U.S. Environmental Protection Agency

Emergency Responder Health and Safety Manual

Chapter 3: Respiratory Protection Program Implementation Plan

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LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
APF	Assigned Protection Factor
APR	Air-purifying Respirator
ASR	Atmosphere Supplying Respirator
CBRN	Chemical, Biological, Radiological, and Nuclear
CFR	Code of Federal Regulation
CGA	Compressed Gas Association
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DOT	Department of Transportation
ESLI	End-of-Service-Life Indicator
EPA	Environmental Protection Agency
FF	Fit Factor
FID	Flame Ionization Detector
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response (OSHA Standard)
HEPA	High Efficiency Particulate Air (Filter)
IDLH	Immediately Dangerous to Life or Health
mg/m3	milligrams per cubic meter
MUC	Maximum Use Concentration
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NIOSH	National Institute for Occupational Safety and Health
O&M	Operation(s) & Maintenance
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
PAPR	Powered Air-Purifying Respirator
PEL	Permissible Exposure Limit
PID	Photo Ionization Detector

PLHCP	Physician or other Licensed Health Care Professional
PNOR	Particles Not Otherwise Regulated
ppm	parts per million
QLFT	Qualitative Fit Test
QNFT	Quantitative Fit Test
RAM	Real-time Aerosol Monitor
REL	Recommended Exposure Limit
SCBA	Self-Contained Breathing Apparatus
SHEMP	Safety, Health, and Environmental Management Program
TLV	Threshold Limit Values
WMD	Weapons of Mass Destruction

1.0 INTRODUCTION

In 2002, representatives from the U.S. Environmental Protection Agency (EPA) identified the need to develop a health and safety manual that specifically addresses the activities of EPA emergency response personnel. People in this group include EPA On-Scene Coordinators (OSCs), Environmental Response Team members, and other emergency responders. In an effort to protect these workers, EPA is developing an Emergency Responder Health and Safety Manual, the objectives of which are to (1) give EPA emergency response personnel the tools they require to perform field work in a safe manner; (2) promote a consistent approach to health and safety across the entire Agency so that emergency responders from different regions are interchangeable; and (3) equip EPA emergency response personnel with the tools they need to write accurate, complete, and effective site-specific Health and Safety Plans (HASPs).

This *Respiratory Protection Program Implementation Plan* serves as one of the "bricks" in the foundation of EPA's Emergency Responder Health and Safety Manual. The chapter was developed by EPA's Respiratory Protection Workgroup, a team represented by people from a variety of backgrounds, including OSCs, Removal Managers, and other key EPA employees.

1.1 Scope and Purpose of this Chapter

EPA provides respiratory protection to personnel who enter atmospheres that contain unhealthy concentrations of contaminants, are suspected to be deficient of oxygen, or where toxic agents could be released. The Agency's emergency response personnel generally work in non-traditional settings and are among the first EPA employees to arrive at a site. While certain respiratory protection devices are prescribed for some situations, emergency response personnel often must make decisions about the type of respirators they will use as the situation changes at a site. This chapter provides information on the selection, use, and maintenance of respiratory protection equipment; the testing and training requirements that must be met before donning a respirator in the field; and tools that are available to help personnel react appropriately to diverse and changing environments. The goal of this chapter is two-fold:

- *Serve as an implementation plan for **regional/local** Respiratory Protection Programs and describes how to meet EPA's National Minimum Standards.* This chapter, along with its appendices, will serve as an implementation guide that should be used by all EPA regional and local emergency response offices. For example, it presents information on the tasks that must be performed to implement a Respiratory Protection Program at the regional or local level and provides information regarding who should be held accountable for performing each of these tasks. (See Appendix A for a detailed task chart.) In addition, this chapter establishes criteria that define the minimum level of compliance or proficiency that must be met with regard to implementing the Respiratory Protection Program for EPA emergency response personnel. These criteria—referred to as EPA's National Minimum Standards for a Respiratory Protection Program—were established by the Respiratory Protection Workgroup. These criteria are presented in Appendix B and reflected throughout this chapter.

- *Providing the building blocks for **site-specific** Respiratory Protection Programs.* The Occupational Safety and Health Administration's (OSHA's) Respiratory Protection standard (29 CFR 1910.134) requires that employers, such as EPA, develop and implement written Respiratory Protection Programs that contain *worksite-specific* procedures for respirator use. As described in more detail below, portions of this chapter can be inserted into a HASP to help satisfy OSHA's requirement for site-specific written Respiratory Protection Programs.

1.2 Using this Chapter

1.2.1 Customizing the Chapter To Incorporate Regional/Local Information

This chapter contains information on implementing a Respiratory Protection Program that is consistent with OSHA requirements (29 CFR 1910.134) and EPA's National Minimum Standards (see Appendix B of this chapter). However, to be relevant at the local or regional level, the chapter must be customized to include current regional/local information. Each region/local office is expected to produce a customized version of this chapter. To accomplish this, those who will play a role in implementing their region's Respiratory Protection Program must insert region-specific information into the yellow-highlighted blank lines that appear throughout the text and in Appendix A. In addition, users must review the tasks and assignments listed in Appendix A and insert the names of the individuals who have been assigned specific responsibilities under the Respiratory Protection Program. The customized version of this chapter will qualify as the region's written respiratory protection program.

1.2.2 Creating Site-Specific Written Respiratory Protection Programs

In accordance with OSHA requirements, for each site where respiratory protection is required, EPA must also produce a written Respiratory Protection Program that contains *worksite-specific* respirator-use procedures. To satisfy OSHA's requirements, the written program governing a site must include information on the procedures that will be used to do the following:

- Perform hazard evaluations.
- Select respirators.
- Ensure respirator users complete an appropriate medical evaluation.
- Ensure respirator users are fit tested with the respirators they wear.
- Ensure respirators are used correctly in routine and reasonably foreseeable emergency situations.
- Clean, disinfect, store, inspect, repair, discard, and otherwise maintain respirators.
- Ensure breathing air quality and quantity meets minimum requirements.
- Train employees on respiratory hazards and proper use of respirators.
- Evaluate the effectiveness of the program.

These topics are addressed in Sections 4.1 through 4.10 and Section 6.0 of this chapter. Thus, to meet OSHA's requirements for a site-specific written program, EPA can insert customized versions of these specific chapter sections directly into a HASP. In addition, a customized version of Appendix A should be inserted into the HASP as well.

> OSHA has clarified that in the case of emergency response activities, which can occur under various conditions and in many locations, simply referencing HASPs in a generic Respiratory Protection Program does not constitute a site-specific program. However, if specific information regarding respirator use is included in the HASP, the HASP itself can satisfy the requirement for a site-specific written Respiratory Protection Program [Reference: *Clarification on the New Respiratory Protection Standard (1910.134) for EPA/Labor Superfund Health and Safety Task Force*].

1.2.3 Other Tools Included in the Chapter

The chapter is designed to be user-friendly and easy to navigate. Toward this end, hyperlinks have been incorporated throughout the text so that users can access detailed information on a particular topic by simply clicking on key words highlighted in blue. In addition, a quick reference guide for emergency response personnel is provided in Section 7; this guide is designed to give personnel an understanding of what they are expected to do to ensure that they are adequately protected from respiratory hazards. Also, a variety of standardized forms, informational tables, and manufacturer instructions are included in the chapter's appendices.

2.0 REGULATORY BASIS

The following laws and regulations are the sources of the legal authority for and establish the applicability and requirements of this Respiratory Protection Program. Other mandates and consensus standards with collateral impact on this program are also included:

- Executive Order 12196, Occupational Safety and Health Programs for Federal Employees, February 26, 1980.
- Environmental Protection Agency, Order 1460.1, Occupational Medical Surveillance Program, June 18, 1996.
- EPA Safety, Health, and Environmental Management Program (SHEMP), Guide No. 46, Respiratory Protection, August 16, 1996 (this guide replaces Environmental Protection Agency, Order 1440.3, Respiratory Protection, July 24, 1981).
- 40 CFR 300, et seq., National Oil and Hazardous Substances Pollution Contingency Plan (NPC).
- 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.
- 29 CFR 1910.134, Respiratory Protection.
- 29 CFR 1910 and 1926, Subpart Z, Toxic and Hazardous Substances.
- 29 CFR 1960, Basic Program Elements for Federal Employees OSHA.
- 49 CFR 173 and 178, General Requirements for Shipping and Packaging.
- ANSI Z88.2-1992, American National Standards Institute (ANSI), Standard Practices for Respiratory Protection.
- ANSI Z48.1-1954, American National Standards Institute (ANSI) Method for Marking Portable Compressed Gas Containers to Identify the Materials Contained.
- Compressed Gas Association G-7.1-1997, Commodity Specification for Air.
- ANSI Z88.10 - 2001, American National Standards Institute (ANSI), Respirator Fit Testing Methods.
- 42 CFR 84, Approval of Respiratory Protective Devices.
- 40 CFR 750, Procedures for Rulemaking Under Section 6 of the Toxic Substances Control Act.
- 10 CFR 20, Standards for Protection Against Radiation.
- National Institute for Occupational Safety and Health (NIOSH) Respirator Selection Logic, Publication No. 2005-100

3.0 ROLES AND RESPONSIBILITIES

Extensive coordination is required to implement a Respiratory Protection Program that protects emergency response personnel from exposures to airborne contaminants. People who will play a role in implementing the program include:

- *The Respiratory Protection Program Administrator.* OSHA requires that a suitably trained Program Administrator implement the written Respiratory Protection Program. This national-level Program Administrator maintains overall responsibility for the operation of the Respiratory Protection Program for emergency response personnel. Responsibility for specific portions of the program may be delegated at the regional or local level by modifying Appendix A of this chapter, however, the ultimate program responsibility cannot be delegated.

- *The Safety, Health, and Environmental Management Program (SHEMP) Manager*. The SHEMP Manager is the primary person responsible for overall worker health and safety for an EPA region. In that role, the suitably trained SHEMP Manager is responsible for overseeing the day-to-day operation of the Respiratory Protection Program at the regional level *(this overall regional responsibility cannot be delegated*). The SHEMP Manager is also responsible for performing (or delegating) the program requirements, such as training, fit testing, coordinating medical evaluations, and recordkeeping.

- *The Removal Manager*. The Removal Manager is responsible for the health and safety of all personnel who work within his or her section or branch. Removal Managers must make sure that the procedures outlined in the Respiratory Protection Program are implemented and followed by the responsible parties. Removal Managers must place strong emphasis on protecting EPA emergency response personnel, supporting programs that are established by the Program Administrator or SHEMP Manager, and promoting an attitude of safety among all workers. (Removal Managers are also responsible for monitoring contractors to ensure that they are compliant with all applicable health and safety requirements.) Removal Managers must authorize assets and time for training, equipment maintenance, and equipment storage, and must devote resources to other issues that pertain to respiratory protection. Toward this end, Removal Managers must communicate frequently with those who deal with respiratory protection issues on a day-to-day basis, such as the Program Administrator, SHEMP Manager, and Health and Safety Program Contact.

  > EPA Removal Managers should be aware of on-site health and safety activities and are responsible for *monitoring* both federal employee and contractor compliance with EPA health and safety requirements, site health and safety requirements, and applicable federal and state standards and regulations. However, EPA Removal Managers are only *directly responsible* for their own staff. Pursuant to 40 CFR 300.150, National Oil and Hazardous Substances Pollution Contingency Plan (NPC), each government agency and private employer is responsible for the health and safety of its own employees and for ensuring compliance with OSHA requirements, applicable state laws, and with EPA health and safety programs. Thus, EPA personnel shall not select respiratory protection levels and/or equipment for contractor personnel. The contractor shall be responsible for selecting the appropriate respiratory protection for contractor personnel, although EPA personnel may accept or disapprove the contractor's selection.

- *The Health and Safety Program Contact*. The Health and Safety Program Contact is an OSC who has special collateral duties and serves as the primary point of contact for a region's emergency response program. This person serves as a contact for all health and safety issues, including those related to respiratory protection during emergency response activities. He or she facilitates communication between the various managers who have been delegated the responsibility of administering the

Respiratory Protection Programs and the emergency response personnel who are subjected to such programs. In addition, the Health and Safety Program Contact may be called upon to help facilitate respiratory protection-related training. Also, he or she may also serve as the single point of contact in charge of centrally-managed respiratory protection equipment and in-house breathing air supplies; while some of these functions may be delegated to assistants or a contractor, overall responsibility for these tasks will reside with the Health and Safety Program Contact.

- *Emergency Response Personnel*. OSCs and other EPA personnel who perform field work or respond to emergency situations are responsible for attending/completing safety training and following on-site safety requirements. While Regional SHEMP Managers, Removal Managers, and the Health and Safety Program Contact must ensure that the appropriate tools are in place to educate and protect workers, it is the responsibility of the individual worker to use these tools and maintain a level of emergency response readiness. Emergency response personnel must also ensure the safety of all on-site personnel working in the field.

Table 1 provides an overview of the tasks involved with implementing a Respiratory Protection Program at the regional level. A more detailed task chart is included in Appendix A. In an effort to promote consistency, the Respiratory Protection Workgroup has assigned tasks to specific EPA positions. At the same time, however, the authors wish to acknowledge that a certain degree of flexibility is acceptable and that some tasks can be re-assigned if it makes more sense to do so for a particular region. If users wish to re-assign a task to someone other than the person the Respiratory Protection Workgroup assigned it to, they can do so when they go through the process of customizing Appendix A and when they fill in region-specific information into the main text. Areas where flexibility is acceptable are indicated within the main text by yellow-highlighted blank lines. For example, the text might say "**The SHEMP Manager (or another designated individual)** is responsible for..." In such cases, users should fill in the name of the specific person (or specific position title) who will be held accountable for performing the task within their particular region. As a key step in implementing this Respiratory Protection Program, the Program Administrator must ensure each individual duty listed in Appendix A is delegated to a specific responsible individual. Although the Program Administrator has overall responsibility for ensuring that the duties are delegated, he/she may delegate the task of making regional-level assignments to the SHEMP Manager.

TABLE 1:
ROLES AND RESPONSIBILITIES—IMPLEMENTING THE RESPIRATORY PROTECTION PROGRAM AT THE REGIONAL LEVEL

Activities	EPA Positions			
	Removal Manager	**SHEMP Manager**	**Health and Safety Program Contact**	**EPA Emergency Response Personnel (e.g., OSCs and other emergency responders)**
General Responsibilities	• Ensure that procedures in this *Respiratory Protection Program Implementation Plan* are followed. • Support respiratory-protection-related initiatives. • Provide the necessary personnel, resources, and equipment needed to support the Respiratory Protection Program.	• Assist the national Program Administrator in ensuring that all of the tasks outlined in the *Respiratory Protection Program Implementation Plan* are assigned to a specific person. • Oversee day-to-day operation of the Respiratory Protection Program at the regional level.	Serve as the regional point of contact on respiratory-protection-related issues for emergency response personnel. (Facilitate communication between managers and emergency response personnel.)	Ensure the safety of all onsite personnel working in the field.
Developing HASPs, Evaluating Hazards, Selecting Controls and Appropriate Respirators, and Adhering to Guidelines Regarding the Proper Usage of Respirators	• Ensure that HASPs include adequate information to guide effective employee protection and to satisfy OSHA's requirements for a written Respiratory Protection Program that contains worksite-specific procedures. • Ensure that the respiratory-protection-related components of the HASP are actually implemented in the field.	• Ensure that HASPs include adequate respiratory-protection-related information and that the HASP components are actually implemented in the field. • Approve respirator selections. • Review and approve (or deny) requests to use alternate (not Standard Issue) respirators.	Upon request, provide the SHEMP Manager and emergency response personnel with information about respiratory protective equipment available for transport to sites.	• Conduct hazard evaluations. • Minimize airborne hazards through hazard-reduction controls whenever feasible. • Determine which type of Standard Issue respirator is needed to perform tasks. • Ensure that a site-specific HASP (containing information on respiratory protection) is developed and approved for each site. Also, ensure that the HASP is implemented in the field. In addition, conduct field monitoring activities to confirm that adequate respiratory protection is being provided. • Adhere to recommended guidelines regarding when to don/doff respirators, when to leave hazardous environments, and when to change filters and cartridges.

Activities	EPA Positions			
	Removal Manager	**SHEMP Manager**	**Health and Safety Program Contact**	**EPA Emergency Response Personnel (e.g., OSCs and other emergency responders)**
Preparing Personnel to Wear Respiratory Protection	Ensure that EPA emergency response personnel demonstrate proper ability/knowledge before being allowed to work in environments that require respiratory protection.	• Provide working condition- and respirator-related information to physicians who examine emergency responders. • Ensure that employees are medically cleared before letting them wear a respirator. • Provide initial and annual QNFT respirator fit testing. • Ensure that personnel obtain respiratory protection training and that they participate in field exercises. Maintain logs of training events. • Provide OSHA-related information to voluntary respirator users.	Assist the SHEMP Manager in preparing personnel to wear respiratory protection.	• Participate in baseline and annual medical evaluations. • Complete initial (and annual refresher) respiratory protection training courses. (This includes participating in annual hands-on exercises to demonstrate prowess in donning/doffing respirators, cleaning and inspecting them, tearing down and reassembling them, etc.) • Complete fit testing with each type of respirator to be worn. • Perform a user seal check whenever donning a tight-fitting respirator.
Managing Respiratory Protective Equipment	Enforce policies related to proper cleaning, maintenance, storage, and inspection procedures for respiratory equipment. As part of this effort, ensure that all of the tasks related to these activities have been delegated and that all involved understand their roles and responsibilities.	• Ensure that all activities related to proper cleaning, maintenance, storage, and inspection procedures for respiratory equipment have been delegated and that all involved understand their roles and responsibilities. • Issue respiratory protection for individual use by qualified employees.	• Maintain responsibility for inspection, maintenance, and storage of centrally-stored equipment. • Collect *Monthly Respirator Inspection Checklists*. • Ensure that adequate supplies are maintained • Arrange for repairs. • Ensure that SCBAs are inspected by the manufacturer. • Maintain logs of inspections performed on cartridges, canisters, and cylinders.	Maintain responsibility for inspection, maintenance, and storage of any respirator issued for his/her personal use. For example, maintain respirators in a clean and sanitized condition; inspect them before and after each use, during cleaning, and also on a monthly basis; and document monthly inspections using the *Monthly Respirator Checklist*.

Activities	EPA Positions			
	Removal Manager	**SHEMP Manager**	**Health and Safety Program Contact**	**EPA Emergency Response Personnel (e.g., OSCs and other emergency responders)**
Managing Breathing Air, Compressors, and Cascade Systems	Ensure that only properly qualified individuals are allowed to operate an air compressor.	Review and approve the *Breathing Air Compressor Operation and Maintenance Plan* if the region has an in-house air compressor.	• Coordinate efforts to obtain breathing air cylinders for emergency responders and ensure that the cylinders come with appropriate documentation. • Serve as point of contact for any regionally operated compressor systems and maintain complete accountability for the operation and maintenance of that system. • Draft the *Breathing Air Compressor Operation and Maintenance Plan* and submit the plan to the regional SHEMP Manager for approval. • Maintain breathing air compressor usage and maintenance logs.	• If purchasing breathing air from an outside source, employees must ensure that it meets Grade D quality and that they obtain appropriate documentation. • If called upon to perform operations and maintenance activities on in-house air compressors or cascade systems, obtain appropriate training from the equipment manufacturer before engaging in activities.
Audits and Program Evaluation	• Assist with internal program evaluation and auditing efforts. • Upon request, provide appropriate information to Core ER program evaluation teams. • Take action to address any program deficiencies that are identified.	• Fill out the *Respiratory Protection Program Audit Form* annually and keep copies of this form on file. • Evaluate program performance. • Take action to address any program deficiencies that are identified. • Upon request, provide appropriate information to Core ER program evaluation teams.	• Upon request, assist with internal program evaluation and auditing efforts. • Upon request, provide appropriate information to Core ER program evaluation teams.	Upon request, provide appropriate information to assist EPA managers and Core ER auditors with program evaluation efforts.

4.0 WRITTEN RESPIRATORY PROTECTION PROGRAM PER 29 CFR 1910.134

Section 4 is organized as a Respiratory Protection Program and reflects provisions of OSHA's Respiratory Protection Standard, 29 CFR 1910.134(c)(1). As noted previously, region-specific information must be incorporated into this section (and incorporated into Appendix A) in order to meet OSHA's requirements for a written program.

4.1 Conducting a Hazard Evaluation

Hazard evaluations are performed to determine whether control measures are needed to address airborne contaminants at a particular site. A task-by-task hazard analysis (using both qualitative and quantitative tools) will be performed so that emergency response personnel are in a good position to select appropriate hazard control measures for each specific site operation.

In cooperation with other onsite and/or knowledgeable personnel, EPA emergency response personnel are responsible for obtaining details regarding hazardous contaminants, work areas, work activities, and other related information that is needed to assess site-specific hazards. Some work areas may currently be, or have previously been, occupied by another organization that developed its own Respiratory Protection Program, HASP, or hazard evaluation. If so, emergency response personnel may find it helpful to obtain and review these documents. Appendix C presents a Hazard Evaluation Form and a list of items to consider when performing an evaluation. The information provided in the appendix is designed to assist EPA emergency response personnel in obtaining and organizing information during the assessment process. It is also acceptable, however, to use other templates or hazard evaluation procedures.

4.2 Using Controls to Minimize Hazards

Once the hazards have been identified, emergency response personnel must determine which types of control measures are required to minimize the hazard. Before selecting respiratory protective equipment, emergency response personnel should use engineering, work practice, or administrative controls to minimize hazards whenever feasible. Examples of control measures that might be used to reduce hazards include substituting hazardous materials or operations for safer ones, enhancing ventilation of enclosed areas, isolating hazardous operations from workers, using wet methods for dust suppression, decontaminating the work area, or implementing other methods that control the contaminant source. Worker rotation should not be used as a means to avoid the use of respiratory protection in areas with elevated airborne contaminants. If control methods do not reduce the hazard to an acceptable level, respiratory protection is required to supplement these control efforts.

4.3 Procedures for Selecting Respirators for Use in the Workplace

4.3.1 Who Chooses Which Type of Respirator To Use?

If respiratory protection is needed for a particular site, EPA must determine which type of respirator is needed based on the type and nature of the hazard that is present and the availability of hazard-reduction controls. In most cases, the selection will be made by EPA emergency response personnel, their contractors, or other responsible parties involved with the site. The specifics regarding who is involved with the respirator selection process, however, can vary region by region. (For example, some EPA regions may require the SHEMP Manager to make the determination about which type of respirator to use). Specific regional variations in the decisionmaking process should be noted here and in Appendix A (Part II[a]).

Regardless of who makes the selection, the individual emergency responder must review the selection and decide whether he or she accepts the selection before entering a hazardous environment. If inadequate information is available to make a respirator selection, EPA personnel may make the decision not to enter a hazardous environment.

4.3.2 Parameters To Consider When Choosing Respirators

4.3.2.1 Acceptable Respirators—EPA's Standard Issue for Emergency Response Personnel

EPA emergency response personnel primarily use *tight-fitting full facepieces*, which can be adapted with approved components for use as either negative pressure air-purifying respirators (APR), powered air-purifying respirators (PAPRs), or atmosphere supplying respirators (ASRs), such as self-contained breathing apparatus (SCBA) or airline respirators.

To promote national consistency and interchangeability among emergency response personnel, the Agency has designated a specific facepiece as the Standard Issue respirator for EPA emergency response personnel to wear in the field. Table 2 summarizes the different configurations of the Standard Issue respirator that are acceptable to use. More detailed information about the Standard Issue respirator (including brand, models, and specific care instructions) is presented in Appendix D.

TABLE 2:
STANDARD ISSUE RESPIRATOR TYPES, FACEPIECES, AND CONDITIONS OF USE

Type	**Facepiece and Conditions**
Air-Purifying Respirators (APRs)	
Negative pressure	Full facepiece P-100 filter and/or suitable chemical cartridge
PAPR	Tight-fitting full facepiece Continuous flow mode P-100 or HEPA filter and/or suitable chemical cartridge
Atmosphere Supplying Respirators (ASRs)	
SCBA	Tight-fitting full facepiece Positive pressure open-circuit mode
Airline	Tight-fitting full facepiece Connected to an appropriate cascade system

When selecting a respirator, emergency response personnel should choose from the EPA-designated Standard Issue equipment. *Another brand or style of respirator may only be substituted for the Standard Issue respirator if an employee cannot achieve an acceptable fit with the Standard Issue equipment.*

EPA emergency response personnel are not allowed to use other (non Standard Issue) styles of respirators during hazardous waste operations in the exclusion zone unless they have received special permission to do so from a qualified health professional involved with the work/incident site (*e.g.*, the regional SHEMP Manager). In all cases, alternate respirator types must be approved by the National Institute for Occupational Safety and Health (NIOSH) and the make and model must be listed here and in Appendix A Part II[b]).

Employee Name	Respirator Type	Make	Model

4.3.2.2 A Word About Facepieces

The Standard Issue respirator configurations listed in Table 2 all include tight-fitting full facepieces. Other facepiece styles (e.g., half-facepiece respirators and quarter-facepiece respirators) may not be used in the exclusion zone without the explicit recommendation of the SHEMP Manager or another qualified health professional involved with the work/incident site. In that case, the respirator must still provide the level of protection needed for the environment.

Half-facepiece and quarter-facepiece respirators may be used on a voluntary basis outside of an exclusion zone during low hazard operations (e.g., construction-related activities where site contaminants are not expected to be present). Selection and use of half-facepiece and quarter-facepiece respirators must be in accordance with 29 CFR 1910.134. Section 4.10 of this chapter outlines requirements for voluntary respirator use.

4.3.3 Tools To Assist With the Respirator Selection Process

EPA emergency response personnel should use a combination of the following tools/approaches to make decisions regarding respirator selection (use of additional respirator selection tools is also acceptable):

- Conduct work area monitoring as part of the hazard evaluation and consult generic action levels. (See section 4.6.6 for additional guidance on work area air monitoring.)
- Follow NIOSH Respirator Selection Logic and *assigned protection factors* (APFs). (See *NIOSH Respirator Selection Logic*, October 2004, and Appendix E and F of this chapter.)
- Calculate Maximum Use Concentrations (MUCs) and compare them to airborne contaminant concentrations. (See Section 4.3.5 and Appendix F for more information.)
- Consult OSHA substance-specific standards that list required levels of respiratory protection. (See Appendix G for a listing of OSHA substance-specific standards [e.g., the Asbestos Standard].)
- Consider need for a respirator approved for chemical, biological, radiological, and nuclear (CBRN) contaminants.

While this list presents some commonly used tools, Appendix F contains a more detailed discussion of the use of MUCs, the respirator selection requirements of OSHA's substance-specific standards, OSHA's proposed APFs, and other tools EPA personnel can use to guide respirator selection. Sections 4.3.4 and

4.3.5 provide some general guidelines that will help emergency response personnel choose between different types of respirators.

4.3.4 ASRs—When Are They Necessary?

An ASR is required for highly hazardous environments, including those that:

- Are oxygen deficient (19.5 percent oxygen or less).
- Contain high concentrations of air contaminants that create an atmosphere immediately dangerous to life or health (IDLH).
- Contain contaminants of unknown identity or concentration.

An ASR is also required in environments that contain hazardous levels of an air contaminant for which no NIOSH-approved air-purifying cartridge is available.

4.3.5 APRs—Scenarios Where They Are Acceptable, Determining Which Type To Use, and Selecting Filters and Cartridges

An APR may be used when the concentration of the hazardous contaminant does not exceed the limitations of the respirator. Specifically:

- Ambient air must contain adequate oxygen (greater than 19.5 percent).
- A NIOSH-approved filter or cartridge must be available to remove the contaminant. (Check Appendix H and the respirator manufacturer's web site or technical information telephone service for more information.)
- The airborne concentration of the contaminant must not exceed the MUC, which is based on OSHA's permissible Exposure Limit (PEL) and represents the estimated level of contaminant against which the respirator adequately protects a wearer. A suggested conservative approach to calculating the MUC is MUC= APF x ½ PEL.

