



DOCUMENT NO.: DND-IH-PRO-00028	REV. NO. 0	EFFECTIVE DATE: <u>8/31/2026</u>
TITLE: Respiratory Protection Program	<u>5</u> YR PERIODIC REVIEW DATE: <u>8/25/2031</u>	
	APPROVED BY:	Brandon Arthur
	DATE:	8/25/2026 (Signature on File)

USE CATEGORY:	INFORMATION USE	Page 1 of 42
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Level 2 Administrative Procedure

Revision	Record of Issue/Revision	Affected Pages
0	Revision/Periodic Review: Initial Release under Southern Ohio Cleanup Company LLC (SOCCo) from FBP-IH-PRO-00028 Rev. 11 (replaced references to Fluor-BWXT Portsmouth LLC with SOCCo; replaced references to FBP documents with DND documents; converted procedure to new SOCCo branding/template/formatting, including combining previous Section 9.0, <i>Source References</i> , with Regulatory Requirements so both are listed in Appendix A, and deleting previous statement in Section 1.0, <i>Purpose</i>).	All

Previous Record of Issue/Revision information is available from the history files.

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1.0 PURPOSE

1.1 This procedure has been developed to implement applicable requirements for respiratory protection from the following:

- 10 Code of Federal Regulations (CFR) 851.22, *Worker Safety and Health Program, Hazard Prevention and Abatement*
- 10 CFR 835, *Occupational Radiation Protection.*
- 29 CFR 1910, *Safety and Health Regulations for General Industry*
- 29 CFR 1910.134, *Respiratory Protection*
- 29 CFR 1926.103, *Personal Protective and Life Saving Equipment*
- 42 CFR 84, *Approval of Respiratory Protective Devices*
- 49 CFR Part 178, Subpart C, *Specifications for Cylinders*
- American National Standards Institute (ANSI) Z88.2, *American National Standard for Respiratory Protection (2015)*
- ANSI Z88.6, *For Respiratory Protection - Respirator Use - Physical Qualifications for Personnel, 2006*
- ANSI/Compressed Gas Association (CGA) 7.1, *Commodity Specification for Air*
- ANSI/CGA C-6.1, *Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders*
- National Fire Protection Association (NFPA) 1404, *Standard for Fire Service Respiratory Protection Training*, latest revision

2.0 SCOPE AND APPLICABILITY

- 2.1** This Level 2 procedure applies to both mandatory and voluntary respirator use (i.e., respiratory protection requirements and wearer responsibilities of this procedure apply regardless of the reason that a respirator is worn).
- 2.2** This procedure provides instructions for a Respiratory Protection Program that provides for protection against inhalation of respirable dusts, toxic gases, vapors, fumes, mists, radioactive air contaminants, bioaerosols, and oxygen deficiency when engineering and administrative controls are not feasible or sufficient.
- 2.3** Various tasks described in this procedure may be performed by a Contractor. In each instance, requirements of the contractual agreement shall supersede applicable steps of this procedure.

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2.4 This procedure applies to Southern Ohio Cleanup Company LLC (SOCCo) and contracted labor resource personnel who issue, use, and supervise the use of respiratory protection equipment for SOCCo at the Department of Energy (DOE) Portsmouth Gaseous Diffusion Plant (PORTS).

2.5 Exceptions:

- Contractors/subcontractors are not governed under this procedure, unless stated in the contract.
- This procedure does not apply to underwater breathing devices, medical inhalers, surgical masks, and resuscitators.
- Occupational Safety and Health Administration (OSHA)-expanded health standards supersede this procedure in those instances for which OSHA standards afford a greater level of respiratory protection.

3.0 GENERAL INFORMATION

Available Respiratory Protection Equipment: Respiratory protection equipment available at PORTS includes, but is not limited to, the following:

- Tight-fitting full-face and half-face Air Purifying Respirators (APRs) with High Efficiency Particulate Air (HEPA or P100) filters and/or chemical cartridges or canisters
- Tight-fitting full-face helmet and hood airline respirators
- Powered Air Purifying Respirators (PAPRs) with HEPA or P100 filters and/or chemical cartridges
- Tight-fitting full-face pressure demand respirators for use with airline or Self-Contained Breathing Apparatus (SCBA)
- Portable Breathing Air Compressors
- Portable Breathing Air Carts

4.0 USE REFERENCES

- A.** 10 CFR 835, *Occupational Radiation Protection*
- B.** 29 CFR 1910, *Safety and Health Regulations for General Industry*
- C.** 29 CFR 1910.134, *Respiratory Protection*
- D.** 42 CFR 84, *Approval of Respiratory Protective Devices*
- E.** ANSI Z88.2, *American National Standard for Respiratory Protection (2015)*
- F.** DND-BS-PRO-00062, *Records Management Process*

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5.0 RESPONSIBILITIES

5.1 Occupational Safety and Health (OS&H) Professional

- 5.1.1** Performs and documents evaluation, such as a Job Hazard Analysis (JHA), of the respiratory hazards in the work area prior to respirator selection and assignment of the approved service life.
- 5.1.2** Provides for periodic monitoring of the type and concentration of the respiratory hazard in the work area to ensure the proper type of respirator is utilized, as needed.
- 5.1.3** Provides information to supervisors and wearers on the proper type of respirator for the hazard.
- 5.1.4** Upon request, assists supervisors in performing inspections of respirator users to ensure that the respiratory protection equipment is being worn properly.
- 5.1.5** Provides oversight for contractor/subcontractor activities to ensure proper use of respiratory protective equipment according to contract specifications.
- 5.1.6** Evaluates the workplace as necessary to ensure the provisions of the Respiratory Protection Program are effectively implemented.
- 5.1.7** During job planning activities, determines if feasible engineering controls (e.g., ventilation) or administrative controls can be put in place that will eliminate the need for respiratory protection.

5.2 Supervisor of Respirator Wearer

- 5.2.1** Ensures only approved Respirator Wearers with job specific training are assigned to tasks requiring the use of respirators.
- 5.2.2** Ensures employees are medically qualified to wear respiratory protection equipment prior to use, and ensures employees adhere to any medical restrictions that limit the use of respiratory protection equipment.
- 5.2.3** Utilizes engineering and administrative controls as the primary methods of controlling hazardous atmospheres.
- 5.2.4** Ensures the proper usage of respiratory protection equipment as listed in operating procedures, work permits, or written job-specific instructions.
- 5.2.5** Ensures respiratory protection equipment is properly stored and placed in a designated location for recycling following use.
- 5.2.6** Ensures employees do not use respiratory protection equipment beyond its expiration date, and that such equipment is placed in designated locations for recycling.

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- 5.2.7** Requests OS&H and RP monitoring for hazardous atmospheres that may require respiratory protection, as needed.
- 5.2.8** Reports all malfunctions of respiratory protective equipment to OS&H or to a Respirator Facility or Respirator Training Professional.
- 5.2.9** Supervisors shall perform inspections of their personnel during use of respirators to ensure that the respiratory protection equipment is being worn properly. Assistance from OS&H or a Respirator Facility or Respirator Training Professional may be requested.
- 5.2.10** Ensures the tight-fitting face piece respirator wearer is clean-shaven and does not have any facial hair coming between the sealing periphery of the respirator and face or interfering with respirator valve function.
- 5.2.11** Ensures each employee in the respiratory protection program is scheduled for an annual medical evaluation for respirator use before initial assignment and at least once every 12 months thereafter, not to exceed 365 days.

