with heavy canvas or leather gloves and aprons or equivalent protection to protect them from the impact of abrasives. Safety shoes shall be worn to protect against foot injury where heavy pieces or work are handled.

1. Equipment for the protection of the eyes and face shall be supplied to the operator when the respirator design does not provide such protection and to any other personnel working in the vicinity of abrasive-blasting operations.

E. Air supply and Air Compressors.

Refer to part IX Air Quality.

F. Respirator care shall be same as set forth in part VII.

G. Training shall be same as set forth in part VIII.

H. All sandblasting areas shall be so designated by barricades and signs stating it is a danger area and that respiratory and hearing protection must be worn by all employees.

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RESPIRATORY PROTECTION PROGRAM FOR
WELDING OPERATIONS

A. General welding, cutting, and heating

1. Welding, cutting and heating, not involving confined spaces or metals of toxic significance may normally be done without mechanical ventilation or respiratory protective equipment. But where, because of unusual physical or atmosphere conditions, an unsafe accumulation of contaminants exist, suitable mechanical ventilation or respiratory protective equipment shall be provided and used.
2. Employees performing any type of welding, cutting or heating shall be protected by suitable eye protective equipment.

B. Welding, cutting and heating in confined spaces

1. General mechanical or local exhaust ventilation shall be provided wherever welding, cutting or heating is performed in a confined space.
2. When sufficient ventilation cannot be obtained without blocking the means of access, employees in the confined space shall be protected by air line respirators. (Note Section IX for Air Quality). An employee on the outside shall be assigned to maintain communications with those working within it and to aid them in an emergency.

C. Welding, cutting or heating of metals of toxic significance

1. Welding, cutting or heating in any enclosed spaces involving

the metals specified below shall be performed with either general mechanical or local exhaust ventilation.

- a) Zinc-bearing base or filler materials or metals coated with zinc-bearing materials.
- b) Lead base metals.
- c) Cadmium-bearing filler materials
- d) Chromium-bearing metals or metals coated with chromium-bearing metals.

2. Welding, cutting or heating in any enclosed spaces involving the metals specified below shall be performed with local exhaust ventilation or employees shall be protected by air-line respirators.

- a) Metals containing lead, other than as an impurity, or metals coated with lead-bearing materials.
- b) Cadmium-bearing or cadmium coated base metals
- c) Metals coated with mercury-bearing metals
- d) Beryllium-containing base or filler metals. Because of its high toxicity, work involving beryllium shall be done with both local exhaust ventilation and air-line respirators.

3. Welding, cutting or heating of metals of toxic significance in the open air shall be protected by filter-type respirators. Such operations on beryllium in the open air shall have air-line respiratory protection available.

4. Other employees exposed to the same atmosphere as the welders or burners shall be protected in the same manner as the welder or burner.

D. Inert-gas metal-arc welding

1. Inert-gas metal-arc welding processes involve the production of ultraviolet radiation of intensities of 5 to 30 times that produced during shielded metal-arc welding. These ultraviolet rays decompose chlorinated solvents and liberate toxic fumes and gases. The use of chlorinated solvents shall be kept at least 200 feet, unless shielded, from the exposed arc, and surfaces prepared with chlorinated solvents shall be thoroughly dry before welding is permitted on such surfaces.
2. When inert-gas metal-arc welding is being performed on stainless steel the requirements of section C-2 of this program shall be met to protect against dangerous concentrations of nitrogen dioxide.

E. Welding, cutting and heating in way of preservative coatings

1. Before welding, cutting or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made to determine its flammability.
2. Protection against toxic preservative coatings.
 - a) In enclosed spaces, all surfaces covered with toxic preservatives shall be stripped of all toxic coatings for a distance of at least four inches from the area of heat application, or the employee shall be protected by air-line respirators.
 - b) In open air, employees shall be protected by a respirator.

F. Respirator care and training - (Note Sections XII & XIII in the General Respiratory Protection Program)

BROWN & ROOT, INC.
RESPIRATORY PROTECTION PROGRAM FOR
SPRAY PAINTING OPERATIONS

- A. When health hazardous substances used in spray coating are in a combination of particulate matter and gases or vapors, the respiratory protector shall contain both a mechanical filter and an absorbent or adsorbent.
 - 1. All employees spray painting in areas where the contaminant concentrations are expected to be extremely high, shall be provided with an air-line respirator or a fresh air hood.
 - 2. Any employee who enters or works in a spray painting area shall wear appropriate respiratory protection.
- B. Spray booths - should comply with Federal Register 1910.107 (b) regulations.
- C. Respiratory protection shall be maintained in a sanitary condition. The filtering and the absorbent or adsorbent materials shall be changed as often as necessary to provide the wearer with adequate protection.
- D. Where spraying is done in room booths, in open shops, or in the open, the employer should provide non drying oil or grease for the workers for the purpose of anointing exposed parts of the body during spraying operations.
- E. The health of persons doing spray coating may be injured by inhaling such substances as lead; poisonous solvents, especially benzol; or finely divided siliceous materials. To render complete protection

to spray operators from these hazards they should be given a thorough physical examination to determine if this type of work would hamper the workers health or if the worker can or cannot wear respiratory equipment.

- F. Care, training and air quality refer to The General Respiratory Protection Program, sections XII, XIII, IX respectively.

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TABLE I - A

METHOD OF OPERATION, USE, AND LIMITATIONS OF
SELF - CONTAINED TYPE RESPIRATORS

	Recirculating	Demand Type	Pressure Demand Type
Method of Operation	Exhaled water vapor reacts with chemical releasing O ₂ and removing CO ₂ . The wearer inhales through a breathing bag.	Air from high pressure cylinders supplied to facepiece only on inhalation. Breath exhaled to atmosphere.	Air from high pressure cylinders supplied to face piece on inhalation and maintains a positive pressure in the facepiece.
Use	Not approved for use on job sites.	Under conditions <u>not</u> immediately dangerous to life because it is apt to permit inward leakage of contaminants.	Required under conditions immediately dangerous to life.
Limitations	Not approved for use on job sites.	Danger of inward leakage of contaminant into facepiece. Heavy and cumbersome.	No contaminant or O ₂ deficiency limitations. Heavy and cumbersome.

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TABLE I - B

METHOD OF OPERATION, USE, AND LIMITATIONS OF
SUPPLIED - AIR TYPE RESPIRATORS

	Air Supplied Suit	With Blower Type A Supplied Air Resp.	Without Blower Type B Supplied Air Resp.
Method of Operation	A form of continuous air line respirator.	Air is supplied by a motor-driven or hand- operated blower.	The wearer provides motivating force to pull air through the hose.
Use	For work where there is exposure to sub- stances that are ir- ritating or corrosive to the skin but where the atmosphere is not immediately dangerous to life.	Use in atmospheres im- mediately dangerous to life or health is per- missible. Up to 300 feet of hose length permitted.	Non-emergency work with protection provided for an unlimited period. Up to 75 feet of travel from air source.
Limitations	Certain contaminants react with the suit materials causing problems. Fatiguing and dangerous unless it is well ventilated.	If the blower fails, the unit still provides protection, although a negative pressure exists in the face- piece during inhalation.	Limited to use in atmospheres from which the wearer can escape unharmed without the aid of the respirator.

TABLE I - B

METHOD OF OPERATION, USE, AND LIMITATIONS OF

SUPPLIED AIR RESPIRATORS (CONTINUED)

Air Line Respirator (Type C Supplied Air Respirators)

	Continuous Flow	Demand Class	Pressure Demand	Abrasive Blasting
Method of Operation	Respirable air is supplied through a small-diameter air-line from a compressor or compressed air cylinders.	Pressurized air supply to half-mask or full facepiece. The demand valve permits flow of air only during inhalation.	Pressurized supply of respirable air to half-mask or full facepiece. A positive pressure is maintained in the facepiece at all times.	Pressurized air supplied through a small diameter hose at about six cubic feet per minute to a loose-fitting hood & helmets
Use	With a half-mask or full facepiece, a steady flow of air is supplied to the work causing a positive pressure within the facepiece.	Use is limited to concentrations of gases or vapors that are not immediately dangerous to life, and is not to be worn in O ₂ deficient atmospheres.	For maximum protection from contaminants in the atmosphere for it is apt to have less leakage in the facepiece.	Desirable to protect head and face from flying particles and supply particulate free air to the worker.
Limitations	Not to be used in atmospheres immediately dangerous to life except under certain conditions of precaution; a small emergency unit worn on the worker.	Not to be used in irrespirable atmospheres for when wearer inhales, a slight negative pressure develops in the face piece possibly drawing contaminated air through leaks.	Can be used in atmospheres immediately dangerous to life if an emergency unit is worn by the wearer.	Bulky to wear. To be used only in atmospheres not immediately hazardous to life.

TABLE 1 - C

METHOD OF OPERATION, USE, AND LIMITATIONS OF

AIR PURIFYING TYPE RESPIRATORS

Chemical Filter Type

	Canister Gas Mask (Full Facepiece Respirator)	Chemical Cartridge Resp. (Half Mask Resp.)	Self - Rescue Mouthpiece Resp.
Method of	Packed sorbent beds removes toxic gases and vapors by absorption, adsorption, chemical reaction or catalysis or a combination of these methods.	Toxic gases and vapors removed by absorption, adsorption, chemical reaction or catalysis or a combination of these. Equipped with one or more cartridges and exhalation & inhalation valves.	A compact device designed for quick application when unexpected concentrations of contaminants are present. Nose clip supplied with unit.
Use	Provides protection against a gas, or vapor or a combination of gases or vapors. The service life is approximately proportional to the canister size. Color coding for particular canisters to use can be seen in table 3. Provides some eye protection.	Provides respiratory protection against single or combination of 2 or more gases and vapors.	For escape only.
Limitations	Should avoid use in atmospheres immediately hazardous to life. Limited to the maximum gas concentration for which the specific canister is recommended (generally 2% maximum).	Shall not be used in atmospheres immediately dangerous to life and limited to low concentrations of gases & vapors. (Generally 0.1% maximum) Cannot be used in atmospheres irritating to skin or eyes.	Mouth breathing with nose clip prevents detection of contaminant by odor. No eye protection provided.

TABLE I - C

METHOD OF OPERATION, USE, AND LIMITATIONS OF
AIR PURIFYING RESPIRATORS (CONTINUED)

	Mechanical - Filter Type Respirators	Combination Chemical and Mechanical Filter Respirators
Method of Operation	Filter media in pads, cartridges or canisters removes dust, fog, fume, mist, smoke or spray particles. Filters may be replaceable or a permanent single use type.	Canisters and cartridges contain both filters and sorbents to provide protection against both particulates and gases and vapors. Some filters attach to a sorbent cartridge as a pre-filter (paint spray operations).
Use	Filters are designed to remove a single type of particulate or classes of particles. It offers no protection against gases or vapors.	For use against particulate matter, gases and vapors in concentration within capacity of device. Filter shall be replaced or cleaned when breathing becomes difficult due to the filter plugging.
Limitations	Protects against non-volatile particles only. Not to be used in high concentrations of particulate matter. Not to be used as a substitute for abrasive blasting respirator units.	The advantages and disadvantages of the component parts of the combination respirator as described under each type will apply here.

TABLE 2

Guide for the Selection of Respirators	
Hazard	Respirator
OXYGEN DEFICIENCY	Self-contained breathing apparatus. Hose mask with blower. Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
GAS AND VAPOR CONTAMINANTS Immediately dangerous to life or health. Not immediately dangerous to life or health.	Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with chemical canister (gas mask). Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm. Air-line respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge.
PARTICULATE CONTAMINANTS Immediately dangerous to life or health. Not immediately dangerous to life or health.	Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with appropriate filter. Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm. Air-purifying, half-mask or mouthpiece with filter pad or cartridge. Air-line respirator. Air-line abrasive-blasting respirator. Hose mask without blower.
COMBINATION GAS, VAPOR, AND PARTICULATE CONTAMINANTS Immediately dangerous to life or health. Not immediately dangerous to life or health.	Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with chemical canister and appropriate filter (gas mask with filter). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm. Air-line respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge and appropriate filter.

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TABLE 3

Color Code for Gas-Mask Canisters (ANSI K13.1 - 1967)

Atmospheric Contaminants to be Protected Against	Colors Assigned*
Acid gases	White
Hydrocyanic acid gas	White with 4-inch <u>green</u> stripe completely around the canister near the bottom.
Chlorine gas	White with 4-inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black
Ammonia gas	Green
Acid gases & ammonia gas	Green with 4-inch <u>white</u> stripe completely around the canister near the bottom.
Carbon monoxide	Blue
Acid gases & organic vapors	Yellow with 4-inch <u>blue</u> stripe completely around the canister near the bottom.
Acid gases, organic vapors, and ammonia gases	Brown
Radioactive materials, excepting tritium and noble gases	Purple (Magenta)
Particulates (dusts, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors.	Canister color for contaminant, as designated above, with 4-inch <u>gray</u> stripe completely around the canister near the top.
All of the above atmospheric contaminants	Red with 4-inch <u>gray</u> stripe completely around the canister near the top.

*Gray shall not be assigned as the main color for a canister designed to remove acids or vapors.

NOTE: Orange shall be used as a complete body, or stripe color to represent gases not included in this table. The user will need to refer to the canister label to determine the degree of protection the canister will afford.

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TABLE 4

BREATHING AIR QUALITY

Gas	Content Analysis
O ₂	19 percent min. to 23 percent max.
CO	20 ppm max.
CO ₂	1.0 ppm max
Hydrocarbons	0.020 mg/liter max (as condensables)
H ₂ O	Dew point less than the lowest probable temperature to be encountered
N ₂	Balance
Odor	Free of all objectionable odors

APPENDIX A

This listing of NIOSH/MESA certified respirators is cumulative as of January 24, 1975, cumulative supplements to this list will be added as they are published by NIOSH.

BROWN & ROOT, INC.

SUB PART A-1

NIOSH/MESA CERTIFIED SELF-CONTAINEDBREATHING APPARATUS BY CLASSIFICATION

OF RESPIRATOR TYPES

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(S)	COMPONENT PARTS NUMBERS AND DESCRIPTION
COMPRESSED AIR DEMAND TYPE <u>ESCAPE ONLY</u>	TC-13F-52	Mine Safety Appliances Co. (5 min. unit)	457156	96680, facepiece 96065, breathing tube assembly 455943, cylinder & valve assembly. 456041, regulator 460744, carrier assembly. 96671, nose cup
	TC-13F-55	Mine Safety Appliances Co. (5 min. unit)	76753	76760, breathing tube mouthpiece assembly. 77140, cylinder & regulator assembly. 460743, carrier assembly.
	TC-13F-35	Surviv Air Div., U.S. Divers Co. (15 min. unit)	9065-03 9865-03	9421-49 or 9423-49 facepiece & regulator assembly. 9158-01 cylinder assembly. 9456-00, canvas sack
	TC-13F-36	Surviv Air Div., U.S. Divers Co. (5 min. unit)	9069-02, 9069-11 9869-02, 9869-11	9421-49 or 9423-49 facepiece & regulator assembly. 9155-32, cylinder assembly 9375-60 case assembly.
	TC-13F-28	Lear Siegler, Inc.	202000	202090, storage case 202016, compressed- air container. 202070, face mask & exhalation valve system.
OXYGEN GENERATING <u>ESCAPE ONLY</u>	TC-13F-31	Lockheed Missiles & Space Co. (60 min. unit)	553717-501	553517-501, respirator assembly
	TC-13F-37	Mine Safety Appliance Co. (10 min. unit)	APR894-91	APR894-91 respirator assembly.

BROWN & ROOT, INC.

SUB PART A-1 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
COMPRESSED AIR DEMAND TYPE	TC-13F-43	Globe Safety Products Inc. (30 min.unit)	2540-W 1540-B 2550-W 2550-B	2221-3 Facepiece, breathing tube and quick connect a-sy. 2489-2 high pressure hose, regulator & demand valve assy. 1058-18 cylinder & valve assembly. 2644-1 back pack and harness assembly.
	TC-13F-46	Mine Safety Appliances Co. (15 min.unit)	457150, 95061, 457151, 95068	96680 or 95940 face- piece. 96065 breathing tube assembly. 9456104 cylinder & valve assembly. 9456066 support assy. 460255 regulator assy.
	TC-13F-29	Mine Safety Appliances Co. (30 min.unit)	457153, 457154, 95066, 96363	96680 or 95940 face- piece. 449267 breathing tube assembly. 94007 or 96337 cylinder valve assembly. 931184 harness 449911 regulator assy.
	TC-13F-50	NASA (30 min.unit)	27275-00	27234-00, facepiece assembly. 27240-00 frame and harness assembly. 27235-00, regulator assembly. 27237-00, pressure reducer assembly. 1630-72-14, cylinder assembly.
	TC-13F-51	NASA (45 min.unit)	27275-01	27234-00 facepiece assy. 27240-00 frame & harness assembly. 27235-00 regulator assy. 27237-00 pressure re- ducer assembly. 1269367-1 cylinder assy.

BROWN & ROOT, INC.

SUB PART A-1 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
COMPRESSED AIR DEMAND TYPE (CONTINUED)	TC-13F-41	Scott Aviation (15 min.unit)	90000-200	800110-02 harness assy. 800010-01 cylinder & valve assembly. 800013-00 regulator assembly. 800029-01 hose coupling assembly. 801450-13 facepiece & tube assembly.
	TC-13F-39	Scott Aviation (30 min.unit)	900000-00	800020-04 harness & backplate assembly 800013-00 regulator assembly. 800010-00 or 8000-10-10 cylinder and valve assembly. 800029-00 hose coupling assembly. 801450-13 facepiece & tube assembly.
	TC-13F-44	Surviv Air Div. U.S. Divers (30 min.unit)	9038-00, 9038-02, 9838-00, 9838-02,	9411-12 or 9413-20 facepiece 9118-00 regulator 9602-47 low pressure 9151-45, cylinder & valve assembly. 9457-00 back pack assy.
	TC-13F-45	Surviv Air Div. U.S.Divers Co. (30 min.unit)	9038-20 9038-22 9838-20 9838-22	9411-60 or 9413-60 facepiece 9118-01 regulator 9602-47 low pressure 9151-45 cylinder & valve assembly. 9457-00 back pack assembly
COMPRESSED AIR PRESSURE-DEMAND TYPE	TC-13F-47	Mine Safety Appliances Co. (15 min. unit)	95063 460262	96057 facepiece 96065 breathing tube assembly. 456104 cylinder and valve assy. 456066 support assy. 460256 regulator assy.

BROWN & ROOT, INC.

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SUB PART A-1 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
COMPRESSED AIR PRESSURE-DEMAND TYPE (CONTINUED)	TC-13F-30	Mine Safety Appliances Co. (30 min.unit)	95069, 96338	96057, facepiece 449267, breathing tube assembly. 94007 or 06337 cylinder and valve assy. 93184 harness 449910 regulator assy.
	TC-13F-42	Scott Aviation (15 min. unit)	900015-00	800110-02 harness assy. 8000010-01 cylinder & valve assembly. 800212-00 or 800212-03 regulator assy. 800029-01 hose coupling assembly. 801500-15 facepiece & tube assembly.
	TC-13F40	Scott Aviation (30 min.unit)	900014-00	800020-04 harness & backplate assembly. 800010-00 or 80000-10 cylinder & valve assy. 800212-00 or 800212-0 regulator assy. 800029-00 hose coupling assembly. 801500-15 facepiece and tube assembly.
	TC-13F-27	BioMarine Industries Inc. (45 min.unit)	BG-174A	M174A/3 mask & hose B174A/3 harness & frame assembly. C174A/3 cylinder & valve. 9/13-28 Co2. canister
COMPRESSED OXYGEN UNITS	TC-13F-38	Dragerwerk, AG (3 hour unit)	BG-174A	M174A/3 mask & hoses B174A/3 harness & frame C174A/3 cylinder & valve 9X18-28 CO ₂ canister
LIQUID OXYGEN UNITS	TC-13F-32	Siebe Gorman Ltd. (3 hour unit)	013831.04 059994.11	032275.00 facepiece assy. 059994.10 harness assy. 05994.11 evaporator sorbent canister & breathing bag assy. 032282.01 timer assy. 029697.01 Sorbent (PROTOSORB)

BROWN & ROOT, INC.

SUB PART A-1 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(S)	COMPONENT PARTS NUMBERS AND DESCRIPTION
COMBINATION COMPRESSED AIR FOR <u>ESCAPE ONLY</u> AND PRESSURE- DEMAND TYPE C AIR LINE RESPIRATOR	TC-13F-56	Mine Safety Appliances Co. (10 min. escape unit) Hose Length Range 25 - 300 ft. Pressure Range 70 - 90 Psi	96395 455994	455862 or 455995 face- piece. 460623 breathing tube assembly. 454081 cylinder & valve assembly. 460673 regulator- connector and pressure switch assembly. 455847 harness. 455011 and/or 455022 air-supply hose.
	TC-13F-48	Scott Aviation (3 or 5 min. escape unit) Hose Length Range 25 - 300 ft. Pressure Range 350 - 450 Psi	900006	801450-13 facepiece assembly and breathing tube assembly. 802157-00 hose & coupling assy. 800013-01 regulator assembly. 22034-01 or 22034-02/03 harness & cylinder assy. 22025-01 coupling hose assembly. 15319/6141 air-supply hose. (Below 32°F., add 801432- 00, nosecup assy. to the above)
	TC-13F-49	Scott Aviation (3 or 5 min escape unit) Hose Length Range 25 - 300 ft. Pressure Range 350 - 450 Psi	900007	801500-15 facepiece assembly. 802157-00 breathing tube assembly. 800212-01 regulator assy. 22034-01 or 22034-02/03 harness & cylinder assy. 22025-01 coupling hose assembly. 15318/6141 air-supply hose. (Below 32°F., add 801432-00 nosecup assy. to the above)

BROWN & ROOT, INC.

SUB PART A-1 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
COMBINATION COMPRESSED AIR FOR <u>ESCAPE ONLY</u> AND PRESSURE- DEMAND TYPE C AIR LINE RESPIRATOR (continued)	TC-13F-33	SurvivAir Div. U.S. Divers Co. (5 min.unit)	9081-12 9881-12	940-05 or 9424-05 facepiece & regulator assembly. 9661-20 regulator assembly. 9115-22 cylinder assy. 9340-41 through 50, 9304 through 73 or 93 -85 air line hose.
	TC-13F-34	Surviv Air Div. U.S. Divers Co. (5 min.unit)	9081-12 9881-12	9404-05 or 9424-05 facepiece & regulator assembly. 9661-20 regulator assy. 9155-22 cylinder assy. 9304-11 through 20, 9304 or 9304-80 through 83 air-line hose.
	TC-13F-53	Surviv Air Div U. S. Divers Co. Hose Length Range 4 - 250 feet Pressure Range 50 - 125 Psi	9081-13 9881-13 (Foster Couplings)	9425-23 or 9405-23 facepiece & regulator assembly. 9155-36 cylinder assy. 9304-11, 9304-12, 9304-13, 9304-14, 9304-15, 9304-16, 9304-17, 9304-18, 9304-19, 9304-20, 9304-68, 9304-80, 9304-81, 8304-82, or 9304-83 air line hose.
	TC-13F-54	Surviv Air Div U.S.Divers Co. Hose Length Range 4 - 250 feet Pressure Range 50 - 125 Psi	9081-15 9881-15 (Schrader Coupling)	9425-24 or 9405-24, facepiece & regulator assembly. 9155-35, cylinder assembly. 9304-41, 9304-42, 9304-43, 9304-44, 9304-45, 9304-46, 9304-47, 9304-48, 9304-49, 9304-50, 9304-70, 9304-71, 9304-72, 9304-73, or 9304-85 air-line hose.

BROWN & ROOT, INC.

SUB PART A-2

NIOSH/MESA CERTIFIED SUPPLIED AIR

RESPIRATORS BY CLASSIFICATION:

OF RESPIRATOR TYPES

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
TYPE B (W/O BLOWER)	TC-19C-77	Mine Safety Appliances Co.	457623	96680 facepiece 88306 breathing tube assembly. 460626 harness assy. 460625, stake & funnel assembly. 17273 air-supply hose
TYPE C DEMAND FLOW	TC-19C-75	Mine Safety Appliances Co.	457165, 84283, 457164, 93928, 46539, 94988	96680, 95940, or 94331 facepiece 457158 breathing tube assembly. 81070 or 92656 regu- lator-connector. 9961 web belt 455021 or 455022 hose
	TC-19C-65	Surviv Air Div. U.S.Divers Co.	9011-14 9811-14	9405-02 or 9425002 facepiece and regulator 9454-00 waist belt 9304-41 through 50, 9340-70 through 73, or 9340-85 air line hose.
	TC-19C-66	Surviv Air Div. U.S.Divers Co.	9011-14 9811-14	9405-02 or 9425-02 facepiece & regulator assembly. 9454-00 waist belt 9304-41 through 50, 9304-70 through 73, or 9304-85 air-line hose.
TYPE C DEMAND & CONTINUOUS FLOW	TC-19C-73	Scott Aviation	802230	801450/41 facepiece assy. 80277-00 regulator assy. 26022-01/03, supply hose or 25002-01/03 supply hose with 26025/01, strap & belt assy. & 30010/ 30020 serial extension hose.

SUB PART A-2 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
TYPE C PRESSURE DEMAND FLOW	TC-19C-74	Scott Aviation	801548	801450-04, facepiece assembly. 801549-00, regulator assembly. 26022-01/03, supply hose with 26022-01/03 supply hose with 26025-01 strap and belt assy. and 30010/300/20 series
	TC-19C-67	Surviv Air Div. U.S. Divers Co.	9011-13 9811-13	9405-00 or 9425 face-piece and regulator assembly. 9454-00 waist belt. 9304-11 through 20, 93,68,or 9340-80 through 83, airline hose.
	TC-19C-68	Surviv Air Div. U.S. Divers Co.	9011-15 9811-15	9405-02 or 9425-02 facepiece and regulator assembly. 9454 waist belt. 9304-41, through 50, 9304-85, airline hose.
TYPE C CONTINUOUS FLOW	TC-19C-78	Mine Safety Appliances Co.	460862, 460863, 460864, 460865.	94331, 95940, or 96680 facepiece with 9661 web belt or 460861 face-piece with 78362 harness. 457158 breathing tube assembly. 460814 control valve. 455021 and/or 455022 air-supply hose.
			460903	460886 hood. 94379 cape. 95302 filter. 460893 filter holder. 9961 web belt. 360814 valve. 455021 or 455022 air-supply hose
(NOTE: FOR HEAVY CONCENTRATIONS OF PARTICULATES-NOT TO BE USED IN SANDBLASTING OPERATIONS)	TC-19C-80	Mine Safety	460904	460886 hood. 94029 collar. 95302 filter. 460893 filter holder.

BROWN & ROOT, INC.

SUB PART A-2 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
			460904	9961 web belt. 460814 valve. 455021 or 455022, air-supply hose.
			460905	460886, hood. 94379, cape. 95302, filter. 460893 filter holder. 9961 web belt 460829 connector. 455021 or 455022 air- supply hose.
			460906	460886 hood. 94029 collar. 95302 filter. 460893 filter holder. 9961 web belt 460829 connector. 455021 or 455022 air- supply hose.
	TC-19C-82	Pulmosan	AL180 #10168	10939 facepiece & breathing tube assy. 10942 belt with orifice coupler assy. 20138, 20141, or 20144 air-supply hose.
	TC-19C-71	Scott Aviation	4616-11 -12, -15, -21, -22, and -25 4622-11 -12, -15, -21, -22, and -25	742 or 4704 facepiece 6119 breathing tube 4196 or 4196-1 flow control valve and cartridge assembly. 4286 air-supply hose.
	TC-19C-72	Scott Aviation	4616-18 -19, -28, and -29 4622-18 -19, -28, and -29.	742 or 4704 facepiece 6119 breathing tube 4119 or 4199-1 flow control cartridge assy. 4225 air-supply hose.
	TC-19C-83	Willson	GA2 GA8	R726 or R727 facepiece R728 breathing tube assy. R729 airline belt subassembly. R714 air-supply hose

SUB PART A-2 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
TYPE C AND/OR TYPE CE CONTINUOUS FLOW (NOTE: USED IN SANDBLASTING OPERATIONS)	TC-19C-64	Cesco Safety Products and U.S. Safety Service	PI-800	800-1-AA, 800-1-DA, or 800-1-1-NA Hood assembly. 800-2, breathing tube 800-3 air-supply hose assembly. 800-6 quick disconnect 800-5 harness.
			77-SH	108-110-7725 hood with 25' of 3/8" air-line 108-240-4640 belt & break valve assy.
			77-SACH	108-110-7755 hood with 25' of 3/8" air-line 108-260-0000 gold line AC system assembly.
	TC-19C-84	E.D. Bullard Co.	77-SG	108-110-7750 box front adaptor kit for 77- series hoods.
	TC-19C-79	Encon Mfg. Co.	6400	6400-1 helmet and shroud assembly. 6400-75 air duct. 6315-50 air regulating valve. 6400-10 belt. 6400-25 or 6400-50 air supply hose assembly.
	TC-19C-81	Mine Safety Appliances Co.	460907	72800 or 460885 hood. 94029 collar. 460814 valve. 9961 web belt 455021 or 455022 air- supply hose.
			460908	460885 hood, 94417 cape. 460814 valve. 9961 web belt. 455021 or 455022 air- supply hose.
			460909	460885 hood. 450924 cape. 460814 valve. 9961 web belt 455021 or 455022 air- supply hose.

BROWN & ROOT, INC.

SUB PART A-2. (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
			460910	460885 hood. 94488 collar. 460814 valve. 9961 web belt. 455021 or 455022 air- supply hose.
	TC-19C-69	3M Company	W-840	W-5002 helmet W-2800 air regulating valve and breathing tube assembly. W-9435 air supply hose.
			W-810	W-5003 helmet W-2800 air regulating valve & breathing tube assembly. W-9435 air supply hose.
			W-870	W-5005 helmet W-2800 air regulating valve and breathing tube assembly. W-9435 air supply hose.
			W-858	W-5006 helmet W-2800 air regulating valve and breathing tube assembly.
			W-856	W-5201 hood W-2800 air regulating valve & breathing tube assembly. W-9435 air supply hose
			W-820	W-5003 helmet W-6803 air & temperature regulating valve & breathing tube assy. W-9435 air supply hose.
			W-888	W-5006 helmet W-6803 air and temp- erature regulating valve and breathing tube assembly. W-9435 air supply hose

BROWN & ROOT, INC.

SUB PART A-2 (CONTINUED)

RESPIRATOR TYPE	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
			W-880	W-5005 helmet W-6803 air and temperature regulating valve and breathing assembly. W-9435 air supply hose.
			W-890	W-5002 helmet W-5803 air and temperature regulating valve and breathing assembly. W-9435 air supply hose.
			W-881	W-5201 helmet W-6803 air and temperature regulating valve and breathing assembly. W-0435 air supply hose.

BROWN & ROOT, INC.

SUB PART A-2

PRESSURE RANGES AND HOSE-LENGTH RANGES FOR APPROVED

SUPPLIED-AIR RESPIRATORS

APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(S)	HOSE-LENGTH RANGE, FEET	PRESSURE RANGE, PSI
TC-19C-64	Cesco	PI-800	15	5 - 17
TC-19C-64	U.S. Safety Services	PI-80	15	5 - 17
TC-19C-65	SurvivAir	9011-12, 9811-12	4 - 250	50 - 125
TC-19C-66	SurvivAir	9011-14 9811-14	4 - 250	50 - 125
TC-19C-67	SurvivAir	9011-13 9811-13	4 - 250	50 - 125
TC-19C-68	SurvivAir	9011-15 9811-15	4 - 250	50 - 125
TC-19C-69	3M Company	W-810, W-840, W-856, W-858, W-870	25 - 300	50 - 90
TC-19C-70	3M Company	W-820, W-880, W-881, W-888, W-890	25 - 100	65 - 90
TC-19C-71	Scott	4616-11, -12, -15, -21, -22, -25; and 4622-11, -12, -15, -21, -22, -25.	15 - 50	12 - 25
			50 - 250	25 - 40
TC-19C-72	Scott	4616-18, -19, -28, -29 and 4622-18, -19, -28, -29	15 - 50	6 - 16
			50 - 250	16 - 22
TC-19C-73	Scott	802230	25 - 250	60 - 125
TC-19C-74	Scott	801548	25 - 250	60 - 125
TC-19C-75	MSA	457165, 84283, 457164, 93928, 46539, 94988	25 - 300	50 - 125

BROWN & ROOT, INC.

SUB PART A-2 (CONTINUED)

APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	HOSE-LENGTH RANGE, FEET	PRESSURE RANGE, PSI
TC-19C-77	MSA	457623	up to 75	
TC-19C-78	MSA	460862, 460863, 460864, 460865	25 - 300	35 - 40
TC-19C-79	Encon Mfg.	6400	25 - 50	55 - 60
TC-19C-80	MSA	460903, 460904, 460905, 460906	25 - 300	55 - 60
TC-19C-81	MSA	460907, 460908, 460909, 460910	25 - 300	55 - 60
TC-19C-82	Pulmosan	AL180 #10168	15 - 50	10 - 20
TC-19C-83	Willson	GA2, GA8	15 - 100 100 - 300	10 - 32 21 - 50

BROWN & POOT, INC.

SUB PART A-3

NIOSH/MESA CERTIFIED GAS MASK

BY CLASSIFICATION OF HAZARDS

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
AMMONIA; DUSTS & MISTS	TC-14G-88	Mine Safety Appliances Co.	448979, 448980, 448981, 448982.	95940 or 96680, face- piece 448973, canister
CARBON MONOXIDE SELF-RESCUE RESPIRATOR	TC-14G-82	Mine Safety Appliances Co.	W-65	455299 respirator assembly
	TC-14G-83	Dragerwerk, AG	810	FSR810 respirator assembly
CHLORINE; DUSTS & MISTS	TC-14G-89	Mine Safety Appliances Co.	460131, 460132, 460133, 460134.	95940 or 96680, face- piece 460113, canister
ORGANIC VAPORS; DUSTS & MISTS	TC-14G-87	Mine Safety Appliances Co.	448975, 448976, 448977, 448978.	95940 or 99680 face- piece 448974, canister
PESTICIDES	TC-14G-86	Mine Safety Appliances Co.	448975, 448984, 448985, 448986.	95940 or 96680, face- piece 448972, canister.
VINYL CHLORIDE	TC-14G-84	Mine Safety Appliances Co.	461481, 461482, 461483, 461484, 461485, 461486.	95940 or 96680, face- piece 88306, 457168, or 457175, breathing tube assembly 84937 or 84938, harness. 461480, canister.
	TC-14G-85	Scott Aviation	601211-17, 601221-17	742 or 600121, facepiece. 6108-10 or 6110-27, breathing tube assembly. 565 or 600309-00, harness 084-VCL canister.
	TC-14G-91	Welsh	7820, 7820S, 7829, and 7829S.	780011 or 780011S, face- piece 780060 or 780061, hose assembly 780039 or 780041, harness assembly 780062, connector. 7800-2VC, canister.

BROWN & ROOT, INC.

SUB PART A-4

NIOSH/MESA CERTIFIED AIR PURIFYING

RESPIRATORS BY CLASSIFICATION OF HAZARD

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
ORGANIC VAPORS (NOT MORE THAN 1,000 PPM BY VOLUME)	TC-23C-56	American Optical Company.	R5051	50206 basic respirator subassembly. R51, adsorbent cartridges.
(*) ALSO CAN BE USED FOR DUSTS & MISTS WITH APPROPRIATE PARTS*	TC-23C-57	American Optical Company	R6051	51071 basic respirator subassembly. R51 adsorbent cartridges.
	*TC-23C-83	American Optical	R5055 R6055	50206 or 51071 basic respirator subassembly. R55 cartridge.
	TC-23C-84	American Optical Company.	R8151	51294 basic respirator subassembly. R151 cartridge.
	TC-23C-86	Binks Mfg.Co.	40-129	460854 facepiece assy. 40-130 cartridge.
	TC-23C-99	Cesco Safety Products	94R40	94 facepiece assembly. R40 cartridge.
	TC-23C-59	DeVilbiss Corp.	MSE-502	50728 basic respirator subassembly. MSE-506 adsorbent cartridges.
	TC-23C-88	Glendale Optical	GR20-21	F-200 facepiece C-21 cartridge F-10 filter F-21 filter cover
	*TC-23C-89	Glendale Optical	GR2021-10	F-200 facepiece. C-21 cartridge.. *F-10 filter *F-21 filter cover
	*TC-23C-40	Mine Safety Appliances Co.	459433	449701 facepiece 459315 cartridges *459595 (10) or 459693 (100) filters *459027 covers.

BROWN & ROOT, INC.

SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
	*TC-23C-48	Mine Safety Appliances Co.	85556	449702 facepiece 44135 cartridges *73654 filters *11147 retainers
	TC-23C-81 *TC-23C-91	Pulmosan	C-256 C-259	10768 body assembly with either 10924 or 10792 face cushion. 17160 chemical cartridge *C-264-7 filter *C-200-8 filter cap
	TC-23C-58	Safeline Products	5211	05862 basic respirator subassembly. 5961 adsorbent cartridges.
	TC-23C-49 *TC-23C-73	Welsh Mfg.Co.	7501 *7511	7500-30 facepiece 7500-12 headband 7500-1 cartridges *7500-6 filters *7500-14 covers
	TC-23C-50 *TC-23C-51	Willson Products Div. ESB, Inc.	1221 *122110	AR700 basic respirator assembly. R21 chemical cartridges *R10 filters *682 retainers
	*TC-23C-52	Willson Prod.Div. ESB, Inc.	*122113	AR700 basic respirator assembly. R21 chemical cartridge *R13 filters
PAINT, LACQUER, ENAMEL, MIST AND ORGANIC VAPORS	TC-23C-92	American Optical Company	R819P	51294 basic respirator subassembly. R191 cartridge.
(NOT MORE THAN 1,000 PPM ORGANIC VAPORS)	TC-23C-93	American Optical Company	R8151P	51194 basic respirator subassembly. R151 cartridge R149 filter R150 filter clip.
	TC-23C-94	American Optical Co.	R5051P	50206 basic respirator subassembly. R51 cartridge R49 filter R185 filter clip.

BROWN & ROOT, INC.

SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
	TC-23C-95	American Optical Co.	R6051P	51071 basic respirator subassembly. R51 cartridge R49 filter R185 filter clip.
	TC-23C-97	American Optical Co.	R5091P	50206 basic respirator subassembly. R91 cartridge.
	TC-23C-98	American Optical Co.	R6091P	51071 basic respirator R91 cartridge.
	TC-23C-87	Binks Mfg.Co.	40-128	460854 facepiece 40-130 cartridge 40-131 filter 40-132 filter cover.
	TC-23C-96	DeVilbiss Co.	MSP-505	50728 basic respirator assembly. MSE-506 cartridge MSP-403 filter MSP-405 filter clip.
	TC-23C-90	Glendale Optical	GR2021-20	F-200 facepiece C-21 cartridge F-20 filter F-21 filter cover.
	TC-23C-80	Mine Safety Appliances Co.	448849	449703 facepiece assy. 459315 cartridges 448842 filters 448844 filter covers
	TC-23C-75	Welsh	7531	7500-30 facepiece assy. 7500-1 cartridges 7500-10 filters 7500-14 filter covers
	TC-23C-53	Willison Prod.Div. ESB, Inc.	122114	AR700 basic respirator assembly. R21 chemical cartridges R683 filter retainers R14 filters

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SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
PESTICIDES	TC-23C-78	3M Company	W262 W263	W2801 powered air purifier. W2031 filter W2114 cartridge W2090 breathing tube W5005 helmet or W5201 hood.
	TC-23C-45	Mine Safety Appliances Co.	459520	449702 facepiece 459519 cartridges.
	TC-23C-79	Mine Safety Appliances Co.	448848	449703 facepiece assy. 448847 cartridges
	TC-23C-74	Welsh	7549	7500-30 facepiece assembly. 7500-21 cartridges 7500-23 filters 7500-14 filter covers
	TC-23C-54	Willson Prod.Div. EBS, Inc.	AGRI-TOX-2	AR700 Basic respirator assembly R21 chemical cartridges R15 filters R683 filter retainers
AMMONIA (NOT MORE THAN 300 PPM)	TC-23C-63 *TC-23C-64	Welsh	7504 *7514	7500-30 facepiece assy. 7500-4 cartridges *7500-6 filters *7500-14 covers
(*) ALSO CAN BE USED FOR DUSTS & MISTS WITH APPROPRIATE PARTS*				
AMMONIA (NOT MORE THAN 300 PPM)	*TC-23C-43	Mine Safety Appliances Co.	459436	449703 facepiece 459318 cartridges *459595 (10) or 459693 (100) *459027 filters
METYL AMINE (NOT MORE THAN 100 PPM)	*TC-23C-44	Mine Safety	855558	449702 facepiece 42876 cartridges *73654 filters *11147 retainers
(*) ALSO CAN BE USED FOR DUSTS & MISTS WITH APPROPRIATE PARTS*				
	TC-23C-70 *TC-23C-71	Willson Prod.Div. EBS, Inc.	1224 *122410	AR700 basic respirator assembly. R24 cartridges *R10 filters *R682 retainers

BROWN & ROOT, INC.

SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
CHLORINE	TC-23C-55	Scott Aviation	70-CL	70-CL respirator assy.
(NOT MORE THAN 10 PPM CHLORINE)	TC-23C-67	Willson	1222	AR700 basic respirator assembly.
(*) ALSO CAN BE USED FOR DUSTS & MISTS WITH APPROPRIATE PARTS*	*TC-23C-68		*122210	R22 cartridges *R10 filters *R682 retainers
SULFUR DIOXIDE	TC-23C69	Willson	1223	AR-700 Basic respirator R23 cartridges
(NOT MORE THAN 50 PPM SULFUR DIOXIDE)	*TC-23C-72		*122310	*R10 filters *R682 retainers
(*) ALSO CAN BE USED FOR DUSTS & MISTS WITH APPROPRIATE PARTS*				
CHLORINE; SULFUR DIOXIDE; HYDROGEN CHLORIDE	TC-23C-60	American Optical Co.	R5052	50206 basic respirator subassembly. R52 cartridges.
(NOT MORE THAN 10 PPM CHLORINE 50 PPM SULFUR DIOXIDE 50 PPM HYDROGEN CHLORIDE)	TC-23C-61	American Optical Co.	R6052	51071 basic respirator subassembly.
(*) ALSO CAN BE USED FOR DUSTS AND MISTS WITH APPROPRIATE PARTS*	*TC-23C-41	Mine Safety Appliances Co.	459434	449703 facepiece 459316 cartridges *459595 (10) or 459693 (100) filters *459027 covers.
	*TC-23C-42	Mine Safety Appliances Co.	459453	449702 facepiece 459452 cartridges *73654 filters *11147 retainers.
	TC-23C-62	Safeline Products	5221	05862 basic respirator subassembly. 5963 cartridges.

BROWN & ROOT, INC.

SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
CHLORINE; SULFUR DIOXIDE; HYDROGEN CHLORIDE ORGANIC VAPORS (NOT MORE THAN 10 PPM CHLORIDE 50 PPM SULFUR DIOXIDE 50 PPM HYDROGEN CHLORIDE 1000 PPM ORGANIC VAPORS) (*) ALSO CAN BE USED FOR DUSTS & MISTS WITH APPROPRIATE PARTS*	TC-23C-82	American Optical Co.	R5053 R6053	50206 or 51071 basic respirator subassembly.
	TC-23C-85	American Optical Co.	R8153	51294 basic respirator subassembly. R153 cartridge.
	*TC-23C-46	Mine Safety Appliances Co.	85557	449702 facepiece 10340 cartridges *73654 filters *11147 retainers
	*TC-23C-47	Mine Safety Appliances Co.	459453	449703 facepiece 459317 cartridges *459545 (10) or 459693 (100) filters *459027 covers
	TC-23C-65	Welsh	7503	7500-30 facepiece assembly. 7500-3 cartridges
	*TC-23C-66		*7513	*7500-6 filters *7500-14 covers
	TC-23C-76 *TC-23C-77	Willson	1225 *122510	AR700 basic respirator assembly. R25 cartridges *R10 filters *R682 retainers
PNEUMOCONIOSIS FIBROSIS- PRODUCING DUST	TC-23C-147	American Optical Co.	R1050	respirator assembly
	TC-21C-132	3M Company	8710	respirator assembly
(SILICA ASBESTOS etc.)	TC-21C-148	Safeline Products	5350	respirator assembly
	TC-21C-143	Willson Products	1400	respirator assembly.
NOTE: SINGLE USE RESPIRATORS				
DUSTS, MISTS	TC-21C-162	American Optical Co.	R8100	51294 basic respirator subassembly. R100 filters 51347 filter cover.

BROWN & ROOT, INC.

SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
	TC-21C-166	American Optical Co.	R2090N	51460 basic respirator subassembly. R90N filter. 51062 filter cover.
	TC-21C-154	Cover	1483	B222 respirator assembly. F100 filters
	TC-21C-167	DeVilbiss	MSD-507	51461 basic respirator subassembly MSD-508- filter. 51062 filter cover.
	TC-21C-138	Mine Safety	96000 or 457344	96042 filters
	TC-21C-156	Mine Safety Appliances Co.	461483	451683 facepiece 457481 filter.
	TC-21C-159	Mine Safety Appliances Co.	460357	460357 facepiece 457481 filter.
	TC-21C-157	Pulmosan	C-264	10768 body assembly with either 10924 or 10792 face cushion. C-264-8 adapter & filter cap. C-264-7 filter.
	TC-21C-165	Pulmosan	L800	10771 body assembly 10924 or 10795 face cushion. C-264-7 filter L-800-8 filter cap.
DUSTS, MISTS, FUMES POWERED AIR PURIFYING RESPIRATORS.	TC-21C-136	3M Company	W 250	W-5005 helmet W2031 filter W2090 breathing tube W2009 back pack harness W2008 machine mounting
			W 252	W-5003 helmet W-2031 filter W-2090 breathing tube W-2009 back pack harness W-2008 machine mounting

BROWN & ROOT, INC.

SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
			W 253	W-5002 helmet W-2031 filter W-2090 breathing tube W-2009 back pack harness W-2008 machine mounting
			W 254	W-501 helmet W-2031 filter W-2090 breathing tube W-2009 back pack harness W-2008 machine mounting
	TC-21C-136A	3M Company	W250, W252, W253, W254.	W2031 filter W2090 breathing tube. Either W2009AA, W2009AD back pack harness, or W2008, W2008BA machine mounting. W5005, W5003, W5002, or W5201 helmet.
DUSTS, MISTS, ASBESTOS	TC-21C-144	American Optical	R5030	50206 basic respirator subassembly R30 filters discs 51062 filter covers.
	TC-21C-145	American Optical	R6030	51071 basic respirator subassembly. R30 filter discs 51062 filter covers.
	TC-21C-161	American Optical	R5063 R6063	50206 or 50171 basic respirator subassy. R56 filter.
	TC-21C-163	Cesco Safety Prod.	94R20	94 facepiece assembly R20 filter 94R9 filter screen.
	TC-21C-164	Glendale Optical	GR2000 GR4000	F-200 or F-400 face- piece. F-10 filter F-14 filter cover
	TC-21C-133	Mine Safety Appliances Co.	459440	449703 facepiece 459032 filter 459027 filter covers

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SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
	TC-21C-146	Safeline Products	5265	05862 basic respirator subassembly. 5905 filters 51062 filter covers
	TC-21C-151	Welsh	7506	7500-30 facepiece 7500-6 filters 7500-14 filter covers
	TC-21C-153	Welsh	7406L	7400-30 facepiece 7400-6 filter 7400-14 filter cover
	TC-21C-139	Willson Products	560	AR699 respirator R707 filter, cartridges assembly. R60 filter R635 filter retainer
	TC-21C-140	Willson Products	1210	AR700 basic respirator assembly. R10 filters R682 filter retainer
	TC-21C-141	Willson	1211	AR700 basic respirator assembly. R11 filters.
DUSTS, FUMES, MISTS, RADIONUCLIDES	TC-21C-160	American Optical	R5057 R6057	50206 or 50171 basic respirator subassembly. R57 filter.
	TC-21C-155	Mine Safety Appliances Co.	460185	460560 facepiece R57 filter.
	TC-21C-134	Mine Safety Appliances Co.	459438	449703 facepiece 459321 filter (RADON DAUGHTERS)
	TC-21C-135	Mine Safety Appliances Co.	459439	449703 facepiece 459322 filters (TC-21C- 135)
	TC-21C-150	Mine Safety Appliances Co.	88479 and 457117	96680 or 95940 facepiece 88480 filter.
	TC-21C-158	Pulmosan	C-263	10768 body assembly 10924 face cushion C0263-7 filter.