4.3.5.1 Choosing Between Different Types of APRs

If emergency response personnel determine that an air-purifying respirator is acceptable, they can choose between a negative pressure APR or a PAPR. Factors that should be considered when making this decision include the respirator's APF and the concentration of the contaminant in the work environment. If both respirator types are deemed acceptable, selection may be based on personal preference, comfort, or availability.

4.3.5.2 Selecting Filters and Cartridges

Particulate filters and chemical cartridges for APRs are selected based on the type of airborne contaminant present.

The P-100 or high efficiency particulate air (HEPA) filter is the designated filter for Standard Issue equipment for EPA emergency response personnel. Use of different filters (e.g., with lower efficiencies) may be allowed during long-term site removal activities, but only with the approval of the SHEMP Manager. Appendix F contains additional information on alternate filter types designated by NIOSH.

Chemical cartridges for APRs are selected on a case-by-case basis, based on the contaminant present and on information that NIOSH has issued on effective cartridge capacity values. Information to help guide the decision can be found in Appendix E or by consulting the respirator manufacturer. (Most manufacturers offer information by phone or on the Internet.) In addition, information on cartridges for Standard Issue respirators can be found in Appendix H. Note that cartridges for APRs have a small sorbent capacity. Contaminant exposures must not exceed the cartridge performance limits determined by the manufacturer and NIOSH for each chemical cartridge. Chemical cartridge and canister elements should not be used beyond their rated shelf-life date.

All filters, canisters, and cartridges must be NIOSH-certified and contain a color-coded label indicating the substance or chemical class for which NIOSH has certified the cartridge. Under no circumstances will EPA personnel use cartridges for which the labels are not present and clearly legible. Additional information regarding labeling and the associated color codes (i.e., markings) for filters and cartridges is provided in Appendix I.

4.4 Medical Evaluation of Employees Who Are Required to Use Respirators

4.4.1 Overview of Program

Prior to fit testing and using a respirator in the workplace, EPA employees must be medically evaluated to determine whether they are eligible to wear a selected respirator. Medical eligibility is determined by a *physician or other licensed health care professional* (PLHCP).

4.4.2 OSHA Respirator Medical Evaluation Questionnaire

To assess an employee's medical eligibility to use a respirator, the PLHCP must perform a medical evaluation that addresses all the questions found on OSHA's standard *Respirator Medical Evaluation Questionnaire* (Appendix C of 29 CFR 1910.134). The medical evaluation for respirator use may be conducted at the same time as other evaluations performed under EPA's Medical Surveillance Program and will be administered confidentially and at a time (during working hours) and place that is convenient to the employee.

4.4.3 Medical Factors and Conditions

The SHEMP Manager must provide the following information to the PLHCP, who in turn must consider these details as part of the medical evaluation.

- A copy of the regional/local Respiratory Protection Program (provide once and whenever updated)
- Type and weight of the respirator to be worn.
- Duration and frequency of respirator use.
- Expected physical work effort.
- Use of protective clothing and equipment to be worn.
- Temperature and humidity extremes that may be encountered.

4.4.4 Medical Clearance Statements/Identification of Limitations

The PLHCP will develop an opinion regarding whether the employee is medically cleared to wear a given type of respirator, whether it is necessary to place restrictions on the employee's assigned workload, or

whether a followup medical examination is needed to assist the PLHCP in making a recommendation. (The Medical Surveillance chapter of this manual provides additional details about the forms that the PLHCP should use to communicate this information.) The PLHCP will submit his/her opinion to EPA's Medical Review Officer, who in turn, will issue a written *Medical Clearance Statement* to the SHEMP Manager. The employee will also receive a copy of this statement. If information from the medical evaluation indicates that the employee can use a PAPR but not a negative pressure respirator, a PAPR will be provided to the employee.

4.4.5 Re-evaluation

A repeat medical evaluation is required *annually* for all EPA emergency response personnel who wear respirators. The annual evaluation may be conducted at the same time as other evaluations that are performed under the medical monitoring program. Although this requirement is more stringent than the OSHA standard, the annual evaluation provides employees with an additional level of assurance that they are medically qualified to wear the indicated types of respirators. A re-evaluation may be performed after a shorter period if the need arises (e.g., due to employee health status, changes in working conditions, or need to use another respirator type).

4.4.6 Medical Records

The PLHCP will store medical records related to employee medical evaluations for respiratory protection. The PLHCP will provide access to these medical records to employees and their designated representatives in accordance with 29 CFR 1910.1020 (OSHA standard on "*Access to employee exposure and medical records*").

4.5 Fit Testing Procedures for Tight-Fitting Respirators

4.5.1 General Requirements

Fit testing is required for all negative and positive pressure tight-fitting facepiece respirators that are used by EPA emergency response personnel. The SHEMP Manager (or another designated person) will conduct initial and annual fit testing for each EPA emergency responder and for each type of respirator that is worn by that individual. The testing is conducted to ensure that the make, model, and the size of respirator is suitable for the employee. In addition, the person performing fit testing checks for problems with respirator wear and reinforces respirator training by having wearers review the proper methods of donning and wearing the respirator. Employees must be medically qualified to wear the style of respirator with which they will be tested.

As a general rule, the fit of tight-fitting respirators for EPA emergency response personnel is evaluated by *quantitative fit testing* (QNFT) with a Portacount system and using the procedures outlined in Appendix J. This QNFT must be completed before the individual wears the respirator in the field and annually thereafter. Additional testing will be required if an employee or Removal Manager reports changes that could influence respirator fit.

Whenever possible, fit tests should be conducted using the actual respirator that has been issued to the individual. However, if this is not possible, fit tests may be conducted using any mask of the same make, model, and size as the one issued to, and used by, the EPA emergency responder.

To assure that a respirator will provide protection equal to the APF, the wearer must achieve a QNFT fit factor (FF) that is at least 10-fold higher than the APF. For example, an APF of 50 can be assumed for the employee's fullface piece, tight-fitting, air-purifying respirator if the wearer achieves a FF of 500 or higher. Fit testing will not be conducted if facial hair interferes with the mask seal. If an employee cannot achieve a good fit with an appropriate size of the Standard Issue respirator, EPA will be required to provide an alternative respirator. Without a well-fitting respirator, EPA employees are not permitted to work in situations where an exposure might take place.

In emergency situations only, a stannic chloride (irritant smoke) *qualitative fit test* (QLFT) may be temporarily substituted for a QNFT in the field. This test is not a permanent substitute for the QNFT requirement and shall be followed by a QNFT as soon as feasible. Until the QNFT is performed, APRs will be assumed to have a lower protective value than indicated by the APF (e.g., with a QLFT, EPA assumes an employee's full-face, tight-fitting air-purifying respirator has a protective value of 10, instead of the APF of 50 allowed with a successful QNFT). However, fit tests for SCBA respirator masks, if different from the APR/PAPR masks, may be performed using either the QLFT or QNFT procedures.

Appendix K includes a template for conducting QLFTs and an example of the form generated by the Portacount™ fit test software. All records associated with fit testing procedures should be retained by the SHEMP Manager (or another designated person).

4.5.2 User Seal Check Procedures

EPA employees must perform a user seal check every time an employee dons a tight-fitting respirator. This requirement applies whenever the individual dons a respirator (either for fit testing purposes, or use in a hazardous environment). Employees may use either a positive or negative seal check, or both. Detailed procedures for both are presented in Appendix J.

4.6 Procedures for Proper Use of Respirators in Routine and Reasonably Foreseeable Emergency Situations

EPA employees are expected to wear the selected respiratory protection whenever they enter areas that contain hazardous atmospheres. Employees must don respirators outside the hazard area and remove them only after returning to an area where airborne hazards are within acceptable limits. Proper use of the respirator is of equal importance to the selection of the respirator itself. The following sections outline some of the considerations governing respirator use, including cartridge-change schedules.

4.6.1 Issuing Respiratory Protection Equipment

Procedures for issuing respiratory protection equipment may vary by EPA Region. For example, while in some regions equipment might be issued by the SHEMP Manager (or another designated person) to individual EPA emergency response personnel, in other regions, equipment might be centrally housed and supplied to EPA emergency response personnel as needed. Where practicable, however, respiratory protection devices should be individually assigned to employees for their exclusive use and to this end, a *Respirator Issuance Form* is provided in Appendix P. Region-specific procedures for issuing respirators (which should be noted in Appendix A Part II[c]) and in the space below) might include local policies regarding who has authority to issue equipment, how consumable supplies are issued and tracked, and procedures related to facepieces, spectacle kits, PAPRs, SCBAs, and filters/cartridges/canisters, as applicable.

4.6.2 Corrective Lenses for Use with Respiratory Protection

If corrective lenses are necessary, approved spectacle kits designed by the respirator manufacturer shall be used. Only ANSI.Z87.1 certified lenses should be used. The facepiece and lenses must be fitted by a qualified individual to provide good vision, comfort, and proper sealing. Contact lenses are permitted in lieu of spectacle kits and may be used while wearing a full-faced APR as appropriate. Contact lenses should be worn with caution since foreign bodies or contaminants that penetrate the respirator may get into the eyes and cause severe discomfort compelling the wearer to remove the respirator.

4.6.3 General Considerations for Respirator Use

The respirator wearer must immediately leave the hazardous atmosphere when problems with the respirator, its fit, or its effectiveness arise, or when conditions occur (or are likely to occur) that would affect the wearer's ability to use the respirator. For example, an emergency responder should leave a hazardous environment if: (1) there is a significant change in contaminant profile or concentration; (2) the respirator malfunctions; (3) a contaminant is detected inside the facepiece; or (4) the wearer experiences increased breathing resistance, dizziness, difficulty breathing, illness, or discomfort. The respirator wearer should also leave the hazardous area to wash his/her respirator facepiece to minimize skin irritation, to change APR components whenever needed, and to take periodic breaks in an uncontaminated area.

Additionally, the following general conditions shall apply:

- Under no circumstances shall parts, cartridges, or tanks from one manufacturer or model of respirator be mixed with those of another. Mixing components voids the NIOSH approval for the respirator. (Exception: According to OSHA's Hazardous Waste Operations and Emergency Response [HAZWOPER], an exception can be made to this rule under emergency situations. As stated in 29 CFR 1910.120[q][3][x]: "when deemed necessary for meeting the task at hand, approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating." This statement applies for emergency response activities covered under 29 CFR 1910.120[a][2][iv].)
- Under no circumstances shall the expiration dates or designated pressure limits of the equipment be exceeded.
- If at any time, appropriate, fit-tested, approved equipment is not available, entry into the area or work on the task requiring the respirator will not be permitted.
- Employees must not remove respirators in hazardous environments.
- No respirator shall be worn when conditions prevent the proper seal of the respirator to the face of the wearer (e.g., the presence of facial hair can come between the sealing surface of the facepiece and the face).
- Employees with perforated ear drums shall not wear respirators.
- The use of gum, tobacco, or other chewing products are not allowed while wearing a respirator.

Wearing respirators and other personal protective equipment in high temperature environments puts the worker at risk of developing heat stress. Excessive sweating may cause a break in the face to facepiece seal, reducing respiratory protection. EPA emergency response personnel must determine safe work/rest regimens. Refer to SHEMP Guide 33, "*Heat Stress and Cold Stress*" for additional information.

4.6.4 Special Considerations for IDLH Atmospheres

Sites with IDLH atmospheres require the highest level of respiratory protection. These atmospheres may only be entered with: (1) a full facepiece pressure-demand SCBA with a minimum service life of 30 minutes, or (2) a combination full facepiece pressure-demand supplied-air respirator with an auxiliary self-contained air supply. Some regions/offices might choose to place additional restrictions on entering an IDLH environment. (For example, some regions/offices might not permit their employees to work in IDLH atmospheres at all.) If additional regional/local restrictions exist, this should be recorded in Appendix A Part II[d]) and here.

In addition to the abovementioned considerations, EPA employees must ensure the following before entering an IDLH atmosphere:

- At least one employee (referred to as the "standby employee") who is trained and equipped to provide emergency rescue is located outside the IDLH atmosphere. This standby employee must maintain visual, voice, or signal communication with the employee(s) in the IDLH atmosphere.
- Standby employees are equipped with appropriate retrieval equipment in situations where retrieval equipment would contribute to rescue efforts and would not increase the overall risk resulting from entry. (Note: As stipulated under 29 CFR 1910.134(g)(3)(vi)(C), in situations where retrieval equipment is not called for, EPA is required to provide an equivalent means of rescue.)
- Standby employees are equipped with: (1) pressure-demand or other positive pressure SCBA, or (2) a pressure-demand or other positive pressure supplied-air respirator with auxiliary SCBA.
- Standby employees must notify designated personnel (e.g., supervisor or other responsible individual located outside the IDLH environment) before the standby employee(s) enter an IDLH environment to provide emergency rescue.
- Upon notification of standby employee(s) entry into an IDLH environment for emergency rescue, the designated personnel (e.g., supervisor or other responsible individual located outside the IDLH environment) must provide necessary assistance appropriate to the situation.
- The buddy system is in use so that EPA emergency response personnel are not making an entry alone.

4.6.5 Filter and Cartridge Change Schedules

4.6.5.1 Particulate Filters

As a rule, EPA emergency response personnel must change particulate filters at the end of each workshift. Additionally, EPA personnel should change their filters if they notice an increase in breathing resistance or breathing becomes more difficult.

4.6.5.2 Gas or Vapor Cartridges

All cartridges used for APRs must have an end-of-service-life indicator (ESLI) or must be covered by an appropriate change schedule for air-purifying elements. (Cartridge change schedules may be determined by consulting the cartridge manufacturer or using the manufacturer's software.) As a safe practice, EPA typically requires that emergency response personnel discard respirator cartridges at the end of the workday regardless of whether the service life has been reached. However, regional variation in policy is allowed. For example, some regions/offices might indicate that cartridges must be replaced every time a respirator is doffed. Any local variation in cartridge change-schedules should be captured in Appendix A Part II[e]) and here.

At some elevated contaminant concentrations, the cartridges should be changed more frequently than 8 hours. Appendix L presents information about the impact that contaminant concentration has on the estimated service life (breakthrough time) of three Standard Issue cartridges. For example, the appendix lists the breakthrough times that can be expected when these cartridges are used in the presence of common air contaminants at concentrations ranging from 10 ppm to 1,000 ppm. Under highly-contaminated scenarios, an SCBA is generally the preferred choice of respirator.

4.6.5.3 Additional Guidance for Specific Contaminants

Specific guidance governs use of respirator filters and cartridges for certain air contaminants:

- ***Asbestos***—At a minimum, filters should be changed at the end of the work shift; after the respirator has entered the decontamination shower.
- ***Formaldehyde***—Cartridges should be replaced after 3 hours of use or at the end of the work shift, whichever occurs first, unless the cartridge contains a NIOSH-approved ESLI.
- ***Acrylonitrile***—Cartridges must be replaced prior to the expiration of their service life or at the completion of each work shift, whichever comes first. A label must be attached to the cartridge to indicate the date and time at which it was installed on the respirator.
- ***Butadiene***—If NIOSH approves an ESLI, the cartridge may be used until the ESLI shows no further useful service life or the cartridge is replaced at the beginning of the next work shift, whichever comes first. If no ESLI is available, the change schedule should be based on 29 CFR 1910.1051. A label must be attached to each filter element to indicate the date and time it was first installed on the respirator.

4.6.6 Monitoring the Work Area and Comparing Results to Pre-Established Action Levels

As noted in Section 4.3.3, air monitoring activities should be performed to aid in the selection of personal protective equipment. In addition, once in the field, air monitoring should be performed to assess conditions, to determine whether the existing hazard is greater than originally anticipated, and to make sure that employees are not being exposed to chemical concentrations that exceed exposure limits or action levels.

Site action levels (i.e., thresholds that are used to help people decide when to implement respiratory protection, engineering controls, or site shut down) should be established prior to commencing site work. Action levels are established based on the contaminants expected or measured at a site, the possibility of

encountering unidentified substances, the amount of control over processes or operations, and other factors. Tables 3 through 6 (presented below) list some generic action levels that can be used to guide people in determining what level of personal protective equipment is needed at a site. (Text Box 1 presents background information that will help with the interpretation of these tables.) Local or regional offices may have different or additional action level guidance. If this is the case, this should be recorded here and in Appendix A Part II[f])

Text Box 1: Levels of Personal Protection

- Examples of ***Level A*** clothing and equipment include positive-pressure, full facepiece SCBA or positive pressure supplied air respirator with escape SCBA, totally encapsulated chemical- and vapor-protective suit, inner and outer chemical-resistant gloves, and disposable protective suit, gloves, and boots.
- Examples of ***Level B*** protection include positive-pressure, full facepiece SCBA or positive pressure supplied air respirator with escape SCBA, inner and outer chemical-resistant gloves, face shield, hooded chemical resistant clothing, coveralls, and outer chemical-resistant boots.
- Typical ***Level C*** equipment includes full facepiece air purifying respirators, inner and outer chemical-resistant gloves, hard hat, escape mask, and disposable chemical-resistant outer boots. The difference between Level C and Level B protection is the level of respiratory protection.
- Appropriate ***Level D*** protective equipment may include gloves, coveralls, safety glasses, face shield, and chemical-resistant, steel-toe boots or shoes.

TABLE 3:
GENERIC ACTION LEVELS[a] FOR UNKNOWN VAPORS[b]

Concentration (in ppm)[c]	Required Level of Personal Protection Equipment
Background - 1 ppm	Level D
1 - 5 ppm above background	Level C
5 - 500 ppm above background	Level B
> 500 ppm above background	Evaluate need for Level A

[a] Under no circumstances should the action levels listed above be used in the field without considering other factors such as instrument response, the possibility of encountering highly toxic materials (chemical warfare agents or toxic industrial chemicals), and site history. These factors can prompt a higher level of respiratory protection.
[b] Unknown vapors are measured by use of a direct-reading Photo Ionization Detector (PID) or a Flame Ionization Detector (FID) in the breathing zone.
[c] To the extent that the contaminant identity or chemical class is known, use the appropriate ppm-equivalents relative to the calibration gas used for the specific instrument.

TABLE 4:
GENERIC ACTION LEVELS FOR OXYGEN CONTENT[a]

Percent Oxygen	Action
< 19.5%	Treat as IDLH environment. Level B required. Determine reason for the deviation from normal O_2 level.

TABLE 4:
GENERIC ACTION LEVELS FOR OXYGEN CONTENT[a]

Percent Oxygen	Action
19.5 - 22.0%	Continue work in accordance with action levels for other contaminants. Continue monitoring for oxygen content.
> 22.0%	Evacuate area, eliminate ignition sources, and reassess conditions due to fire potential. Determine reason for the deviation.

[a] Measured by use of a direct-reading Oxygen Meter/Explosimeter.

TABLE 5:
GENERIC ACTION LEVELS FOR IONIZING RADIATION[a]
(To be considered at sites not previously suspected of containing radiological hazards)

Observed Radiation Level	Action [b]
< 2 times background	Continue work in accordance with procedures based on action levels for other hazards and instrumentation.
≥2 times background to <4 times background	Reassess work plan and contact regional radiation experts for necessary protective actions.
≥4 times background	Evacuate area; reassess work plan and contact regional radiation experts.

[a] Measured by use of an instrument capable of measuring dose rates (e.g., a Ludlum Model 192 micro-R meter).
[b] These actions are applicable for sites not previously suspected of containing radiological hazards. Known or suspected radiation sites must be further evaluated by a qualified person.

TABLE 6:
GENERIC ACTION LEVELS FOR PARTICULATE NUISANCE DUST AND CONTAMINATED DUST[a,b]

Dust Type	Concentration as milligrams per cubic meter (mg/m^3)[c]	Action
Uncontaminated *nuisance* dust/Particles not otherwise regulated (PNOR)	<2.5 mg/m^3	Level D
	>2.5 mg/m^3	Evaluate health and safety measures, consider Level C.
Dust contaminated with a known percentage of hazardous substance	Calculate an Action Level using the following equation: AL = EL (1,000,000) ÷ (2C) where: • AL = Action Level (for airborne dust in mg/m^3) • EL = Exposure Limit for the contaminant (e.g., PEL, TLV, OSHA Action Level). • C = Contaminant concentration in the dust, as either ppm or mg/kg (e.g., from bulk sample analysis).	• Compare the calculated AL to the measured airborne dust level. Use respiratory protection if the measured airborne dust level exceeds the AL. (*Note: A safety factor of at least 2 should always be used to calculate the Action Level. The equation provided in the previous column already incorporates a safety factor of 2 [in the denominator].*) • Conduct substance-specific air monitoring to obtain more accurate characterization of the hazard.

[a] Measured by use of a direct-reading real-time aerosol monitor (RAM), Data RAM, or Mini-RAM. Assumes that a substantial percentage of the dust could be respirable size.
[b] If dust is contaminated, refer to the PEL for the specific contaminant. If the percentage of contaminant in the dust is known, the concentration of contaminant might be roughly estimated by applying the percent of contamination to the dust concentration measured using the RAM, dividing by 100, then comparing the resulting value to the contaminant PEL.
[c] Use the mg/m^3 concentration values provided by direct reading instruments, which are based on the instrument's internal calibration.

4.7 Cleaning, Storing, Inspecting, and Maintaining Respirators

EPA emergency response personnel are responsible for the proper handling, cleaning, inspection, maintenance, and storage of any respiratory protection equipment that has been issued directly to them. Centrally-stored respiratory protection equipment, including that related to breathing air, is the responsibility of the Health and Safety Program Contact (or another designated individual).

4.7.1 Cleaning, Disinfecting, and Storing

Respiratory protection equipment should be cleaned and disinfected following the manufacturer's recommended procedures, as long as the recommendations meet the minimum OSHA requirements specified in Appendix B-2 of 29 CFR 1910.134. Appendices M, N, and O to this chapter present manufacturer instructions for EPA Standard Issue facepieces, regulators, PAPRs, and SCBA equipment for emergency response personnel. If an EPA employee is assigned equipment that differs from the

Standard Issue respiratory protection equipment, that individual will be responsible for obtaining and following the appropriate manufacturer instructions and recommendations for the equipment.

4.7.1.1 Respirator Cleaning and Disinfecting

EPA emergency response personnel are responsible for keeping their personally issued respirator(s) in an appropriately clean and sanitized condition. Respirators that are issued for the exclusive use of an employee must be cleaned and disinfected as often as necessary to be maintained in a sanitary condition. At a minimum, respirators being used for heavy service should be cleaned and disinfected at the end of each shift using the manufacturer's recommended cleaning solutions (or equivalent). In cases of heavy use in contaminated environments, it might be necessary to wipe the face seal several times per day. Visible accumulation on the facepiece should trigger a *thorough* cleaning. It should also be noted that shared respirators must always be disinfected between users.

Respirators should be cleaned and/or disinfected using the procedures and cleaning solutions specified by the manufacturer (for detailed instructions on care of Standard Issue respirators see Appendices M, N, and O). Briefly, manufacturers generally recommend that respirator *facepieces, breathing tubes* (inside and outside), *and harness assemblies* (head and backpack) be washed in a tepid (body temperature) water solution that contains a mild detergent, rinsed with clean (potable) water, and dried thoroughly. Use a soft cloth to wipe *PAPR blower assemblies* with the warm water solution, but do not submerge the blower. *Regulators,* as well as *facepieces that are not heavily soiled,* may be wiped using a soft cloth and a cleaning and disinfection solution recommended by the manufacturer. Heavily soiled regulators should not be submerged in cleaning solution, but rather should be returned to the manufacturer for cleaning.

Facepieces and regulators issued to individuals must be disinfected regularly (for example at the end of each shift). Shared facepieces and regulators must be disinfected between each user. Appendix M presents the manufacturer's instructions for disinfecting the Standard Issue facepieces and regulators after cleaning. Typical procedures involve coating or soaking the cleaned item in disinfectant solution for the specified contact time required to achieve disinfection, then rinsing the item thoroughly in clean (potable) water. Finally, respirators and components may be air dried, or gently blown with low-pressure compressed air. These last two steps (rinsing and drying) are important to avoid skin irritation from contact with disinfectant residue and to ensure all components are *completely* dry before they are packaged for storage.

Some cleaning products damage or shorten the service life of respirators or their components.
Several different respirator disinfection solutions are commercially available (e.g., solutions of iodine, isopropyl alcohol, or quaternary ammonium compounds). However, no single solution is compatible with all respirator types. An incompatible solution can degrade or prematurely age the respirator and damage some components.

IMPORTANT: Consult the manufacturer's instructions and determine the appropriate type of cleaning/disinfectant solution for each respirator and components (make and model). Minimize the use of alternate cleaning and disinfection products, including moist towelettes, if they contain other solutions.

4.7.1.2 Special Considerations for Cleaning SCBAs

The following considerations should be taken into account when performing cleaning or disinfection procedures on a respirator or SCBA unit:

- Equipment that is grossly contaminated may require removal from service.

- When responding to events involving biological agents, special decontamination procedures may be required.
- Some portions of respirators and SCBA units may be constructed of porous materials that may be difficult or impossible to disinfect or clean once contaminated. Special precautions should be taken to prevent contamination of these components.

If any of the above mentioned special conditions exist, the manufacturer should be asked to provide special recommendations on how to clean or disinfect the equipment.

4.7.1.3 Storing Respiratory Protection Equipment

Respirators must be stored in a manner that protects against dust, harmful chemicals, sunlight, excessive heat or cold, and moisture. Appendices N and O provide manufacturer's specific recommendations for Standard Issue equipment. Any specific regional storage procedures that apply should be documented in Appendix A Part II[g]) and the space provided below.

Storing Facepieces. Clean/dry respirators should be placed in sealable enclosures (e.g., a plastic zip bag) and stored so that the facepiece seal and valves rest in a normal position to avoid permanent distortion. Sealed respirators should be placed in crush-resistant cases, boxes, or cubbies. Emergency-use respirators should be stored in areas that are easily accessible and clearly marked or otherwise identified. Respirators should not be stored in extreme environmental conditions, such as direct sunlight, extreme heat or cold, damp or wet conditions, or contaminated environments.

Do not hang respirators by their harness straps!

Storing PAPR Blowers. Before storing a clean/dry PAPR blower, one should verify that the unit is functioning properly by temporarily installing a battery and checking the air flow according to manufacturer instructions (see Appendix N). If the unit is not functional, it should be fixed immediately or red-tagged and removed from service. If the equipment is confirmed to be functional, the battery should be removed, recharged, and stored with the unit as applicable.

Cannister ports and air outlets on the blower assembly should be capped or plugged according to manufacturer recommendations. After this is completed, the breathing tube should be sealed either by capping or plugging it, placing it in a sealable plastic bag, or threading the female end onto the male end for storage.

Always verify that all respirator components are completely dry before storing. Placing damp respirators in storage may result in corrosion or other damage. In cold temperatures, residual moisture may freeze and cause the respirator to malfunction.

Storing SCBA Components. Clean/dry SCBA components should be kept in a storage case or container as recommended by the manufacturer (see Appendix O). First, one should ensure that the breathing air cylinder is fully charged (at least 90 percent full) and the cylinder valve is in the closed position. (SCBAs that are intended for emergency use *must* be stored with a full cylinder.) Also, one should ensure that any electronic warning devices have been turned off as applicable. Finally, all straps should be fully extended before storing the equipment.

Spare SCBA cylinders should be stored in a storage rack in a manner that protects the valves from damage and prevents accidental impact. Empty cylinders should be labeled and stored apart from full cylinders.

4.7.2 Inspecting Respiratory Protection Equipment: An Overview of the Inspection Process

All respiratory protection devices used by EPA emergency response personnel must be inspected before and after each use, during cleaning, and also on a monthly basis. Although this frequency is more protective than required by OSHA, EPA has determined that this requirement should be applied to negative pressure respirators, PAPRs, SCBAs, and any other respirators that EPA emergency personnel use. Additionally, escape respirators must be inspected prior to bringing them into the workplace for use.

Inspections of individually issued respiratory equipment shall be conducted by the individual EPA employee. The Health and Safety Program Contact (or another designated individual) is responsible for inspecting respiratory protection equipment that is stored and managed in a central location. Inspections of all equipment (both that which is individually issued and that which is centrally stored) must be documented on the *Monthly Respirator Inspection Checklist* that is included as Appendix P. Those who fill out the inspection checklists should retain copies of the records in their files. On a quarterly basis, all of the checklists should be provided to the Health and Safety Program Contact (or another designated individual), who in turn, will maintain a log (see Appendix Q) tracking receipt of the checklists and will retain hard copies of the checklists for one year.

In addition to maintaining the above inspection schedules, personnel are responsible for conducting inspections of new respiratory protection equipment that will be under their responsibility. The inspection will be conducted upon receipt of the equipment and prior to placing the equipment into service.

Sections 4.7.2.1 through 4.7.2.4 describe the minimum requirements for inspection of respiratory equipment. Manufacturer instructions should be followed where available.

4.7.2.1 General Inspection Procedures

All surfaces of respirator facepieces, faceshields, harnesses, straps, valves, blowers, backframes, regulators, hoses, cylinders and other components, should be checked for functional integrity. Specifically, one should look for dirt, holes, tears, damage to (or loss of proper connections) at sealing surfaces or attachments, distortion, loss of elasticity, kinks, or other signs of deterioration. One should check to ensure that all of the components of the device are associated with the appropriate brand and model of respirator. Also, cartridge expiration dates and cylinder hydrostatic test dates should be checked. Facepieces should be tested by performing a user face seal check before each use. EPA employees should check to be sure that PAPR batteries are fully charged and that blowers function. Also, SCBA systems should be checked for leaks and EPA employees should ensure that the gauges indicate that cylinders are full and that there are no leaks in the system. Expanded inspection procedures are provided in Appendix P.

Detailed inspection procedures may also be found in the manufacturer instruction manuals (see Appendices N and O) for Standard Issue equipment for EPA emergency response personnel.

Always check for the presence of inhalation and exhalation valves during inspections.

4.7.2.2 Periodic Testing of SCBAs

In addition to normal operational checks and inspections, SCBAs should be periodically inspected by the manufacturer, or the manufacturer's authorized agent, to ensure that the unit is functioning properly and that the condition of all critical components is satisfactory. The Health and Safety Program Contact (or another designated individual) will ensure that this testing is conducted at a frequency, and in accordance with specifications, recommended by the equipment manufacturer. Periodic (at least monthly) testing requirements for EPA's Standard Issue SCBA unit are included in the Operations and Maintenance Instruction Manual that is presented in Appendix O. Records should be maintained of the periodic testing that manufacturers perform.

4.7.2.3 Inspection of SCBA Cylinders

In accordance with the provisions of 49 CFR Part 173, SCBA cylinders must be hydrostatically tested either every 3 or 5 years, depending on their construction and associated Department of Transportation (DOT) approval number. The hydrostatic test date on cylinders stored with the SCBA units should be checked as part of the monthly inspection of that unit and documented on the *Monthly Respirator Inspection Checklist* (Appendix P). Individuals who check cylinders should refer to Appendix R, which includes safety precautions for Standard Issue respirator cylinders and lists the specific hyrdrostatic test frequencies required (and maximum fill pressure allowed) for the available cylinders. Centrally-stored spare cylinders should be inspected on a quarterly basis and the dates of these inspections should be logged by the Health and Safety Program Contact (or another designated individual). A sample *Quarterly Tank Inspection Log for Breathing Air Cylinders* is provided in Appendix S. Cylinders that are out of compliance, or will be out of compliance prior to the next inspection date, should be removed from service, red-tagged, and sent out for retesting. Out-of-compliance cylinders issued to individual EPA emergency response personnel should be returned immediately to the Health and Safety Program Contact (or another designated individual) for hydrostatic testing. All red-tagged cylinders should be stored separately from in-service cylinders.

Refer to Appendix R for a table of DOT approval numbers and hydrostatic test frequencies for EPA Standard Issue SCBA cylinders.

4.7.2.4 Special Inspection Requirements for Centrally-Stored Respiratory Protection Equipment

The Health and Safety Program Contact (or another designated individual) is responsible for conducting monthly inspections of all APR, PAPR, and SCBA equipment that is not issued to individual EPA emergency response personnel and is stored in a central location. All inspection requirements and procedures noted in the previous sections shall apply to centrally-stored equipment with the following exceptions:

- APRs, PAPRs, and SCBAs that are found to be in good operational condition shall be tagged with a green tag that bears the equipment serial number (or other identifying number as is feasible and appropriate), date of inspection, and inspector's signature. (For centrally-stored negative pressure respirators that have not been used since they were cleaned, inspected, and sealed in a labeled container only need to be inventoried (not reinspected each month). However, associated chemical cartridges, which have an expiration date, must be checked quarterly (see the related bullet below).

- Equipment that is found to be deficient/defective shall be repaired immediately or red-tagged and removed from service.

- Cylinders that are out of compliance, or will be out of compliance prior to the next inspection date, should be removed from service, red-tagged, and sent out for retesting. All red-tagged cylinders should be stored separately from in-service cylinders.

- The expiration dates of APR canisters and cartridges shall be inspected on a quarterly basis. An example *Quarterly Inspection Log for APR Canisters and Cartridges* is included as Appendix S. Expired items shall be discarded.

4.7.3 Respiratory Protection Equipment Maintenance, Repair, and Retirement

EPA emergency response personnel are responsible for the overall care of their individually issued respiratory protection equipment. They are also responsible for ensuring that the equipment remains functional and in good repair. EPA emergency response personnel will not be expected to make major repairs; however, they are expected to maintain a high level of proficiency in using and inspecting the equipment so that they can identify the need for minor parts replacement and/or repair.

EPA emergency response personnel may make minor repairs that are described in the equipment owner's manual, such as replacing inhalation/exhalation valves, harness straps, and o-rings on air hose connections. Only the respirator manufacturer's NIOSH-approved parts (for the same make and model respirator) may be used. Substitution of parts from a different brand or type of respirator will invalidate the NIOSH-approval of the respirator. Such substitutions will not be made.

All SCBA equipment requiring adjustment or repair to the regulator and valves must be returned to the manufacturer or given to a technician who is adequately trained and authorized by the manufacturer to make the repair. The Health and Safety Program Contact (or another designated individual) is responsible for facilitating contact with the respirator manufacturers and technicians, as well as maintaining documentation of any inspections or repairs they perform.

Retirement criteria and considerations for SCBAs shall be determined by the manufacturer or an authorized agent. The Health and Safety Program Contact (or another designated individual) is responsible for ensuring that equipment being considered for retirement is returned to the manufacturer for evaluation.

4.8 Breathing Air for ASRs

4.8.1 Obtaining Breathing Air

Some EPA regions maintain compressors capable of producing breathing air that can be used in SCBA breathing air cylinders. This allows these regions to be self-sufficient in obtaining breathing air. In other cases, EPA purchases breathing air from other (non-EPA sources.) In fact, depending on the location, type, and logistics of the field operations being conducted, EPA emergency response personnel may be required to procure breathing air through a variety of sources, such as vendor service agreements, direct purchase from dive shops or other local vendors, or via local fire departments, HAZMAT teams, or other response agencies. Regardless of how it is supplied, it is imperative that the source is reliable and that documentation is obtained of the quality of the air being provided.

Information about local sources of breathing air and the region's compressor capabilities should be noted in Appendix A (Part II[h]) and in the space provided below. Information should be included on local procedures and any breathing air cascade systems operated by the local/regional office.

EPA-operated Breathing Air Compressors	Type	Make/Model	Location

Local Procedures Associated with Breathing Air Compressor/Cascade System

Other Breathing Air Sources Location (Indicate whether a routine or emergency source)

4.8.2 Acceptable Breathing Air Grades

Breathing air for ASRs must, at a minimum, meet the requirements for Compressed Gas Association (CGA) Grade D breathing air specified in ANSI/CGA G-7.1-1989 as follows:

- Oxygen (volume/volume) between 19.5 % to 23.5%;
- Hydrocarbon (condensed) content of 5 milligrams per cubic meter (mg/m^3) of air, or less;
- Carbon monoxide (CO) content of 10 parts per million (ppm), or less;
- Carbon dioxide (CO_2) content of 1,000 ppm, or less; and
- Lack of noticeable odor.

Additionally, the moisture content of compressed air in cylinders cannot exceed a dew point of -50^0 F (-46.6°C) at 1 atmosphere of pressure.

4.8.3 Acceptable Breathing Air Cylinders (for SCBAs)

All cylinders used for breathing air must meet the specifications and testing requirements of the DOT Shipping Container Specification Regulations as described in 49 CFR parts 173 and 178. Breathing air cylinders must also be marked in accordance with 49 CFR 178 and the NIOSH respirator certification standard 42 CFR part 84.

4.8.4 Obtaining Breathing Air From An Outside Source

When obtaining breathing air from an outside source, EPA personnel should obtain (and carefully review) air quality documents to confirm that the air is of suitable quality. In fact, EPA personnel are expected to obtain the following documentation from the entity supplying the air:

- A certificate stating that the air meets Grade D breathing air requirements (at a minimum), and
- Information about the type and frequency of testing that has taken place.

Alternatively, if a certificate is not available, the following documents will be considered an acceptable substitute:

- Copies of recent air quality testing, and
- Information about the type and frequency of testing that has taken place.

Text Box 2 list guidelines that EPA personnel should keep in mind when trying to determine whether breathing air is of an acceptable quality. The Health and Safety Program Contact (or another designated individual) is responsible for obtaining and tracking breathing-air-related documents. If an EPA employee obtains breathing air from an outside source, the employee will be held responsible for obtaining these records and providing them to the Health and Safety Program Contact (or another designated individual) for review and recordkeeping purposes. If, in an emergency, EPA personnel obtain breathing air from a fire department, they should also obtain an assurance that the air meets at least Grade D quality.

Text Box 2
Guidelines to Consider When Obtaining Breathing Air From an Outside Source

- **Grade E air**, typically found at dive shops, meets the same or more stringent standards and may be substituted for Grade D air in ASRs.
- The terms "**medical air**" and "**breathing air**" often refer to air that would be of an acceptable quality for use in ASRs. However, the terms do not ensure a suitable product and air quality testing documents must be obtained to confirm that the air does indeed meet the minimum requirements for Grade D air.
- **Oxygen-enriched air** (above 23.5% oxygen), **compressed oxygen**, and **liquid oxygen** must NOT be used in respiratory protection equipment used by EPA personnel.
- In cases where multiple cylinders are filled simultaneously through a manifold from tanks of oxygen and nitrogen, the oxygen/nitrogen ratio in individual containers might be inconsistent. Therefore, **when breathing air is produced in this manner (i.e., without a compressor), each cylinder should be tested individually to ensure that it contains the appropriate level of oxygen**. Thus, if EPA personnel obtain breathing air produced in this fashion, they should ensure that the entity supplying the air has indeed tested each cylinder individually. If such testing has not been conducted, EPA will be expected to perform these tests before allowing its employees to use these cylinders.

4.8.5 Producing Breathing Air with an In-house Compressor

4.8.5.1 Avoid Direct Connections to Air Compressors

Air compressors used by EPA emergency response personnel shall only be used to provide breathing air for filling SCBA cylinders or cylinder storage/cascade systems. EPA personnel ***shall not*** use air compressors to supply air directly to airline respirators for immediate breathing. As noted in section 4.8.5.2, inline filters (e.g., carbon monoxide, hydrocarbons, particulates, and moisture) are required between the compressor and the airline respirator connection. Appropriate pressure regulators are also needed to ensure the breathing air is supplied to the respirator facepiece within the respirator manufacturer's specified pressure range consistent with the NIOSH approval for the respirator.

4.8.5.2 Breathing Air Compressor Operation and Maintenance

Compressors used for supplying breathing air must be installed by a qualified technician who meets the appropriate training requirements as specified by the manufacturer. Documentation of the installer's training and qualifications shall be obtained by the Health and Safety Program Contact and maintained on

file. In most cases, the vendor will install the compressor, provide start-up services, and provide training on how to operate and maintain the system.

The compressor, whether stationary or mobile, must be constructed and located so that contaminated air cannot enter the air supply system. The compressor must also be fitted with appropriate alarms (e.g., high temperature, carbon monoxide) and filters (e.g., carbon monoxide, hydrocarbons, particulates, and moisture). On compressors used to fill cylinders, an automatic shut-off device (if available) should be installed in conjunction with the carbon monoxide alarm and the high temperature alarm.

In accordance with OSHA, all breathing air couplings used to hook up cylinders to the compressor must be designated for breathing air use only and incompatible with those for use with non-respirable air or other gases.

Cylinders must be filled following accepted safety procedures, which are presented in Appendix T.

4.8.5.3 Compressor System Operator Qualifications and Responsibilities

In EPA regions that have in-house compressor systems, the Health and Safety Program Contact shall be the single point of contact for that equipment and will have complete accountability for the operations and maintenance of that system. Although the Health and Safety Program Contact may choose to delegate some activities, he or she must retain final accountability for activities that relate to the in-house compressor equipment. All individuals with responsibilities or duties associated with the compressor system shall receive appropriate training from the manufacturer prior to operating or maintaining the system (Appendix T lists specific training requirements). The Health and Safety Program Contact will retain documentation of these individuals' training and qualifications.

4.8.5.4 Written Breathing Air Compressor Operation and Maintenance Plan

Each EPA region that operates a compressor for the supply of breathing air shall develop a written *Breathing Air Compressor Operation and Maintenance Plan* that delineates specific procedures based on model specifications, actual usage (operating hours and volume of air processed per unit period of time), and manufacturer's recommendations. The plan shall be drafted by the Health and Safety Program Contact and submitted to the Regional SHEMP Manager for approval prior to bringing the compressor on-line for normal operations. See Appendix T for details that must be included in the plan.

4.8.5.5 Compressed Breathing Air Quality

Compressed breathing air that is generated using an EPA compressor will be periodically tested to ensure that the air meets Grade D quality. For compressors used to fill cylinders, air quality testing shall be conducted at the frequency of once per batch of cylinders filled (by testing a cylinder), or once per month, whichever is more frequent. Compressors used to supply airline respirators shall be tested monthly. The Health and Safety Program Contact is responsible for ensuring that this testing is conducted and for maintaining records of the results.

4.9 Training of Employees

Respiratory protection training for EPA emergency response personnel will consist of a combination of classroom lectures, field exercises, and field safety briefings. The minimum training requirements are described below. The SHEMP Manager is responsible for making sure that all emergency response personnel receive this training and for documenting that such training events have occurred. The Health

and Safety Program Contact might also be called upon to assist with this task. Appendix U provides a sample training roster that may be used to document EPA emergency response personnel attendance at various classroom lectures, exercises, and/or training courses.

Initial Respirator Training: (6 hours minimum) This training will cover potential respiratory hazards and the proper use, limitations, care, and maintenance of respirators. The class will be completed before an EPA employee is allowed to wear a respirator and enter a potentially hazardous environment. This requirement can be fulfilled as a component of the employee's 40-hour HAZWOPER Initial Training. Attendance must be documented.

Annual Refresher Respirator Training: This training will be conducted in the form of classroom lectures and field exercises. Emergency response personnel will receive a minimum of 2 hours of classroom lectures annually to cover the requirements of the written Respiratory Protection Program. These two hours may be credited towards an employee's annual 8-Hour HAZWOPER refresher training requirement per 29 CFR 1910.120(e)(8) and attendance must be documented. Additionally, at least once a year, each EPA emergency responder will participate in an exercise on the use of a negative pressure APR and a PAPR by conducting a respirator inspection, tear-down, cleaning, reassembly, and donning/doffing. Also, on at least an annual basis, each EPA emergency responder who uses a SCBA will practice the use of this type of respiratory protection by conducting an inspection, donning/doffing, breathing down a tank of air (20 minutes minimum), cleaning, and reassembling the SCBA. Each of these exercises will be documented on signed rosters.

Breathing Air Compressor/Cascade System Training: Before emergency response personnel are allowed to use in-house air compressors or cascade systems, they must receive appropriate training from the manufacturer and demonstrate proficiency in using these systems to fill air bottles. The Health and Safety Program Contact will maintain training records for all employees who are authorized to operate or maintain air compressors or cascade systems.

4.10 Procedures for Voluntary Respirator Use

Even when exposures are below regulated levels, EPA personnel may choose to wear respiratory protection equipment to guard against nuisance odors or respiratory/eye irritation. Examples of voluntary use include wearing a disposable dust mask for protection against modest levels of uncontaminated dust and use of organic vapor cartridges to protect against organic solvent odor. Those who are voluntarily using filtering facepieces (e.g., dust masks) must be given information contained in OSHA's Appendix D of 29 CFR 1910.134 (included as Appendix V to this chapter). For all other types of respiratory protection equipment, voluntary use by EPA emergency response personnel is acceptable if a hazard evaluation (see Section 4.1) is conducted to determine that respiratory protection is not required for that specific activity or area and steps are taken to ensure that the respiratory protection does not in itself create a hazard to the user. Specifically, the EPA employee must: (1) attend initial and annual refresher training, (2) be medically qualified to wear the respirator, and (3) be given information contained in OSHA's Appendix D of 29 CFR 1910.134. The SHEMP Manager will be responsible for ensuring the latter is provided to emergency response personnel. All voluntary users will acknowledge receipt of this OSHA information by signing a log sheet (a sample log sheet is included as Appendix W of this chapter).

EPA emergency response personnel will be expected to re-evaluate the potential for exposures associated with the specific activity or area whenever conditions change in a manner that might also change the level or type of airborne hazard.

5.0 RECORDKEEPING

This section describes the recordkeeping requirements associated with EPA's Respiratory Protection Program for emergency response personnel. Proper recordkeeping is essential to enable the Program Administrator and others with responsibilities under the program to be informed about the status of respiratory protective equipment and the employees who wear them. Nationally consistent, readily accessible records will be maintained in each region to document (1) employee medical qualification, training, and fit testing, and (2) respirator and breathing air quality/equipment evaluations. These records are to be generated and maintained according to the procedures described in this chapter. Table 7 summarizes overall recordkeeping requirements. Sections 5.1 through 5.9 provide more detailed information on recordkeeping procedures.

In addition to the specific recordkeeping requirements described below, all documentation for the region's emergency response personnel (with the exception of medical records held by the PLHCP) will be retained in a permanent repository that is accessible to the Respiratory Protection Program Administrator, the SHEMP Manager, Removal Manager, the Health and Safety Program Contact, and emergency response personnel.

TABLE 7:
RESPIRATORY PROTECTION RECORD RETENTION REQUIREMENTS

Required Record	Specified Form	Completed By*	Retained By*
Regional/local written Respiratory Protection Program—information on roles, policies, and procedures	This chapter (including Appendix A: *Designation of Regional/Local Roles, Responsibilities, Policies, and Procedures Associated With the Respiratory Protection Program*)	• Program Administrator • SHEMP Manager • Removal Manager • Health and Safety Program Contact • Emergency Response Personnel	• Program Administrator • SHEMP Manager
Site-specific written Respiratory Protection Program	• Sections of this *Respiratory Protection Program Implementation Plan* (Sections 4.1 through 4.10, Section 6, and Appendix A) • Completed *Site/Task Specific Hazard Evaluation Form* (Appendix C) • Combined with site-specific HASP	• SHEMP Manager • Emergency Response Personnel • Removal Manager	• Emergency Response Personnel • Removal Manager

Required Record	Specified Form	Completed By*	Retained By*
Documents related to medical evaluations	OSHA Respirator Medical Evaluation Questionnaire	• Emergency Response Personnel • PLHCP	PLHCP
	Medical Clearance Statement (template presented in the *Medical Surveillance Implementation Plan* chapter)	EPA's Medical Review Officer	• EPA's Medical Review Officer • SHEMP Manager • Removal Manager** • Emergency Response Personnel
	Medical records generated during employee medical evaluations	PLHCP	PLHCP
Training records	Employee training roster documenting who has taken respiratory protection classes and participated in field exercises (see Appendix U of this chapter)	SHEMP Manager	• SHEMP Manager • Removal Manager**
	Records documenting that air compressor and cascade system operators have received training on these systems	• Compressor Manufacturer • Health and Safety Program Contact	• Health and Safety Program Contact • Removal Manager**
Fit test records	Portacount QNFT printout/QLFT records (see Appendix K of this chapter for examples of these records)	SHEMP Manager	• SHEMP Manager • Removal Manager**
Respiratory protection equipment issuance, maintenance, and inspection records	Respirator Issuance form (see Appendix P of this chapter)	• SHEMP Manager	• SHEMP Manager
	Monthly Respirator Inspection Checklist form (see Appendix P of this chapter)	• Health and Safety Program Contact • Emergency Response Personnel	• Health and Safety Program Contact • Emergency Response Personnel
	Log documenting the receipt of the *Monthly Respirator Inspection Checklist* forms (see Appendix Q of this chapter)	Health and Safety Program Contact	Health and Safety Program Contact
	Logs documenting quarterly inspections of centrally-stored cartridges, canisters, and breathing air cylinders (see Appendix S of this chapter)	Health and Safety Program Contact	Health and Safety Program Contact
	Records documenting respirator maintenance performed locally and documentation of periodic evaluations or repairs performed by the manufacturer.	• Health and Safety Program Contact • Emergency Response Personnel • Manufacturer	Health and Safety Program Contact

Required Record	Specified Form	Completed By*	Retained By*
Records related to obtaining or generating breathing air	Documentation that any breathing air purchased from an outside source meets Grade D criteria	• Health and Safety Program Contact • Emergency Response Personnel	Health and Safety Program Contact
	Records related to in-house breathing air compressor systems: • *Breathing Air Compressor Operations and Maintenance Plan*. • Installation records (including qualifications of the installer) • Air compressor operations and maintenance logs that document the date and type of maintenance performed and include service and repair records. • Test results documenting that the breathing air being generated in-house meets Grade D quality.	Health and Safety Program Contact	Health and Safety Program Contact
Records related to voluntary respirator use	Log acknowledging that voluntary respirator users have received 29 CFR 1910.134 Appendix D (see Appendix W of this chapter)	SHEMP Manager	SHEMP Manager
Respiratory Protection Program Audit Form	Checklist (see Appendix X)	SHEMP Manager (with assistance of Removal Manager and Health and Safety Program Contact)	SHEMP Manager

* Recommended delegation of recordkeeping responsibilities.

** Removal Managers need only retain sufficient documentation (such as a list or a spreadsheet) that will allow them to quickly confirm an employee's current medical evaluation, training, and fit testing status.

5.1 Regional/Local Written Respiratory Protection Program—Local Roles, Responsibilities, and Policies

Each region should prepare a written document that designates roles, responsibilities and policies for the Regional Respiratory Protection Program. The Program Administrator or SHEMP Manager will be responsible for ensuring that this is done. This can be accomplished by customizing this chapter with program-specific information. For example, Appendix A of this chapter must be completed and information must be filled into the yellow-highlighted spaces that appear throughout the main text. The Program Administrator and SHEMP Manager will maintain the regional written Respiratory Protection Program and make copies available to other individuals with roles and responsibilities under the program.

5.2 Site-specific Written Respiratory Protection Program

For each program or site where respiratory protection is required, a written respiratory protection program must be developed and maintained. Emergency response personnel, Removal Managers, and SHEMP Managers, are responsible for ensuring that a site/task specific hazard evaluation is completed and that the site-specific HASP includes the information contained in specific sections of this chapter (i.e., Sections 4.1 through 4.10, Section 6.0, and Appendix A). Documents that constitute the site-specific respiratory

protection program will be maintained by emergency response personnel at the site and by the Removal Manager.

5.3 Annual Medical Qualification

Emergency response personnel are responsible for completing the necessary OSHA medical questionnaire or providing equivalent information. After reviewing the employee's medical evaluation questionnaire or completing any needed examinations, the PLHCP will develop an opinion regarding whether the employee is medically cleared to wear a respirator. He/she will submit this opinion to EPA's Medical Review Officer, who will in turn, prepare and submit the *Medical Clearance Statement* (a sample is provided in the *Medical Surveillance Program Implementation Plan*, which is included as a separate chapter of this Health and Safety Manual) to the SHEMP Manager. (The *Medical Clearance Statements* will not include specific medical information; the recommendations on the clearance form related to respiratory protection should be expressed in general terms and should not include diagnostic information. Medical records generated by the PLHCP during medical evaluations will be maintained by the PLHCP.) The SHEMP Manager will maintain copies of the *Medical Clearance Statement* in his/her files for each emergency response worker in the region and will provide copies to individual employees upon receipt. In addition, Removal Managers will be expected to maintain a list that indicates the current medical evaluation status of their employees.

5.4 Training Logs

When a worker completes a training course, the SHEMP Manager will document this in a training log. (See Appendix U for an example.) Additionally, the Health and Safety Program Contact will maintain training records for employees authorized to operate or maintain an air compressor or cascade system. In addition, Removal Managers will be expected to maintain information regarding the training status of employees.

5.5 Fit Test Records

Upon completing each initial or annual fit test, the SHEMP Manager (or another designated person) will retain the Portacount QNFT printout, or in an emergency situation, a completed QLFT record. (Examples of these records are included in Appendix K.) In addition, Removal Managers will be expected to maintain a list indicating the fit test status of their employees.

5.6 Respiratory Protection Equipment Issuance, Maintenance, and Inspection Records

The SHEMP Manager (or another designated person) will maintain records of the specific respiratory protective equipment issued to individuals. (Appendix P provides an example of a Respirator Issuance Form.) To ensure equipment is maintained in good working order, monthly inspections must be performed for all respirators and the results must be documented on the *Monthly Respirator Inspection Checklist*. This requirement applies to all emergency response personnel who have been issued respirators, as well as the person (i.e., the Health and Safety Program Contact [or another designated individual]) responsible for managing centrally-stored respiratory protection equipment. On a quarterly basis, the Health and Safety Program Contact (or another designated individual) will collect all of the checklists, use a log (see Appendix Q) to track receipt of the inspection records, and retain hardcopies of the checklists for a year. The Health and Safety Program Contact (or another designated individual) will also use logs (such as those included as Appendix S) to document quarterly inspections of centrally-stored respirator cartridges and compressed breathing air cylinders. Other records to be retained include logs of respirator maintenance performed locally and documentation of periodic evaluations or repairs made by the manufacturer or a qualified representative.

5.7 Records Related to Installation, Operation, and Maintenance of Air Compressor and Breathing Air Quality

The Health and Safety Program Contact will maintain records of air compressor installation (including qualifications of the installer), operational practices (at least monthly), and maintenance. These records will indicate system capabilities, note the date and type of maintenance performed (e.g., filters changed), and include service and repair records. The Health and Safety Program Contact will also develop and maintain the written *Breathing Air Compressor Operations and Maintenance Plan.* Additionally, the Health and Safety Program Contact will obtain and maintain test results (each time a batch of cylinders is filled, or at least monthly) indicating that compressor breathing air quality meets Grade D criteria. Any EPA employee who obtains breathing air from an outside source must obtain certification or test results indicating that the air meets Grade D requirements. These records will be provided to and maintained by the Health and Safety Program Contact (or another designated individual).

5.8 Records Related to Voluntary Respirator Use

The SHEMP Manager will provide information contained in *Information for Voluntary Users of Respiratory Protection* (Appendix V of this chapter) to qualified employees who wish to wear a respirator voluntarily. The SHEMP Manager will maintain a log (Appendix W) of voluntary respirator users that documents the users' receipt of this OSHA Information.

5.9 Audit Form

As described in Section 6.1 of this chapter, the SHEMP Manager (with the assistance of the Removal Manager and the Health and Safety Program Contact) is expected to complete the *Respiratory Protection Program Audit Form* (see Appendix X) and to keep a copy of the completed form in his or her files.

6.0 AUDITS AND PROGRAM EVALUATION

Evaluations should be performed to ensure that EPA's Respiratory Protection Program is being implemented consistently across the nation and that the program is actually protecting employees. Toward this end, the Respiratory Protection Workgroup recommends performing internal, as well as external audits, on an annual basis.

6.1 Internal Audit/Program Evaluation

The Removal Manager, SHEMP Manager, and the Health and Safety Program Contact should work together to evaluate their region's Respiratory Protection Program annually. The goal of the evaluation will be two-fold:

- Ensure that the program is being implemented in accordance with the national minimum standards listed in Appendix B of this chapter, and

- Determine whether the respiratory protection program is meeting its ultimate objectives, which are to ensure that employees are adequately prepared to enter sites that pose respiratory hazards; to provide the means of detecting deficiencies in respirator selection, usage, or maintenance procedures; and to ensure that procedures are in place to address issues that require attention.

Table 8 summarizes the types of questions that the SHEMP Manager (with assistance from the Removal Manager and the Health and Safety Program Contact) should consider during the audit and program evaluation process. The first activity listed in the table—which involves evaluating program implementation—can be accomplished by filling out the checklist provided in Appendix X. This checklist should be filled out annually and kept on file with the SHEMP Manager. If program deficiencies are identified during the audit process, the Removal Manager and the SHEMP Manager should take action to fix these problems.

The other activities listed in Table 8 assess program performance. The SHEMP Manager (along with other stakeholders) will be expected to perform a broad analysis of program outcomes and ask questions such as those listed in Table 8 to determine whether the respiratory protection program is working as intended. As part of the evaluation, efforts should be made to review HASPs and observe workers in the field to determine whether appropriate respirator selection, cleaning, and storage procedures are being followed. The SHEMP Manager will determine whether he/she is receiving the information needed to support program decisions and to identify emerging trends that require corrective action (e.g., modification in the Respiratory Protection Program or other related programs). Additionally, as part of the review process, OSHA requires that employees who wear respirators be asked to submit comments on the respiratory protection program and that their feedback is documented and addressed.

TABLE 8: FRAMEWORK FOR INTERNAL AUDITS AND PROGRAM EVALUATIONS

Goal	Sample Evaluation Questions
Ensure that the respiratory protection program is being implemented in accordance with the national minimum standards identified in Appendix B of this chapter	See Appendix X for a checklist that presents questions that must be answered annually. For example, the checklist asks: • Are employees evaluated by a PLHCP to determine if they are medically qualified to wear a particular respirator *before* they actually wear that respirator in the field? • Do employees receive 6 hours of initial respiratory protection training and 2 hours of classroom training annually thereafter?
Ensure that employees are adequately prepared to enter sites that pose respiratory hazards	• Is the region receiving *Medical Clearance Statements* in a consistent way and in a timely fashion? Is the region following up appropriately based on physician opinion? • Have there been instances of employees wearing respirators in the field even though they did not have medical clearance to do so? If “yes,” how did this situation arise? • Have there been any instances of employees wearing respirators that did not fit appropriately? If so, how did this situation arise?

TABLE 8: FRAMEWORK FOR INTERNAL AUDITS AND PROGRAM EVALUATIONS

Goal	Sample Evaluation Questions
Determine whether there are any deficiencies in the way that respirators are selected, used, or maintained	• Are employees and the SHEMP Manager receiving adequate information to make decisions regarding respirator selections? Are appropriate respirator selections (type, cartridges) made based on this information? • Do employees wear respirators properly when entering contaminated/ hazardous atmospheres? (For example, do they don their respirator and conduct user seal checks before entering the area? Do they wear their respirator constantly until exiting the area?) • Have incidents of employee overexposure to hazardous atmospheres without a suitable respirator or with a spent or inappropriate respirator occurred, and if so, has an analysis been conducted to determine what should be done to prevent future incidents? • Have employees been given an opportunity to comment on the elements of the respiratory protection program, such as the availability and acceptance of respirators and supplies and the selection procedures that are used to choose respiratory protection equipment? If employee feedback has been provided, what has been done to address their concerns?
Ensure that procedures are in place to address any deficiencies that are identified	

6.2 External Evaluations

Once a year, representatives from the Core ER team visit each EPA region to examine the elements of the region's health and safety program. As part of this effort, Core ER representatives will be expected to evaluate each region's respiratory protection program and to pay specific attention to whether the program is being implemented in a consistent fashion across the nation. The Removal Manager, SHEMP Manager, and Health and Safety Program Contact will work with the Core ER representatives to ensure that they have the information they need to perform the evaluation.

7.0 QUICK REFERENCE GUIDE (RELATING TO RESPIRATORY PROTECTION) FOR EPA EMERGENCY RESPONSE PERSONNEL

The following two pages summarize information that emergency response personnel must know about the Respiratory Protection Program. To be specific, information is provided on:

- Items that emergency responders should address ***before*** going into the field, and
- Information that emergency response personnel need to know in the field.

The following two pages should be printed on one front-and-back page, laminated, and taken to the field.

Respiratory Protection Program
Checklist for EPA's Emergency Response Personnel

Part I: Getting Prepared—What Do You Need to Address Before Going Into the Field?

Within the past year, have you:

1.	Received medical clearance to wear *each* type of respirator that you expect to use in the field?	Yes__ No__
2.	Completed initial (or refresher) respiratory protection training and engaged in a hands-on exercise?	Yes__ No__
3.	Demonstrated that you can breath down a tank of air for a minimum of 20 minutes? (*Note: This question is relevant for SCBA users only.*)	Yes__ No__
4.	Passed a quantitative fit test (QNFT) for *each* type of respirator you expect to use?	Yes__ No__

If you are preparing to take respirators to a site:

5.	Have you or a team-member conducted a hazard evaluation of the site?	Yes__ No__
6.	Have you or a team-member produced a site-specific written respiratory protection program (RPP), or incorporated respirator use, selection, and care information into the HASP?	Yes__ No__
7.	Does the RPP/HASP indicate which specific respirator type and filter/cartridge is needed?	Yes__ No__
8.	Have you examined the respiratory protection equipment you will be taking to the site to ensure that it is appropriate, complete, in-service (no red tags, no expired cartridges/ cylinders), and that spare parts and an adequate number of filters/cartridges are included?	Yes__ No__
9.	Do you know the contact time required for your respirator disinfection solution and which sanitation compounds are incompatible with your equipment?	Yes__ No__
10.	If you wear corrective lenses, have you obtained a spectacle kit for your make/model of respirator?	Yes__ No__

Part II: What Do You Need to Do at the Site?

1.	Do you implement engineering, workpractice, and/or administrative controls whenever feasible to minimize hazardous air contaminants?	Yes__ No__
2.	Before entering a site, do you confirm that <u>you</u> agree with the respirator selection that has been chosen for each task that you will be expected to perform?	Yes__ No__
3.	Do you conduct air monitoring to confirm that the selection is appropriate?	Yes__ No__
4.	Do you maintain proper conditions for your respirator to seal to your face (e.g. shave, wash)?	Yes__ No__
5.	Do you inspect your respirator and conduct a user seal check (fit check) each time you don it?	Yes__ No__
6.	Do you track chemical cartridge service life and change cartridges and filters at least at the end of each shift, or according to regional policy?	Yes__ No__
7.	Do you exit hazardous atmospheres and report problems if your respirator does not perform as expected (breakthrough odor, breathing resistance, or malfunctions) or if site conditions change significantly (new contaminants emerge of concentrations change)?	Yes__ No__
8.	Do you clean your respirator during the shift when visible accumulation is present?	Yes__ No__
1.	Do you clean, disinfect, and properly store your respirator at the end of every shift?	Yes__ No__
2.	If you obtain breathing air from an outside source, do you ensure that it is Grade D Breathing Air and provide documentation of this to the Health & Safety Program Contact?	Yes__ No__

Respiratory Protection Program
Information for EPA's Emergency Response Personnel
Part III: Things You Need to Know in the Field

RESPIRATOR SELECTION

- Use EPA Standard Issue Respirators unless you have received explicit permission from SHEMP Manager (or a health official associated with the site) to use a different respirator or if the conditions for voluntary respirator use are in effect.
- **Standard Issue Respirators—Specified Facepieces and Conditions of Use**:
  - **Air-Purifying Respirators (APRs)**
    Negative pressure: Full facepiece; P-100 filter and/or suitable chemical cartridge
    PAPR: Tight-fitting full facepiece; continuous flow mode; P-100/HEPA filter and/or suitable chemical cartridge
  - **Atmosphere-Supplying Respirators (ASRs)**
    SCBA: Tight-fitting full facepiece; positive pressure open-circuit mode
    Airline: Tight-fitting full facepiece; connected to an appropriate cascade system
- **Conditions Requiring an ASR**:
  - O_2 is 19.5% or less.
  - Possibility of an IDLH atmosphere
  - Contaminants of unknown identity or concentration might be present.
- **Situations when an APR is Acceptable**:
  - O_2 in ambient air is greater than 19.5%.
  - A filter or cartridge that can remove the contaminant is available.
  - Airborne concentration of the contaminant does not exceed the Maximum Use Concentration (MUC).
- **Calculating the MUC** (conservative method):
  - MUC = APF x ½ PEL
  - *APF* is the *assigned protection factor* for the respirator published by NIOSH or OSHA (not the *fit factor* [FF] from QNFT)
  - *PEL* is the means *permissible exposure limit* (e.g., from OSHA 29CFR 1910.1000)

VOLUNTARY RESPIRATOR USE IS ALLOWED...

- For nuisance dust and odors
- If a hazard evaluation indicates that a respirator is not required for the task or area and that wearing a respirator voluntarily will not in itself create a hazard.
- If the user: (1) has received OSHA's information For Voluntary Users (29 CFR 1910.134 Appendix D), (2) has received training on wearing respirators, and (3) is medically qualified to wear a respirator. (Exception: medical evaluation and training are not required for voluntary use of filtering facepieces ["dust masks"].)

FILTERS AND CHEMICAL CARTRIDGES

- Use only NIOSH-approved filters, cartridges, and parts intended for the specific make and model of respirator (no substitutions are acceptable).
- **Change Schedules for Filters and Cartridges:**
  - **Filters** (whichever of the following occurs sooner):
    * Breathing resistance increases significantly
    * At the end of each shift
  - **Chemical Cartridges** (whichever of the following calls for the earliest exchange):
    * Change schedules based on airborne contaminant concentration and cartridge capacity
    * Change schedule specified by local/regional policy
    * Based on indication from end-of-service-life-indicator (ESLI).
    * At the end of each shift

EMERGENCY FIT TESTING IN THE FIELD

- A qualitative fit test (QLFT) may be used as a temporary measure under emergency conditions
- Use irritant smoke (stannic chloride).
- QLFT is NOT a substitute for quantitative fit testing! Obtain a QNFT as soon as feasible
- Prior to a QLFT, the employee must be trained and medically qualified to wear the type of respirator.

ENTRY PROCEDURES FOR AN IDLH ATMOSPHERE

- Wear SCBA with minimum 30 minutes of service life or airline respirator (pressure-demand mode) with auxiliary self-contained air supply
- Use the "Buddy System"
- A standby employee must maintain communication with employee(s) in IDLH atmosphere
- The standby employee must have rescue equipment and a respirator suitable for IDLH atmosphere
- The standby employee must notify designated personnel before entering an IDLH environment to provide emergency rescue

BREATHING AIR (USED WITH ASRs)

- Must meet the criteria for Grade D classification, which are:
  - O_2 is between 19.5% and 23.5%
  - Hydrocarbons (condensed) are 5 mg/m^3 or less
  - Carbon monoxide (CO) is 10 ppm or less
  - Carbon dioxide (CO_2) is 1,000 ppm or less
  - No noticeable odor
- Also Acceptable: Grade E Breathing Air
- Unacceptable: Oxygen-enriched air (above 23.5% O_2)

8.0 GLOSSARY

Atmosphere Supplying Respirator (ASR): A respirator that provides clean air from an uncontaminated source to the facepiece. Examples include supplied-air (airline) respirators, SCBAs, and combination supplied-air/SCBAs.

Assigned Protection Factor (APF): A rating assigned to a respirator style by OSHA or NIOSH. This rating indicates the level of protection most workers can expect from the properly worn, maintained, and fitted respirator used under actual workplace conditions. An APF of 1,000 indicates that the concentration of contaminant inside the facepiece would be 1,000 times lower than concentration in the surrounding air. A respirator with an APF of 1,000 will provide greater protection than a respirator with an APF of 100. (Note: The APF should not be confused with a similar measure, the "fit factor," obtained during quantitative fit testing. Fit factors, which tend to be higher numbers, provide a relative indication of how well a respirator fits an individual, but do not represent the level of protection the respirator would provide in the workplace.)

CBRN: Chemical, biological, radiological, or nuclear [agent or substance].

Doff: To take off or remove (e.g., PPE).

Don: To put on, in order to wear (e.g., PPE).

End-of-Service-Live-Indicator (ESLI): A system that warns the respirator user of the approach of the end of adequate respiratory protection from a respirator filter or cartridge. For example, when the sorbent is approaching saturation or is no longer effective in removing the chemical from the inhaled air.

Fit Factor (FF): A quantitative measure of the fit of a particular tight-fitting respirator facepiece to a particular individual. Fit factor is usually measured as the ratio of the concentration of a substance (aerosol) in ambient air to its concentration inside the respirator when worn and tested according to a specific test protocol (e.g., Portacount). It should not be assumed that there is a correlation between the numeric value of the fit factor and the specific level of protection the respirator will provide in the workplace. This is due to the following factors: differences in the conditions of the fit test and the conditions in the workplace; variations in the position of the facepiece on a person's face after different donnings; different face, head, and body movements by the respirator wearer during a fit test and during actual work. Typically, a minimum quantitative fit factor (e.g., 500) is chosen for a particular class of respirator to ensure the respirator provides a minimum level of fit to the user's face when tested according to a specific protocol.

Gas: Any material in the gaseous state at 25 C and 760 mm of mercury (mm Hg).

Grade D Breathing Air: Air (from a breathing air compressor) that meets the requirements of the Compressed Gas Associations Specification G-7, which indicates oxygen content of 19.5 to 23.5 percent by volume, hydrocarbon content of 5 mg/m^3 or less, carbon monoxide content of 10 ppm or less, carbon dioxide content of 1,000 ppm or less, moisture content that does not exceed a dew point of -50 degrees F at one atmosphere of pressure, and lack of noticeable odor.

High-efficiency Particulate Air (HEPA) Filter: A filter that is at least 99.97 percent efficient in removing monodispersed particles of 0.3 microns in diameter. For respirators, the equivalent filter under NIOSH's standard (42-CFR part 84) is the P100 filter.

Immediately Dangerous to Life or Health (IDLH): An atmospheric concentration of any toxic, corrosive, or asphyxiant substance that 1) poses an immediate threat to life, 2) would cause irreversible or delayed adverse health effects, or 3) would interfere with an individual's ability to escape from a dangerous atmosphere.

Maximum use concentration (MUC): An estimate of the maximum airborne concentration of contaminant against which the respirator will adequately protect the wearer. The MUC is derived by multiplying the PEL (or one-half of the PEL for a more conservative approach) for the airborne contaminant by the APF for the specific type of respirator and facepiece.

Oxygen-deficient Atmosphere: An atmosphere with oxygen content below 19.5 percent.

Permissible Exposure Limit (PEL): The maximum average concentration of airborne contaminant exposure allowed by OSHA over a specified period of time (e.g., 8-hour time-weighted average, or 30-minute short term exposure limit. OSHA also sets *ceiling* concentration limits, which must not be exceeded at any time. In the absence of an OSHA limit, other exposure limits may be used. Examples of other exposure limits include NIOSH Recommended Exposure Limits (RELs) and ACGIH Threshold Limit Values (TLVs).

Personal Protective Equipment (PPE): Examples include protective suits, gloves, foot coverings, respiratory protection, hoods, safety glasses, goggles, and face shields.

Powered Air-Purifying Respirator (PAPR): A respirator that uses a battery-powered blower to force air through a filter or purifying cartridge before blowing the cleaned air into the respirator facepiece.

Qualitative Fit Test: A pass/fail subjective fit test to assess the adequacy of respirator fit. This test relies on the individual's response to the test agent. Test agents may evoke eye, nose, or throat irritation, or have a characteristic odor or taste, if they leak inside the respirator.

Quantitative Fit Test: An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator. This is an objective test using analytical measuring equipment. The result of this test is called a fit factor.

Self-Contained Breathing Apparatus (SCBA): An atmosphere-supplying respirator for which the source of breathing air is designed to be carried by the user.

Supplied-Air Respirator (SAR): A respirator that provides breathing air through an airline hose from an uncontaminated decompressed air source to the facepeice. The facepiece can be a hood, helmet, or tight-fitting facepiece.

Tight-fitting Facepiece: A respirator inlet cover that forms a complete seal with the wearer's skin (usually the face).

User Seal Check (fit check): A test conducted by the user of a tight-fitting respirator to ensure the facepiece is properly seated to the face. This test must be done each time a tight-fitting respirator is donned before entering the contaminated atmosphere. This check helps reduce or prevent air contaminant leakage between the user's face and facepiece seal.

Vapor: Gaseous phase of a substance ordinarily liquid or solid at 25 degrees C and 760 mm Hg. Vapors enter the air as liquids evaporate.

APPENDIX A:

Designation of Regional/Local Roles, Responsibilities, Policies, and Procedures Associated With the Respiratory Protection Program

Appendix A: Regional or Local Roles, Responsibilities, Policies, and Procedures for _____

(Name region or local office)

Last updated on: _____.
Updated by: _____.

Background Information

This appendix provides space for regional/local offices to enter information specific to their local Respiratory Protection Program. The Respiratory Protection Program Administrator or Regional SHEMP Manager must ensure that this appendix is completed with relevant information regarding individual responsibilities and local policies and procedures. To do so, they must customize Part A-I and Part A-II of this appendix.

Instructions For Part A-I

Table A-1 presents a list of tasks that should be performed to ensure the smooth operation of a respiratory protection program. The tasks are listed in rows. EPA position titles (e.g., the Removal Manager or the Health and Safety Program Contact) are listed in columns. Check marks are used to assign each task to a specific individual. The Respiratory Protection Workgroup has assigned each task to a specific position title. For some of the tasks, a check mark has been placed in two or more columns to indicate that more than one individual bears some responsibility for that task. **Please note that regional representatives can move the pre-filled check marks to re-delegate tasks if doing so makes sense for a particular region**.

The major stakeholders who are responsible for implementing their region's Respiratory Protection Program are expected to review and complete Table A-1 on a regular basis. When doing so, care should be taken to:

1. Fill in the background information that is requested at the top of page A-3. For example, indicate when the table is being updated and who is doing the updating.

2. Fill in actual names under the position titles.

1. Add columns to include additional key players (if necessary).

2. Determine whether any of the recommended task assignments should be delegated to another person. (If so, move the checkmarks to re-assign the task.)

3. Ensure that each task has indeed been assigned to a specific person in the region.

Instructions For Part A-II

The major stakeholders who are responsible for implementing their region's Respiratory Protection Program are expected to fill in the yellow-highlighted blank spaces that appear in Part A-II.

PART A-I

TABLE A-1: TASK CHART FOR IMPLEMENTING RESPIRATORY PROTECTION PROGRAMS AT THE REGIONAL/LOCAL LEVEL

Region ____
Last Updated on: Month Day, Year .
Updated by _____.

	Who is Responsible for Each Task or Action?						
ROLES ▸	Program Administrator	Removal Manager	SHEMP Manager	Health and Safety Program Contact	Emergency Response Personnel	Other individuals with specially designated responsibilities (EPA employees, contractors, etc.)	
Name of person in role ▸	(Name)	(Name)	(Name)	(Name)	(Names)	(Name)	(Name)
General Tasks Associated with the Respiratory Protection Program							
1. Maintain overall Agency-wide responsibility for the operation of EPA's Respiratory Protection Program. (*Note: This responsibility may not be delegated to someone else.)*	✓						
2. Ensure that a nationally consistent Respiratory Protection Program exists across all of the EPA regions and Environmental Response Team offices.	✓						
3. Ensure that the Agency's Respiratory Protection Program complies with all applicable laws, regulations, orders, rules, standards, and guidance.	✓						
4. Ensure that the *Respiratory Protection Program Implementation Plan* is customized with region-specific information. For example, ensure that region-specific information is filled into the yellow highlighted-blank spaces that appear throughout the document and in Appendix A. In addition, ensure that all of the tasks listed in Table A-1 are assigned to specific individuals.	✓		✓				
5. On a regular basis, call together the major stakeholders involved in implementing the region's Respiratory Protection Program to discuss the status of the program and to determine whether it is necessary to update region-specific information on policies, procedures, and task assignments. If updates are made, ensure that customized versions of the *Respiratory Protection Program Implementation Plan* are distributed to all relevant regional stakeholders. In addition, ensure that any other written procedures that relate to the Respiratory Protection Program are kept current and that copies are provided to the appropriate individuals/organizations.			✓				
6. Ensure that the tasks and procedures outlined in this *Respiratory Protection Program Implementation Plan* are being followed at the regional/local level by employees who have been identified as responsible parties. (For example, ensure that employees meet training, respirator sanitation, and recordkeeping requirements.) Also, support any respiratory-protection-related initiatives that the Program Administrator or the SHEMP Manager establish. In addition, provide the necessary personnel, resources, and equipment to support the proper and safe implementation of the Respiratory Protection Program.		✓					
7. Oversee the day-to-day operation of EPA's Respiratory Protection Program at the regional level.			✓				

	Who is Responsible for Each Task or Action?						
ROLES ▸	Program Administrator	Removal Manager	SHEMP Manager	Health and Safety Program Contact	Emergency Response Personnel	Other individuals with specially designated responsibilities (EPA employees, contractors, etc.)	
Name of person in role ▸	(Name)	(Name)	(Name)	(Name)	(Names)	(Name)	(Name)
8. Serve as the regional point of contact on all respiratory-protection-related issues for emergency responders. (Facilitate and coordinate communication between the managers who administer the Respiratory Protection Program and the emergency responders subjected to the program.)				✓			
9. Ensure the safety of onsite personnel working in the field.					✓		
10. Develop HASPs that document site-specific information about respiratory-protection-related procedures that emergency response personnel will follow. (Include components of this *Respiratory Protection Program Implementation Plan* in the HASP.) Ensure that the HASP is approved before entering a work site.					✓		
11. Review HASPs to ensure that they include adequate information to satisfy OSHA's requirements for a written Respiratory Protection Program that contains worksite-specific procedures.		✓	✓				
12. Ensure that all respiratory-protection-related components of the HASP are actually implemented in the field.		✓	✓		✓		
Tasks Associated with Hazard Evaluations, Hazard-Reduction Control Measures, Respirator Selection, and HASP Development (see Sections 4.1, 4.2, and 4.3)							
13. Conduct task-by-task hazard evaluations to determine what level of respiratory protection is needed at a particular site and document the process. (See Appendix C of this *Respiratory Protection Program Implementation Plan* for an example Hazard Evaluation template).					✓		
14. Identify and implement engineering, work practice, or administrative controls to minimize airborne hazards whenever feasible. Determine whether respiratory protection will be needed to supplement these mitigation efforts. Consult with the SHEMP and Removal Managers as necessary.		✓	✓		✓		
15. Determine which type of respirator (e.g., APR or ASR) is needed to perform tasks at a particular site using a combination of the following tools: • Conduct air monitoring. • Consider NIOSH's Respirator Selection Logic, APFs, and MUCs. • Consider OSHA's substance-specific standards. • Consult generic action levels. • Consider special needs associated with chemical, biological, radiological, and nuclear contaminants. • Review HASPs developed by other (non-EPA) entities who have performed work at the site. (*Note: The respirator selected must fall under EPA's Standard Issue classification as specified in Appendix D of this Respiratory Protection Program Implementation Plan. [Another brand may only be substituted if an employee is unable to achieve an acceptable fit with the Standard Issue respirator.*])					✓		
16. Approve the respirator selections that emergency response personnel identify as appropriate for each site. If a request is made to use alternate (i.e., not Standard Issue) respirators/filters in the exclusion zone, determine whether this request should be approved or denied.			✓				

	Who is Responsible for Each Task or Action?						
ROLES ▸	Program Administrator	Removal Manager	SHEMP Manager	Health and Safety Program Contact	Emergency Response Personnel	Other individuals with specially designated responsibilities (EPA employees, contractors, etc.)	
Name of person in role ▸	(Name)	(Name)	(Name)	(Name)	(Names)	(Name)	(Name)
Tasks Associated with Procedures for Proper Use of Respirators in the Field (see Section 4.6)							
17. Ensure that all emergency responders receive a laminated copy of *Quick Reference Guide (Relating to Respiratory Protection) for EPA Emergency Response Personnel*. (Note: The guide is included in Section 7 of this *Respiratory Protection Program Implementation Plan*.		✓	✓				
18.Conduct field monitoring activities to assess field conditions. Compare the results to pre-established action levels to determine whether it is necessary to increase the level of respiratory protection or to shut down activities.					✓		
19. Adhere to the guidelines presented in this chapter regarding: • **When to don/doff respirators**. For example, don them outside hazard areas and remove them only after returning to an area where airborne hazards are within acceptable limits. • **General requirements for respiratory use as detailed in Section 4.6.3 of this chapter**. For example, do not use expired equipment parts, do not use chewing products while wearing respirators, maintain a facial surface consistent with proper fit, etc. • **When to leave hazardous environments**. For example, exit a site if a respirator does not perform as expected or if site conditions change significantly. • **Special considerations for IDLH environments**. For example, use the highest level of respiratory protection and ensure that a standby employee is appropriately equipped. • **When to change filters and cartridges**. For example, discard filters/cartridges if breathing resistance increases significantly, when the service life has been reached, or at the end of each workshift (which ever occurs first), or according to regional policy.					✓		
Tasks Associated with Preparing Employees To Wear Respirators in the Field (see Sections 4.4, 4.5, 4.6.1, 4.9, and 4.10)							
20.Ensure that policies are in place regarding who has the authority to issue equipment, which equipment is issued, and how consumable supplies are issued and tracked.			✓	✓			
21. Issue respiratory protective equipment for individual use to qualified personnel.			✓				
22. Ensure that emergency response personnel demonstrate proper ability/knowledge before being allowed to work in environments that require respiratory protection. (For example, ensure that their medical clearance, fit testing, and training requirements are all in order.)		✓					
23. Participate in baseline and annual medical evaluations and answer all respirator-related questions that are asked during the exam.					✓		

	Who is Responsible for Each Task or Action?						
ROLES ▸	Program Administrator	Removal Manager	SHEMP Manager	Health and Safety Program Contact	Emergency Response Personnel	Other individuals with specially designated responsibilities (EPA employees, contractors, etc.)	
Name of person in role ▸	(Name)	(Name)	(Name)	(Name)	(Names)	(Name)	(Name)
24. Provide the following respirator-related information to physicians who perform medical evaluations on EPA emergency response personnel: (1) the type and weight of the respirator the employee wears, (2) the duration and frequency of respirator use, (3) the expected physical work effort, (4) the use of protective clothing and equipment to be worn, and (5) the temperature and humidity extremes that the employee might encounter.			✓				
25. Obtain *Medical Clearance Statements* from EPA's Medical Review Officer and check to make sure that employees who have been issued a respirator have proper medical clearance for use of that respirator. (Verify each employee's medical clearance status on an annual basis.)			✓				
26. Participate in baseline and annual QNFT respirator fit testing.					✓		
27. Perform a user seal check whenever donning a tight-fitting respirator.					✓		
28. Provide initial and annual QNFT for each emergency responder and for each type of respirator that he/she uses. (As part of this effort, ensure that the fit testing equipment if properly calibrated. Also, check for problems with the respirator during the test and ask employees to review the proper methods for donning and wearing their respirator.)			✓				
29. Keep records of Portacount QNFT printouts and completed QLFT records.			✓				
30. Participate in initial (and annual refresher) respiratory protection training courses. In addition, at least once a year, participate in an exercise on the use of a negative pressure APR and a PAPR by conducting a respirator inspection, tear down, cleaning, reassembly, and donning/doffing. Also, participate in an SCBA exercise once a year that involves inspecting, donning/doffing, cleaning, and reassembling a respirator, as well as breathing down a tank (20 minutes minimum). (*Note: The SCBA exercise only applies to SCBA users.)*					✓		
31. Ensure that emergency response personnel receive respiratory protection training, which should consist of a combination of classroom lectures and field exercises. In addition, maintain log sheets documenting who has received training.			✓				
32. Provide a copy of OSHA's 29 CFR 1910.134 Appendix D to qualified employees who wish to wear a respirator voluntarily. Also, ask voluntary respirator users to sign a log sheet to document that they have indeed received the OSHA information.			✓				
Tasks Associated with Cleaning, Storing, Inspecting, and Maintaining Respiratory Protection Equipment (see Section 4.7)							
33. Ensure that all activities related to proper handling, cleaning, inspection, and maintenance of respiratory protection equipment have been delegated and that all involved understand their roles and responsibilities.		✓	✓				

	Who is Responsible for Each Task or Action?						
ROLES ▸	Program Administrator	Removal Manager	SHEMP Manager	Health and Safety Program Contact	Emergency Response Personnel	Other individuals with specially designated responsibilities (EPA employees, contractors, etc.)	
Name of person in role ▸	(Name)	(Name)	(Name)	(Name)	(Names)	(Name)	(Name)
34. Ensure that proper handling, cleaning, inspection, maintenance, and storage procedures are followed for all respirators that have been issued for your personal use. For example, maintain respirators in a clean and sanitized condition; inspect respirators before and after each use, during cleaning, and also on a monthly basis; and document monthly inspections using the *Monthly Respirator Inspection Checklist*. Also, if any damage is detected, report this problem immediately and ensure that repairs are made or replacements are issued before using the equipment again in the field.					✓		
35. Maintain responsibility for the proper handling, cleaning, inspection, maintenance, and storage of all centrally-stored respiratory protection equipment.				✓			
36. Inspect all centrally-stored respiratory protection equipment and document inspection activities on the *Monthly Respirator Inspection Checklist*. In addition, on a quarterly basis, collect copies of all of the *Monthly Respirator Inspection Checklist*s that emergency response personnel have completed and maintain a log documenting the receipt of these checklists.				✓			
37. Receive an appropriate level of training from the manufacturer to make minor repairs to respiratory protection equipment. Assist EPA emergency response personnel in making repairs to their equipment and/or obtaining replacement parts.				✓			
38. Ship respiratory protection equipment to the manufacturer for major repairs and for regular equipment inspections.				✓			
39. Properly tag equipment awaiting repair and appropriately discard equipment that is no longer serviceable.				✓			
40. Maintain adequate supplies of spare parts and consumable supplies required for regular use and in-house maintenance of respirators. For example, maintain adequate supply of breathing air and respirator cartridges.				✓			
41. Ensure that SCBAs are periodically inspected by the manufacturer (or the manufacturer's authorized agent).				✓			
42. Ensure that SCBA cylinders are hydrostatically tested at required intervals (depending on cylinder composition).				✓			
43. Maintain logs of quarterly inspections that are performed on cartridges, canisters, and breathing air cylinders. Ensure that cartridges, canisters, and breathing air cylinders are inspected on a quarterly basis and that items are removed from service (tagged and stored separately) if they have expired or are scheduled to expire in the following quarter.				✓			
44. Ensure that all equipment being considered for retirement is returned to the manufacturer for evaluation.				✓			
45. Contact equipment manufacturers and technicians as the need arises to ask for assistance and/or recommendations. Maintain documentation of any evaluations, inspections, or repairs that the manufacturer (or a qualified representative) performs.				✓			

	Who is Responsible for Each Task or Action?						
ROLES ▸	Program Administrator	Removal Manager	SHEMP Manager	Health and Safety Program Contact	Emergency Response Personnel	Other individuals with specially designated responsibilities (EPA employees, contractors, etc.)	
Name of person in role ▸	(Name)	(Name)	(Name)	(Name)	(Names)	(Name)	(Name)
Tasks Associated with Obtaining Breathing Air From An Outside Source or Operating and Maintaining an In-House Breathing Air Compressor							
46. Obtain and retain the following documentation whenever breathing air is obtained from an outside source: certification that the air meets Grade D (at a minimum) breathing requirements, information on the type and frequency of testing, and copies of recent air quality tests (if a certificate is not available).				✓	✓		
47. If your region has an in-house air compressor, ensure that only properly qualified individuals are allowed to operate it.		✓					
48. Write a *Breathing Air Compressor Operation and Maintenance Plan* if your region has (or plans to obtain) an in-house air compressor. Also, assume full accountability (a task that cannot be delegated) for the operation and maintenance of this air compressor system. In addition, obtain training from the compressor manufacturer on the following: start-up operations and maintenance procedures, safe handling for compressed gas cylinders, and DOT Hazardous Materials Shipping Requirements.				✓			
49. Review and approve the region's *Breathing Air Compressor Operation and Maintenance Plan* if the region has an in-house air compressor.			✓				
50. Obtain training records from the technician who installed the air compressor for your region (assuming your region has an in-house air compressor system).				✓			
51. Maintain records documenting that employees who are allowed to operate/maintain the region's in-house air compressor have received training from the system manufacturer.				✓			
52. Conduct quality tests (each time a batch of cylinders is filled or at least monthly) to ensure that the region's in-house air compressor provides Grade D breathing air. Maintain records of the results.				✓			
53. Maintain records documenting maintenance activities and repairs that are performed on in-house air compressor systems.				✓			
Tasks Associated with Audits and Program Evaluation							
54. Assist in performing audits/program evaluations in an effort to determine whether the Respiratory Protection Program is: • Being implemented in accordance with the National Minimum Standards identified in this chapter. • Meeting its ultimate objectives, which are to ensure that employees are adequately prepared to enter sites that pose respiratory hazards; to provide the means of detecting deficiencies in respirator selection, usage, or maintenance procedures; and to ensure that procedures are in place to address issues that require attention.		✓	✓	✓			
55. Fill out the *Respiratory Protection Program Audit Form* (see Appendix X) on an annual basis and retain copies of that form.			✓				
56. Take steps to correct program deficiencies identified during audits.		✓	✓				
57. Upon request, provide information about the respiratory protection program		✓	✓	✓	✓		

Name of person in role ▲						
ROLES ▲	Administrator Program	Approval	Who is Responsible f SHEMP	Program coordi Safety		Emergency
	(Name)	(Name)	(Name)	(Name)		(Names)
to Core ER representatives when they visit the region to perform annual health and safety audits.						

A-II. Local Policies and Procedures (where local variation is allowed)

To maintain national consistency, all emergency response personnel in all offices and regions are expected to follow the standard procedures that are outlined in this *Respiratory Protection Program Implementation Plan*; however, some aspects of the program specifically allow for regional variation. When local policies or procedures vary from the Respiratory Protection Program, they must be recorded in this section of Appendix A.

A-II(a) Respirator Selection

(Regarding chapter section 4.3.1) In most cases, respirator selection will be made by the EPA emergency response team members, their contractors, or other responsible parties involved with the site and tasks. If this is not the case for your region, please describe who is responsible for making respirator selections here. [Enter "none" if no local variation exists.] (*Note: Regional variability is acceptable when it comes to determining who will perform respirator selections. For example, in some regions, the SHEMP Manager might be assigned the task.*)

A-II(b) Acceptable Respirators for Emergency Response Personnel

(Regarding chapter section 4.3.2) To promote national consistency and interchangeability among EPA Emergency response personnel, a Standard Issue respirator has been designated. Another brand or model of full facepiece may be substituted only if the employee cannot achieve an acceptable fit with the Standard Issue respirator. In this case, the alternate NIOSH-approved respirator make and model must be listed here. [Enter "none" if no local variation exists]

Employee Name	Respirator Type	Make	Model

A-II(c) Issuing respiratory protection

(Regarding chapter section 4.6.1) State the region-specific procedures for issuing respirators (including facepieces, spectacle kits, PAPRs, SCBAs, and filters/cartridges/canisters, as applicable).

A-II(d) Special Considerations for IDLH Atmospheres

(Regarding chapter section 4.6.4) In most regions, an IDLH atmosphere may only be entered with: (1) a full facepiece pressure-demand SCBA with a minimum service life of 30 minutes, or (2) a combination full facepiece pressure-demand supplied-air respirator with an auxiliary self-contained air supply. Please indicate whether your region has chosen to place additional restrictions on entering an IDLH environment here. (For example, some regions/offices do not permit their employees to work in IDLH atmospheres at all). [Enter "none" if no local variation exists]

A-II(e) Chemical Cartridge Change Schedules

(Regarding chapter section. 4.6.5.2) As a safe practice, EPA typically requires that emergency response personnel discard respirator cartridges at the end of the workday, regardless of whether the service life has been reached. However, regional variation in policy is allowed. For example, some regions/offices might indicate that cartridges must be replaced every time a respirator is doffed. State any local variation in cartridge change schedule here. [Enter "none" if no local variation exists]

A-II(f) Action Levels Triggering Respiratory Protection

(Regarding chapter section 4.6.6) Action levels (i.e., chemical concentrations used to assist in determining necessary respiratory protection levels, required engineering controls, or site shut down) will depend on the contaminants expected at the site, the possibility of encountering unidentified substances, the amount of control over the process or operation, and other factors. This chapter provides several examples of action levels that are commonly used (see Tables 3 through 6 in the main text of this chapter). Local or regional offices may use other action levels. If this office uses action levels different than (or in addition to) those listed in the chapter, state them here. [Enter "none" if no local variation exists]

A-II(g) Respiratory Protection Equipment Storage

(Regarding chapter section 4.7.1.3) Respirators must be stored in a manner that protects against dust, harmful chemicals, sunlight, excessive heat or cold, and moisture. Enter the specific regional storage procedures here (e.g., type of sealing containers used and acceptable storage locations).

A-II(h) Breathing Air Quality and Use

(*Regarding chapter section 4.8.1*) Some EPA regions maintain compressors capable of producing breathing air that can be used in SCBA breathing air cylinders. This allows these regions to be self-sufficient in obtaining breathing air. In other cases, EPA purchases breathing air from other (non-EPA sources.) Information about local sources of breathing air and the region's compressor capabilities should be noted in Appendix A and in the space provided below. Information should be included on local procedures and any breathing air cascade systems operated by the local/regional office.

EPA-operated Breathing Air Compressors	Type	Make/Model	Location

Local Procedures Associated with Breathing Air Compressor/Cascade System

Other Breathing Air Sources	Location	(Indicate whether a routine or emergency source)

APPENDIX B:

Respiratory Protection Program for EPA Emergency Response Personnel—National Minimum Standards

Respiratory Protection Program for Emergency Response Personnel National Minimum Standards

PURPOSE

- Comply with all appropriate regulatory requirements and EPA orders/guidance.
- Provide nationally consistent equipment which can be used interchangeably between regions.
- Ensure emergency response personnel have a clear understanding of respiratory protection requirements.
- Ensure emergency response personnel have the resources and tools necessary to implement an adequate site-specific respiratory protection program.
- Ensure emergency response personnel are proficient in the use of all levels of respiratory protection, including air-purifying respirators, powered air-purifying respirators (PAPRs), and self-contained breathing apparatus (SCBA).
- Maintain nationally consistent records to document compliance with this program.
- Establish a nationally consistent evaluation program.

CRITERIA

Regulatory

- The written Respiratory Protection Program must meet the requirements of 29 CFR 1910.134 and all substance-specific standards (including but not limited to the toxic and hazardous substances detailed in 29 CFR 1910 and 1926, Subpart Z).
- The written Respiratory Protection Program must be consistent with 29 CFR 1910.120, EPA Order 1440.3, and EPA SHEMP Guide No. 46.
- Site-specific respiratory protection is the responsibility of the OSC per the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300, et seq).
- Respirators must meet NIOSH certification requirements per 42 CFR 84.
- Respirator selection will be based on appropriate guidance such as “NIOSH Respirator Decision Logic”, NIOSH Publication No. 87-1-8, May 1987, and “American National Standard for Respiratory Protection”, ANSI Standard Z88.2-1992.
- Cylinders must meet testing and maintenance requirements in DOT 49 CFR 173 and 178.
- Compressed breathing air must at least meet the Grade D breathing air requirements outlined in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, or more recent.

Responsibilities

- To assure that a respirator will provide protection equal to the APF, the wearer must achieve a QNFT fit factor (FF) that is at least 10-fold higher than the APF. For example, an APF of 50 can be assumed for the employee's full facepiece, tight-fitting air-purifying respirator if the wearer achieves a FF of 500 or higher.

Respiratory Protection Equipment

- Each emergency responder will be individually issued a full facepiece, tight-fitting respirator mask for use in APR, PAPR, and SCBA applications. The national standard issue will be a Scott® combination APR/PAPR/SCBA respirator; however, if an emergency responder cannot achieve a proper fit with a mask available from this manufacturer, alternative respirators that do provide a proper fit will be provided.
- As the national standard, each Region will maintain a similar cache of equipment for the respiratory protection program. Contact the Program Administrator for a current equipment list.
- Individually issued respirators will be maintained by emergency response personnel as outlined in this chapter, with an inspection conducted before and after each use. Monthly documented inspections will also be conducted.
- Other respiratory protection equipment will be centrally stored and maintained as documented in this chapter, with monthly documented inspections.

Air Monitoring Equipment

- Appropriate air monitoring equipment will be made available for the purpose of selection and use of respiratory protection equipment and emergency response personnel will be required to demonstrate proficiency in use of this equipment.
- The selected respirator must have an assigned protection factor (APF) that will offer adequate protection from the maximum level of contaminant to which the employee is expected to be exposed.

Respiratory Medical Clearance

- Before being issued a respirator, each EPA emergency responder must obtain medical clearance for respirator usage. Although not mandated by OSHA, a repeat medical evaluation will be performed annually to ensure that the employee is still medically qualified to wear respiratory protection equipment.

Fit Testing

- Each emergency responder is required to pass a quantitative fit test (QNFT) before using a respirator with a tight-fitting facepiece. The initial QNFT must be completed before the employee uses the respirator in the field. The test must be repeated annually, or if an employee

reports changes, or if there are observations of changes in the employee's physical condition that could affect respirator fit. To assure a protection factor of 50 can be assumed during use of a negative pressure tight-fitting full facepiece, emergency response personnel must achieve a fit factor of at least 500 during a QNFT performed using the Portacount system.

- Initial and annual QNFT fit testing will be required for each different make, model, type, and/or size of tight-fitting respirator mask (regardless of negative or positive pressure use) that will be worn by each emergency responder
- The initial or annual QNFT should be performed as soon as possible after the employee is given medical clearance to wear the respirator and *must* be performed prior to respirator use.
  - Exception #1: For a SCBA mask, either a QNFT or QLFT may be used to confirm the employee is assigned a properly fitting respirator.
  - Exception #2: In an emergency situation in the field, employees must sometimes wear tight-fitting respirator types, makes, models, or sizes for which they have not been fit tested within the previous year. In this case, if a Portacount is not available, a stannic chloride (irritant smoke) qualitative fit test (QLFT) may be performed in the field as a temporary substitute for a QNFT. If the employee will continue using the respirator over an extended period, the QLFT should be followed by a QNFT as soon as feasible. [Note: As always, the type of respirator must be selected to provide adequate protection from the anticipated conditions (e.g., a half-mask respirator is assigned an APF of 10). Additionally, the employee must be medically qualified to wear the type of respirator selected.]

Training/Exercises

- Each emergency responder will initially receive a minimum of six hours of respiratory protection training before wearing a respirator in the field. (This can be part of 40-hour HAZWOPER training). In addition, emergency response personnel will be required to take a minimum of two classroom hours of annual respiratory protection refresher training (as described in this chapter).
- At least once a year, each emergency responder will exercise in the use of an APR and PAPR by conducting a respirator inspection, tear-down, cleaning, reassembly, donning/doffing (as described in this chapter).
- At least once a year, each emergency responder who has been issued a SCBA respirator will exercise in the use of an SCBA respirator by conducting an inspection, donning/doffing, breathing down a tank of air (20 minutes minimum), cleaning, and reassembly (as described in this chapter).
- If compressors and/or cascade systems are used by emergency response personnel in a region, then each emergency responder in that region will be required to demonstrate proficiency in using this equipment to fill air bottles. This will be documented one time at a minimum.

Recordkeeping

- Nationally consistent, readily accessible records will be maintained according to the procedures described in this chapter in each region to document the following:

  — Medical respirator clearance and limitations, if applicable
  — Portacount calibration and maintenance records
  — QNFT and QLFT results
  — Initial respiratory protection training (40-hour HAZWOPER certificate would suffice)
  — Annual 2-hour classroom respiratory protection training
  — Annual APR/PAPR exercise
  — Annual SCBA exercise
  — Cylinder filling proficiency
  — Respirator issuance
  — Monthly APR inspection logs for individually issued respirators
  — Monthly APR/PAPR inspection logs for stock and emergency respirators
  — Monthly SCBA inspection logs for stock units
  — Periodic inspection and/or maintenance records for other respiratory equipment and expendable supplies (i.e., compressors, batteries, cartridges, canisters, etc.)

Program Evaluation

- A process improvement review will be conducted by each Regional SHEMP Manager as needed or at least annually as described in this chapter. The compiled information will be evaluated nationally for potential changes to this program.

Audits

- As part of the Core ER Program Evaluation process, regional audits will be conducted one time every year to ensure proper compliance to this program, using the checklist(s) provided in this chapter. (SHEMD or other audits may also be performed according to needs/schedules.)
- To evaluate implementation of site-specific respiratory protection programs, regional audits will be conducted at five percent, or a minimum of two, hazardous substance and/or oil sites on an annual basis, using the checklist(s) provided in this chapter.

APPENDIX C:

Tools To Assist With Hazard Evaluations

- **Site/Task Specific Hazard Evaluation Form**
- **Things To Consider When Performing a Hazard Evaluation**

Site/Task Specific Hazard Evaluation Form

Site Name/Location: _____

Operation or procedure where respirators are required:_____
_____
_____
_____

Air contaminants requiring the use of respiratory protection:

CONTAMINANT	EST. AIR CONC.	PEL	IDLH	CHEMICAL/PHYSICAL FORM
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Other considerations for respirator selection: _____
_____
_____

Type of respirator to be used: Air-Purifying _____; Supplied Air _____; SCBA:_____

If air-purifying respirator, specify type of filters/canisters and cartridge change schedule:
_____
_____

Conditions under which a respirator is to be used:_____
_____
_____

Type and frequency of area or personal air monitoring: _____
_____
_____
_____

Date of Preparation:_____Prepared by:_____

(This evaluation form may be used as an attachment to the site-specific Health and Safety Plan [HASP], but may not be used as a substitute for the HASP.)

Things To Consider When Performing A Hazard Evaluation

A hazard evaluation must be performed to determine what level of respiratory protection is required at a site. The following is a list of considerations that should be taken into account when conducting a hazard evaluation:

- The nature of the hazardous operation or process (process characteristics).
- Materials used or produced during the process.
- The nature of the respiratory hazard, such as:
  - Type (oxygen deficient or contaminated atmosphere)
  - Atmospheric stability (i.e., is the oxygen level expected to fluctuate or decrease, can the contaminant levels increase?)
  - Physical properties of the contaminant (i.e., physical state [gas, vapor, mist, dust, fume, fiber, biological hazard], particle size, molecular weight, and vapor pressure)
  - Chemical properties of the contaminant (i.e., solubility in water and other liquids, reactivity with other chemicals, and hazardous decomposition products)
  - Range of expected air contaminant concentrations, if known
  - Physiological effects (including synergistic) of the contaminants on the body (i.e., eye irritation, skin absorption, and adverse olfactory effects)
  - Whether multiple contaminants are present
  - Established Permissible Exposure Limits, Recommended Exposure Limits, and Threshold Limit Values, or other recommended exposure limit for each contaminant present at the site
  - Whether Immediately Dangerous to Life or Health (IDLH) conditions exist
  - Contaminant warning properties (odor threshold, or other)
  - Flammability/lower explosive limits of contaminants
- Characteristics of the work environment (i.e., external physical factors such as entry/egress pathways, mobility, weather, severe temperatures or humidity, weather, prevailing winds, low-lying areas or other geographic concerns for outdoor work, etc.).
- The location of the hazardous area in relation to the nearest area having respirable air.
- The employee's activities in the hazardous area (work rate and degree of contact with contaminants).
- The length of time the respiratory protection will be needed (especially critical for atmosphere supplying devices since the air supply is finite).
- Physical limitations/health of the workers.
- Potential for upset conditions or abnormal situations, such as emergency spills and air releases.
- The possibility to encounter unknown conditions.
- The physical characteristics, functional capabilities, protection factors, fit, and limitations of the respiratory protection devices (i.e., cartridge breakthrough time).
- End of service life indicators and or cartridge change-out schedule.

APPENDIX D:

Standard Issue Scott® Respirators, Components, and Care Instructions

Standard Issue Scott® Respirators, Components, and Care Instructions

Background

To promote national consistency and interchangeability among personnel, EPA has designated the Scott® brand AV-3000 full facepiece as the primary Standard Issue respirator for EPA emergency response personnel. The AV-2000 (which is very similar) is also an acceptable alternative. The following table lists configurations of Standard Issue equipment that are acceptable for EPA emergency response personnel to use. Another brand or style of respirator may be substituted for Standard Issue equipment only if the employee cannot achieve an acceptable fit with Scott AV-3000 or the AV-2000.

Scott® National Standard-Issue Respirators for Emergency Response Personnel

Type	Facepiece and Conditions	Standard Issue Equipment
Air-Purifying:		
Negative pressure	Full facepiece	Scott® AV-3000 facepiece and head harness with 1/4-turn adaptor for 742 series cartridges (or alternate Model 74 twin cartridge full facepiece, also compatible with 742 series cartridges)
PAPR	Tight-fitting full facepiece Continuous flow mode	Scott® AV-2000 or AV-3000 (and 40 mm adapter) with C420 blower assembly
Atmosphere Supplying:		
SCBA	Tight-fitting full facepiece Positive pressure open-circuit mode	Scott® AV-3000, with AirPack Fifty 4.5 unit (no adapter required), including 1-hour cylinder rated for 4,500 psi. Check configuration for NIOSH CBRN approval.
Airline	Tight-fitting full facepiece Connected to an appropriate cascade system	Scott® AV-3000, with Scott® airline equipment

Information on Scott® series 742 cartridges, approved for use with EPA's standard-issue respirator for emergency response personnel, can be found at Scott's website or by contacting Scott® Technical Support at 1-800-247-7257.) In addition, information on Scott® series 742 cartridges can be found in Appendix H of this *Respiratory Protection Program* chapter

Cleaning and Disinfecting

For all Scott® respirator *facepieces, breathing tubes* (inside and outside), *and harness assemblies* (head and backpack) the manufacturer recommends washing the equipment in a warm (110° F. maximum) water solution that contains a mild detergent, rinsing with clean (potable) water, and drying thoroughly.

Use a soft cloth to wipe *PAPR blower assemblies* with the warm water solution, but do not submerge the blower. Scott® *Regulators*, as well as *facepieces that are not heavily soiled*, may be wiped using a soft cloth and an iodine-based cleaning and disinfection solution (e.g., Scott® *Multi-Wash Mini*). Heavily

soiled regulators should not be submerged in cleaning solution, but rather should be returned to the manufacturer for cleaning.

Facepieces and regulators issued to individuals must be disinfected regularly (for example at the end of each shift). Shared facepieces and regulators must be disinfected between each user. Appendix M presents the manufacturer's instructions for disinfecting Scott® facepieces and regulators after cleaning. The instructions say to spray generously with the iodine-based solution (e.g., 6 pumps from the spray bottle), swirl excess solution in the unit, shake out the excess liquid, and allow the facepiece or regulator to stand for 10 minutes (i.e., the required contact time for disinfection), rinse the device in clean (potable) water, and dry thoroughly.

Some cleaning products may damage or shorten the service life of respirators or their components. Alcohol-based cleaning products will damage 40 mm adaptors, but are safe for Scott® facepieces. (Alcohol solutions will deteriorate other brands of facepieces, however.) Furthermore, quaternary ammonium compounds (e.g., ammonium chloride) will accelerate aging of Scott® respirators. Therefore, it is desirable to minimize the use of alternate cleaning and disinfection products, including moist towelettes, if they contain this ingredient. Instead, for interim cleaning, users are advised to wipe Scott® equipment with an alcohol pad (carefully avoiding the regulator) or a pad dampened with water. Whenever it is feasible to rinse the respirator, use the manufacturer's cleaning solution.

APPENDIX E:

Assigned Protection Factor (APF) Classifications of Respirators for Protection Against Combination Gas/Vapor and Particulate Exposures

Combination Gas/Vapor and Particulate Respirators [1]

Assigned Protection Factor [2]	Type of Respirator
10	Any air-purifying half-mask respirator equipped with appropriate gas/vapor cartridges[3] in combination with appropriate type of particulate filter [4]
	Any full facepiece respirator with appropriate gas/vapor cartridges[3] in combination with appropriate type of particulate filter [4]
	Any negative pressure (demand) supplied-air respirator equipped with a half-mask
25	Any powered air-purifying respirator with a loose-fitting hood or helmet that is equipped with an appropriate gas/vapor cartridge[3] in combination with a high-efficiency particulate filter
	Any continuous flow supplied-air respirator equipped with a hood or helmet
50	Any air-purifying full facepiece respirator equipped with appropriate gas/vapor cartridges[3] in combination with an N-100, R-100 or P-100 filter or an appropriate canister[3] incorporating an N-100, P-100 or R-100 filter
	Any powered air-purifying respirator with a tight-fitting facepiece (half or full facepiece) equipped with appropriate gas/vapor cartridges[3] in combination with a high efficiency filter or an appropriate canister[3] incorporating a high efficiency filter
	Any negative pressure (demand) supplied-air respirator equipped with a full facepiece
	Any continuous flow supplied-air respirator equipped with a tight-fitting facepiece (half or full facepiece)
	Any negative pressure (demand) self-contained respirator equipped with a full facepiece
1,000	Any pressure-demand supplied-air respirator equipped with a half-mask
2,000	Any pressure-demand supplied-air respirator equipped with a full facepiece
10,000	Any pressure-demand self-contained respirator equipped with a full facepiece
	Any pressure-demand supplied-air respirator equipped with a full facepiece in combination with an auxiliary pressure-demand self-contained breathing apparatus

– This table was reprinted from, "*NIOSH Respirator Selection Logic*", Publication No. 2005-100, Table 3, Pages 15 and 16. Additional assigned protection factors (APFs) for particulate exposures only, or gas/vapor exposures only, can be found in Tables 1 and 2 of this NIOSH reference, respectively.

– The protection offered by a given respirator is contingent upon (1) the respirator user adhering to complete program requirements (such as the ones required by OSHA in 29 CFR 1910.134), (2) the use of NIOSH-certified respirators in their approved configuration, and (3) individual fit testing to rule out those respirators that cannot achieve a good fit on individual workers.

– Select a cartridge/canister certified to be used for the specific class of chemicals or the specific gas/vapor found in your workplace.

– Appropriate means that the filter medium will provide protection against the particulate in question. See step 9.2 (of the NIOSH Respirator Selection Logic Sequence, page 8 of the NIOSH publication) for information on the presence or absence of oil particulates.

APPENDIX F:

Points to Consider When Selecting Respiratory Protection Equipment

Points To Consider When Selecting Respiratory Protection Equipment

As a first step in deciding which type of respiratory protection device to use, emergency response personnel must determine whether an APR is acceptable or whether the situation requires use of an ASR in the form of a SCBA. An ASR is required for highly hazardous environments, including those that are oxygen deficient (19.5 percent oxygen or less), contain high concentrations of air contaminants that create an atmosphere immediately dangerous to life or health (IDLH), or when the concentration or identity of the hazard is unknown. An ASR is also required in environments that contain hazardous levels of an air contaminant for which no NIOSH-approved air-purifying cartridge is available.

An APR may be used when the concentration of the hazard does not exceed the limitations of the respirator. Specifically, ambient air must contain adequate oxygen, a filter or cartridge must be available to remove the contaminant, and the airborne concentration of the contaminant must not exceed the *maximum use concentration* (MUC), which represents the estimated level of contaminant against which the respirator adequately protects a wearer.

If emergency response personnel determine that an air-purifying respirator is acceptable, they can choose between a negative pressure APR or a PAPR. This decision might be based on the respirator's *assigned protection factor* (APF) and the MUC needed for the environment. If both respirator types are acceptable, selection may be based on personal preference, comfort, or availability. Finally, EPA personnel must select an appropriate air-purifying filter or cartridge.

Terminology Review

Permissible Exposure Limit (PEL): The maximum average concentration of airborne contaminant exposure allowed by OSHA over an 8-hour period. OSHA also sets short-term *ceiling* concentration limits, which must not be exceeded at any time. In the absence of an OSHA limit, other exposure limits may be used to determine the MUC. Examples of other exposure limits include NIOSH Recommended Exposure Limits (RELs) and ACGIH Threshold Limit Values (TLVs).

Assigned Protection Factor (APF): The APF represents a level of protection that most workers will achieve when correctly wearing a well maintained and properly fitted respirator under actual workplace conditions. APFs are set by NIOSH and OSHA for each style of respirator and facepiece. The higher the APF, the greater the degree of protection offered by the respirator (e.g., a respirator with an APF of 50 will reduce the amount of contaminant inside the facepiece 5 times more effectively than a respirator with an APF of 10)

A similar ratio, the respirator fit factor (FF), obtained during quantitative fit testing, should not be confused with APFs. The FF should not be used to determine the upper limit of contaminant concentration in which the respirator can be used safely.

Maximum use concentration (MUC): An estimate of the maximum airborne concentration of contaminant against which the respirator will adequately protect the wearer. The MUC is derived by multiplying the PEL (or one-half of the PEL for a more conservative approach) for the airborne contaminant by the APF for the specific type of respirator and facepiece.

Example: The PEL for acetaldehyde is 200 ppm, thus ½ the PEL is 100 ppm. When considering a a respirator with an APF of 50, the MUC would be 100 ppm x 50, or 5,000 ppm. Thus, a respirator with an APF of 50 would be suitable for use in an environment where concentrations of acetaldehyde are up to 5,000 ppm. Note that a separate factor, the performance limits of the chemical cartridge (if used) should also be considered in the final respirator selection.

The following sections provide a more detailed discussion of the use of MUCs, the respirator selection requirements of OSHA's substance-specific standards, and other tools EPA personnel can use to guide respirator selection.

Assessing MUCs

Airborne concentrations at emergency response or uncontrolled hazardous waste sites are not well quantified or stable and an extra safety factor should be used when determining the MUC in these situations. A suggested conservative approach for these conditions, frequently used by the emergency response industry, involves multiplying the APF by *one-half* of the permissible exposure limit (PEL) when determining the MUC and considering whether the respiratory protection afforded by a specific device is adequate.

Appendix E lists the APFs currently assigned by NIOSH and describes various types of respirators used for protection against combination gas/vapor and particulate exposures, as presented in the *"NIOSH Respirator Selection Logic"* (dated October 2004).

In 2003, OSHA proposed an updated list of APFs for various respirator types (presented in Table 1 on page 34114 of *Federal Register 68FR34035.* If the proposed rule is promulgated, OSHA's Respiratory Protection Standard will be updated to include APFs assigned by OSHA.

Consideration for Environments Impacted by Chemical, Biological, Radiological, and Nuclear (CBRN) Events

In environments containing CBRN agents, the ideal would be to use a respiratory protection device that NIOSH has certified as being acceptable to address such situations. However, NIOSH is responsible for certifying respirators that will be suitable in CBRN environments. As NIOSH's standards are promulgated and suitable respirators become available, emergency response managers should check the NIOSH CBRN respirator website and select approved respirators for incidents involving these substances. In the interim, for respirator types not yet covered by a NIOSH CBRN standard (e.g., PAPRs), they should consult respirator manufacturers to determine whether commercial laboratory testing has been conducted on their products to determine whether the respirator has the ability to protect a wearer from CBRN agents.

Decision Tools that Assist with the Respirator Selection Process

There are a number of guides and references available to assist with the respirator selection process. EPA emergency response personnel may use the decision logic and guides presented below. Additional guides are published by EPA, NIOSH, OSHA, and the American National Standards Institute (ANSI). Some OSHA substance-specific standards designate required levels of respiratory protection (a list of such standards appears in Appendix G of this chapter).

Decision Logic for Selecting Respirator Type (APR or SCBA)

If you answer "yes" to all of the questions listed below, then an APR might be acceptable to use (one must still assess additional selection criteria to confirm). If the answer to any of these is "no," then an SCBA must be used.

- Is there greater than 19.5 % oxygen in the task environment?
- Are the task contaminants known?
- Are the task contaminant concentration(s) known?
- Are the task contaminant concentration(s) below IDLH?

- Are the task contaminant concentration(s) below the MUC?
  - If QNFT is performed, the MUC for a full facepiece negative pressure APR equals the APF of 50 X ½ PEL.
  - If QLFT is performed, the MUC for a full facepiece APR equals 10 X ½ PEL.
  - Or, if the region has established other more stringent requirements, these apply (if noted in Appendix A).
- Do the task contaminants have adequate warning properties?
- Do the task contaminants have high break-through qualities?
- Does a cartridge/canister exist that filters for the task contaminant(s)?
- Is the cartridge/canister rated for the task contaminant concentration(s)?

SCBAs must be worn when:

- Performing assessment activities at sites where the levels of airborne contaminants are not known and cannot be reasonably estimated by a qualified person.
- Opening containers or drums that contain: (1) unknown hazardous materials or (2) known materials for which SCBAs are required. (In cases where the contents are unknown, sampling can be performed to determine the hazard. If the data indicate that the hazard is low, then the level of respiratory protection that is required can be downgraded.)
- Operating in confined spaces where oxygen levels are low or toxic materials are present, such as in abandoned waste chemical storage buildings, manholes, storm drains, or drainage ditches.

APRs may be worn when:

- EPA emergency response personnel, or another responsible person, determines that APRs are needed to prevent exposure to low ambient levels of toxic substances. (These substances might be generated during sampling, handling, decontamination, or other activities.)
- The duration of on-site use will not exhaust the capacity of the filter/sorbet.
- Emergency SCBA-escape respirators are carried by, or located in the immediate area of, APR users during activities in which an unexpected significant release of toxic chemicals is possible even if the risk is low. (Escape respirators must be donned immediately when experiencing any warning factor such as difficulty breathing, dizziness, change in taste or smell, or other adverse reactions. Escape respirators shall only be used for escape; upon donning one, the user must leave the contaminated site immediately.)

Decision Logic for Selecting Filter and Cartridge Type for APRs

Particulate filters and chemical cartridges for APRs are selected based on the type of airborne contaminant present. All filters, canisters, and cartridges must be NIOSH-certified and contain a color coded label indicating the substance or chemical class for which NIOSH has certified the cartridge. Under no circumstances will EPA personnel use cartridges for which the labels are not present and clearly legible. Additional information regarding labeling and the associated color codes (i.e., markings) for filters and cartridges is provided in Appendix I.

<u>Choosing Particulate Filters</u>

The P-100 or high efficiency particulate air (HEPA) filter cartridges (99.97 % efficient) will be the Standard Issue filter for use by EPA emergency response personnel when particulate hazards are encountered. Use of respirator filters of different types or lower efficiencies may be allowed for use with negative pressure respirators during long-term site removal activities, but only with the approval of the Regional SHEMP Manager. Because some alternative filters become less effective in the presence of

oils, emergency response personnel will use the following decision logic to select a filter when the SHEMP Manager indicates that an alternate filter is acceptable:

Select the Type of Filter - The selection of N-, R-, and P-series filters depends on the presence or absence of oil particles, as follows:

- Use a filter of any series (i.e., N-, R-, or P-series) if no oil particles are present in the work environment.
- Use an R- or P-series filter if oil particles (e.g., lubricants, cutting fluids, or glycerine) are present. (Note: N-series filters cannot be used if oil particles are present.)
- Use a P-series filter if oil particles are present and the filter is to be used for more than one work shift.

Selecting Filter Efficiency- Selection of filter efficiency (i.e., 95%, 99%, or 99.97%) depends on how much filter leakage can be accepted. Higher filter efficiency results in lower filter leakage. However, higher efficiency comes at the expense of higher breathing resistance and possible increased facepiece leakage.

To remember the filter series, use the following guide:
N for Not resistant to oil.
R for Resistant to oil.
P for oil Proof.

Choosing Chemical Cartridges

Chemical cartridges for APRs are selected on a case-by-case basis, based on the contaminant present and on information that NIOSH has issued on effective cartridge capacity values. Information to help guide the decision can be found in Appendix E or by consulting the respirator manufacturer. Most manufacturers offer information by phone or on the internet. In addition, information on cartridges for Standard Issue respirators can be found in Appendix H.

Cartridges for APRs have a small sorbent capacity. Contaminant exposures must not exceed the cartridge performance limits determined by the manufacturer and NIOSH for each chemical cartridge. For example, organic vapor cartridges are rated to a performance capacity of 1,000 parts per million (ppm) over an 8-hour day, while canisters, which are larger, are rated to 5,000 - 20,000 ppm. These values represent the *total* organic vapor capacity of the filtration element (from all sources combined). When APRs are used in atmospheres containing a mixture of organic substances, EPA personnel must ensure that the sum of all organic vapors does not exceed these capacity levels.

Chemical cartridge and canister elements should not be used beyond their rated shelf-life date.

APPENDIX G:

List of OSHA Substance-Specific Standards that Designate Levels of Respiratory Protection

OSHA's Substance-Specific Standards that Designate Respiratory Protection

Some substance-specific OSHA standards, such as the Asbestos standard (29 CFR 1910.1001), contain respirator selection requirements. Anytime that the site environment includes a contaminant covered in OSHA's substance-specific standard, the appropriate substance-specific standard must be consulted to determine its applicability. A listing of OSHA substance-specific standards can be found on the *OSHA web site* and are summarized in the following table. (Please note that, except for the respirator selection requirements, other provisions related to respiratory protection that appear within OSHA's substance-specific standards have now been superceded by OSHA's current respiratory protection standard.)

OSHA Substance-Specific Standards

Substance	OSHA Standard
Asbestos	1910.1001, 1915.1001, 1926.1101
13 Carcinogens *	1910.1003, 1004, 1006-1016 1926.1103-04, 1106-1116
Vinyl Chloride	1910.1017, 1926.1117
Arsenic, Inorganic	1910.1018, 1926.1118
Lead	1910.1025, 1926.62
Cadmuim	1910.1027, 1926.1127
Benzene	1910.1028, 1926.1128
Coke Oven Emissions	1910.1029, 1926.1129
Cotton Dust	1910.1043
1,2-Dibromo-3-chloropropane	1910.1044, 1926.1144
Acrylonitrile	1910.1045, 1926.1145
Ethylene Oxide	1910.1047, 1926.1147
Formaldehyde	1910.1048, 1926.1148
Methylenedianiline	1910.1050, 1926.60
1,3-Butadiene	1910.1051
Methylene Chloride	1910.1052, 1926.1152

* For alpha-naphthylamine, methyl chloromethyl ether, 3'-dichlorobenzidine (and its salts), bis-chloromethyl ether, beta-naphthylamine, benzidine, 4-aminodiphenyl, ethyleneimine, beta-propiolacetone, 2-acetylaminofluorene, 4-dimethylaminoazobenzene, and n-nitrosodimethylamine refer to 29 CFR 1910.1003, 13 carcinogens, for their substance-specific requirements.

EPA has developed additional guidelines and requirements for a number of these regulated substances, including asbestos (i.e., SHEMP Guide No. 22 and the EPA document entitled, "*Safety and Health Guidelines for Asbestos Inspectors*"), bloodborne pathogens (i.e., "*EPA Guide for Infectious Waste Management,*" EPA/530-SW-86-014), and ionizing radiation (i.e., SHEMP Guide No. 38). EPA employees should consult regional radiological experts for recommendations regarding respiratory protection selection at sites where ionizing radiation is present.

APPENDIX H:

Scott® Health and Safety
742-Series Twin Cartridge Specification Information

Scott® Health and Safety
742-Series Twin Cartridge Specification Information

742 Series Twin Cartridges		
Description	**Part Number by the Package (5 pair)**	**Part Number by the Case (30 pair)**
Acid Gas	7422-WA2	7422-WA3
Acid Gas with P100	7422-WB2	7422-WB3
Organic Vapor	7422-BA2	7422-BA3
Organic Vapor with P100	7422-BB2	7422-BB3
Ammonia/Methylamine	7422-GA2	7422-GA3
Ammonia/Methylamine with P100	7422-GB2	7422-GB3
Formaldehyde	7422-IA2	7422-IA3
Formaldehyde with P100	7422-IB2	7422-IB3
Mercury Vapor/Chlorine (with End-of-Service Life Indicator)	7422-ZA2	7422-ZA3
Mercury Vapor/Chlorine with P100 Filter (with End-of-Service Life Indicator)	7422-ZB2	7422-ZB3
P100 Filter	7422- FP2	7422- FP3

742 PLUS Series Twin Cartridges (Plus series cartridges provide almost double the service life over regular 742 series cartridges with 120 cc of carbon)		
Description	**Part Number by the Package (5 pair)**	**Part Number by the Case (30 pair)**
Acid Gas	7422-WC2	7422-WC3
Acid Gas with P100	7422-WD2	7422-WD3
Multi-Purpose	7422-SC2	7422-SC3
Multi-Purpose with P100	7422-SD2	7422-SD3
Organic Vapor	7422-BC2	7422-BC3
Organic Vapor with P100	7422-BD2	7422-BD3
Organic Vapor/Acid Gas	7422-YC2	7422-YC3
Organic Vapor/Acid Gas with P100	7422-YD2	7422-YD3
Ammonia/Methylamine	7422-GC2	7422-GC3
Ammonia/Methylamine with P100	7422-GD2	7422-GD3
Triethylenediamine (TEDA) with P100	7422-PD2	7422-PD3

Options and Accessories		
Description	**Part Number**	**Quantity**
N95 Filter Add-On	7422-FN5	50 Pair
R95 Filter Add-On	7422-FR2	25 Pair
Add-On Filter Enclosure Cover and Retainer	7422-FE4	10 Sets per Box
Quantitative Fit Test Adapter	7422-FT1	Each
Quarter Turn Adapter for Full Facepiece	805622-01	Each

This information was obtained from the specification card provided by Scott Health and Safety, document number H/S 6281 A 4/02.

APPENDIX I:

Air-Purifying Respirator Canister Markings

Air-Purifying Respirator Canister Markings

A properly worded label is the primary means of identifying an air-purifying respirator (APR) canister. The secondary means of identifying an APR canister is by color code. Each person who either issues or uses an APR shall make sure that each APR canister purchased or used is properly labeled and color coded in accordance with the requirements specified in this appendix, and that the labels and colors are properly maintained at all times thereafter until the APR canisters have completely served their purpose.

The following must appear in bold letters on each canister:

- **Canister for: _____**; or
  (Name for atmospheric contaminant)

- **Type N Gas Mask Canister**.

In addition, the following wording (or equivalent) must appear beneath the appropriate phrase on the canister label:

- "**For Respiratory Protection in atmospheres containing not more than _____ percent by volume of _____.**"

Canisters having a special high-efficiency filter for protection against radio nuclides and other highly toxic particulates must be labeled with a statement of the type and degree of protection afforded by the filter. The label shall be affixed to the neck end of, or to the gray stripe which is around and near the top of, the canister. The degree of protection shall be marked as the percent penetration of the canister by a 0.3-micron-diameter dioctyl phthalate smoke at a flow rate of 85 liters per minute.

Each canister must have a label warning that APRs should be used only in atmospheres containing sufficient oxygen to support life.

Each APR canister must be a distinctive color or combination of colors as indicated in the following table. All colors used must be such that they are clearly identifiable by the user and clearly distinguishable from one another. The color coding used must offer a high degree of resistance to chipping, scaling, peeling, blistering, fading, and the effects of ordinary atmospheres to which they may be exposed under normal conditions of storage and use. Appropriately colored, pressure-sensitive tape may be used for the stripes.

APR Canister Color Table

Atmospheric Contaminants to be Protected Against	Colors Assigned*
Acid gases	White
Hydrocyanic acid gas	White with ½ inch green stripe completely around the canister near the bottom
Chlorine gas	White with ½ inch yellow stripe completely around the canister near the bottom
Organic vapors	Black
Ammonia gas	Green
Acid gasses and ammonia gas	Green with ½ inch white stripe completely around the canister near the bottom
Carbon monoxide	Blue
Acid gases and organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapors	Yellow with ½ inch blue 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 ½ inch gray stripe completely around the canister near the top
All of the above atmospheric contaminants	Red with ½ inch gray stripe completely around the canister near the top

* Gray shall not be assigned as the main color for a canister designed to prevent acids or vapors from entering the facepiece. 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.

APPENDIX J:

Fit Test and User Seal Check Procedures

Information of Fit Test and User Seal Check Procedures

The following are excerpts from Appendices A and B of OSHA's Respiratory Protection Standard (29 CFR 1910.134). (Please note that EPA has inserted some notes [see the shaded text boxes within these excerpts] to provide information about how the information presented in the OSHA excerpts relates to the Agency.)

Excerpts From Appendix A of 29 CFR 1910.134: Fit Testing Procedures (Mandatory)

A. Fit Testing Procedures—General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
   (a) Position of the mask on the nose;
   (b) Room for eye protection;
   (c) Room to talk; and
   (d) Position of mask on face and cheeks.
7. The following criteria shall be used to help determine the adequacy of the respirator fit:
   (a) Chin properly placed;
   (b) Adequate strap tension, not overly tightened;
   (c) Fit across nose bridge;
   (d) Respirator of proper size to span distance from nose to chin;
   (e) Tendency of respirator to slip; and
   (f) Self-observation in mirror to evaluate fit and respirator position.
8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described by OSHA or those recommended by the respirator manufacturer which provide equivalent

protection to OSHA's procedures. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.
10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.
11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.
12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.
13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.
14. Test Exercises.
    (a) The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:
        (1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.
        (2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
        (3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
        (4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
        (5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)
(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.
(8) Normal breathing. Same as exercise (1).

(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

B. Qualitative Fit Test (QLFT) Protocols

General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.
(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

****

5. Irritant Smoke (Stannic Chloride) Protocol

Note: THE FOLLOWING IRRITANT SMOKE FIT TEST PROCEDURE WILL BE THE QLFT PROCEDURE USED BY EPA IN EMERGENCY SITUATIONS, AND FOR SCBA MASKS, IF DIFFERENT THAN THE APR/PAPR MASK.

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).
(2) Only stannic chloride smoke tubes shall be used for this protocol.
(3) No form of test enclosure or hood for the test subject shall be used.
(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

(b) Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

(c) Irritant Smoke Fit Test Procedure

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

General

(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

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3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol

Note: THE FOLLOWING AMBIENT AEROSOL CONDENSATION NUCLEI COUNTER [CNC] WILL BE THE QNFT PROCEDURE USED BY EPA FOR ANNUAL FIT TESTING.)

The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount TM) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Portacount Fit Test Requirements.

(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

(3) Check the following conditions for the adequacy of the respirator fit:

Chin properly placed;

Adequate strap tension, not overly tightened;
Fit across nose bridge;
Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip;
Self-observation in a mirror to evaluate fit and respirator position.

(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

(7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

(b) Portacount Test Instrument.

(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this appendix.

(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

Excerpts From Appendix B-1 of 29 CFR 1910.134: User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks

A. *Positive pressure check.* Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. *Negative pressure check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some

cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

APPENDIX K:

QLFT Template
and
Example QNFT Form Generated from the Portacount™ Fit Test Software

SAMPLE - BLANK QLFT FORM

ENVIRONMENTAL PROTECTION AGENCY
REGION ___

Qualitative Fit-test

Name: _____

Org./Div./Branch: _____

Respirator Information:
Manufacturer: _____ Model: _____ Size: _____

Seal Check:
Positive Pressure Test: Yes No
Negative Pressure Test: Yes No

Sensitivity Screening Check:
Irritating properties detected: Yes No

Test Atmosphere:
Enclosure used: Yes No

Test Exercises:

	Isoamyl Acetate		**Stannic Chloride**	
Normal Breathing	Pass	Fail	Pass	Fail
Deep Breathing	Pass	Fail	Pass	Fail
Side-to-Side Head Movement	Pass	Fail	Pass	Fail
Up-and-Down Head Movement	Pass	Fail	Pass	Fail
Vocalizing	Pass	Fail	Pass	Fail
Bending Over/Jogging	Pass	Fail	Pass	Fail
Normal Breathing	Pass	Fail	Pass	Fail

Overall Test Results	Pass	Fail

I certify that the above named individual has been trained and qualitatively fit-tested in accordance with the guidelines established in the EPA Respiratory Protection Order 1440.3 and OSHA 29 CFR 1910.134.

Examiner
Signature: _____ Date: _____

SAMPLE - COMPLETED QLFT FORM

ENVIRONMENTAL PROTECTION AGENCY
REGION 4

Qualitative Fit-test

Name: Smith, Joe

Org./Div./Branch: ERRB/REGION 4

Respirator Information:
Manufacturer: Scott Model: AV-3000 Size: Medium

Seal Check:
Positive Pressure Test: x-Yes No
Negative Pressure Test: x-Yes No

Sensitivity Screening Check:
Irritating properties detected: x-Yes No

Test Atmosphere:
Enclosure used: Yes x-No

Test Exercises:

	Isoamyl Acetate		Stannic Chloride	
Normal Breathing	Pass	Fail	x-Pass	Fail
Deep Breathing	Pass	Fail	x-Pass	Fail
Side-to-Side Head Movement	Pass	Fail	x-Pass	Fail
Up-and-Down Head Movement	Pass	Fail	x-Pass	Fail
Vocalizing	Pass	Fail	x-Pass	Fail
Bending Over/Jogging	Pass	Fail	x-Pass	Fail
Normal Breathing	Pass	Fail	x-Pass	Fail

Overall Test Results	x- Pass	Fail

I certify that the above named individual has been trained and qualitatively fit-tested in accordance with the guidelines established in the EPA Respiratory Protection Order 1440.3 and OSHA 29 CFR 1910.134.

Examiner
Signature: _____ Date: MM/DD/YYYY

SAMPLE - BLANK QNFT FORM

LAST NAME
FIRST NAME

FIT TEST REPORT

Fit Test Information

ID NUMBER
LAST NAME
FIRST NAME
COMPANY
LOCATION EPA REGION
NOTE

CUSTOM 1
CUSTOM 2
CUSTOM 3
CUSTOM 4

TEST DATE MM/DD/YYYY
TEST TIME
DUE DATE MM/DD/YYYY

PORTACOUNT S/N
N95 COMPANION

RESPIRATOR
MANUFACTURER
MODEL
MASK STYLE
MASK SIZE
APPROVAL
EFF. <99%

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING			
DEEP BREATHING			
HEAD SIDE TO SIDE			
HEAD UP AND DOWN			
TALKING			
GRIMACE			
BEND AND TOUCH TOES			
NORMAL BREATHING			

OVERALL FF

FIT TEST OPERATOR _____ DATE _____

NAME _____ DATE _____

SAMPLE - COMPLETED QNFT FORM

05/13/2003

LAST NAME SMITH
FIRST NAME JOE

FIT TEST REPORT

Fit Test Information

ID NUMBER 28934
LAST NAME SMITH
FIRST NAME JOE
COMPANY ERRB
LOCATION EPA REGION 4
NOTE

CUSTOM 1
CUSTOM 2
CUSTOM 3
CUSTOM 4

TEST DATE 04/11/2003
TEST TIME 14:54
DUE DATE 04/11/2004

PORTACOUNT S/N 43803
N95 COMPANION N

RESPIRATOR
MANUFACTURER SCOTT
MODEL AV-3000
MASK STYLE FULL-FACE/RUBBER
MASK SIZE MEDIUM
APPROVAL
EFF. <99% N

PROTOCOL OSHA 29CFR1910.134
PASS LEVEL 500

EXERCISE	DURATION (SEC)	FIT FACTOR	PASS
NORMAL BREATHING	60	45800	Y
DEEP BREATHING	60	226000	Y
HEAD SIDE TO SIDE	60	126000	Y
HEAD UP AND DOWN	60	95300	Y
TALKING	60	21800	Y
GRIMACE	15	Excl.	X
BEND AND TOUCH TOES	60	5590	Y
NORMAL BREATHING	60	2110	Y
OVERALL FF		9430	Y

FIT TEST OPERATOR _____ DATE _____

NAME _____ DATE _____

APPENDIX L:

Estimated Cartridge Breakthrough Times for Selected Scott® Health and Safety 742-Series Cartridges

This appendix contains tables, provided by Scott Health and Safety, with estimated breakthrough times for various chemicals for the following cartridges:

- 7422-SC1 Multi-Purpose Cartridge;
- 7422-YC1 Organic Vapor/Acid Gas Cartridge; and
- 7422-BA1 Organic Vapor Cartridge.

Part I - 7422-SC1 Multi-Purpose Cartridge

ESTIMATED CARTRIDGE BREAKTHROUGH TIME FOR THE SCOTT 7422-SC1MULTI-PURPOSE CARTRIDGE

MEDIUM WORK RATE, 22°C AND LESS THAN 65 % RH

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at:				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Acetic anhydride	108-24-7	98	33	21	7.1	**4.5**
Acetone	67-64-1	28	9.5	6.0	2.0	**1.3**
Acrylonitrile	107-13-1	37	13	7.9	2.7	**1.7**
Allyl acetate	591-87-7	60	20	13	4.4	**2.7**
Allyl alcohol	107-18-6	52	18	11	3.8	**2.4**
Allyl chloride	107-05-1	24	8.3	5.2	1.8	**1.1**
Benzene	71-43-2	58	20	12	4.2	**2.6**
Bromobenzene	108-86-1	108	37	23	7.8	**4.9**
Butanol	71-36-3	91	31	19	6.6	**4.1**
Butanol, 2-	78-92-2	76	26	16	5.5	**3.5**
Butanone, 2-	78-93-3	62	21	13	4.5	**2.8**
Butyl acetate	123-86-4	61	21	13	4.4	**2.8**
Butyl acetate, sec	105-46-4	65	22	14	4.8	**3.0**
Butylamine	109-73-9	83	28	18	6.1	**3.8**
Carbon tetrachloride	56-32-5	61	21	13	4.4	**2.8**
Chlorobenzene	108-90-7	84	29	18	6.1	**3.9**
Chlorobutane, 1-	109-69-3	57	19	12	4.1	**2.6**
Chlorocyclopentane	930-28-9	61	21	13	4.5	**2.8**
Chloroform	67-66-3	26	8.8	5.6	1.9	**1.2**
Chloroheptane, 1-	629-06-1	65	22	14	4.7	**3.0**
Chlorohexane, 1-	544-10-5	61	21	13	4.4	**2.8**
Chloromethyl heptane, 3-	123-04-6	50	17	11	3.6	**2.3**
Chloropentane, 1-	543-59-9	59	20	13	4.3	**2.7**
Chloropropane, 1-	540-54-5	20	6.7	4.2	1.4	**0.9**
Chloropropane, 2-	75-29-6	20	7.0	4.4	1.5	**0.9**
Chlorotoluene, o-	95-49-8	80	27	17	5.8	**3.7**
Chloro-2-methylbutane, 2-	594-36-5	47	16	10	3.4	**2.1**
Chloro-2-methylpropane, 2-	507-20-0	29	10	6.2	2.1	**1.3**
Cumene	98-82-8	64	22	14	4.6	**2.9**
Cycloheptatriene, 1,3,5-	544-25-2	92	31	20	6.7	**4.2**
Cyclohexane	110-82-7	52	18	11	3.8	**2.4**
Cyclohexanone	108-94-1	96	32	20	6.9	**4.4**
Cyclohexene	110-83-8	65	22	14	4.7	**3.0**
Cyclohexylamine	108-91-8	85	29	18	6.2	**3.9**
Cyclooctane	292-64-8	74	25	16	5.3	**3.4**
Cyclopentanone	120-92-3	107	36	23	7.8	**4.9**
Cymene, p-	99-87-6	60	20	13	4.4	**2.7**
Decane	124-18-5	54	18	12	3.9	**2.5**
Dibromoethane, 1,2-	106-93-4	107	36	23	7.8	**4.9**
Dibromomethane	74-95-3	62	21	13	4.5	**2.8**
Dibutylamine	111-92-2	58	20	12	4.2	**2.6**

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at:				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Dichlorobenzene, 1,2-	95-50-1	86	29	18	6.2	**3.9**
Dichlorobutane, 1,4-	110-56-5	85	29	18	6.2	**3.9**
Dichloroethane, 1,1-	75-35-4	18	6.2	3.9	1.3	**0.8**
Dichloroethane, 1,2-	107-06-2	43	14	9.1	3.1	**1.9**
Dichloroethylene, 1,2-cis	156-59-2	24	8.0	5.1	1.7	**1.1**
Dichloroethylene, 1,2-trans	156-60-5	26	8.8	5.6	1.9	**1.2**
Dichloromethane	75-09-2	7.9	2.7	1.7	0.6	**0.4**
Dichloropropane, 1,2-	78-87-5	51	17	11	3.7	**2.3**
Dichloropropene, 1,3-cis, trans	542-75-6	68	23	14	4.9	**3.1**
Diethylamine	109-89-7	67	23	14	4.9	**3.0**
Diisobutyl ketone	108-83-8	54	18	12	3.9	**2.5**
Diisopropylamine	108-18-9	58	20	12	4.2	**2.7**
Dimethylamine	124-40-3	13	4.4	2.8	0.9	**0.6**
Dimethylbutane, 2,3-	79-29-8	55	19	12	4.0	**2.5**
Dipropylamine	142-84-7	70	24	15	5.1	**3.2**
Epichlorohydrin	106-89-8	68	23	14	4.9	**3.1**
Ethanol	64-17-5	22	7.5	4.7	1.6	**1.0**
Ethoxyethanol, 2-	110-80-5	61	21	13	4.4	**2.8**
Ethoxyethlyacetate, 2-	111-15-9	63	21	13	4.6	**2.9**
Ethyl acetate	141-78-6	53	18	11	3.8	**2.4**
Ethyl benzene	100-41-4	66	23	14	4.8	**3.0**
Ethyl chloride	75-00-3	4.7	1.6	1.0	0.3	**0.2**
Ethylamine	75-04-7	31	11	6.6	2.3	**1.4**
Ethylidene, 5 - norbornene, 2-	16219-75-3	66	22	14	4.8	**3.0**
Ethyl-1-butanol, 2-	97-95-0	61	21	13	4.4	**2.8**
Heptane	142-82-5	59	20	13	4.3	**2.7**
Heptanone, 2-	110-43-0	77	26	16	5.6	**3.5**
Heptanone, 3-	106-35-4	69	23	15	5.0	**3.2**
Hexane	110-54-3	39	13	8.4	2.9	**1.8**
Hexyl acetate	142-92-7	53	18	11	3.8	**2.4**
Isopentyl acetate	123-92-2	56	19	12	4.1	**2.6**
Isopropanol	67-63-0	43	14	9.1	3.1	**1.9**
Isopropenyl acetate	108-22-5	64	22	14	4.6	**2.9**
Isopropyl acetate	108-21-4	51	17	11	3.7	**2.3**
Isopropylamine	75-31-0	50	17	11	3.6	**2.3**
Mesityl oxide	141-79-7	92	31	20	6.7	**4.2**
Mesitylene	108-67-8	68	23	14	4.9	**3.1**
Methanol	67-56-1	0.2	0.1	0.03	0.01	**0.01**
Methoxyethanol, 2-	109-86-4	91	31	20	6.6	**4.2**
Methoxyethylacetate, 2-	110-49-6	73	25	16	5.3	**3.4**
Methyl acetate	79-20-9	26	8.8	5.6	1.9	**1.2**
Methyl chloride	74-87-3	0.04	0.01	0.01	0.003	**0.002**
Methyl chloroform	71-55-6	32	11	6.7	2.3	**1.4**
Methyl iodide	74-88-4	9.1	3.1	1.9	0.7	**0.4**
Methylamine	74-89-5	9.1	3.1	1.9	0.7	**0.4**
Methylcyclohexane	108-87-2	52	18	11	3.8	**2.4**
Methylcyclohexanone, 4-	589-92-4	84	29	18	6.1	**3.8**

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at:				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Methylcyclopentane	96-37-7	47	16	10	3.4	**2.1**
Methyl-3 - cyclohexanone	591-24-2	77	26	16	5.6	**3.5**
Methyl-3-butanol, 1-	123-41-3	76	26	16	5.6	**3.5**
Methyl-4 - pentanone,2-	108-10-1	73	25	16	5.3	**3.3**
Methyl-4-pentanol, 2-	108-11-2	59	20	13	4.3	**2.7**
Methyl-5 - heptanone, 3-	541-85-5	65	22	14	4.7	**3.0**
Nitropropane, 1-	108-03-2	108	37	23	7.9	**5.0**
Nonane	111-84-2	58	20	12	4.2	**2.6**
Pentachloroethane	76-01-7	73	25	16	5.3	**3.4**
Pentane	109-66-0	46	16	9.9	3.4	**2.1**
Pentanedione, 2,4-	123-54-6	99	34	21	7.2	**4.5**
Pentanol	71-41-0	80	27	17	5.8	**3.7**
Pentanol, 2-	6032-29-7	69	23	15	5.0	**3.1**
Pentanone, 2-	107-87-9	79	27	17	5.7	**3.6**
Pentanone, 3-	96-22-0	71	24	15	5.2	**3.3**
Pentyl acetate	628-63-7	58	20	12	4.2	**2.6**
Perchloroethylene	127-18-4	84	29	18	6.1	**3.9**
Propanol	71-23-8	55	19	12	4.0	**2.5**
Propyl acetate	109-60-4	62	21	13	4.5	**2.8**
Propylamine	107-10-8	68	23	15	5.0	**3.1**
Pyridine	110-86-1	90	31	19	6.6	**4.1**
Tetrachloroethane, 1,1,2,2-	79-34-5	82	28	18	6.0	**3.7**
Toluene	108-88-3	74	25	16	5.4	**3.4**
Trichloroethane, 1,1,2-	79-00-5	57	19	12	4.1	**2.6**
Trichloroethylene	79-01-6	43	15	9.3	3.2	**2.0**
Trichloropropane, 1,2,3-	96-18-4	87	30	19	6.4	**4.0**
Triethylamine	121-44-8	61	21	13	4.5	**2.8**
Trimethlypentane, 2,2,4-	540-84-1	52	18	11	3.7	**2.4**
Trimethylhexane, 2,2,5-	35-94-9	52	18	11	3.7	**2.4**
Vinyl acetate	108-05-4	43	15	9.3	3.2	**2.0**
Vinyl chloride	75-01-4	3.2	1.1	0.7	0.2	**0.1**
Xylene, m	108-38-3	78	27	17	5.7	**3.6**

Part II - 7422-YC1 Organic Vapor/Acid Gas Cartridge

ESTIMATED CARTRIDGE BREAKTHROUGH TIME FOR THE SCOTT 7422-YC1 OV/AG CARTRIDGE

MEDIUM WORK RATE, 22°C AND LESS THAN 65% RH

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at:				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Acetic anhydride	108-24-7	132	45	28	9.6	**6.0**
Acetone	67-64-1	39	13	8.3	2.8	**1.8**
Acrylonitrile	107-13-1	51	17	11	3.7	**2.4**
Allyl acetate	591-87-7	81	27	17	5.9	**3.7**
Allyl alcohol	107-18-6	70	24	15	5.1	**3.2**
Allyl chloride	107-05-1	33	11	7.0	2.4	**1.5**
Benzene	71-43-2	78	26	17	5.6	**3.5**
Bromobenzene	108-86-1	149	51	32	11	**6.8**
Butanol	71-36-3	122	42	26	8.9	**5.6**
Butanol, 2-	78-92-2	102	35	22	7.4	**4.7**
Butanone, 2-	78-93-3	86	29	18	6.3	**3.9**
Butyl acetate	123-86-4	82	28	18	6.0	**3.7**
Butyl acetate, sec	105-46-4	88	30	19	6.4	**4.0**
Butylamine	109-73-9	115	39	25	8.4	**5.3**
Carbon tetrachloride	56-32-5	82	28	18	6.0	**3.7**
Chlorobenzene	108-90-7	114	39	24	8.3	**5.2**
Chlorobutane, 1-	109-69-3	77	26	16	5.6	**3.5**
Chlorocyclopentane	930-28-9	83	28	18	6.0	**3.8**
Chloroform	67-66-3	35	12	7.5	2.6	**1.6**
Chloroheptane, 1-	629-06-1	87	30	19	6.3	**4.0**
Chlorohexane, 1-	544-10-5	82	28	18	6.0	**3.7**
Chloromethyl heptane, 3-	123-04-6	67	23	14	4.9	**3.1**
Chloropentane, 1-	543-59-9	80	27	17	5.8	**3.6**
Chloropropane, 1-	540-54-5	27	9.0	5.7	1.9	**1.2**
Chloropropane, 2-	75-29-6	28	9.4	5.9	2.0	**1.3**
Chlorotoluene, o-	95-49-8	108	37	23	7.9	**5.0**
Chloro-2-methylbutane, 2-	594-36-5	63	21	13	4.6	**2.9**
Chloro-2-methylpropane, 2-	507-20-0	39	13	8.4	2.9	**1.8**
Cumene	98-82-8	86	29	18	6.3	**3.9**
Cycloheptatriene, 1,3,5-	544-25-2	127	43	27	9.2	**5.8**
Cyclohexane	110-82-7	72	25	15	5.3	**3.3**
Cyclohexanone	108-94-1	132	45	28	9.6	**6.0**
Cyclohexene	110-83-8	90	31	19	6.6	**4.1**
Cyclohexylamine	108-91-8	118	40	25	8.5	**5.4**
Cyclooctane	292-64-8	102	35	22	7.4	**4.7**
Cyclopentanone	120-92-3	148	50	32	11	**6.8**
Cymene, p-	99-87-6	81	27	17	5.9	**3.7**

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at:				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Decane	124-18-5	75	25	16	5.4	**3.4**
Dibromoethane, 1,2-	106-93-4	148	50	32	11	**6.8**
Dibromomethane	74-95-3	86	29	18	6.3	**3.9**
Dibutylamine	111-92-2	80	27	17	5.8	**3.6**
Dichlorobenzene, 1,2-	95-50-1	116	39	25	8.4	**5.3**
Dichlorobutane, 1,4-	110-56-5	115	39	25	8.4	**5.3**
Dichloroethane, 1,1-	75-35-4	24	8.3	5.2	1.8	**1.1**
Dichloroethane, 1,2-	107-06-2	57	20	12	4.2	**2.6**
Dichloroethylene, 1,2-cis	156-59-2	32	11	6.8	2.3	**1.5**
Dichloroethylene, 1,2-trans	156-60-5	35	12	7.5	2.6	**1.6**
Dichloromethane	75-09-2	11	3.6	2.3	0.8	**0.5**
Dichloropropane, 1,2-	78-87-5	69	24	15	5.0	**3.2**
Dichloropropene, 1,3-cis, trans	542-75-6	91	31	20	6.7	**4.2**
Diethylamine	109-89-7	92	31	20	6.7	**4.2**
Diisobutyl ketone	108-83-8	75	25	16	5.4	**3.4**
Diisopropylamine	108-18-9	81	27	17	5.9	**3.7**
Dimethylamine	124-40-3	18	6.1	3.8	1.3	**0.8**
Dimethylbutane, 2,3-	79-29-8	76	26	16	5.5	**3.5**
Dipropylamine	142-84-7	98	33	21	7.1	**4.5**
Epichlorohydrin	106-89-8	91	31	20	6.7	**4.2**
Ethanol	64-17-5	30	10.1	6.4	2.2	**1.4**
Ethoxyethanol, 2-	110-80-5	82	28	18	6.0	**3.7**
Ethoxyethlyacetate, 2-	111-15-9	85	29	18	6.2	**3.9**
Ethyl acetate	141-78-6	71	24	15	5.2	**3.3**
Ethyl benzene	100-41-4	89	30	19	6.5	**4.1**
Ethyl chloride	75-00-3	6.4	2.2	1.4	0.5	**0.3**
Ethylamine	75-04-7	43	15	9.2	3.1	**2.0**
Ethylidene, 5 - norbornene, 2-	16219-75-3	91	31	20	6.6	**4.2**
Ethyl-1-butanol, 2-	97-95-0	82	28	18	6.0	**3.7**
Heptane	142-82-5	82	28	18	6.0	**3.7**
Heptanone, 2-	110-43-0	106	36	23	7.7	**4.8**
Heptanone, 3-	106-35-4	96	32	20	6.9	**4.4**
Hexane	110-54-3	55	19	11.7	4.0	**2.5**
Hexyl acetate	142-92-7	71	24	15	5.2	**3.3**
Isopentyl acetate	123-92-2	76	26	16	5.5	**3.5**
Isopropanol	67-63-0	57	20	12	4.2	**2.6**
Isopropenyl acetate	108-22-5	86	29	18	6.3	**3.9**
Isopropyl acetate	108-21-4	69	24	15	5.0	**3.2**
Isopropylamine	75-31-0	69	24	15	5.0	**3.2**
Mesityl oxide	141-79-7	128	44	27	9.3	**5.9**
Mesitylene	108-67-8	91	31	20	6.7	**4.2**
Methanol	67-56-1	0.2	0.1	0.05	0.02	**0.01**
Methoxyethanol, 2-	109-86-4	123	42	26	9.0	**5.6**
Methoxyethylacetate, 2-	110-49-6	99	34	21	7.2	**4.5**

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at:				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Methyl acetate	79-20-9	35	12	7.5	2.6	**1.6**
Methyl chloride	74-87-3	0.05	0.02	0.01	0.004	**0.002**
Methyl chloroform	71-55-6	43	14	9.1	3.1	**1.9**
Methyl iodide	74-88-4	13	4.3	2.7	0.9	**0.6**
Methylamine	74-89-5	13	4.3	2.7	0.9	**0.6**
Methylcyclohexane	108-87-2	72	25	15	5.3	**3.3**
Methylcyclohexanone, 4-	589-92-4	116	40	25	8.5	**5.3**
Methylcyclopentane	96-37-7	65	22	14	4.7	**3.0**
Methyl-3 - cyclohexanone	591-24-2	106	36	23	7.7	**4.8**
Methyl-3-butanol, 1-	123-41-3	103	35	22	7.5	**4.7**
Methyl-4 - pentanone,2-	108-10-1	101	34	22	7.3	**4.6**
Methyl-4-pentanol, 2-	108-11-2	80	27	17	5.8	**3.6**
Methyl-5 - heptanone, 3-	541-85-5	90	31	19	6.6	**4.1**
Nitropropane, 1-	108-03-2	150	51	32	10.9	**6.9**
Nonane	111-84-2	80	27	17	5.8	**3.6**
Pentachloroethane	76-01-7	99	34	21	7.2	**4.5**
Pentane	109-66-0	64	22	13.7	4.7	**2.9**
Pentanedione, 2,4-	123-54-6	136	46	29	9.9	**6.2**
Pentanol	71-41-0	108	37	23	7.9	**5.0**
Pentanol, 2-	6032-29-7	93	31	20	6.7	**4.2**
Pentanone, 2-	107-87-9	109	37	23	7.9	**5.0**
Pentanone, 3-	96-22-0	99	34	21	7.2	**4.5**
Pentyl acetate	628-63-7	78	26	17	5.6	**3.5**
Perchloroethylene	127-18-4	114	39	24	8.3	**5.2**
Propanol	71-23-8	74	25	16	5.4	**3.4**
Propyl acetate	109-60-4	84	29	18	6.1	**3.8**
Propylamine	107-10-8	94	32	20	6.9	**4.3**
Pyridine	110-86-1	125	42	27	9.1	**5.7**
Tetrachloroethane, 1,1,2,2-	79-34-5	111	38	24	8.0	**5.1**
Toluene	108-88-3	100	34	21	7.3	**4.6**
Trichloroethane, 1,1,2-	79-00-5	77	26	16	5.6	**3.5**
Trichloroethylene	79-01-6	58	20	13	4.3	**2.7**
Trichloropropane, 1,2,3-	96-18-4	118	40	25	8.6	**5.4**
Triethylamine	121-44-8	85	29	18	6.2	**3.9**
Trimethlypentane, 2,2,4-	540-84-1	71	24	15	5.2	**3.3**
Trimethylhexane, 2,2,5-	35-94-9	71	24	15	5.2	**3.3**
Vinyl acetate	108-05-4	58	20	13	4.3	**2.7**
Vinyl chloride	75-01-4	4.3	1.4	0.9	0.3	**0.2**
Xylene, m	108-38-3	105	36	23	7.7	**4.8**

Part III - 7422-BA1 Organic Vapor Cartridge

Estimated Cartridge Breakthrough Time for the Scott 7422-BA1 Organic Vapor Cartridge

(At medium work rate, 22°C and less than 65% RH)

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at Indicated concentration (ppm)				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Acetic anhydride	108-24-7	102	35	22	7.4	**4.7**
Acetone	67-64-1	27	9.1	5.7	1.9	**1.2**
Acrylonitrile	107-13-1	35	12	7.5	2.6	**1.6**
Allyl acetate	591-87-7	63	21	13	4.6	**2.9**
Allyl alcohol	107-18-6	55	19	12	4.0	**2.5**
Allyl chloride	107-05-1	26	8.7	5.5	1.9	**1.2**
Benzene	71-43-2	60	21	13	4.4	**2.8**
Bromobenzene	108-86-1	102	35	22	7.4	**4.7**
Butanol	71-36-3	95	32	20	6.9	**4.3**
Butanol, 2-	78-92-2	79	27	17	5.8	**3.6**
Butanone, 2-	78-93-3	59	20	13	4.3	**2.7**
Butyl acetate	123-86-4	64	22	14	4.6	**2.9**
Butyl acetate, sec	105-46-4	69	23	15	5.0	**3.1**
Butylamine	109-73-9	79	27	17	5.8	**3.6**
Carbon tetrachloride	56-32-5	64	22	14	4.6	**2.9**
Chlorobenzene	108-90-7	88	30	19	6.4	**4.0**
Chlorobutane, 1-	109-69-3	59	20	13	4.3	**2.7**
Chlorocyclopentane	930-28-9	64	22	14	4.7	**2.9**
Chloroform	67-66-3	27	9.3	5.8	2.0	**1.2**
Chloroheptane, 1-	629-06-1	68	23	14	4.9	**3.1**
Chlorohexane, 1-	544-10-5	64	22	14	4.6	**2.9**
Chloromethyl heptane, 3-	123-04-6	52	18	11	3.8	**2.4**
Chloropentane, 1-	543-59-9	62	21	13	4.5	**2.8**
Chloropropane, 1-	540-54-5	21	7.0	4.4	1.5	**0.9**
Chloropropane, 2-	75-29-6	21	7.3	4.6	1.6	**1.0**
Chlorotoluene, o-	95-49-8	84	29	18	6.1	**3.9**
Chloro-2-methylbutane, 2-	594-36-5	49	17	10	3.5	**2.2**
Chloro-2-methylpropane, 2-	507-20-0	31	10	6.5	2.2	**1.4**
Cumene	98-82-8	67	23	14	4.9	**3.1**
Cycloheptatriene, 1,3,5-	544-25-2	87	30	19	6.3	**4.0**
Cyclohexane	110-82-7	50	17	11	3.6	**2.3**
Cyclohexanone	108-94-1	91	31	19	6.6	**4.1**
Cyclohexene	110-83-8	62	21	13	4.5	**2.8**
Cyclohexylamine	108-91-8	81	27	17	5.9	**3.7**
Cyclooctane	292-64-8	70	24	15	5.1	**3.2**
Cyclopentanone	120-92-3	101	34	22	7.4	**4.6**
Cymene, p-	99-87-6	63	21	13	4.6	**2.9**
Decane	124-18-5	51	17	11	3.7	**2.3**
Dibromoethane, 1,2-	106-93-4	101	34	22	7.4	**4.6**
Dibromomethane	74-95-3	59	20	13	4.3	**2.7**

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at Indicated concentration (ppm)				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Dibutylamine	111-92-2	55	19	12	4.0	**2.5**
Dichlorobenzene, 1,2-	95-50-1	90	31	19	6.5	**4.1**
Dichlorobutane, 1,4-	110-56-5	89	30	19	6.5	**4.1**
Dichloroethane, 1,1-	75-35-4	19	6.5	4.1	1.4	**0.9**
Dichloroethane, 1,2-	107-06-2	45	15	10	3.2	**2.0**
Dichloroethylene, 1,2-cis	156-59-2	25	8.4	5.3	1.8	**1.1**
Dichloroethylene, 1,2-trans	156-60-5	27	9.3	5.8	2.0	**1.2**
Dichloromethane	75-09-2	8.3	2.8	1.8	0.6	**0.4**
Dichloropropane, 1,2-	78-87-5	54	18	11	3.9	**2.5**
Dichloropropene, 1,3-cis, trans	542-75-6	71	24	15	5.2	**3.2**
Diethylamine	109-89-7	63	22	14	4.6	**2.9**
Diisobutyl ketone	108-83-8	51	17	11	3.7	**2.3**
Diisopropylamine	108-18-9	55	19	12	4.0	**2.5**
Dimethylamine	124-40-3	12	4.2	2.6	0.9	**0.6**
Dimethylbutane, 2,3-	79-29-8	52	18	11	3.8	**2.4**
Dipropylamine	142-84-7	67	23	14	4.9	**3.1**
Epichlorohydrin	106-89-8	71	24	15	5.2	**3.2**
Ethanol	64-17-5	23	7.9	4.9	1.7	**1.1**
Ethoxyethanol, 2-	110-80-5	64	22	14	4.6	**2.9**
Ethoxyethlyacetate, 2-	111-15-9	66	22	14	4.8	**3.0**
Ethyl acetate	141-78-6	55	19	12	4.0	**2.5**
Ethyl benzene	100-41-4	69	24	15	5.0	**3.2**
Ethyl chloride	75-00-3	5.0	1.7	1.1	0.4	**0.2**
Ethylamine	75-04-7	29	10	6.3	2.1	**1.3**
Ethylidene, 5 - norbornene, 2-	16219-75-3	63	21	13	4.5	**2.9**
Ethyl-1-butanol, 2-	97-95-0	64	22	14	4.6	**2.9**
Heptane	142-82-5	56	19	12	4.1	**2.6**
Heptanone, 2-	110-43-0	73	25	16	5.3	**3.3**
Heptanone, 3-	106-35-4	65	22	14	4.8	**3.0**
Hexane	110-54-3	37	13	8.0	2.7	**1.7**
Hexyl acetate	142-92-7	55	19	12	4.0	**2.5**
Isopentyl acetate	123-92-2	59	20	13	4.3	**2.7**
Isopropanol	67-63-0	45	15	10	3.2	**2.0**
Isopropenyl acetate	108-22-5	67	23	14	4.9	**3.1**
Isopropyl acetate	108-21-4	54	18	11	3.9	**2.5**
Isopropylamine	75-31-0	47	16	10	3.5	**2.2**
Mesityl oxide	141-79-7	88	30	19	6.4	**4.0**
Mesitylene	108-67-8	71	24	15	5.2	**3.2**
Methanol	67-56-1	0.2	0.1	0.04	0.01	**0.01**
Methoxyethanol, 2-	109-86-4	96	33	20	7.0	**4.4**
Methoxyethylacetate, 2-	110-49-6	77	26	16	5.6	**3.5**
Methyl acetate	79-20-9	27	9.3	5.8	2.0	**1.2**
Methyl chloride	74-87-3	0.04	0.01	0.01	0.003	**0.002**
Methyl chloroform	71-55-6	33	11	7.1	2.4	**1.5**
Methyl iodide	74-88-4	8.6	2.9	1.8	0.6	**0.4**
Methylamine	74-89-5	8.6	2.9	1.8	0.6	**0.4**

Chemical	CAS No.	Estimated Cartridge Service Life in Hours at Indicated concentration (ppm)				
		10.0 ppm	50.0 ppm	100.0 ppm	500.0 ppm	1000.0 ppm
Methylcyclohexane	108-87-2	50	17	11	3.6	**2.3**
Methylcyclohexanone, 4-	589-92-4	80	27	17	5.8	**3.6**
Methylcyclopentane	96-37-7	45	15	10	3.2	**2.0**
Methyl-3 - cyclohexanone	591-24-2	73	25	16	5.3	**3.3**
Methyl-3-butanol, 1-	123-41-3	80	27	17	5.8	**3.7**
Methyl-4 - pentanone,2-	108-10-1	69	23	15	5.0	**3.2**
Methyl-4-pentanol, 2-	108-11-2	62	21	13	4.5	**2.8**
Methyl-5 - heptanone, 3-	541-85-5	62	21	13	4.5	**2.8**
Nitropropane, 1-	108-03-2	103	35	22	7.5	**4.7**
Nonane	111-84-2	55	19	12	4.0	**2.5**
Pentachloroethane	76-01-7	77	26	16	5.6	**3.5**
Pentane	109-66-0	44	15	9.4	3.2	**2.0**
Pentanedione, 2,4-	123-54-6	93	32	20	6.8	**4.3**
Pentanol	71-41-0	84	29	18	6.1	**3.9**
Pentanol, 2-	6032-29-7	72	24	15	5.2	**3.3**
Pentanone, 2-	107-87-9	75	25	16	5.4	**3.4**
Pentanone, 3-	96-22-0	68	23	14	4.9	**3.1**
Pentyl acetate	628-63-7	60	21	13	4.4	**2.8**
Perchloroethylene	127-18-4	88	30	19	6.4	**4.0**
Propanol	71-23-8	58	20	12	4.2	**2.6**
Propyl acetate	109-60-4	65	22	14	4.7	**3.0**
Propylamine	107-10-8	65	22	14	4.7	**3.0**
Pyridine	110-86-1	86	29	18	6.2	**3.9**
Tetrachloroethane, 1,1,2,2-	79-34-5	86	29	18	6.2	**3.9**
Toluene	108-88-3	78	26	17	5.6	**3.5**
Trichloroethane, 1,1,2-	79-00-5	59	20	13	4.3	**2.7**
Trichloroethylene	79-01-6	45	15	10	3.3	**2.1**
Trichloropropane, 1,2,3-	96-18-4	92	31	20	6.7	**4.2**
Triethylamine	121-44-8	58	20	12	4.2	**2.7**
Trimethlypentane, 2,2,4-	540-84-1	49	17	10	3.6	**2.2**
Trimethylhexane, 2,2,5-	35-94-9	49	17	10	3.6	**2.2**
Vinyl acetate	108-05-4	45	15	10	3.3	**2.1**
Vinyl chloride	75-01-4	3.3	1.1	0.7	0.2	**0.2**
Xylene, m	108-38-3	82	28	17	5.9	**3.7**

Part IV - Notes

Bold print numbers represent experimental 1% breakthrough data points obtained in the 1970's adjusted for a medium work rate and the increased carbon volume and capacity of current cartridge technology.

