

**SCBA
Training
HPT063.002**



TVA NPG

**NUCLEAR TRAINING
TRAINING MATERIALS COVERSHEET**

RADIOLOGICAL CONTROL TRAINING
PROGRAM

RESPIRATORY PROTECTION
COURSE

HPT063
COURSE NO.

SELF-CONTAINED BREATHING APPARATUS (SCBA) TRAINING
LESSON TITLE

HPT063.002
LESSON PLAN NO.

INPO ACCREDITED

YES _____ NO X

MULTIPLE SITES AFFECTED

YES X NO _____

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NUCLEAR TRAINING REVISION/USAGE LOG				
REVISION NUMBER	DESCRIPTION OF CHANGES	DATE	PAGES AFFECTED	REVIEWED BY
0	Initial Issue. This is a standard lesson plan for use at BFN, SQN, and WBN.	04/06/90	Body 1-19 Att. 1, 1-1 Att. 2, 1-1	
1	To delete requirement for an annual whole body count and to correct typographical errors.	01/01/94	Body 1-18 Att. 1, 1-1 Att. 2, 1-1	
2	To replace HPT163.002, HPT263.002 and HPT363.002	09/05/99	All	
3	Changes for standardization based on RADCON Peer Team recommendations.	02/07/2000	All	
4	Standardization of training regarding bottle change out; changed attachments to appendices	1/10/2001	2-4,10,14,16-17,19-21	Randy Waldrep
5	Changed structure of lesson to group topics more logically.	12/18/02	ALL	Tom Shirley
6	Correct missing page break on Appendix 3, to permit reposting clean copy to Web (SQN PER-03-012766-000). Adjusted Tabs throughout to align text.	10/28/2003	ALL	Tom Sawyer
7	Clarify use of communication devices in explosive atmospheres; clarify the sequence of the use of the main line valve and bypass valve when there is a regulator failure; incorporate error reduction tools.	4/1/04	ALL	Tom Shirley

- I. **PROGRAM:** RADIOLOGICAL CONTROL TRAINING
- II. **COURSE:** RESPIRATORY PROTECTION
- III. **LESSON TITLE:** SELF-CONTAINED BREATHING APPARATUS (SCBA) TRAINING
- IV. **LENGTH OF LESSON/COURSE:** 1-1/2 - 3 Hours
- V. **TRAINING OBJECTIVES:**

A. Terminal Objective:

Upon completion of this course, the participants will demonstrate their knowledge and understanding of the Self-Contained Breathing Apparatus (SCBA) by obtaining a minimum score of 80 percent on the written examination and also by satisfactory completion of a practical exercise as per this lesson material.

B. Enabling Objectives:

Upon completion of this course, the trainee will be able to successfully:

1. Identify the purpose of the SCBA.
2. Recognize the requirements workers must meet before wearing a SCBA.
3. Recognize the inspection steps that must be completed to ensure operability of the SCBA prior to its use.
4. Choose from sets of given responses the characteristics of the SCBA to include:
 - a. Components.
 - b. Donning Procedure and Use.
 - c. Emergency Procedures.
 - d. Removal Procedure.
 - e. Changing Cylinders.
 - f. Changing Cylinders in a Toxic Environment (Licensed Operations Personnel only)
5. Identify the capabilities and limitations of the SCBA, including its assigned protection factor.
6. Demonstrate, through a practical exercise, the proper procedure for donning, use and removal of the SCBA.
7. Apply appropriate human error reduction tools.

VI. TRAINING AIDS:

- A. VTR Player and Monitor
- B. Erasable Board and Markers
- C. Videotape - SCBA Component Parts and Donning Procedures (optional)
- D. SCBA for each student

VII. TRAINING MATERIALS:

Appendices

- 1. Appendix 1 - SCBA Practical Factors Checklist
- 2. Appendix 2 - INPO Network Item, SER 35-88
- 3. Appendix 3 - NRC Information Notice Number 89-47

VIII. REFERENCES:

- A. SQN RCI-4, "Respiratory Protection Program"
- B. NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials"
- C. Mine Safety Appliance Company - ESP Communications System
- D. Title 10, Code of Federal Regulations, Part 20
- E. Title 29, Code of Federal Regulations, Part 1910
- F. INPO Network Item, SER 35-88, Inadequate Work Controls, Work Practices, and Rescue Preparations Contribute to Fatality
- G. NRC Information Notice No. 89-47, Potential Problems with Worn or Distorted Hose Clamps on Self-Contained Breathing Apparatus
- H. TRN-2, General Employee Training, TVA
- I. SQN Radiological Control Instructions 3
- J. NRC IN 98-20

- K. WBN, RCI-107, Respiratory Protection Equipment Inspection Maintenance Issuance and Accountability
- L. Mine Safety Appliance Company - MSA Air Mask Model Custom 4500 II Parts List (WBN)
- M. BFN RCI-3, Respiratory Protection Program
- N. SQN, RMD RP-01, Selection, Issue, and Use of Respiratory Protection Devices
- O. SPP-5.10, Radiological Respiratory Program
- P. SQN, PER SQ94-0073
- Q. TVAN Human Performance Handbook
- R. Mine Safety Appliances Ultralite II, Ultralite Dual Purpose, Custom 4500 II and Custom 4500 II Dual Purpose Instructions and Level I Maintenance Manual (TAL 2901 (L) Rev. 2)

IX. INTRODUCTION:

The Self-Contained Breathing Apparatus (SCBA) is a respiratory protection device that provides the highest level of protection to the wearer against respiratory hazards. The proper use of the SCBA is extremely important for personnel safety at nuclear power plants. Special attention is required in the use of the apparatus because it is complex in operation and must be used properly to avoid injury. Use of error prevention tools is an effective way to ensure safe and proper use of the SCBA.