5.3 Respirator Wearer

- 5.3.1** Prior to use, verifies receipt of the correct respiratory protection equipment.
- 5.3.2** Inspects, uses, cleans, and stores approved respiratory protection equipment daily according to instructions and training received.
- 5.3.3** Inspects, installs, and removes respirator cartridges/canisters and air flow checks (PAPRs only) according to instructions and training received.
- 5.3.4** Only wears respiratory protection equipment issued specifically to him/her when applicable.
- 5.3.5** Only uses respiratory protection equipment within the approved service life, and places expired equipment in designated locations for recycling.
- 5.3.6** Requests RP to survey (monitor) respirator before exiting from Radiological Area.
- 5.3.7** Requests RP to survey respirator for radiological contamination prior to re-use, if it has been doffed in a Radiological Area and is to be re-used without exiting.
- 5.3.8** Informs supervision and Occupational Physician as soon as possible when any health condition affects ability to wear a respirator.
- 5.3.9** Adheres to any medical restrictions or limitations for respirator use.
- 5.3.10** Reports respirator malfunctions to supervision.

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- 5.3.11** Ensures prior to wearing a tight-fitting face piece user is clean-shaven and does not have any facial hair coming between the sealing periphery of the respirator and face or interfering with respirator valve function.

5.4 Radiation Protection Professional

- 5.4.1** Provides radiological protection assistance to Supervisors in determining feasible engineering and/or administrative controls for jobs requiring respiratory protection.
- 5.4.2** Determines respiratory protection requirements for radiological hazards and ensures respiratory protection equipment is specified in appropriate Radiological Work Permit (RWP).
- 5.4.3** Prior to release from the building, surveys respiratory protection equipment used in a radiological area for potential contamination.
- 5.4.4** Prior to being returned to Respirator Facility for an inspection (i.e., failure/malfunction), surveys respiratory protection equipment for potential contamination.

5.5 Occupational Physician

- 5.5.1** Provides medical evaluation for each employee in the Respiratory Protection Program.
- 5.5.2** Notifies the employee, the employee's supervision, Training, and a Respirator Training Professional whenever medical restrictions related to the wearing of a respirator are imposed.

5.6 Respirator Facility and Respirator Training Professional

- 5.6.1** Issues respiratory protection equipment when requested.
- 5.6.2** Oversees periodic inspections of respiratory protection equipment.
- 5.6.3** Maintains respiratory protection equipment inventory.
- 5.6.4** Provides and oversees respiratory protection equipment fit-testing and training.
- 5.6.5** Conducts monthly inspections of respiratory protection equipment and annual replacements of equipment for emergency response groups.

5.7 Qualified ESH&Q Personnel

- 5.7.1** Coordinates their activities with Respiratory Facility Professionals.
- 5.7.2** Issues respiratory protection equipment when requested.
- 5.7.3** Performs periodic inspections of respiratory protection equipment.

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5.8 Fire Services Professional

- 5.8.1** Establishes written procedures for the selection, use, and maintenance of SCBA.
- 5.8.2** Conducts monthly inspections for each in-service SCBA and Emergency Self-Contained Breathing Apparatus (ESCBAs) stored for emergency use including SCBA masks assigned to personnel.
- 5.8.3** Completes required annual documented NFPA inspection of all SCBA masks including emergency use and those used for training.

5.9 Standby Person

Remains available to assist Respirator Wearers who enter areas Immediately Dangerous to Life or Health (IDLH).

5.10 Protective Forces Professional

Returns emergency use respirators to the Respirator Facility for inspection and issuance.

5.11 Respiratory Protection Program Manager

- 5.11.1** Coordinates the respiratory protection program in close liaison with the Occupational Physician and Radiation Protection (RP).
- 5.11.2** Ensures only qualified individuals issue respiratory equipment and ensures applicable training and fit testing is in place.
- 5.11.3** Ensures only approved equipment is issued and used for respiratory protection.
- 5.11.4** Approves auxiliary respiratory equipment issue points and testing areas that are not located in the Respirator Facility.
- 5.11.5** Ensures programs are in place to provide each approved Respirator Wearer with a respirator that is clean, sanitized, and maintained in good operating condition.
- 5.11.6** Reviews plans and approves all new atmosphere-supplying respiratory equipment or any modification of an existing system in order to ensure proper breathing air quality.
- 5.11.7** Receives inspection findings and provides appropriate response actions as needed.
- 5.11.8** Reviews Respiratory Protection Program annually.
- 5.11.9** Reviews and approves all documented requests for an alternate service life for respiratory equipment.

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6.0 ACTIONS

6.1 Engineering Controls for Respirator Use

Occupational Safety and Health Professional

- 6.1.1 Prior to selecting respirator protection equipment as a method of protection, ensure engineering controls such as process containment and ventilation are reviewed and evaluated for adequacy.
- 6.1.2 Evaluate the workplace as necessary to ensure the provisions of the Respiratory Protection Program are effectively implemented in accordance with ANSI Z88.2, *American National Standard for Respiratory Protection*, and OSHA 1910.134, *Respiratory Protection*.

6.2 Emergency Use Respirators

Respirator Facility and Respirator Training Professional/Qualified ESH&Q Personnel

- 6.2.1 Ensure that respiratory equipment that is designated as an Emergency Use Respirator has a “DUE DATE” tag or label identifying when the respirator is required to be inspected or replaced including the following information:
 - DUE DATE (30 days from issue or last inspection)
 - Size
 - Name of individual with the badge number or group the respirator is assigned
- 6.2.2 Ensure Emergency Use Respirators are stored in compartments or covers that are clearly marked as containing Emergency Use Respirators or that the tag or label on the respirator states, “For Emergency Use Only.”
- 6.2.3 Ensure that Emergency Use Respirators (except SCBA masks) are replaced one year from the original issue date, regardless of the inspection results.
- 6.2.4 Ensure that SCBA masks (except SCBA masks assigned to personnel) are returned to the Respirator Facility for cleaning after use.
- 6.2.5 Ensure that personnel who inspect Emergency Use Respirators are properly trained and qualified.
- 6.2.6 Complete monthly inspections and issuance of emergency use respiratory equipment assigned to RP, Protective Forces, and Fire Services.
- 6.2.7 Complete DND-IH-PRO-00028-F03, *Inspection Checklist for Emergency Use Air-Purifying Respirators*, for inspection of emergency use APRs assigned to RP and Fire Services.

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Protective Forces Professional

- 6.2.8 Return emergency use respiratory equipment to the Respirator Facility for monthly inspection and issuance.

Emergency Response Professional

- 6.2.9 Remain clean-shaven at all times.

6.3 General Respirator Use

OS&H Professional

NOTE

Other types of respirators may be used for escape if deemed appropriate through hazard assessment. Written procedures for emergency and rescue uses of respirators shall specify requirements according to ANSI Z88.2, *American National Standard for Respiratory Protection*.

- 6.3.1 Ensure only Pressure Demand (PD) SCBA or PD airline respirators with escape bottles, approved by National Institute for Occupational Safety and Health (NIOSH), are used for standby emergency or rescue equipment.

Supervisor of Respirator Wearer

- 6.3.2 Ensure respirator wearers meet current training requirements, medical evaluations, and quantitative fit-testing for the type of respirator to be worn prior to use.
- 6.3.3 Ensure tight-fitting facepiece respirator wearers do not have facial hair or anything else that interferes with valve function or face-to-facepiece seal.
- 6.3.4 Ensure wearers do **not** use air-purifying or airline respirators without an Escape SCBA under the following circumstances:
- For entry into IDLH or oxygen-deficient atmospheres
 - For emergency rescue or escape, unless specifically allowed by NIOSH
- 6.3.5 Ensure wearers do **not** use particulate filters for removal of gases and vapors.
- 6.3.6 Ensure wearers do **not** use half-face respirators for radiological hazards.