Conversion factors

This data is applicable for ambient conditions at 22° C, relative humidities from 0 to 65% and a medium work rate (25 LPM). The other breakthrough times were calculated from Equation 2 taken from Nelson, G. O. and A. N. Correia, "Respirator Cartridge Efficiency Studies: VIII Summary and Conclusions" Am. Ind. Hyg. Assoc. J. 37: 514 (1976). These tests and calculations assume no safety factor.

- For temperatures at 32°C, multiply breakthrough times by 0.8.
- For temperatures at 12°C, multiply breakthrough times by 1.2.
-
- For relative humidities between 65 and 80%, multiply breakthrough times by 0.9.
- For relative humidities between 80 and 95%, multiply breakthrough times by 0.8.
-
- For heavy work rates (35 LPM), multiply breakthrough times by 0.7.
- For light work rates (15 LPM), multiply breakthrough times by 1.7.

These tests were performed under laboratory conditions and not under actual use conditions. Miller-Nelson Research Inc makes no warranties concerning protection by these air purifying respirator devices. These are estimates and the user should determine the suitability of the devices under actual field conditions.

Compiled by Miller-Nelson Research Inc, 8 Harris Ct., Suite C-6, Monterey, CA 93940

APPENDIX M:

Using Scott® Multi-Wash Mini to Clean and Disinfect Scott® Mask Mounted Regulators and all Scott® Full Facepieces

(Note: This appendix is available as a separate file.)

APPENDIX N:

Operations and Maintenance Instructions Manual for Scott® C420 Powered Air Purifying Respirator (PAPR)

(Note: This appendix is available as a separate file.)

APPENDIX O:

Operations and Maintenance Instruction Manual for Scott® Air-PAK Models 2.0/3.0/4.5 Fifty Pressure-Demand Self Contained Breathing Apparatus (SCBA)

(Note: This appendix is available as a separate file.)

APPENDIX P:

Tools To Assist With Respirator Issuance and Inspections

- **Respirator Issuance Form**
- **Monthly Respirator Inspection Checklist**
- **Respirator Inspection Procedures**

Respirator Issuance Form

Issued to:_____**Phone:**_____
(PRINT)

Supervisor:_____**Division/Region/Office:**_____
(PRINT)

Respirator Number Date, Signatures (Fill in blanks)	**Respirator Type (Check applicable boxes)**	**Manufacturer & Model (Check applicable boxes or write in)**	**Major Components (e.g., blower assembly) & Serial Numbers (if applicable) (List major components issued with respirator)**	**Employee qualified for this respirator ?**
Respirator #____ **Issued on_____By:_____** **Employee Signature_____** **Returned on:_____** **Received by:**	**Primary Type (or use):** **☐-Negative pressure APR** **☐-PAPR** **☐-SCBA** **☐-Airline** **Facepiece Style** **☐-half ☐-full** **Size** **☐-Small ☐-Med ☐-Large ☐-___**	**Manufacturer:** **☐-Scott** **☐-Other:_____** **Model:** **☐-AV 2000 ☐-AV 3000** **☐-Other:_____**	**Component Serial #**	**Medical evaluation** **☐-Yes ☐-No** **Trained** **☐-Yes ☐-No** **Fit tested** **☐-Yes ☐-No**
Respirator #____ **Issued on_____By:_____** **Employee Signature_____** **Returned on:_____** **Received by:**	**Primary Type:** **☐-Negative pressure APR** **☐-PAPR** **☐-SCBA** **☐-Airline** **Facepiece Style** **☐-half ☐-full** **Size** **☐-Small ☐-Med ☐-Large ☐-___**	**Manufacturer:** **☐-Scott** **☐-Other:_____** **Model:** **☐-AV 2000 ☐-AV 3000** **☐-Other:_____**	**Component Serial #**	**Medical evaluation** **☐-Yes ☐-No** **Trained** **☐-Yes ☐-No** **Fit tested** **☐-Yes ☐-No**
Respirator #____ **Issued on_____By:_____** **Employee Signature_____** **Returned on:_____** **Received by:**	**Primary Type:** **☐-Negative pressure APR** **☐-PAPR** **☐-SCBA** **☐-Airline** **Facepiece Style** **☐-half ☐-full** **Size** **☐-Small ☐-Med ☐-Large ☐-___**	**Manufacturer:** **☐-Scott** **☐-Other:_____** **Model:** **☐-AV 2000 ☐-AV 3000** **☐-Other:_____**	**Component Serial #**	**Medical evaluation** **☐-Yes ☐-No** **Trained** **☐-Yes ☐-No** **Fit tested** **☐-Yes ☐-No**

Monthly Respirator Inspection Checklist

for negative pressure, PAPR, and SCBA respirators

Respirator:_____
Model/ID#: _____

Issued to:_____
Storage Location: _____

Inspector's Name:_____
(PRINT)

Instructions: Inspect each respirator under your control every month, following the manufacturer's inspection procedures. Writing legibly, enter the appropriate condition rating or qualifying note regarding repairs or adjustments in the appropriate block. Use the back of this sheet (or another page) for additional notes. Initial the bottom row after completing a monthly inspection.
Submit this checklist quarterly to the Health and Safety Program Contact or designated individual.

Follow manufacturer's inspection procedures, record findings in blocks	Month 1_____ (mm/yy)	Month 2_____ (mm/yy)	Month 3_____ (mm/yy)
Cleanliness (overall)			
Storage situation (protected from contamination, distortion, extreme temperatures)			
Assembly intact (components, valves, o-rings, present and appropriate)			
Face seal & face shield condition			
Harness/frame condition			
Cartridges on hand (same mfr, change schedule, expiration)			
PAPR blower (flow rate, battery status)			
Regulator condition			
Hose/connection condition			
Cylinder condition (body, 90% full, hydrostatic test status, age)			
Performance test result (harness adjustment, leaks, alarms)			
Inspector's initials			

Rating Key

1 - Good/yes **3 - Poor/needs attention**
2 - Acceptable/serviceable **NA - Not applicable**

Respirator Inspection Procedures

Air-purifying Respirator (APR) Inspection Procedures

APR inspection procedures should include the following:

- **Check rubber facepiece for dirt, pliability of rubber/silicone, deterioration, disfigurement, cracks, tears, or holes.**
- **Check harness and straps for breaks, tears, loss of elasticity, broken attachment snaps, and proper tightness.**
- **Check for the presence of inhalation and exhalation valves.**
- **Check inhalation and exhalation valves for holes, warpage, cracks, and dirt.**
- **Check the facepiece lens for proper mounting, cracks, or severe scratches that may impede vision.**
- **Check filter/cartridge mounts for the presence of gaskets and inspect for dirt, deterioration, cracks, tears, or holes.**
- **Check filters, cartridges, and canisters for dents, corrosion, and expiration dates.**
- **Conduct a positive and negative pressure face seal check in accordance with manufacturer instructions.**

Detailed APR inspection procedures for inspecting facepieces may be found in the manufacturer's Operation and Maintenance Instruction Manual (Appendices N and O).

Powered Air-purifying Respirator (PAPR) Inspection Procedures

The following are the minimum inspection procedures for PAPRs:

- **Examine the respirator facepiece as specified above in the APR inspection procedures.**
- **Check the condition of all hardware to verify the presence and integrity of threads, couplings, gaskets, and connections per manufacturer recommendations.**
- **Check the breathing tube for leaks, cracks, or tears.**
- **Check the condition and functionality of the blower assembly according to manufacturer recommendations.**
- **Ensure that batteries are fully charged prior to storage and use.**

Refer to the PAPR manufacture's Operation and Maintenance Instruction Manual (Appendix N) for detailed inspection instructions.

Self-Contained Breathing Apparatus (SCBA) Inspection Procedures
The following represent the minimum general procedures for SCBA inspection:

- **Inspect the facepiece as specified above in the APR inspection procedures.**
- **Check for the presence of the facepiece airline gasket and inspect for dirt, deterioration, cracks, tears, or holes.**
- **Check the condition of air supply hoses, pressure gauges, gaskets, o-rings, valves, and couplings per manufacturer instructions.**
- **Check the regulator for dirt and inspect the condition of gaskets, couplings, threads, and valve assembly per manufacturer instructions.**
- **Check the integrity of the back pack and harness assembly and all associated straps and buckles.**
- **Check the hydrostatic test date of the cylinder (refer to Section 4.7.2.2 of the main document).**
- **Check the cylinder gauge and ensure that the cylinder is full.**
- **Conduct an operational check of the unit per manufacturer instructions to verify the correct operation of the regulator, pressure gauges, and warning devices (end-of-service alarms) and to ensure there are no leaks in the system.**

Refer to the SCBA manufacturer's Operation and Maintenance Instruction Manual (Appendix O) for detailed inspection instructions.

APPENDIX Q:

Receipt Log for
Monthly Respiratory Inspection Checklists

Receipt Log for Monthly Respiratory Inspection Checklists Year_____, Page __ of __

Month▸ Employee Name (respirator type, model, or ID#)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

APPENDIX R:

Safety Precautions for Scott® Air-PAK® Cylinders and Air Supplied Respirator Cylinders

(Note: This appendix is available as a separate file.)

APPENDIX S:

Quarterly Inspection Logs for Cartridges and Canisters and for Breathing Air Cylinders

Quarterly Inspection Log For Cartridges and Canisters for Air Purifying Respirators

Storage Location:_____

Inspection Date	**Verify that available cartridges/canisters...**			**Inspector's Initials**	**Notes**
	...are NIOSH-approved for the respirators on hand or issued	...have not exceeded expiration dates or change schedule requirements	..are stored in airtight packages that are sealed well		

Quarterly Tank Evaluation **Location:_____**
Log for Breathing Air Cylinders

_____

Date	Cylinders On-hand			Removed from service during this inspection date		Inspector's Name/Signature
	# full	# empty	# previously tagged as out of service	# removed due to expiration date (hydrostatic test, manufacture)	# removed for other reasons (include reason and action in note on an attached page)	

APPENDIX T:

Procedures for Maintaining Breathing Air Compressors and Filling Cylinders

Procedures for Maintaining Breathing Air Compressors and Filling Cylinders

Compressor System Operator Qualifications and Responsibilities

In regions/local offices that have in-house compressor systems, the Health and Safety Program Contact shall be the single point of contact for that equipment and will have complete accountability for the operations and maintenance of that system. The Health and Safety Program Contact shall receive training in the following areas, at a minimum, prior to operating or maintaining the system:

1. Start-up, operations, and maintenance procedures as provided by the compressor manufacturer;
2. Safe handling practices for compressed gas cylinders; and
3. DOT Hazardous Materials Shipping Requirements.

The Health and Safety Program Contact may further delegate his/her responsibilities to an assistant, alternate, or contractor; however, final accountability will remain with the Region's original designee. Any person that is designated to assist the Health and Safety Program Contact shall receive all applicable training from the manufacturer prior to performing any system operation and maintenance. If a contractor is used to operate and maintain the compressor system, the Health and Safety Program Contact shall be responsible for ensuring that all appropriate operation and maintenance procedures are followed by that contractor.

Elements of the *Breathing Air Compressor Operation and Maintenance Plan*

Each EPA region that operates a compressor for the supply of breathing air shall develop a written *Breathing Air Compressor Operation and Maintenance Plan* that delineates specific procedures based on model specifications, actual usage (operating hours and volume of air processed per unit period of time), and manufacturer's recommendations. The plan shall be drafted by the Health and Safety Program Contact and submitted to the SHEMP Manager for approval prior to bringing the compressor on-line for normal operations. The written *Breathing Air Compressor Operation and Maintenance Plan* shall include the following elements, at a minimum:

1. Name of the Health and Safety Program Contact and any alternates;
2. Regular inspection procedures;
3. Schedule of regular inspections;
4. Frequency of sorbent-bed and filter changes;
5. Methods and procedures for periodic air quality testing;
6. Frequency of air quality testing; and
7. Documentation procedures.

It is expected that the demand for breathing air may fluctuate significantly due to variations in workloads and the type of site work being conducted within a region at any given time. As a result, there may be extended periods of time where there is no significant need to utilize the compressor to generate a breathing air supply. Therefore, in order to maintain the compressor system at a high level of readiness, a stipulation for periodic system start-ups shall be included in the *Breathing Air Compressor Operation and Maintenance Plan*. The compressor shall be started, run to full pressure, and used to fill at least one SCBA bottle on a monthly basis, or as otherwise specified by the manufacturer.

SCBA Cylinder Filling Procedures

The following minimum procedures apply to the filling of SCBA bottles:

1. Visually inspect each cylinder for damage prior to filling. Cylinders that are bulging, have large chips, show signs of fiber strand unwrapping, or show other signs of damage should not be filled.
2. Check the hydrostatic test date on the cylinder. Fiber-wrapped cylinders that are within 5 years of the test date can be filled. Cylinders that have not been tested within the past 5 years should be red-tagged, removed from service, and sent for hydrostatic testing before restored to service.
3. Verify the pressure rating of the cylinder (cylinders may not be filled in excess of their specified operating pressure rating).
4. Ensure all couplings are properly tightened and secured prior to filling.
5. Place the cylinder to be filled in an explosion protection cage prior to filling.
6. Open the fill valve slowly and maintain a slow fill rate in order to avoid excessive heat build-up. (Tip: use a fill rate of 100 psi per minute to get a good fill, with a maximum rate of 300 psi when “jamming” bottles.)
7. After closing the SCBA cylinder valve and fill valve, depressurize the system before fully disconnecting couplings.
8. Leak test each cylinder after filling by applying a soapy water solution to the cylinder neck/valve assembly. If no leakage is detected, the cylinder is ready for use.

APPENDIX U:

Sample Training Roster

US EPA Region ____
_____

Training Module Title: _____
Brief Description of Training: _____
_____
_____
_____
_____

Date: _____ Instructor Name: _____
Hours: _____ - _____ Instructor Signature: _____

Name (Print)	Signature	Phone Ext.
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19.		
20.		

Name (Print)	Signature	Phone Ext.
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43.		

Signature of Instructor:_____ Date: _____

APPENDIX V:

Information for Voluntary Users of Respiratory Protection
(Appendix D of 29 CFR 1910.134)

Excerpt from Appendix D of 29 CFR 1910.134: (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1) Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.
2) Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3) Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4) Keep track of your respirator so that you do not mistakenly use someone else's respirator.

[63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998]

APPENDIX W:

Log of Voluntary Respirator Users

Log of Voluntary Respirator Users

I wish to use a respirator on a voluntary basis in an area or for a specific activity for which the Regional SHEMP Manager (or designated representative) has determined that respiratory protection is not required.

I acknowledge that I have received a copy of ***OSHA's Information for Employees Using Respirators When Not Required Under the Standard (29 CFR 1910.134 - Mandatory Appendix D)*** informing me of certain precautions I must take to be sure that the respirator itself does not present a hazard.

Date	**Employee Name (print)**	**Employee Signature**	**Area or activity for which respirator will be used**	**Respirator type**	**Medical evaluation and training current? (Yes/No)**

[1] The hazard evaluation must indicate that a respirator is not required.

[2] Not required for filtering facepieces.

APPENDIX X:

Respiratory Protection Program Audit Form

RESPIRATORY PROTECTION PROGRAM AUDIT FORM

Date of Review: _____

Name of Reviewer: _____ Phone number: _____

REVIEW CRITERIA	COMPLIANT		
	Yes	No	N/A
General			
1. Have the SHEMP Manager, Removal Manager, Health and Safety Program Contact, and other relevant stakeholders met to discuss the status of their region's respiratory protection program, to assign roles and responsibilities to specific individuals, and to customize Appendix A (as well as other sections) of the *Respiratory Protection Program* chapter?	☐	☐	☐
2. Is Appendix A (as well as other sections) of the *Respiratory Protection Program* chapter updated at least annually?	☐	☐	☐
3. Do the Program Administrator and the SHEMP Manager maintain copies of the region's written Respiratory Protection Program and make copies available to other individuals with roles and responsibilities under the program?	☐	☐	☐
4. Do project- and site-specific HASPs include adequate information to satisfy OSHA's requirements for a written Respiratory Protection Program that contains worksite-specific procedures, and are these HASPs updated to reflect any changes that affect requirements for respiratory protection? (*Note: OSHA's requirements for a site-specific written Respiratory Protection Program can be met by including customized versions of the Respiratory Protection Program chapter [i.e., Sections 4.1 through 4.10, Section 6, and Appendix A], as well as a detailed hazard evaluation*.)	☐	☐	☐
5. Are copies of all site-specific written Respiratory Protection Programs maintained by the Removal Manager and the emergency response personnel who are working at that particular site?	☐	☐	☐
Conducting Hazard Evaluations, Identifying Hazard-Reduction Control Measures, and Selecting Respirators (see Sections 4.1, 4.2, and 4.3 of the *Respiratory Protection Program* chapter)			
6. Are task-by-task hazard evaluations performed for each project or site to determine what level of respiratory protection is necessary?	☐	☐	☐
7. Are engineering, work practice, or administrative controls implemented to reduce airborne hazards to the extent feasible, and do employees wear respiratory protection in cases where these measures are incapable of completely controlling the hazard?	☐	☐	☐
8. Do emergency response personnel wear national Standard Issue respirators unless they have specifically obtained permission to use an alternate brand? *(Note: Alternates are acceptable if an employee is unable to achieve a proper fit with the Standard Issue respirator*.)	☐	☐	☐
9. Are the procedures being used to select respirators providing adequate protection against airborne hazards? (*For example, is respirator selection appropriate under OSHA and NIOSH criteria? Do the respirator APF [or MUC] levels indicate that the respirator offers adequate protection against the contaminant concentrations that are present? Are the cartridges or filters suitable for the particular contaminant?*).	☐	☐	☐

REVIEW CRITERIA	COMPLIANT		
	Yes	No	N/A
Medical Evaluations (see Section 4.4 of the *Respiratory Protection Program* chapter)			
10. Are employees evaluated by a PLHCP to determine if they are medically qualified to wear a particular respirator (APR, PAPR, SCBA) *before* they actually wear that respirator in the field?	☐	☐	☐
11. Are medical evaluations repeated annually for all employees who are required to wear respirators?	☐	☐	☐
12. Is the following respirator-related information provided to PLHCPs: (1) the type and weight of the respirator the employee wears, (2) the duration and frequency of respirator use, (3) the expected physical work effort, (4) the use of protective clothing and equipment to be worn, and (5) the temperature and humidity extremes that the employee might encounter?	☐	☐	☐
13. Does the SHEMP Manager receive written *Medical Clearance Statements* which provide an opinion regarding whether an employee is medically qualified to wear respiratory protection equipment?	☐	☐	☐
14. Are emergency response personnel given copies of their *Medical Clearance Statement*?	☐	☐	☐
Fit Testing/User Seal Check (see Section 4.5 of the *Respiratory Protection Program* chapter)			
15. Is initial and annual fit testing conducted for each respirator model that employees are expected to wear?	☐	☐	☐
16. Is QNFT (rather than QLFT) used to perform fit testing? (*Note: QLFT is not to be used during routine fit testing, but it is considered an acceptable temporary measure under emergency conditions or for SCBAs.*)	☐	☐	☐
17. When performing QNFT, does EPA ensure that the wearer has achieved a fit factor that is at least 10-fold higher than the APF? (*For example, an APF of 50 can be assumed for a fullface piece, tight-fitting, air-purifying respirator if the wearer achieves a fit factor of 500 or greater.*)	☐	☐	☐
18. During fit tests, does EPA ensure that employees demonstrate knowledge of user seal test procedures and that employees know that they are supposed to perform user seal checks whenever they don a tight-fitting respirator?	☐	☐	☐
19. Are records of Portacount QNFT printouts and completed QLFT records retained and stored in an easily accessible location?	☐	☐	☐
Procedures for Proper Use of Respirators in the Field (see Section 4.6 of the *Respiratory Protection Program* chapter)			
20. Have policies been established regarding who has the authority to issue equipment, which equipment is issued, and how consumable supplies are issued and tracked?	☐	☐	☐
21. Is a Respirator Issuance Form maintained and stored in an easily accessible location?	☐	☐	☐
22. Have emergency response personnel received laminated copies of *Quick Reference Guide (Relating to Respiratory Protection) for EPA Emergency Response Personnel*?	☐	☐	☐

REVIEW CRITERIA	COMPLIANT		
	Yes	No	N/A
23. Are emergency response personnel adhering to the guidelines presented in Section 4.6 of the *Respiratory Protection Program* chapter with regard to the following: ■ **When to don/doff respirators**. For example, don them outside hazard areas and remove them only after returning to an area where airborne hazards are within acceptable limits. ■ **General requirements for respiratory use as detailed in Section 4.6.3**. For example, do not use expired equipment parts, do not use chewing gum while wearing respirators, and maintain a facial surface consistent with proper fit. ■ **When to leave hazardous environments**. For example, exit a site if a respirator does not perform as expected or if site conditions change significantly. ■ **Special considerations for IDLH environments**. For example, only full facepiece, pressure demand SCBAs with a 30-minute capacity, or equivalent airline respirator with auxiliary air supply, can be used in IDLH atmospheres. Also, a standby employee must be present and appropriately equipped. ■ **When to change filters and cartridges**. For example, discard cartridges if breathing resistance increases significantly, when the service life has been reached, or at the end of each workshift (which ever occurs first), or according to regional policy.	☐	☐	☐
24. Is monitoring performed to assess field conditions and to determine whether it is necessary to increase the level of respiratory protection or to shut down activities?	☐	☐	☐
Cleaning, Storing, Inspecting, and Maintaining Respirators (see Section 4.7 of the *Respiratory Protection Program* chapter)			
25. Based on periodic spot-checks, do employees appear to be keeping their respiratory protection equipment in a clean and sanitized condition?	☐	☐	☐
26. Based on periodic spot-checks, has EPA confirmed that its employees are using only NIOSH-approved parts for the given make and model of their respirators (as opposed to mixing parts from different models)?	☐	☐	☐
27. Do EPA employees conduct monthly (at a minimum) inspections of each respirator that is under their control and document these inspection activities on *Monthly Respirator Inspection Checklists*?	☐	☐	☐
28. Does the Health and Safety Program Contact collect copies of all the *Monthly Respirator Inspection Checklists* that emergency response personnel have completed and maintain a log documenting the receipt of these checklists?	☐	☐	☐
29. Does EPA ensure that SCBAs are periodically tested by the manufacturer and that SCBA cylinders are hydrostatically tested at required intervals (depending on cylinder composition)?	☐	☐	☐
30. Are cartridges, canisters, and breathing air cylinders inspected on a quarterly basis in an effort to determine whether any items need to be removed from service (tagged and stored separately) because they have already expired or they are scheduled to expire within the next quarter?	☐	☐	☐
31. Are logs maintained of all quarterly inspections performed on canisters, cartridges, and cylinders?	☐	☐	☐
32. Is equipment awaiting repair properly tagged as out-of-service?	☐	☐	☐
33. Is an adequate supply of spare parts and consumable supplies maintained?	☐	☐	☐
34. Are records maintained of all repairs and maintenance that is performed on respiratory protection equipment?	☐	☐	☐
35. Are all inspection and maintenance logs and records stored in a readily accessible location?	☐	☐	☐

REVIEW CRITERIA	COMPLIANT		
	Yes	No	N/A
Breathing Air for Atmosphere-Supplying Respirators (see Section 4.8 of the *Respiratory Protection Program* chapter)			
36. Does the breathing air that EPA uses meet at least Grade D requirements?	☐	☐	☐
37. When breathing air is obtained from an outside source is the following documentation obtained and retained: (1) certification that the air meets Grade D breathing requirements, (2) information on the type and frequency of testing that has been performed, and (3) copies of recent air quality tests (if a certificate is not available)?	☐	☐	☐
38. If the region operates an in-house air compressor:			
■ Has a *Breathing Air Compressor Operation and Maintenance Plan* been written and approved?	☐	☐	☐
■ Has EPA obtained training records from the technician who installed the air compressor?			
■ Have all employees who are allowed to operate/maintain the compressor received training from the system manufacturer, and are records maintained to confirm that this training has been conducted?	☐	☐	☐
■ Are records maintained documenting all maintenance activities and repairs performed on the compressor system?	☐	☐	☐
■ Are quality tests performed each time a batch of cylinders is filled (or at least monthly) to ensure that the region's compressor system is producing Grade D breathing air?	☐	☐	☐
■ Are records of these quality tests maintained?	☐	☐	☐
■ Are all breathing-air-compressor records maintained in a readily accessible location?	☐	☐	☐
	☐	☐	☐
Training for Emergency Response Personnel (see Section 4.9 of the *Respiratory Protection Program* chapter)			
39. Do employees receive 6 hours of initial respiratory protection training and 2 hours of classroom training annually thereafter?	☐	☐	☐
40. Do employees participate in an annual exercise on the use of negative pressure APRs and PAPRs by conducting a respirator inspection, tear down, cleaning, reassembly, and donning/doffing?	☐	☐	☐
41. Do all SCBA users participate in an SCBA exercise once a year that involves inspecting, donning/doffing, cleaning, and reassembling a respirator, as well as breathing down a tank (20 minutes minimum)?	☐	☐	☐
42. Are logs maintained (and stored in a readily accessible location) to document who has received classroom training and who has participated in hands-on exercises?	☐	☐	☐
43. Have employees who use compressors or cascade systems obtained documentation indicating that they are proficient in using this equipment, and is this documentation stored in an easily accessible location?	☐	☐	☐
Voluntary Respirator Use (see Section 4.10 of the *Respiratory Protection Program* chapter)			
44. Is a copy of OSHA's 29 CFR 1910.134 Appendix D provided to all qualified employees who wish to wear a respirator voluntarily?	☐	☐	☐
45. Is documentation maintained (and stored in a readily accessible location) to confirm that voluntary users of respiratory protection have received Appendix D of OSHA's Respiratory Protection standard, and that (except for filtering facepieces) a hazard assessment has been conducted, users are medically qualified, and employees are trained to wear the respirator?	☐	☐	☐
Audit/Program Evaluation (see Section 6 of the *Respiratory Protection Program* chapter)			

REVIEW CRITERIA	COMPLIANT		
	Yes	No	N/A
46. Is an internal audit/program evaluation performed on an annual basis to examine how well the region's respiratory protection program is operating?	☐	☐	☐
47. Does the Core ER team perform an external audit of the region's respiratory protection program on an annual basis?	☐	☐	☐