<u>Worker Error Prevention Toolbox</u>	<u>S A F E R Task Preview</u>
<p style="text-align: center;"><u>Two-minute Rule</u></p> <p style="text-align: center;"><u>Procedure Use and Adherence</u> Independent Verification Second-party Verification</p> <p style="text-align: center;"><u>Effective Communication</u> Three-way Communication Phonetic Alphabet</p> <p style="text-align: center;"><u>Self Checking</u> STAR Flagging</p> <p style="text-align: center;"><u>Peer-checking Questioning Attitude</u> Qualify-Validate-Verify (QV&V) Stop When Unsure</p>	<p><i>Summarize</i> critical steps</p> <p><i>Anticipate</i> errors at each critical step.</p> <p><i>Foresee</i> consequences of errors at each critical step.</p> <p><i>Evaluate</i> defenses, barriers, and contingencies at each critical step to:</p> <ul style="list-style-type: none"> • prevent or catch errors. • recover from errors, or • mitigate consequences of errors <p><i>Review</i> experience relevant to each critical step.</p>

X. LESSON BODY:**INSTRUCTOR NOTES**

<p>A. The purpose of the SCBA is to provide a supply of breathing air for personnel entering the following areas:</p> <ol style="list-style-type: none"> 1. Harmful gases, vapors and particulates <ol style="list-style-type: none"> a. Radiological <ol style="list-style-type: none"> (1) Inert gases such as xenon and krypton. (2) Radioactive iodine. (3) Cobalt, iron and cesium. b. Non-radiological <ol style="list-style-type: none"> (1) Gas and vapors--ammonia, chlorine, benzene and CO₂. (2) Particulates--asbestos, acidic mists and alkalines. 2. Atmospheres immediately dangerous to life or health (IDLH) <ol style="list-style-type: none"> a. Unknown atmospheres b. Oxygen deficient areas <ol style="list-style-type: none"> (1) Normal atmosphere oxygen content is 20.9% by volume. (2) Atmosphere is considered to be oxygen deficient at less than 19.5%. (3) Areas containing hazardous chemical exposures above the Threshold Limit Value (TLV) c. The SCBA is the <u>ONLY</u> respiratory device classified for use in an IDLH atmosphere or under emergency conditions. 	<p>Objective 1</p> <p>Ensure all participants have proper corrective eyewear, medical clearance and training prior to start of presentation.</p> <p>Capture every available opportunity to reinforce the proper use of worker error reduction tools during the course.</p> <p>IDLH/confined space entries may involve additional entry requirements. Additionally, unknown atmospheres could be lethal. Personnel <u>must</u> notify Industrial Safety prior to entry.</p> <p>TLV is the maximum amount of a non-radioactive substance in the air to which it is believed that nearly all workers may be exposed day after day without adverse health effects.</p>
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X. LESSON BODY:**INSTRUCTOR NOTES**

B. Requirements for Wearing SCBA Equipment:	Objective 2
<ol style="list-style-type: none"> 1. Workers must have proper and up-to-date training. Proper training consists of Radworker Training (RWT010/RWT000), Radiological Respiratory Training (RRT010) and HPT063.002 courses. This training must be completed initially and updated annually. 2. Workers must have a current medical exam. The medical exam to use SCBA equipment consists of S-3 and S-4 clearances. These exams are completed initially and must be updated annually. These medical exams will determine if workers are physically capable of functioning while wearing SCBA equipment. 3. Workers must have a current respirator fit test. This is also an annual requirement. 4. Workers must have a current whole body count or other type of bioassay when wearing the SCBA for RADCON purposes. 5. Workers must be clean shaven and have corrective eyewear if required for both issue of a SCBA unit and mask fit. 	<p>Stress the importance of keeping all training and medical clearances up-to-date.</p> <p>Self-checking - STAR</p> <p>Workers should make sure prescription eyewear is available and that prescription is up-to-date. - Self-checking</p>
C. Capabilities and Limitations of the SCBA:	Objective 5
<ol style="list-style-type: none"> 1. Capabilities: <ol style="list-style-type: none"> a. Offers highest assigned protection factor against gases, vapors and particulates (PF = 10,000). b. An alarm will sound when air supply drops to ~1/4 of full bottle pressure (10-15 minutes on 60 minute tanks and ~5 minutes on 30 minute tanks). 2. Limitations: <ol style="list-style-type: none"> a. Heavy and bulky, which makes movement in small cramped areas difficult. 	<p>Your response is to exit the area immediately even though you may think you have time to finish the job.</p>

X. LESSON BODY:**INSTRUCTOR NOTES**

D. MSA SCBA Unit Overview:

1. Components:

a. Compressed air cylinder

- (1) Cylinders are aluminum and wrapped in fiberglass (composite). