PPG INDUSTRIES, INC. CHEMICAL DIVISION · U.S. P. O. BOX 1000 LAKE CHARLES, LA. 70602

RESPIRATORY PROTECTION PROGRAM MANUAL

APPROVED AS PLANT SAFETY POLICY BY PLANT SAFETY COUNCIL
MAY 28, 1980

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I. General

1.1 Purpose - This manual sets forth the minimum requirements for use of respiratory protection equipment at the Lake Charles plant. It applies to all PPG employees, contractors, and visitors.

1.2 Permissable Practice - In order to provide a safe and healthful workplace, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures to control harmful dust, fumes, sprays, mists fogs, smoke, vapors or gases. When effective engineering controls are not feasible, while they are being instituted, or once instituted do not reduce the hazard to acceptable levels, approved respirators shall be used pursuant to the following requirements.

1.3 Employer Responsibility

1.3.1 Respirators shall be provided by the company when such equipment is necessary to protect the health of the employee.

1.3.2 The company shall provide respirators which are applicable and suitable for the purpose intended.

1.4 Employee Responsibility

1.4.1 The employee shall use the provided respiratory protection in accordance with instructions and training provided.

1.4.2 The employee shall guard against damage to the respirator.

1.4.3 The employee shall promptly report any malfunction of the respirator to his supervisor.

1.4.4 The user shall keep personal issue respirators clean and change cartridge or canisters conscientiously in order to assure the maximum degree of protection.

II. Program Administration

2.1 Program Administrator - It shall be the responsibility of the Safety Department Industrial Hygienist to oversee the operation of the plant Respiratory Protection Program, including but not limited to,

1. Selection and specification of respirators
2. Training
3. Fit testing--both quantitative and qualitative
4. Program evaluation in conjunction with plant supervisors

2.2 Supervision - It shall be the responsibility of the supervisors to require the proper use of respiratory protective equipment by employees, within their respective areas, when required, or when conditions indicate the need. Assistance and/or guidance in matters relating to proper usage shall be made available by the Industrial Hygiene section of the Safety Department.

2.3 Medical Review - It shall be the responsibility of the Plant Physician to determine the fitness of an employee to perform tasks which require the use of respiratory protective equipment. If such a determination indicates that the employee should not perform tasks requiring a respirator, that fact shall be transmitted to the employee, his supervisor and to the program administrator. This determination shall be reviewed at least annually.

2.4 Respirator Selection

2.4.1 All respiratory equipment shall be selected on the basis of being recommended for the service required and according to the guidance of the latest ANSI Standard Practices for Respiratory Protection (ANSI Z88.2), and whenever available shall bear NIOSH approvals.

2.4.2 All purchases of respiratory equipment and related replacement parts must be coordinated through the Safety Department Industrial Hygiene section.

III. TRAINING

3.1 User Training

All employees who use respirators shall be instructed in the purpose of and limitations of respiratory protective equipment. The initial training will be conducted by the Safety Department and will be given to employees during their "New Employee Safety Orientation". The content of such training shall include:

1. Reasons for the need of respiratory protection.
2. Nature, extent, and effects of respiratory hazards to which the person may be exposed.
3. Explanation of why engineering controls are not being applied or are not adequate and what effort is being made to reduce or eliminate the need for respirators.
4. Explanation of why a particular type of respirator has been selected for a specific respiratory hazard.
5. Explanation of the operation, and the capabilities and limitations of the selected respirator.
6. Instruction in inspecting, putting on, checking the fit, and wearing the respirator.
7. Opportunity for each respirator wearer to handle the respirator, learn how to properly put it on and wear it, check its seals, wear it in a safe atmosphere, and wear it in a test atmosphere.
8. Explanation of how maintenance and storage of the respirator is carried out.
9. Instructions on how to recognize and cope with emergency situations

10. Job Safety Instruction (J.S.I.) as needed for special respirator use.

11. Regulations concerning respirator use.

The supervisor shall instruct each employee in the location and use of respirator equipment used in the department/area; limitations of the equipment will be part of such training.

3.2 Supervisor Training

Supervisors who have the responsibility of overseeing the work activities of one or more persons who must wear respirators, shall be given adequate training to insure the proper use of respirators. Supervisor training shall include, but not necessarily be limited to, the following subjects:

1. Basic respiratory protection practices.
2. Nature and extent of respiratory hazards to which persons under his/her supervision may be exposed.
3. How to train respirator wearers.
4. Policies regarding the issuance, procurement, and return of respiratory protective equipment.
5. Respirator inspection.
6. Use of respirators, including monitoring/evaluation of use.
7. Maintenance and storage of respirators.
8. Regulations concerning respirator use.

3.3 Training of Persons Issuing Respirators

All persons assigned the task of issuing respirators to employees shall be given adequate training to insure that the correct respirator is issued for each application in accordance with written procedures.

3.4 Retraining

Each respirator wearer shall be retrained at least annually. This shall be done by the employee's supervisor with the assistance of the Safety Departme

IV. RESPIRATORY HAZARDS

Toxic materials can enter the body in three ways:

1. through the gastro-intestinal tract,
2. through the skin,
3. through the lungs.

Of these modes of entry, the human respiratory system presents ths quickest and most direct avenue of entry because of its intimate association with the circulatory system and the constant need to oxygenate the tissue cells to sustain life. Hence, there are two basic respiratory hazards: oxygen deficient air, and air laden with contaminants.

4.1 Oxygen Deficiency

The normal content of oxygen in the air is 20.9 per cent by volume. Oxygen concentrations below 16 per cent are considered unsafe for human exposure because of harmful effects on bodily functions, mental processes, and coordination. At low oxygen concentrations, collapse can be immediate, without warning; and death can ensue within minutes. Current regulation requires that the oxygen percentage in a working place be not less than 19.5.

In assessing the exposure conditions, it is important to remember that oxygen deficiency can occur in confined spaces by displacement of air by other gases and vapors; or by means of oxidation processes such as fire, rusting, aerobic bacteria, etc., where oxygen is consumed.

4.2 Air Contaminants

Air contaminants include particulate matter in the form of discrete particles or solids or liquids, gaseous material in the form of a true gas or vapor, or a combination of both gaseous and particulate matter.

4.2 Particulate Hazards

Particulate contaminants may be classified according to their physical and chemical characteristics and their biological effect on the body. The particle diameter measured in microns (1 micron = 1/25,400 inch) is of utmost importance. Particles below 10 microns in diameter have a greater opportunity to enter the respiratory system and particles below 5 microns in diameter are more apt to reach the deep lung. In the healthy lung, particles from 5 to 10 microns in diameter are generally removed from the respiratory system by a constant cleansing action present in the upper respiratory tract. However, with excessive "dust" exposures, heavy smoking, and/or diseased systems, the efficiency of the cleansing action can be markedly reduced.

Types of Particulate Matter - The various types of airborne particulate contaminants (sometimes called "aerosals" or dispersoids") may be classified as follows:

Dust - Mechanically generated solid particulate matter (usually found in the harmful size range of from 0.5 to 10 microns.

Mist and Fog - Liquid particulate matter (usually found in the size range from 5 to 100 microns).

Fumes - Solid condensation particles of fine diameter, commonly generated from molten metal as metal fumes (size range from 0.1 to 1.0 micron).

Smoke - A system, which includes the products of combustion, pyrolysis, or chemical reaction, of substances in the form of visible and invisible soli

and liquid particles and gaseous products in air. Smoke is usually of sufficient concentration to perceptibly obscure vision.

4.2.2 Gaseous Contaminants - Gaseous contaminants occuring as true gases such as sulfure dioxide, carbon monoxide, etc., or vapors from organic liquids can likewise be classified according to their chemical characteristics and biological effect on the body.

Types of Gaseous Contaminants - Chemically, gaseous contaminants may be classified as follows:

Inert Gases - Such as nitrogen, helium, argon, neon, etc., which do not metabolize in the body but produce an oxygen deficiency by displacement of air.

Acidic Gases - Such as chlorine, hydrogen sulfide, hydrogen chloride, etc., which are acids or produce acids by reaction with water.

Organic Compounds - Which can exist as true gases or vapors from organic liquids.

Organometallic Compounds - Comprised of metals attached to organic groups such as tetraethyl lead and organic phosphates.

V. TYPES AND LIMITATIONS OF RESPIRATORY PROTECTIVE EQUIPMENT

Respiratory protective equipment falls into three classes;

1. Air-Purifying Respirators
2. Supplied-Air Respirators
3. Self-Contained Respirators

The major limitation of the first two groups of equipment (air purifying and supplied air) is that they cannot be used to protect against a hazard or chemical concentration which is considered "Immediately Dangerous to Life or Health" (abbreviated IDLH). IDLH is defined as "any atmosphere that poses an immediate hazard to life or produces irreversible debilitating effects on health." See Section VI.3 for a more complete discussion of IDLH-also Appendix B for a table of chemical concentrations which are considered to be IDLH.

5.1 Air Purifying Respirators

These devices remove contaminants from the atmosphere and can be used only on atmospheres containing sufficient oxygen to sustain life (at least 19.5 per cent by volume at sea level) and within specified concentration limitations of the specific device. Various sorbents remove specific gases and vapors, and mechanical filters remove particulate matter. The useful life of an air-purifying device is dependent upon the concentration of the contaminants, the breathing volume of the wearer, and the capacity of the purifying medium. The basic types of air purifying devices are as follows: (see 5.1.1 through 5.1.3).

5.1.1 Pocket or Mouthpiece Escape Respirator - (e.g. MSA's Mouthpiece Respirator, or Scott CL-70) is carried by all persons when in the plant. These respirators are currently approved only for escape from chlorine or hydrogen chloride. Current approval schedules do not show the mouthbit respirator as a work mask.

5.1.2 Simple Filter Respirators - Mechanical filter respirators offer respiratory protection against airborne particulate matter including dusts, mists, metal fumes, and smokes. They consist of soft resilient facepiece of either half-mask or full-face design, to which is directly attached one of several types of mechanical filters made up of some fibrous material which removes the harmful particles by physical trapping as air is inhaled through the material. Gaseous matter such as air itself will pass through the filter, but solid or liquid particles are trapped in much the same manner as large rocks and small pebbles are separated in a screening process. The filter must be highly efficient, however, to stop the small particles. Mechanical filter respirators do not provide protection against gases, vapors or oxygen deficiency.

Mechanical filter respirators are available with the following characteristics:

1. Single Use Disposable Masks (e.g. 3M#8710) - Provides protection against nuisance dusts, mists, and asbestos. Not for use against paint sprays, fumes, or toxic dust.
2. Half or full-face cartridge respirator, with dust filter element - Provides protection against dusts and mists (including asbestos) which have a permissible exposure limit (P.E.L.) of not less than 0.5 mg/m^3.
3. Half of full-face cartridge respirator with fume filter element - Provides protection against fumes which have a P.E.L. of not less than .05 mg/m^3.
4. Half or full-face cartridge respirator with high efficiency filter element - Provides protection against dusts, mists or fumes which have a P.E.L of less than .05 mg/m^3. In addition, some

chemical cartridges or canisters have a built in or "combination" filtering element which allows for protection against particulate/vapor mixtures (e.g. the MSA GMC-H cartridge).

5.1.3 Chemical Cartridge Respirators - Chemical cartridge respirators afford protection against light concentrations (up to 1000 ppm by volume, depending upon the type of contaminant) or certain acid gases, alkaline gases, organic vapors, and mercury vapors by utilizing various chemical sorbents to purify the inhaled air. They differ from mechanical filter respirators only in that they use cartridges containing chemicals to remove harmful gases and vapors.

Many gases and vapors are dangerous or irritating to breathe. Some are hazardous or discomforting, or both, in extremely low concentrations. Although not usually immediately harmful to life or health, light concentrations of these gaseous materials may cause nausea and headache that reduce worker ability and sometimes produce chronic disorders which may eventually be fatal. Worker health as well as safety is involved.

Organic vapors, such as the vapors of methylchloroform, ethylene dichloride, perchlorethylene, and paint solvents; acid gases, such as chlorine or hydrogenchloride; and ammonia gas and mercury vapor, are the contaminants with which we are normally concerned.

The simplest and most convenient type of respiratory protective equipment to use in these cases is the chemical cartridge respirator equipped with the proper chemical filtering elements. These are available in both half-mask and full-face styles. These filtering elements are usually called "cartridges". The most common types are:

1. Organic Vapor Cartridge - (e.g. MSA's GMA and Scott's OV), for protection against certain organic vapors (see limitation below);

provides for concentrations up to 1000 ppm (.1% by volume).

2. Acid Gas Cartridge - (e.g. MSA's GMB and Scott's AG), for protection against up to 10 ppm of chlorine, and up to 50 ppm of hydrogen chloride.
3. Acid Gas/Organic Vapor Cartridges - (e.g. MSA's GMC and Scott's OA), combines protection and limits of Items 1 and 2 above.
4. Ammonia Cartridge - (e.g. MSA's GMD and Scott's AM), for protection against ammonia in concentrations up to 300 ppm (see Item C, Page 14).
5. Mercury Cartridge - (e.g. MSA's Mersorb), is satisfactory for use against all exposures to metallic mercury at normal pressures and temperatures. This cartridge can only be used in conjunction with MSA Comfo II and Ultra Twin cartridge masks. The "Mersorb" cartridge has an end of service life indicator which, when it turns black, shows that the cartridges need to be replaced with fresh ones.
6. Combination Simple Filter/Chemical Filter Cartridges - Utilize dust, mists or fume filters with a chemical cartridge for dual or multiple exposures. Respirators with independently replaceable mechanical filters are usually used for this type because the dust filter normally plugs before the chemical cartridge is exhausted.

Chemical Cartridge Respirators are non-emergency respiratory protective devices and should never be used in immediately dangerous atmospheres, except for escape purposes.

However, to clarify this general statement, it will be well to list four other major negative rules which apply to Chemical Cartridge Respirators:

A. Do not use Chemical Cartridge Respirators for protection against gaseous material which is extremely toxic in very small concentrations.

Example: hydrogen cyanide. A concentration of 100 parts per million is very dangerous within one hour. The toxicity is entirely too great to chance the minimum protection afforded by Chemical Cartridge Respirators.

B. Chemical Cartridge Respirators should not be used for exposures to harmful gaseous matter which cannot clearly be detected by odor. Example: vinyl chloride and hydrogen sulphide. The former is odorless; and the latter, although foul smelling, paralyzes the olfactory nerves so quickly that detection by odor is unreliable. (An exception to this would be if the cartridge used has an end of service indicator specifically for the contaminant being protected against.

C. Half-Mask Chemical Cartridge Respirators should not be used against any gaseous material in concentrations which are highly irritating to the eyes. Example: Although a Chemical Cartridge Respirator can be made to afford good respiratory protection against ammonia (NH_3) in concentrations up to 300 parts per million, serious eye irritation begins in the range of 100 parts per million, and it is impossible to remain in an atmosphere containing 150 parts per million for more than one minute without satisfactory eye protection, such as a full-face mask.

D. Obviously, Chemical Cartridge Respirators cannot be used for protection against gaseous material which is not effectively stopped by the chemical fill utilized, regardless of concentration.

Be certain that the cartridge used is appropriate for the contaminant(s) anticipated.

5.1.4 Gas Masks--Application and Limitations

Gas masks have been used effectively for many years for respiratory protection against certain gases, vapors, and particulate matter which otherwise might be harmful to life or health. They provide simplicity of operation, compactness, ease of maintenance, and economy. However, because gas masks are air-purifying devices, designed solely to remove specific contaminants from the air, it is essential that their use be restricted to atmospheres which contain sufficient oxygen to support life (at least 19.5 per cent by volume at sea level) and contain generally no more than 2 per cent concentrations of toxic gases and vapors by volume. It is recommended that instruments be used where possible in any situation to measure the concentration of oxygen and harmful gases and vapors present in the atmosphere under the various exposure and operating conditions.

From a practical standpoint, gas masks are generally suitable for ventilated areas not subject to rapid changes, but shall never be used in confined spaces where oxygen deficiency or high gas concentrations may occur.

Canister Replacement -- It is generally recommended that gas mask canisters used for emergency purposes should be replaced after each use. Specific indications for canister replacement and/or return to fresh air are:

1. If any leakage (or break through) is detected by smell, taste, eye, nose or throat irritation,

2. If high breathing resistance develops,

3. If the canister has a specific shelf life date (i.e. "use before--") indicated, be sure that it has not been exceeded.

Warning Signs - Specific warning signs which require immediate return to fresh air are:

1. Uncomforable heat in the inhaled air. (A properly operating canister will become warm on exposure to certain gases or vapors, but a canister which becomes extremely hot indicates that concentrations above the canister limit have been encountered),

2. If nausea, dizziness or signs of distress develop.

5.2 Supplied-Air Respirators

Air-Line Respirators (without escape bottles) - Shall be used only in atmospheres not immediately dangerous to life or health, or from which the wearer can escape without the use of the respirator. This limitation is necessary because the air-line respirator is entirely dependent upon an air supply which is not carried by the wearer of the respirator. If the air supply fails, the wearer is without respiratory protection and might not escape from an IDLH atmosphere. Another limitation of air-line respirators is that the air-supply hose limits the wearer to a fixed distance from the air-supply source.

The air-line respirator is connected to a suitable compressed air source by a hose of small inner diameter and air is delivered to the user continuously or intermittently in sufficient volume to meet the wearer's breathing requirements.

Air-line respirators are furnished in many types, but there are three basic classes. There are constant flow, demand flow, and pressure demand

flow, with the respirators equipped with full facepieces.

Constant flow units are normally used where there is an ample air supply such as provided by an air compressor. Demand type and pressure demand type are generally used where only compressed-air cylinders are available and there is a need to conserve air supply.

Accessories such as welding adaptors are available for protection against arc while wearing the respirator.

5.3 Self-Contained Respirators - Provide complete respiratory protection in areas where the conditions are considered to be immediately dangerous to life or health. The wearer is independent of the surrounding atmosphere because he is breathing with a system admitting no outside air. The air supply of the apparatus itself takes care of all respiratory requirements.

5.3.1 Airline Respirator with Escape Bottle - Airline respirators (discussed in 5.2 become self-contained apparatus with the addition of an "escape bottle" of air. This allows the wearer, should the primary air source fail. to escape to a clear atmosphere by disconnecting the air supply hose and breathing from the escape bottle. This equipment is not meant to be used routinely without the airline connection. (The "5-minute" bottle itself is to be used for ESCAPE ONLY. At no time should it be used to enter a hazardous atmosphere or perform work.)

5.3.2 "Air Paks" (Open Circuit Self-Contained Breathing Apparatus (SCBA) - "Air Paks" are to be used for emergency procedures or for instances where an airline respirator with escape bottle would not be feasible. They provide a service life of approximately 30 minutes. The actual service life is dependent on the individual users work load, emotional stress and familiarity with the equipment. All of our "Air Paks" are of the pressure demand variety.

Pressure demand style "air paks" have a special regulatory and exhalation valve combination which maintains a slight positive pressure in the facepiece at all times. In this case, should the facepiece not be sealed properly, air will be forced out of the facepiece preventing the contaminant from entering the mask.

5.3.3 Close Circuit Self-Contained Breathing Apparatus

This is a special item of equipment used only by the "Chlorep Team". They are maintained by the Safety Department. Special training, beyond that for regular air paks, must be taken before using this equipment. Their nominal service life is four hours.

VI. SELECTION OF RESPIRATORS

6.1 General

The Plant Industrial Hygienist shall select and specify the type of respiratory protection to be used for each job in the plant. In those instances where a task or job has not previously been assigned the proper respirator (see Appendix A), the supervisor will contact the Safety Department Industrial Hygienist for a determination. Once that determination has been made, it will be added to the manual for future reference.

The selection of the proper type of respirator shall be based on:

1) the nature of the hazardous operation or process,
2) the type of respiratory hazard--including physical properties, physiological effects on the body, concentration of toxic material, established permissible exposure limits, and established I.D.L.H. concentrations for the material(s),
3) the location of the hazardous area in relation to the nearest area having respirable air,
4) the period of time for which respiratory protection must be worn,
5) the actvities of workers in the hazardous area,
6) the physical characteristics and functional capabilities and limitations of the various respirators,
7) respirator protection factors.

For those chemical hazards which are covered by a specific OSHA Comprehensive Standard (e.g. Lead, Asbestos, or Vinyl chloride) or a PPG Health Performance

Guideline (e.g. Mercury, EDC, or VDC) respirator selection will be based on requirements set therein.

Respirator selections shall be periodically reviewed and changed if necessary, when changes have been made in operations, monitoring results show change in average workplace concentrations, or at employee or supervisor request.

6.2 Specified Respiratory Protection

Appendix A contains the completed respirator selection sheets for most jobs in the plant. These sheets and the information therein are not to be interpreted as dictating job or task assignments for that job title. If an employee normally functions in some other capacity, but has been assigned by his/her supervisor to do a task similar to one which is listed, they shall be required to wear the respiratory protection indicated for that assignment.

6.3 Respirator Selection Logic Diagram

This diagram has been included to give users and supervisors a brief "picture" of the decision making logic behind respirator selection. The actual process is much more involved and should not be done based on information contained in this sub-part alone. Numbers placed under the respirator types refer to the description and limitations for each found in Section V "Types and Limitations of Respiratory Equipment).

An important decision point involves whether the concentration of the contaminant (and thus the worker's environment or atmosphere) is considered "Immediately Dangerous to Life or Health" (IDLH). An IDLH atmosphere is defined as one which "poses an immediate hazard

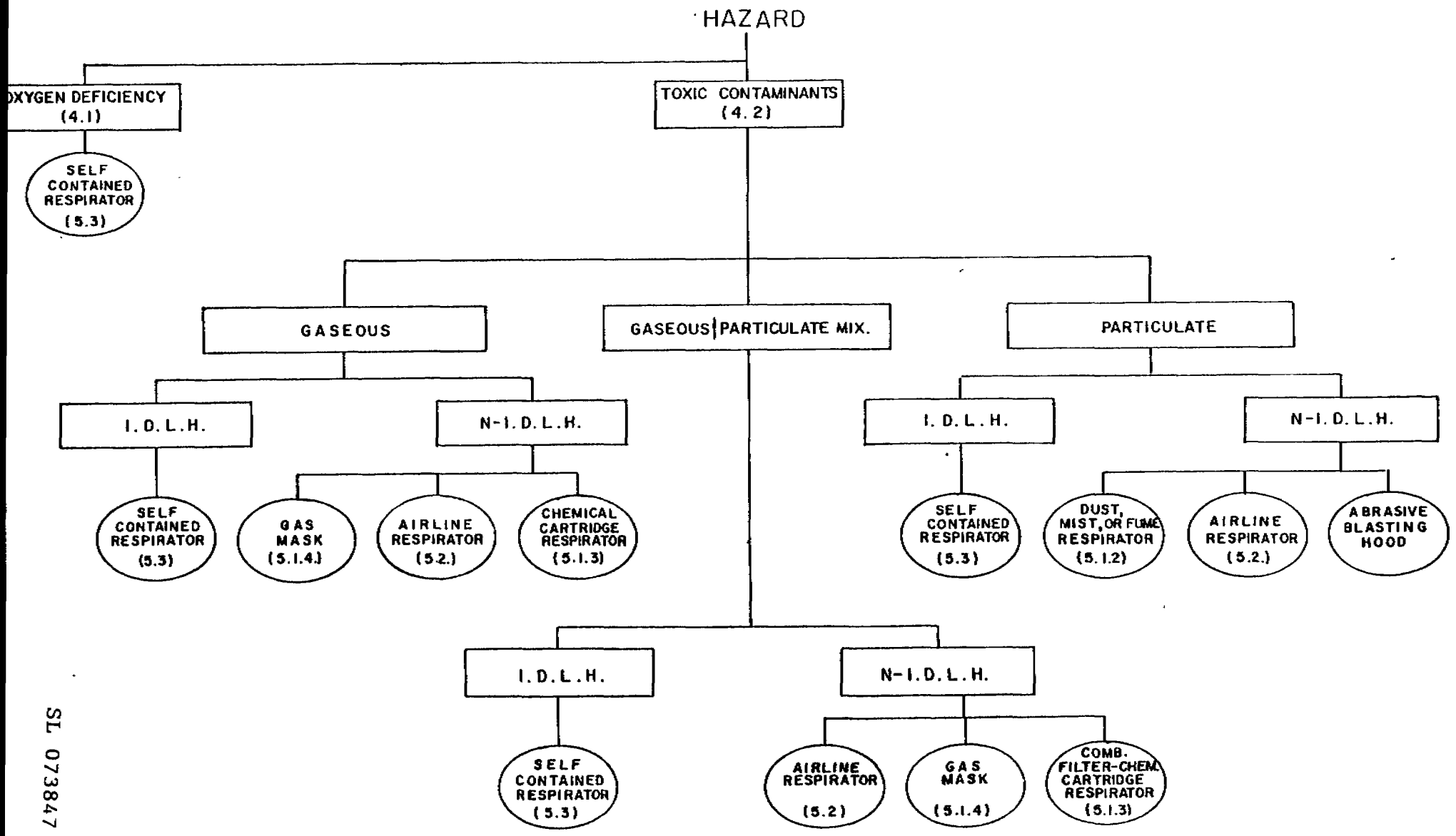
to life or produces irreversible debilitating effects on health."

An atmosphere which is considered "Not Immediately Dangerous to Life or Health" (N-IDLH) may still be considered as hazardous and thus require respiratory protection. N-IDLH is defined as "any hazardous atmosphere which may produce physical discomfort immediately, chronic poisoning after repeated exposure, or acute adverse physiological symptoms after prolonged exposure".

Chemical concentrations which are considered to be "IDLH" are listed in Appendix B. Chemical concentrations which are less than IDLH but greater than the PPG Internal Exposure Limit for that chemical should be considered as N-IDLH.

FIGURE 1

RESPIRATOR SELECTION LOGIC DIAGRAM



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VII. USE OF RESPIRATORY PROTECTIVE EQUIPMENT

7.1 Field Testing for a Proper Facial Seal

Each time respiratory protective equipment is put on, it must be checked for a proper seal by the wearer. (An exception to this rule is when an individual is wearing a constant flow air supplied hood---for example, an abrasive blasting hood.) There are two acceptable methods for doing this:

A. Negative Pressure Test

1. Put the respirator on as instructed during training.
2. Seal the respirator inlet(s) by placing the palm(s) of hand(s) over the respirator inlet (cartridges, breathing tube, etc.).
3. Inhale gently until the mask collapses against face, and then hold your breath for at least 10 seconds.
4. If the mask stays collapsed against your face while you are holding your breath, you can be reasonably sure you have a good seal. If not, readjust the straps and try again.

-OR-

B. Positive Pressure Test

1. Put the respirator on as instructed in training.
2. Seal or close off the exhalation valve/outlet by placing the palm of your hand over it. NOTE: With some equipment it may be necessary to remove the exhalation valve cover before the valve itself can be blocked off. This should be done carefully to avoid disturbing the mask's seal.

3. Exhale gently.

4. The fit of a respirator can be considered to be satisfactory if a slight positive pressure can be built up inside the mask without detecting any outward leakage of air between the sealing surface of the facepiece and the wearer's face.

5. If the fit is satisfactory, carefully replace the exhalation valve cover--if removed.

Care must be taken in carrying out a negative or positive pressure sealing test or the results of the test may be unreliable.

7.2 Emergency Use of Respiratory Protective Equipment

7.2.1 Emergency entry into areas of unknown contaminant levels or possible oxygen deficiency shall be done only with pressure-demand Self-Contained Breathing Apparatus or with pressure-demand airline respirators which are equipped with an "Escape" bottle. This shall apply to:

1. Entry into an operating unit under major upset conditions either from that control room or from outside the plant.

2. Those individuals required to remain inside of a control room after non-essential personnel have evacuated.

3. Those individuals required to enter a hazardous or IDLH area for the purpose of making emergency repairs.

4. Those individuals required to enter a hazardous or IDLH area to contain or clean up a major spill of some hazardous liquid.

5. Entry into a vessel or other confined space when an occupant has been overcome.

7.2.2 Firefighting and/or Rescue

Those individuals entering an area of unknown contaminant levels or possible oxygen deficiency for the purpose of firefighting or rescue shall wear Self-Contained Breathing Apparatus (air paks) only. SL 073849

7.3 Leaving a Hazardous Area

A respirator wearer shall be required to leave a hazardous area for a respiratory malfunction. Reasons which may cause a respirator wearer to leave a hazardous area include, but are not limited to, the following:

1) failure of respirator to provide adequate protection,
2) malfunction of respirator,
3) detection of leakage of air contaminant into the respirator,
4) increase in resistance of respirator to breathing,
5) severe discomfort of wearing the respirator,
6) illness of respirator wearer including: sensation of dizziness, nausea, weakness, breathing difficulty, coughing, sneezing, vomiting, fever, or chills.

7.4 Special Problems in Respirator Use

7.4.1 Facial Hair

Facial hair lying between the sealing surface of a respirator facepiece and the wearer's skin will prevent a good seal. Even a few day's growth of stubble will permit excessive contaminant penetration.

Respirators must fit the face properly in order to provide protection as designed. Therefore, anyone who has facial hair that passes between his face and the sealing portion of a mask shall remove such hair. It is necessary to have only bare skin contacting the sealing surface of the respirator facepiece. (Refer also to Standard Polices and Procedures Manual III-2.)

7.4.2 Corrective Lenses

Those who must wear spectacles present a problem in respirator protection. Spectacle temple bars or straps that pass between the sealing surface of a full facepiece and the wearer's face prevent a good seal. Therefore,

spectacles that have temple bars or straps cannot be used when a full facepiece respirator must be worn. Those individuals who, as determined by the Plant Physician, cannot see well enough to function safely without corrective lenses will be provided with a special pair of glasses. These glasses have an attachment device which can be mounted within the facepiece and does not interfere with the mask seal. Persons requiring the attachment must keep them available, close at hand, at all times.

Contact lenses may not be worn in the plant. Special permission may be granted by the Plant Physician and Plant Manager, but full-face respirators may not be worn in conjunction with contact lenses. Those who have special permission to wear contact lenses must wear goggles while in eye protection areas.

7.4.3 Miscellaneous Sealing Problems

Scars, hollow temples, very prominent cheekbones, deep skin creases, or lack of teeth or dentures may cause respirator facepiece sealing problems. Respirators shall not be worn when, for any reason, a proper facepiece seal cannot be achieved.

7.5 Common Mistakes with Respiratory Equipment

The following is a list of common mistakes in respiratory protection practices. By noting these mistakes and becoming aware of them, the employee will be able to obtain the necessary protection from his respirator.

1. Cartridge Respirator

   a) Exhalation valve cover missing - This round cover, which is located under the "chin" of the respirator face cup, must always be in place. Its purpose is to protect the exhalation

spectacles that have temple bars or straps shall not be used when a full facepiece respirator must be worn. Those individuals who cannot see well enough to function safely without corrective lenses will be provided with a special pair of glasses. These glasses have an attachment device which can be mounted within the facepiece and does not interfere with the mask seal. Persons requiring the attachment must keep them available, close at hand, at all times.

Contact lenses shall not be worn while wearing a respirator in contaminated atmosphere. Contaminants that penetrate the respirator may get into the eyes and cause severe discomfort because of the contact lenses. Unless a special exception is made by the Plant Physician as absolutely necessary, contact lenses shall not be worn while in the plant.

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valve from damage and from foreign objects getting between the valve and the respirator face cup. Since the air will travel the path of least resistance, it is possible to breathe air in through the exhalation valve if dust or another foreign object is preventing the valve from completely closing. The cover also provides a "dead space" of safe air. This space increases the protection provided by a respirator against toxic contaminants. In this situation, the air breathed would be unfiltered. This condition is very common and is dangerous.

b) Use of only one strap - To insure a proper face-to-respirator seal, it is important that all "head" straps be used. It is also imperative that the proper strap be used with the respirator. Occasionally an employee may modify the manufacturer's straps in a configeration where only one strap is used to hold the respirator on. Likewise, occasionally an employee replaces the manufacturer's straps with elastic straps that are made for another type of respirator. Any modification will nullify the approval of the respirator and also increase the likelihood of a poor fit or seal.

The correct way for the straps to be worn is for one to be worn across the top of the head, and the other around the neck. Both of these straps must have enough tension to hold the respirator firmly against the face.

d) Torn or distorted face cup - Occasionally an employee is seen wearing a respirator with a torn or badly distorted face cup. When the cup is in either of these conditions, it is impossible to obtain a proper face-to-respirator seal, and it must be replaced.

e) Using cartridges too long - There is no set rule for the amount of time that a chemical cartridge should be worn. The useful life of these cartridges is dependent upon the exposure that these cartridges have had.

Cartridges should be replaced on the respirators if the following conditions exist:

a) if it becomes hard to breathe through,

b) if any odor is detected coming through the cartridge.

f) Improper seal along the nose "bridge" - Occasionally employees are seen wearing their respirators in a manner where there is a large space between the respirator and the nose. A person wearing a respirator in this manner is receiving almost no protection, since most of the air he breathes enters and exits through the space between the respirator and nose. See Safety Department for assistance if a proper fit cannot be obtained.

2. Canister Gas Mask

The major error in the use of the canister gas mask is using beyond its design limits. These masks must not be used in place of supplied air respirators or a self-contained breathing apparatus. A canister gas mask is nothing more than a "large" cartridge respirator.

3. Supplied Air Respirators

With the supplied air respirators, the major error is improper care of the respirator in contaminated areas. Employees may be observed leaving their respirators in contaminated areas while they are on breaks. After returning from breaks, the employees put

these respirators back on, not realizing the possibility of the respirators themselves becoming contaminated during the time they were on break. Therefore, respirators must never be left in a contaminated area.

For all types of equipment, respirator facepieces must not be handled with contaminated gloves, nor wiped on soiled clothing.

VIII. EQUIPMENT PROCUREMENT AND RETURN

8.1 General

Equipment procurement and return shall be the responsibility of those checking out the equipment. All equipment which is not assigned to a unit or individual will be used on a loan basis from the Safety Department. Equipment is issued by serial number and becomes responsibility of the person who checks it out to see that it is returned promptly after use. This policy is necessary in order to insure adequate equipment to respond to emergency needs and to facilitate proper stocks for routine usage.

8.2 Procurement

Equipment can be picked up from either of the Safety Repair Shops. The person receiving the equipment will sign the "Equipment Loan Report" and receive a copy. The shops are located in Plants "A" and "C".

When it is not possible for the supervisor or one of their employees to pick up the equipment, the Storeroom Delivery System may be used. All air line bottle rigs are delivered by the Delivery System winch truck.

Pre-planning is necessary to insure that equipment is at the job site when needed. The proper procedure for getting safety equipment by way of the Delivery System is as follows:

1. Call the nearest Safety Repair Shop.
2. Tell the Safety Attendant what you need, how long you will need it and what delivery station it will go to. They will

3. The Safety Attendant will then call the Delivery System dispatcher and tell him you have materials at Safety Repair "A" or "C" to go to Station ___? They will pick up the equipment at the delivery station. THE SAFETY DEPARTMENT, EXCEPT DURING AN EMERGENCY SITUATION, CANNOT DELIVER EQUIPMENT.

8.3 Equipment Return

The return of equipment is essentially the opposite of procurement. Equipment must be returned to the Safety Repair Shop from which it was issued in order to receive proper credit for return and so that the equipment may be quickly cleaned, etc., and made available for the next user.

If you must use the Storeroom Delivery System to return equipment, you must contact them. However, using the Delivery System does not relieve the individual user of his responsibility to insure that the equipment is returned.

When returning air bottle rigs, remember that the regulator must be removed and the bottles properly capped, before the winch truck moves them. This is a plant safety rule! Winch truck operators do not carry the tools to do this--one of the work crews must do this beforehand.

IX. CLEANING AND MAINTENANCE OF RESPIRATORY EQUIPMENT

9.1 Individually Issued Equipment

Individually issued respiratory protective equipment must be cleaned by the user after the end of the work shift. After cleaning and drying, the individual should visually inspect the respirator for signs of deterioration or damage. The proper procedure for inspecting a respiratory is covered under Section X of this manual. After inspecting the respirator it must be placed in a clean container and stored in a clean and dry location in such a manner to prevent damaging or deforming the respirator. (Do not store respirators in the work area or in tool boxes.)

Proper method for cleaning:

1. Remove cartridges and/or filters (discard if necessary).
2. Rinse under stream of running water to remove excess deposits of dirt, etc.
3. Using cleaner - sanitizer spray provided by the Safety Department--spray inner and outer surfaces of respirator lightly. (A little goes a long way!)
4. Wipe the respirator clean/dry using paper towels. (Do not rinse solution off.)
5. Reassemble and store respirator properly.
6. Respirators which show damage or deterioration must be replaced on an exchange basis from the Safety Repair Shop.

9.2 General Issue Equipment (Loaned)

Generally issued equipment shall be cleaned and serviced by the Safety Department prior to being reissued.

X. INSPECTION

10.1 Cartridge Respirators

1. Personal Issue - After cleaning and/or before each day's use, the wearer shall complete a visual inspection of the respirator checking the following items:
   1. Inhalation valves in place.
   2. Exhalation valve and cover in place.
   3. Head and neck straps not overstretched or damaged.
   4. Cartridge holder gaskets in place.
   5. Body of respirator pliable, sealing surfaces not torn or distorted.
   6. Respirator is clean and dry.
   7. Supervisors shall insure that personal issue respirators are maintained in good condition.
2. Loan Issue - The Safety Department inspects cartridge respirators issued on loan during cleaning and servicing, prior to issue.

10.2 Gas Masks

The Safety Department inspects all gas masks during cleaning/servicing. In addition, those masks which are stored in the plant for emergency use are inspected monthly. The user, however, should still inspect the gas mask prior to putting it on. To do this, the following items should be checked:

1. Facepiece is flexible.
2. There are no holes in the breathing tube.
3. The seal is in place on the bottom of the canister.

10.3 Airline Respirators

The Safety Department inspects all airline respirators and associ air hose and bottle regulators during cleaning/servicing. In addition,

emergency airline respirators with escape bottles which are stored in control rooms are inspected monthly.

10.4 Self-Contained Breathing Apparatus (Air Paks)

The Safety Department makes a monthly inspection of all air paks stored in the plant for emergency use. Records of such inspection are maintained by the Safety Department in addition to a tag on the equipment which is dated and initiated by the person completing the inspection. Each user should additionally check the equipment prior to putting it on using the following list:

1. Check that facepiece is clean and rubber parts are pliable.
2. Check the cylinder gauge--it should read "Full" or approximately 2000 psig. (The regulator gauge will not indicate cylinder pressure until the bottle valve is opened!
3. Check that all straps are fully extended.

XI. PROGRAM EVALUATION

The Safety Department and departmental supervisors shall conduct periodic inspections to assure compliance with this program. On an annual basis the Program Administrator in conjunction with plant supervisors shall complete a "Progam Evaluation", the results of which shall be reported to the Plant Safety Council.

APPENDIX A

SPECIFIED RESPIRATOR USAGE

PLANT_____

DEPARTMENT_____

AREA_____

JOB TITLE OR ASSIGNMENT:_____

POTENTIAL CHEMICAL EXPOSURES:_____

_____

CONDITION	RESPIRATOR

APPENDIX B

	IDLH CONCENTRATION (IN PPM)	PPG INTERNAL EXPOSURE LIMITS (shift twa) (in ppm)
Ammonia	500	25
Chlorine	25	1 (STEL)
1,1 - Dichloroethane	4,000	10
Epichlorophydrin	100	5 (STEL)
Ethyl Chloride	20,000	200
Ethylene Dichloride	1,000	5
Hydrogen Chloride	100	5 (STEL)
Hydrogen Sulfide	300	10
Mercury	28 mg/m^3	0.1 mg/m^3
Methyl Chloroform	1,000	350
Perchloroethylene	500	50
Phosgene	2	.1
Pyridine	3,600	5
Sulfuric Acid	80 mg/m^3	1 mg/m^3
1,1,2,2 - Tetrachloroethane	150	5
1,1,2 - Trichloroethane	500	10
Trichloroethylene	1,000	150
Vinylidene Chloride	4,000	2.5
Vinyl Chloride	(25.)	1.0