NOTE

With the exception of group issue, use of a respirator by anyone other than the assigned user is prohibited.

- 6.3.7 Ensure respirators are only worn by the person to whom they have been issued.

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- 6.3.8** Locate attendants so they maintain contact with entrants, remain unaffected by any incident, and maintain a communication system to call for help in an emergency.
- 6.3.9** **WHEN** respirator wearer is in IDLH atmosphere, **THEN** ensure attendant is equipped with a respirator approved for use in an IDLH atmosphere.
- 6.3.10** Ensure at least one attendant is present in areas where a respirator wearer can be overcome by a toxic IDLH or oxygen-deficient atmosphere if respirator fails.
- 6.3.11** **IF** respirators are required to be worn for long periods, **THEN** ensure periodic breaks are taken by respirator wearers.
- 6.3.12** **IF** a respirator wearer's respiratory protection malfunctions and/or is damaged or fails during use/or pre-use inspections, **THEN** perform the following:
 - A.** Initiate problem report (PR), as applicable – ensure to include identifying information (i.e. “TR” and/or helmet “PAH” number).
 - B.** Contact Radiational Protection to survey equipment prior to returning to the Respirator Facility.
 - C.** Ensure a copy of the radiological survey and PR is attached to the bag the respiratory equipment is returned in.
 - D.** Ensure respiratory equipment is returned to a Respirator Facility employee.

Radiation Protection Professional

- 6.3.13** **IF** respiratory protection equipment is required for radiological purposes, **THEN** ensure issued protection maintains Total Effective Dose (TED) As Low As Reasonably Achievable (ALARA).

Respirator Wearer

- 6.3.14** Before each use, inspect respirator and perform positive and negative pressure fit checks for specific tight-fitting facepiece respirators, as trained.
- 6.3.15** Before each use, inspect loose-fitting respirators (hoods or helmets) for tears, cracks, or other defects affecting air supply or flow across the breathing zone.
- 6.3.16** **IF** wearing a tight-fitting facepiece respirator, **THEN** ensure no facial hair or anything else interferes with valve function or face-to-facepiece seal.
- 6.3.17** Before each use, inspect all PAPR components such as helmets, motor blowers, batteries, power cords, hoods, and cartridge to ensure all parts are properly assembled, properly secured, and free of damage.
- 6.3.18** Before each use, perform a successful air flow check on the PAPR motor blower with the cartridge attached.

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6.3.19 IF experiencing difficulty in a non-IDLH atmosphere, THEN it is permissible to remove respiratory protection equipment and exit area immediately, as necessary.

6.3.20 IF an emergency occurs while performing work in an IDLH area while using an airline respirator, THEN use the egress escape bottle to exit.

6.4 Filtering Facepiece Masks (Non-Voluntary Use)

Occupational Safety and Health Professional

Approve for use the filtering facepiece mask, provided the following conditions and limitations are met:

- The wearer is trained on the limitations of filtering facepiece mask usage, and the wearer is medically qualified for respirator use.
- Mask is not permitted for use in any hazardous atmosphere.
- Mask will not be used to protect individuals from exposure to any substance having an occupational exposure limit less than 5 mg/m³ or from radiological materials.
- Only nuisance levels of work-related contaminants are present or use is for minimum protection of an individual with allergies or suspected sensitivity to non-disease causing microbial agents or bioaerosols.
- Mask is desired for comfort purposes.
- Protective head gear does not interfere with face-to-facepiece seal.

6.5 Medical Suitability and Surveillance

NOTE

Recommended guidance for minimum evaluation requirements are found in ANSI Z88.6 and 29 CFR 1910.134.

Occupational Physician

6.5.1 Working in conjunction with OS&H and RP, determine requirements of medical surveillance program.

6.5.2 Evaluate workers to ensure they are medically fit to perform assigned duties while using respiratory protection equipment.

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- 6.5.3** Determine which physiological and psychological conditions are pertinent to wearing respirators, and whether an individual is medically suited to be assigned a task requiring use of a respirator. Determination may be made through the following:
- Review of responses to medical questionnaire provided by the Occupational Physician and completed by the individual
 - Results of physical examinations deemed necessary by the Occupational Physician
- 6.5.4** Medically evaluate respirator wearers on an annual basis.
- 6.5.5** **WHEN** deemed appropriate by OS&H and RP, **THEN** perform medical surveillance including bioassay to determine if respiratory protection provided for an individual is adequate.
- 6.5.6** Notify the employee, the employee's supervision, Training, and a Respirator Training Professional whenever medical restrictions related to the wearing of a respirator are imposed or when corrective lens inserts for full face mask usage are required.
- 6.5.7** Provide employees requiring prescription corrective lenses with an optical exam to determine visual acuity and lens prescription.

Respirator Facility and Respirator Training Professional

- 6.5.8** Conduct quantitative fit testing for corrective lens wearers with the lens insert in place during fit-test and annotate this on the respirator wearer's fit test card.

Respirator Wearer

- 6.5.9** Report to supervision and Occupational Physician any change in medical status that may impact the ability to wear respiratory protection including:
- Respiratory or cardiovascular disease
 - Diabetes
 - Fear of tight or enclosed spaces
 - Ruptured eardrum
 - Defective vision
- 6.5.10** Adhere to any medical restrictions or limitations for respirator use.

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NOTE

Do **NOT** use eyeglasses with straps or temple bars that pass through the sealing surface of either negative pressure or positive pressure, tight-fitting, full-face respirators.

Use of contact lenses is permitted with full-face respirators.

- 6.5.11** Obtain prescriptive corrective lens inserts for use inside full face respirators, if needed:
- A.** Ensure corrective lens inserts are compatible with full face respirator and do not affect the face seal of the mask.
 - B.** **IF** contact lenses are worn, **THEN** practice wearing respirator while wearing contact lenses in respiratory protection training or while performing respirator fit-testing.
- 6.5.12** **IF** necessary, **THEN** wear full or partial dentures with tight-fitting respirators to ensure a proper face-to-facepiece seal.
- 6.5.13** **IF** there is a possibility of partial dentures being swallowed, **THEN** remove the dentures for respirator fit testing, as well as work, due to potential changes in facial contours.

6.6 Evaluation of Respiratory Hazards

Radiation Protection Professional/Occupational Safety and Health Professional

- 6.6.1** Ensure applicable group procedures are considered during evaluation of potential respiratory hazards.

NOTE

The documents below identify the potential hazards associated with the work operation and the appropriate type of respiratory and filtering media, where applicable, to be used for each task.

- 6.6.2** Allow Supervisors to obtain respiratory protection only after a hazard assessment has been conducted and documented by the project team with OS&H and/or RP, as appropriate, taking the lead role in the selection of respiratory equipment. This documentation may take the form of the following:
- Approved Procedures
 - Project Plans
 - JHAs
 - Work Packages

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- Radiological Work Permits
- Other applicable documentation

Occupational Safety and Health Professional

- 6.6.3** Determine the non-radiological nature with assistance from RP in determining the radiological nature of the atmospheric hazard by performing the following:
- Consider oxygen content and what contaminants are present or expected in the work area, and evaluate atmosphere for sufficient oxygen concentration to support life, as needed.
 - Evaluate for contaminants in the form of gases, vapors, particulates, or combinations of these.
 - Determine applicable exposure limits and IDLH values. **IF** unavailable, **THEN** estimate material hazard.
 - Determine if applicable OSHA- or DOE-expanded health standard applies.
 - Evaluate hazard or contaminant chemical properties.
 - Determine contaminant's physical state.
 - Determine if adequate warning properties exist.
 - Determine if a particulate filter is appropriate for use with radionuclides that decay from a particulate to a gaseous state or from a gaseous to a particulate state.
 - Identify respiratory hazards that may affect normal functioning of the body.

Radiation Protection Professional/Occupational Safety and Health Professional

- 6.6.4** Evaluate radiological airborne levels, actual, or potential. Refer to effective DACs based on mixtures of uranium, thorium and TRU per DND-RP-PRO-00022, *Posting and Labeling*, and DND-RP-PRO-00009, *Air Monitoring Program*.
- 6.6.5** Monitor chemical concentration of gases, vapors, and/or particulates; and/or airborne radioactivity level of the respiratory hazard in the work area, as needed, to ensure the proper type of respirator is being used. Evaluate the area for the following during monitoring:
- Potential for unexpected increase in humidity, temperature, chemical compounds, concentrations, exertion level, or breathing resistance that may shorten APR service life
 - Presence of multiple gases and vapors

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- Potential for equipment damage and noticeable chemical contamination

6.6.6 Consider worker's activity and location within the hazardous area.

6.6.7 Consider the physical characteristics, functional capabilities, and performance limitations of the various respirators.

NOTE

A listing of Assigned Protection Factors (APFs) for each respirator type is presented in Appendix B, *Assigned Protection Factors for Respiratory Protection*.

6.6.8 Determine whether use of respirators affording greater protection against higher concentrations should be recommended, based on evaluation of the following characteristics of the work and user requirements:

- Activity to be performed
- Temperature of the work area
- Presence of water in the work area
- Worker's mobility throughout the work area
- Space constraints within work area

6.6.9 IF non-radiological respiratory hazards exist, **THEN** estimate the maximum use concentration (MUC) of the substance in which a respirator that is not approved for IDLH atmospheres may be used, as follows:

$$\text{MUC} = (\text{TLV or PEL}) \times \text{APF} \text{ -OR- IDLH (whichever is lower)}$$

Where:

TLV = Threshold Limit Value

PEL = Permissible Exposure Limit

IDLH = Immediately Dangerous to Life or Health (Limit)

APF = Assigned Protection Factor

MUC = Maximum Use Concentration

6.6.10 Consider limitations of respirator filters, cartridges, and canisters.

6.6.11 Ensure APF most suited to the specific job task is selected, according to Appendix B. IF in doubt, **THEN** select the most conservative APF for the chosen respirator.

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NOTE

Only use respirators approved for use by OS&H. The Respiratory Protection Program Manager must be contacted if evidence of approval is needed.

6.6.12 IF radiological hazards exist, THEN estimate the concentration inhaled, as follows:

$$\text{Airborne Concentration Inhaled} = \text{Airborne Concentration} / \text{APF}$$

6.7 Selection of Respiratory Protection Equipment

Radiation Protection Professional/Occupational Safety and Health Professional

NOTE

Workers may upgrade one level of respiratory protection higher than the minimum required by OS&H or RP upon request to the Supervisor, provided it is practical and feasible to do so. This determination will be made by the Supervisor.

Consider the following when selecting the minimum required respiratory protection equipment:

- Physical and psychological requirements of the work activities to be performed
- Additional stress and associated risk from use of respiratory protection equipment
- Factors, such as vision loss, ventilation flow, temperature extremes, and movement restrictions
- Effects of ambient noise on communication
- Respirator APF
- The nature of the hazardous operation or process and reasonable estimated times for individual exposures
- The location of the hazardous area in relation to the nearest area having respirable air (e.g., make-up air for supplied air portable air compressors)
- The activities of workers in the hazardous area
- The physical characteristics and functional capabilities and limitations of the various types of respirators

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- The type of respiratory hazard, including physical properties, physiological effects, concentration of toxic material or airborne radioactivity level, established permissible airborne concentration for radioactive material, and concentration of toxic material established as IDLH
- The APF needed to protect against the maximum expected time weighted average (TWA) and ceiling concentrations of the contaminants
- NIOSH certification of respiratory equipment according to 42 CFR 84, Approval of Respiratory Protective Devices

6.8 Service Life of Respiratory Protection Equipment

Respirator Wearer/Supervisor of Respirator Wearer

- 6.8.1** Maintain awareness of the following conditions **AND** terminate use of APR or Atmosphere Supplying Respirator (ASR) if any of the following conditions arise:
- Activation or visible discoloration of cartridge/canister End of Service Life Indicator (ESLI), when present
 - Expiration of applicable service life or respirator change schedule
 - Unexpected increase in humidity, temperature, chemical compounds, concentrations, or exertion level (prolonged increase in breathing rate) that may shorten APR service life
 - Increased breathing resistance
 - Chemical breakthrough, as indicated by odor, taste, irritation, or other unusual sensation
 - Other changes in condition, such as abnormal function, visible damage, or noticeable chemical contamination
 - Exposure in unexpected, significant release of UF₆ or other hazardous material
 - For Emergency Use respirators, when 30 days have elapsed since initial issue date
 - For non-Emergency Use respirators, expiration of the Due Date (normally 30 days unless the requestor specifies a longer issue period based on a documented alternate approved service life).
 - **IF** the medical approval or fit-test date expires in less than 30 days or less than the approved service life, **THEN** the “Date Due” is shortened so as not to exceed the expiration date.

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- 6.8.2** In the absence of conditions listed in Step 6.8.1, adhere to the following service life requirements for APR/PAPR equipment:
- A.** Single use (one donning and doffing cycle), whenever the approved service life for the respirator is designated as single use for the job.
 - B.** Multiple use (multiple donning and doffing cycles over a period of time, e.g., single shift), whenever the approved service life for the respirator is designated as multiple use for the job, provided the following requirements are met:
 - Worn as a precaution against gases or vapors that are not present in detectable concentrations, within the approved service life, OR worn exclusively for protection against airborne particulates (not gases or vapors)
 - Used only by the individual to whom it was issued (unless group issue)
 - Maintained in good condition; cleaned, as needed; and stored properly
 - Surveyed (monitored) prior to exiting from a contamination area, and activity is less than 100 counts per minute above background

NOTE

In the absence of conditions listed in Step 6.8.1, ASRs shall follow the same requirements as Step 6.8.2A and Step 6.8.2B, with the exception of respirable airline hoses, which are normally issued for 30 days or the alternate approved service life and only used for the period of time required to complete the job, even if multiple shifts are necessary.

- 6.8.3** Request a replacement respirator, when necessary.
- 6.8.4** Place respiratory equipment to be returned for service in designated receptacles.
- 6.8.5** **IF** an uncontrolled release is detected during respirator use and real-time monitoring is **not** being performed, **THEN** perform the following:
- A.** Escape from affected release work area to a safe location.
 - B.** Notify Emergency Response and contact Supervisor.
 - C.** Place respirator in designated receptacle for expired respiratory equipment.
- 6.8.6** **IF** either of the following occurs, **THEN** segregate respirator for inspection by Respirator Facility or Respirator Training Professional, and notify Supervision:
- Malfunction
 - Physical inspection shows need for repair or replacement

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6.9 Issue, Storage, and Control of Respiratory Protection Equipment

Respirator Wearer/Supervisor of Respirator Wearer

- 6.9.1** Initiate DND-IH-PRO-00028-F01, *Respirator Facility Request Form*, or submit respiratory equipment request to the Respirator Facility by email, telephone, fax, or other method of communication, as follows:
- A.** Provide information regarding building, job description, Supervisor, phone, etc., as needed by the Respirator Facility Professional or Qualified ESH&Q personnel.
 - B.** Name and badge number.
 - C.** Specific respirator type (e.g., “Full-Face with GME-P100 Cartridges”).
 - D.** Submit request to Respirator Facility Professional or Qualified ESH&Q personnel at least 2 working days prior to actual issue/exchange date, when possible.
 - E.** In case of an emergency and/or during hours that the Respirator Facility and other approved auxiliary issue point is closed, contact the Respirator Facility Supervisor or the Plant Shift Superintendent (PSS) to request issuance of respiratory equipment.

Respirator Facility and Respirator Training Professional/Qualified ESH&Q Personnel

- 6.9.2** Issue respiratory protection to approved Respirator Wearers for requested items.
- 6.9.3** Ensure an adequate inventory of respiratory protection equipment is maintained and properly stored.
- 6.9.4** Ensure the issue point maintains an equipment control system to account for respirators issued.
- 6.9.5** Ensure respiratory protection equipment is cleaned, sanitized and, maintained, according to applicable procedures.
- 6.9.6** Ensure completion of monthly inspections and issuances of Emergency Use respiratory equipment assigned to emergency response groups.
- 6.9.7** Prior to issue, ensure employee is an approved Respirator Wearer, and verify respirator qualifications, including:
 - Name
 - Badge
 - Type and size of respirator

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- Medical Approval for Respirator Usage Information (includes Date of Approval)
 - Date Quantitative Fit-Test expires
 - Date supplied air or other respirator training expires
- 6.9.8** Prepare and affix a DUE DATE tag/label to the respirator or case, identifying the following:
- Name and badge number
 - Date respirator is due to be returned
 - Size of mask, if applicable
- 6.9.9** Ensure supplied air hoses and MSA Premier Cadet regulators have a tag or label identifying the expiration date, user's name, and badge number. Supplied air hoses and MSA Premier Cadet regulators shall be issued to supervisors only.
- 6.9.10** **WHEN** issuing designated emergency respiratory protection equipment, **THEN** ensure equipment has a DUE DATE tag identifying when the equipment is required to be returned to the Respirator Facility, the mask size, the group assignment (such as Fire Services), and designated storage location. A tag identifying the equipment as Emergency Use shall be affixed to the equipment, or the storage location to indicate that equipment is for emergency use only.

Respirator Wearer/Supervisor of Respirator Wearer

- 6.9.11** Store and maintain respirators in an acceptable storage area.
- 6.9.12** Use the following guidelines to determine the adequacy of the assigned respirator storage location:
- A.** Respirators are stored in plastic bags (heat sealed or re-sealable).
 - B.** Respirators are stored in a manner that will not cause distortion of the facepiece.
 - C.** Compartments or covers used to store emergency use respirators are clearly marked as containing Emergency Use respirators.

6.10 Use of Respiratory Equipment

Occupational Safety and Health Professional

- 6.10.1** Specify respiratory protection equipment required for non-radiological hazards via a hazard assessment, JHA, survey report, operating procedure, or other applicable documentation.

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Radiation Protection Professional

- 6.10.2** Ensure respiratory protection equipment required for radiological hazards is listed on the appropriate RWP.

Occupational Safety and Health Professional

- 6.10.3** Coordinate with RP to determine the appropriate type of respiratory protection equipment for use against combined non-radiological and radiological hazards.

Supervisor of Respirator Wearer

- 6.10.4** Provide support personnel outside the hazardous atmosphere who maintain adequate and continuous communication with respirator wearers inside hazardous atmospheres, as needed.
- 6.10.5** Ensure personnel using tight-fitting respiratory protection equipment do not have any facial hair that interferes with the sealing surface or valves of the respirator.

Respirator Wearer

- 6.10.6** Ensure tight-fitting respirators are not worn when conditions prevent a good face seal from being maintained throughout the job.
- A.** Ensure none of the following may interfere with the respirator's ability to create a good face seal:
- Facial hair
 - Head coverings
 - Facial injuries
 - Scars
 - Excessive makeup
 - Bandages
- B.** **IF** corrective spectacles, goggles, face shield, or welding helmet are required, **THEN** ensure the item does not adversely affect the seal of the face to the facepiece.
- C.** Ensure protective headgear does not interfere with proper seal of respiratory protection equipment. **IF** protective headgear may interfere with proper seal of facepiece, **THEN** ensure respirator fit test is performed while wearing the headgear.
- 6.10.7** Ensure straps of tight fitting respirators are not worn over hard hats.

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- 6.10.8** Inspect, install, and remove respirator cartridges/canisters, as needed, according to instructions and training received.
- 6.10.9** Inspect respirator before use and after use, when applicable and as trained.
- 6.10.10** Request RP to survey respirator for radiological contamination prior to re-use, if it has been doffed in a Radiological Area and is to be re-used without exiting.
- 6.10.11** Prior to respirator use, perform the following tests according to fit test training and/or manufacturer's guidelines:
- A.** Conduct a positive pressure test by performing the following:
- 1) Close off the exhalation valve.
 - 2) Gently exhale into the facepiece to create a slight positive pressure.
 - 3) Hold breath to ensure seal, as trained.
 - 4) **IF** the slight positive pressure built up inside the facepiece remains without evidence of leakage, **THEN** positive pressure test passed.

NOTE

Respirator exhalation valve covers should **not** be removed to perform this test.

- B.** Perform a negative pressure test by performing the following:
- 1) Close off the inlet of the canister, cartridge, or filter; **OR** squeeze the breathing tube, so air cannot pass through.
 - 2) Inhale gently so facepiece collapses slightly.
 - 3) Hold breath to ensure seal, as trained.
 - 4) **IF** facepiece remains slightly collapsed and no inward leakage is detected, **THEN** negative pressure test passed.
- 6.10.12** Don and doff respirator in a manner that prevents cross-contamination.
- 6.10.13** **WHEN** using a respirator in an area controlled for removable contamination, **THEN** request RP to perform a survey upon exit.
- 6.10.14** **IF** doubt arises as to the adequacy of protection, **THEN** immediately exit area.

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NOTE

Step 6.10.15 applies only to non-IDLH environments.

6.10.15 IF any of the following conditions are experienced, **THEN** it is permissible to remove the respirator, if necessary; exit the environment and contact Supervision, OS&H, or RP:

- Respirator fails to provide adequate protection.
- Respirator malfunctions.
- Contaminant warning properties are detected while wearing the respirator.
- Excessive breathing resistance.
- Severe discomfort in wearing the respirator.
- Procedural or communication failure.
- Illness occurs, including sensation of dizziness, nausea, weakness, breathing difficulty, coughing, sneezing, vomiting, fever, chills or other symptoms.

6.10.16 IF wearing a supplied airline respirator and disruption in airflow occurs, **THEN** immediately exit area.

6.10.17 IF suffering from a respiratory or gastrointestinal illness, **THEN** consult with Supervisor, OS&H, and/or RP prior to performing tasks requiring the use of a respirator.

6.10.18 IF damage is observed during cleaning or inspection, or malfunctions occur during use, **THEN** segregate respirator from other used or expired masks for inspection by a Respirator Facility or Respirator Training Professional. Notify Supervisor and OS&H.

Occupational Safety and Health Professional

6.10.19 Investigate reported or discovered malfunction of respiratory protection equipment, as necessary.

6.10.20 Submit inspection findings to Respiratory Protection Program Manager.

6.11 Use of Respirators in IDLH Conditions

Respirator Wearer

6.11.1 Prior to entering an IDLH environment, contact Supervisor, OS&H, and/or RP for a hazard assessment.

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6.11.2 IF entering an IDLH environment, **THEN** only use a full-face SCBA, or full-face airline equipped with egress escape bottle, operated in Pressure Demand or other positive pressure mode.

6.11.3 WHEN entering an IDLH environment, **THEN** ensure at least 1 fully equipped standby person is monitoring the entrant from a safe area.

Standby Person

6.11.4 Maintain communication with respirator wearer. Radio, telephone, visual, voice, etc., may be used, as necessary.

6.11.5 Have SCBA, or full-face airline equipped with egress escape bottle, and all other required personal protection equipment immediately available to assist the entrant in the event of difficulty.

6.11.6 Ensure you are trained and equipped to provide assistance to the entrant.

Respirator Wearer

6.11.7 IF in IDLH atmosphere and you experience respiratory or gastrointestinal illness without vomiting, **THEN** perform the following:

- A.** Immediately leave area.
- B.** Remove respirator.
- C.** Contact Supervisor, OS&H, and/or RP.

6.11.8 IF in IDLH atmosphere and you begin vomiting, **THEN** perform the following:

- A.** Raise facepiece away from face to prevent interference while vomiting.
- B.** Reposition respirator on face as soon as possible.
- C.** Immediately leave work area.
- D.** Contact Supervisor, OS&H, and/or RP.

6.12 Decontamination, Cleaning, and Disinfecting of Respiratory Protection Equipment

Respirator Wearer

6.12.1 Ensure respirator is clean, stored, and inspected, as required.

6.12.2 IF damage is observed during cleaning or inspection, or malfunctions occur during use, **THEN** segregate respirator from other used or expired masks for inspection by a Respirator Facility or Respirator Training Professional. Notify Supervisor and OS&H.

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Respirator Facility and Respirator Training Professional

- 6.12.3** Ensure respiratory protection equipment is cleaned, sanitized, and maintained according to applicable procedures.

Occupational Safety and Health Professional

- 6.12.4** Investigate reported or discovered malfunctions of respiratory protection equipment, as necessary.
- 6.12.5** Submit inspection findings to Respiratory Protection Program Manager.
- 6.12.6** Ensure programs and activities are in place to provide each approved Respirator Wearer with a respirator that is clean, sanitized, and maintained in good operating condition.

Radiation Protection Professional

- 6.12.7** Prior to releasing respiratory equipment to the Respirator Facility, survey it for radiological contamination, when applicable.
- 6.12.8** Respiratory equipment found to be contaminated (radiological and non-radiological) should be prepared and processed for chemical cleaning accordingly.

6.13 Respirator Fit-Testing/Training

Respirator Wearer

- 6.13.1** **WHEN** using a tight-fitting respirator, **THEN** report for fit-test on a 12-month frequency (not to exceed 365 days).
- 6.13.2** Satisfactorily complete training, medical evaluation, and quantitative fit-testing for the model and size of respirator to be worn, to qualify as an approved Respirator Wearer.

Supervisor of Respirator Wearer

- 6.13.3** Schedule fit-tests as soon as possible following successful completion of medical evaluation.

Respirator Facility and Respirator Training Professional

- 6.13.4** Ensure fit factors are a minimum of 10 times greater than the APF of the respirator.
- 6.13.5** Ensure Respirator Wearer dons the respirator for a minimum of 5 minutes prior to the start of a fit test.

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- 6.13.6** IF adequate quantitative fit-test results are achieved on respirators that operate in the air-purifying (negative pressure) mode, **THEN** allow use of the same brand and type equipment in positive pressure mode (continuous flow or pressure demand) without retest.
- 6.13.7** IF facial features prevent adequate fit-test results, **THEN** perform the following:
- Fail the fit-test subject, therefore not allowing the worker to wear a tight-fitting respirator(s) for which the inadequate fit-test result is obtained.
 - Notify worker's Supervisor and Training to prohibit issuance of applicable tight-fitting respirator(s) until acceptable fit-test is attained.
- 6.13.8** Ensure APFs printed on the respiratory fit-test card are equal to those specified in Appendix B.
- 6.13.9** For subcontractor personnel, review and accept adequate documentation for applicable contractor/subcontractor personnel.
- 6.13.10** IF the following criteria are met, **THEN** accept written documentation of training, medical evaluation, and quantitative fit-testing from other facilities or offsite organizations:
- Fit-test method complies with the requirements of PORTS respiratory protection program.
 - Candidate meets the fit factor criteria established at PORTS.
 - Fit-test has been performed within the previous 12 months.
 - The respirator the wearer is approved to wear is available at PORTS.

NOTE

SOCCo and contracted labor resource personnel do not typically perform work in areas which require emergency escape respirators. Each situation which has been evaluated and determined to need emergency escape respirators shall be handled independently. Specific instructions given to persons who will wear the escape devices shall be documented in a fashion to provide a record of the instruction given for the use of the device. These devices are typically a loose-fitting assembly, which does not require a fit test. If tight fitting facepieces are to be used, the section of this procedure covering tight fitting respirators shall be followed.

- 6.13.11** Train individuals to properly issue respirators, as necessary.

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6.13.12 Train Supervisors of Respirator Wearers on the following to ensure the proper use of respirators:

- Basic respiratory protection practices
- Nature and extent of respiratory hazards to which workers may be exposed
- Principles and criteria of selecting respirators
- Training requirements of respirator wearers
- Issuance of respirators
- Inspection of respirators
- Use of respirators, including monitoring of usage
- Maintenance and storage of respirators
- Regulations concerning respirator use

6.13.13 Train Respirator Wearers on the following to ensure the proper and safe use of respirators:

- Reasons for the need of respiratory protection
- Nature, extent, and effects of respiratory hazards the wearer may be exposed to
- Explanation of why engineering and administrative controls are not being applied or are not adequate, and of what effort is being made to reduce or eliminate the need for respirators, as needed
- Explanation of why a particular type of respirator has been selected for a specific respiratory hazard
- Explanation of the operation, capabilities, and limitations of the respirator selected
- Instruction in inspecting, donning, checking the fit of, wearing, and doffing the respirator
- Instruction in the inspection, installation, and removal of respirator cartridges/canisters, as needed

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NOTE

A test atmosphere is any atmosphere in which the wearer can carry out activities simulating work movements and respirator leakage or in which respirator malfunction can be detected by the wearer.

- Opportunity for each respirator wearer to handle the respirator, learn how to don and wear it properly, check its seal, wear it in a safe atmosphere, and wear it in a test atmosphere
- Explanation of maintaining and storing respirators
- Instructions on how to recognize and cope with emergency situations
- Regulations concerning respirator use
- Reporting of respirator malfunctions
- Adjusting the respirator so its respiratory inlet covering is properly fitted on the wearer and so the respirator causes a minimum of discomfort

6.13.14 Provide specific training for individuals who wear the following equipment:

- Air purifying respirator
- Powered air purifying respirator
- Supplied air pressure demand respirator
- Abrasive blasting respiratory protection equipment
- Continuous flow airline respirators
- Self-Contained Breathing Apparatus (performed by Fire Services)

6.13.15 Train filtering facepiece mask wearers (non-voluntary use) on the following:

- Reasons for wearing filtering facepiece mask
- Recognition of nuisance hazards
- Proper donning and doffing technique
- Limitations for wearing filtering facepiece mask

Supervisor of Respirator Wearer

6.13.16 Ensure employees who use filtering facepiece masks on a voluntary basis are trained to Appendix D of 29 CFR 1910.134.

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6.13.17 Have Respirator Wearer, except those limited to voluntary use of filtering facepiece masks, retrained under the following conditions:

- At least annually (not to exceed 365 days)
- Prior to use of new respiratory equipment to be placed into service

NOTE

It is imperative that the quality of breathing air meets or exceeds the standards set forth in this procedure to ensure the safety, health, and well-being of personnel involved.

In no case shall pure oxygen be used for airline respirators.

Supervisor of Respirator Wearer/OS&H Professional/Fire Services Professional

6.13.18 Ensure that compressed breathing air is a controlled item and is not issued without authorization from Fire Services or OS&H.

6.13.19 Ensure that all air used for breathing meets the following criteria for Grade D breathing air, as established in ANSI/CGA G-7.1:

- Oxygen – 19.5% to 23.5%
- Condensed Hydrocarbons – less than 5 mg/m³
- Carbon Monoxide – less than 10 ppm
- Odor – absence of a “pronounced odor”
- Carbon Dioxide – 1000 ppm
- For all air that may be used in SCBA, the dew point must be -50°F (i.e., nominally 67 ppm) or less

6.13.20 Ensure breathing air sources meet Minimum Testing Frequency and Protocols of Breathing Air Sources by performing the following:

- A.** Ensure that all listed parameters are tested quarterly for compressors used to fill breathing air cylinders.
- B.** Ensure that oil-free compressors are quality tested at least annually.
- C.** Ensure that oil screw compressors used for independent sources of breathing air are quality tested at least quarterly.
- D.** Evaluate the output flow of all breathing air supply compressors to ensure adequacy at breathing air stations.

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- E.** Ensure that tube bank units are tested or certification is received upon arrival at the site.
- F.** Ensure that compressor air cylinders (including cascade systems) are individually tested or that certification is received upon their arrival at the site for oxygen content.

NOTE

All air quality testing described in this section shall be done at the point of attachment (whenever possible) and in the same configuration in which the equipment is normally used.

- 6.13.21** Ensure that all compressors used to supply breathing air are equipped with appropriate filters, detectors and/or alarms. Maintain these filters, cartridges, and other equipment according to the manufacturers' guidance.
- 6.13.22** Ensure that contaminants do not enter the system when compressors are used to supply breathing air.
- 6.13.23** Clearly mark all breathing air containers and sources, "Breathing Air."

NOTE

An alarming device or system may be an electrical or mechanical device or other means; or it may be an assigned attendant who continually monitors the supply or other equivalent means.

- 6.13.24** Ensure that all breathing air systems are equipped with an alarming device or system, in the event of a low or inadequate breathing air supply.

Occupational Safety and Health Professional

- 6.13.25** Review plans and approve all new atmosphere-supplying respiratory equipment or any modification of an existing system in order to ensure proper breathing air quality.

7.0 RECORDS

7.1 Records Generated

- A.** DND-IH-PRO-00028-F01, *Respirator Facility Request Form*
- B.** DND-IH-PRO-00028-F03, *Inspection Checklist for Emergency Use Air-Purifying Respirators*
- C.** Program Surveillance – The findings, outcomes, and actions resulting from the Respiratory Protection Program evaluation

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7.2 Requirements

Records generated or received as a result of performing this procedure shall be managed according to DND-BS-PRO-00062, *Records Management Process*.

8.0 DEFINITIONS/ACRONYMS

8.1 Definitions

- A. **Airline Respirator** – An atmosphere supplying respirator (ASR) that receives respirable air through a supply hose from a portable or stationary source of compressed respirable air. Types include helmets, hoods, and tight-fitting masks.
- B. **Air-Purifying Respirator (APR)** – A class of respirator in which ambient air is passed through an air-purifying element that removes contaminants such as dust, fumes, mists, gasses, vapors, or aerosols.
- C. **Approved Respiratory Equipment** – A device that has been tested and certified by the National Institute for Occupational Safety and Health (NIOSH) or approved by the DOE through its Respirator Studies Program.
- D. **Assigned Protection Factor (APF)** – The expected workplace level of respiratory protection provided by a properly functioning respirator or class of respirators to the majority of properly fitted and trained users.
- E. **Atmosphere Supplying Respirator (ASR)** – A class of respirators that supplies a respirable atmosphere independent of the workplace atmosphere.
- F. **Canister/Cartridge** – The part of a gas and vapor or particulate air purifying respirator that contains the sorbent, filter, or catalyst which removes specific contaminants from inhaled ambient air.
- G. **Emergency** – A situation where the respirator is malfunctioning (such as loss of air pressure) or if the worker is experiencing symptoms such as dizziness, shortness of breath, nausea, lightheadedness, etc.
- H. **End-of-Service Life Indicator (ESLI)** – A visual system (color-change indicator) that warns the respirator user of the approach of the end of adequate respiratory protection. For example, that the sorbent is approaching saturation or is no longer effective.
- I. **Filtering facepiece Mask** – A mask where the facepiece is the filter according to 42 CFR 84, *Approval of Respiratory Protective Devices*.
- J. **Fit Factor** – An averaged ratio of ambient concentration of a challenge agent to the concentration inside the respirator as determined by a quantitative fit-test.
- K. **Fit Test** – The use of a challenge agent during steps that simulate workplace activities to evaluate the adequacy of respirator fit for an individual.

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- L. Hazardous Atmosphere** – An atmosphere presenting a potential for death, disablement, injury, or acute illness from one or more causes such as:
- A flammable gas, vapor, or mist in excess of 10% of its lower explosive limit.
 - An oxygen deficient atmosphere containing less than 19.5% oxygen by volume or an oxygen enriched atmosphere containing more than 23.5% oxygen by volume.
 - An atmospheric concentration of any substance listed in subpart Z of 29 CFR 1910 OSHA standard above the listed numerical value of the PEL or above the listed numerical value of the TLV published by the American Conference of Governmental Industrial Hygienists (ACGIH), latest revision.
 - An IDLH condition.
- M. Helmet** – A hood with a fixed shape that offers head protection against impact or penetration.
- N. High Efficiency Particulate Air Filter (HEPA)** – A filter with a particle removal efficiency of no less than 99.97 percent for 3 micron aerosols.
- O. Hood** – A flexible respiratory inlet covering that completely covers the head and neck and may cover portions of the shoulder and torso.
- P. Immediately Dangerous to Life or Health (IDLH)** – A condition that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects, or prevent unaided escape from such an environment.
- Q. Job Specific Training** – Training intended to detail job situations an employee may encounter that will require use of a respirator.
- R. Loose-Fitting Respirator** – A respiratory inlet covering that forms a partial seal, can cover the head, neck, and shoulders and may or may not offer head protection against impact and penetration (e.g., supplied-air hood or helmet).
- S. Maximum Use Concentration (MUC)** – The maximum concentration of an air contaminant in which a particular class of respirator can be used, based on the respirator's APF. The MUC shall not exceed the use limitations specified on the NIOSH approval label for the respiratory inlet covering, cartridge, canister, or filter. The MUC is the product of the APF and the applicable exposure limits for the air contaminants in which the respirator will be used.
- T. Medical Evaluation** – The medical review and testing that an individual undergoes to become medically approved to wear a respirator as determined by an Occupational Physician.

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- U. **Oxygen Deficient Atmosphere** – An atmosphere with oxygen content of less than 19.5 % by volume.
- V. **Permissible Exposure Limit (PEL)** – A Time Weighted Average or Ceiling concentration of an airborne contaminant that shall not be exceeded. PELs are federal exposure limits established by OSHA. They are published in 29 CFR 1910 Subpart Z, *Toxic and Hazardous Substances*.
- W. **Positive Pressure Respirator** – A respirator in which the air pressure inside the respiratory inlet covering is normally positive in relation to ambient air pressure outside the respirator.
- X. **Powered Air-Purifying Respirator (PAPR)** – An air-purifying respirator that uses a blower to force ambient air through the air-purifying elements to the respiratory inlet covering.
- Y. **Pressure Demand (PD) Respirator** – A positive pressure, atmosphere supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.
- Z. **Protection Factor** – The ratio of the concentration of an airborne substance outside the respirator at the wearer's breathing zone to the concentration inside the respirator. The protection factor is the measure of the degree of protection provided by a respirator to the wearer.
- AA. **Qualified Environmental, Safety and Health Personnel** – ESH&Q personnel who are qualified to perform the steps outlined in this procedure due to having successfully completed corresponding training.
- BB. **Qualified Respirator Issuer** – Respirator Facility Professionals, Respirator Training Professionals, or Qualified ESH&Q personnel who issue respirators to respirator users and have had adequate training in proper respirator use and issue. Worker respirator qualifications are verified prior to issuance of respiratory protection equipment. Records are controlled and maintained that are related to routine-use respiratory protection equipment.
- CC. **Quantitative Fit –Testing** – An evaluation of the sealing characteristics of the respirator by numerically measuring the amount of leakage into the respirator under controlled conditions that simulate workplace activities.
- DD. **Respirator** – A device designed to protect the wearer from the inhalation of hazardous atmospheres.
- EE. **Respirator Facility or Respirator Training Professional** – Trained personnel (those individuals who have successfully passed an approved Respiratory Protection Training course) and who are authorized by supervision to perform the required steps in this procedure.

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- FF. Respirator Wearer** – An individual who has been approved to wear a respirator due to being medically approved, quantitatively fit-tested as required and trained on the use of respiratory protective equipment initially and retrained once every 12 months (not to exceed 365 days).
- GG. Routine Operation** – Planned activities that are generally repetitive and occur frequently.
- HH. Self-Contained Breathing Apparatus (SCBA)** – An atmosphere-supplying respiratory protection device in which the respirable gas source (e.g., a cylinder filled with compressed air) is designed to be carried by the wearer.
- II. Service Life** – The period of time a chemical or organic vapor cartridge or canister will provide adequate protection to the respirator wearer.
- JJ. Single Use** - One donning and doffing cycle.
- KK. Supervisor of Respirator Wearer** – A person who has the responsibility of overseeing the work activities of persons who wear respirators. Respirator supervisors must successfully complete applicable training.
- LL. Tight Fitting Facepiece** – A respiratory inlet covering that is designed to form a complete seal with the face.
- MM. Threshold Limit Value (TLV)** – Airborne concentrations of substances to which nearly all employees may be repeatedly exposed to day after day without adverse effects. TLVs are established by the ACGIH and are not to be exceeded. TLVs are specified in 3 categories:
- TLV-TWA – 8-hour time weighted average concentration
 - TLV-STEL – Short Term Exposure Limit (15 minutes)
 - TLV-C – Ceiling Concentration Limit
- NN. Threshold Limit Value – Ceiling (TLV-C)** – The concentration exposure limit not be exceeded during any part of the work day. If instantaneous measurements are not available, sampling should be conducted for the minimum period of time sufficient to detect exposures at or above the ceiling value. ACGIH believes that TLVs based on physical irritation should be considered no less binding than those based on physical impairment. There is increasing evidence that physical irritation may initiate, promote, or accelerate adverse health effects through interaction with other chemical or biological agents or through other mechanisms.

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- OO. Threshold Limit Value – Short Term Exposure Level (TLV-STEL)** – The 15-minute TWA exposure limit that is not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. The TLV-STEL is the concentration to which it is believed that workers can be exposed continuously for a short period of time without suffering from irritation, chronic or irreversible tissue damage, dose-rate-dependent toxic effects, or narcosis of sufficient degree to increase the likelihood of accidental injury, impaired self-rescue, or materially reduced work efficiency.
- PP. Threshold Limit Value – Time Weighted Average (TLV-TWA)** – The TWA concentration exposure limit for a conventional 8-hour workday and a 40-hour workweek to which it is believed that nearly all workers may be repeatedly exposed, day after day, for a working lifetime without adverse effects.
- QQ. User Seal-Check** – A field-test conducted by the wearer to determine whether the respirator is properly functioning and adequately sealed to the face.
- RR. Warning Properties** – The detectable characteristics of a hazardous chemical including odor, taste or irritation effects that are considered to be adequate when detectable and persistent at concentrations at or below the hazardous exposure level.

8.2 Acronyms

- A. ACGIH** – American Conference of Governmental Industrial Hygienists
- B. APF** – Assigned Protection Factor
- C. APR** – Air Purifying Respirator
- D. ASR** – Atmosphere-Supplying Respirator
- E. ESLI** – End of Service Life Indicator
- F. HEPA** – High Efficiency Particulate Air Filter
- G. IDLH** – Immediately Dangerous to Life or Health
- H. MUC** – Maximum Use Concentration
- I. NIOSH** – National Institute for Occupational Safety and Health
- J. PAPR** – Powered Air Purifying Respirator
- K. PD** – Pressure Demand
- L. PEL** – Permissible Exposure Limit
- M. PR** – Problem Report

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- N. RP** – Radiation Protection
- O. SCBA** – Self-Contained Breathing Apparatus
- P. SOCCo** – Southern Ohio Cleanup Company LLC
- Q. TLV** – Threshold Limit Value
- R. TWA** – Time Weighted Average

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Appendix A **SOURCE REFERENCES AND REGULATORY REQUIREMENTS**

1. 10 CFR 851.22, *Worker Safety and Health Program, Hazard Prevention and Abatement*
2. 10 CFR 835, *Occupational Radiation Protection*
3. 29 CFR 1910.134, *Respiratory Protection*
4. 29 CFR 1926.103, *Personal Protective and Life Saving Equipment*
5. 49 CFR Part 178, Subpart C, *Specifications for Cylinders*
6. ANSI Z88.2, *American National Standard for Respiratory Protection*
7. ANSI Z88.6, *For Respiratory Protection – Respirator Use – Physical Qualifications for Personnel*, 2006
8. ANSI/Compressed Gas Association CGA 7.1, *Commodity Specification for Air*
9. ANSI/Compressed Gas Association CGA C-6.1, *Standards for Visual Inspection of High-Pressure Aluminum Compressed Gas Cylinders*
10. NFPA 1404, *Standard for Fire Service Respiratory Protection Training*

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Appendix B ASSIGNED PROTECTION FACTORS FOR RESPIRATORY PROTECTION

Assigned Protection Factors (APFs) - The assigned protection factors listed below are used to select a respirator that meets or exceeds the required level of employee protection. When using a combination respirator (e.g., airline respirators with an air-purifying filter), steps must be taken to ensure that the assigned protection factor is appropriate to the mode of operation in which the respirator is being used.

Assigned Protection Factors⁵

Type of Respirator ^{1,2}	Quarter mask	Half mask	Full facepiece	Helmet/hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	³ 10	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)	.....	50	1,000	⁴ 25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode	.....	10	50	.....	.....
• Continuous flow mode	.....	50	1,000	⁴ 25/1,000	25
• Pressure demand or other positive-pressure mode	.....	50	1,000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)					
• Demand mode	.....	10	50	50	.....
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	.....	.....	10,000	10,000	.....

Notes: OSHA 29 CFR 1910.134

¹Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

²The assigned protection factors are only effective when the employer implements a continuing, effective respirator program as required by 29 CFR 1910.134, including training, fit testing, maintenance, and use requirements.

³This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

⁴The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

⁵These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