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SUB PART A-4 (CONTINUED)

CONTAMINANT CONDITION	APPROVAL NUMBER	APPROVAL ISSUED TO:	RESPIRATOR NUMBER(s)	COMPONENT PARTS NUMBERS AND DESCRIPTION
	TC-21C-149	Scott Aviation	662-1 and 662-2	805 or 742 facepiece 502R filter
	TC-21C-152	Welsh	7580.	75-30 facepiece assembly.
	TC-21C0142	Willson	1212	Ar700, basic respirator assembly. R12 filters

APPENDIX B

**Forms for Inspection and Maintenance
of Respiratory Protective Equipment
and Air Filters.**

JOB # _____

[illegible]

JOB # _____

[illegible]

APPENDIX C

Respiratory Protection

Definitions & Terms

ABRASIVE-BLASTING RESPIRATOR---see respirator.

AERODYNAMIC DIAMETER-----The diameter of a unit density sphere having the same settling velocity as the particle in question of whatever shape and density.

AIRLINE RESPIRATOR-----see respirator.

AIR-PURIFYING RESPIRATOR-----see respirator.

AIR-REGULATING VALVE-----An adjustable valve used to regulate airflow to the facepiece, helmet, or hood of an air-line respirator.

AIR SUPPLY DEVICE-----A hand or motor operated blower for the hose mask or a compressor or other source of respirable air for air-line and abrasive-blasting respirators.

BREATHING TUBE-----A tube through which air or oxygen flows to the facepiece, helmet, or hood.

CANISTER (AIR-PURIFYING)-----A container filled with sorbents and catalysts that remove gases and vapors from air drawn through the unit. The canister may also contain an aerosol (particulate) filter to remove solid or liquid particles.

CANISTER (OXYGEN-GENERATING)---A container filled with a chemical which generates oxygen by chemical reaction.

CARTRIDGE-----A small container filled with air-purifying media.

CATALYST-----In respirator use, a substance which converts a toxic gas (or vapor) into a less-toxic gas (or vapor).

CHEMICAL-CARTRIDGE RESPIRATOR--see respirator.

CONTAMINANT-----A harmful, irritating, or nuisance material that is foreign to the normal atmosphere.

CORRECTIVE LENS-----A lens ground to the wearer's individual corrective prescription.

DETACHABLE COUPLING-----A device by means of which the respirator wearer, without using hand-tools, may detach the air supply line from that part of the respirator worn on the person or from the air-supply source.

DISINFECTION-----The destruction and removal of pathogenic organisms, especially by means of chemical substances.

DUST-----Suspended particles of solid matter in such a fine state of sub-division that they may be inhaled, swallowed or absorbed by the body.

EXHALATION VALVE-----A device that allows exhaled air to leave a respirator and prevents outside air from entering through the valve.

EYEPiece-----A gastight, transparent window(s) in a full facepiece through which the wearer may see.

FACEPIECE-----That portion of a respirator that covers the wearer's nose and mouth in a half-mask facepiece or nose, mouth and eyes in a full facepiece. It is designed to make a gas-tight or dust-tight fit with the face and includes the headbands, exhalation valve(s), and connections for purifying device or respirable gas source or both.

FILTER RESPIRATOR-----see respirator.

FILTER-----A fibrous media (canned or uncanned) used in respirators to remove solid or liquid particles from the airstream entering the respirator enclosure.

FOG-----A mist of sufficient concentrate to perceptibly obscure vision .

FULL FACEPIECE-----see facepiece

HEAD HARNESS-----A device for holding the facepiece securely in place on the wearer's head.

HELMET-----A device that shields the eyes, face, neck and other parts of the head.

HOOD-----A device that completely covers the head, neck, and portions of the shoulders.

HOSE MASK-----see respirator

IMMEDIATELY DANGEROUS TO
LIFE OR HEALTH-----Included are conditions that pose an immediate threat to life or health and conditions that

pose an immediate threat of severe exposure to contaminants such as radioactive materials which are likely to have adverse delayed effects on health.

INHALATION VALVE-----A device that allows respirable air to enter the facepiece and prevents exhaled air from leaving the facepiece through the intake opening.

IRRESPIRABLE-----Unfit for breathing.

MIST-----A liquid condensation particle with sizes ranging from sub-microscopic to visible.

MPC-----Maximum permissible concentration. These concentrations are set by the National Committee on Radiation Protection. They are recommended maximum average concentrations of radionuclides to which a worker may be exposed, assuming that he works 8 hours a day, 5 days a week and 50 weeks a year.

PARTICULATE MATTER-----A suspension of fine solid or liquid particles in air, such as dust, fog, fume, mist, smoke, or sprays. Particulate matter suspended in air is commonly known as an aerosol.

PNEUMOCONIOSIS-PRODUCING DUST--Dust, which when inhaled, deposited, and retained in the lungs, may produce signs, symptoms and findings of pulmonary disease.

RESISTANCE-----Opposition to the flow of air, as through a canister, cartridge, particulate filter, or orifice.

RESPIRABLE-----Fit to breath.

RESPIRATOR-----A device designed to protect the wearer from inhalation of harmful atmospheres.
(see Table 1 & 1)

SELF-CONTAINED BREATHING
APPARATUS-----see respirator

SORBENT-----A material which removes toxic gases and vapors from air inhaled through a canister or cartridge.

SPRAY-----A liquid mechanically produced particle with sizes generally in visible range.

SUPPLIED-AIR RESPIRATOR-----See respirator.

SUPPLIED-AIR SUIT-----A one or two piece suit that is impermeable to most particulate and gaseous contaminants and is provided with an adequate supply of respirable air.

TLV-----Threshold limit value. A table of these values and accompanying precautions is published annually by the American Conference of Governmental Industrial Hygienists.

TOXIC DUST-----Dust that may be harmful to the respiratory system or to other parts of the body through passing from the respiratory tract into the blood stream.

VALVE (air or oxygen)-----A device which controls the direction of air or oxygen flow or the rate and pressure at which air or oxygen is delivered, or both.

VAPOR-----The gaseous state of a substance that is solid or liquid at ordinary temperature and pressure.

WINDOW INDICATOR-----A colorimetric indicator for gas mask canisters which denotes the service life for a particular gas.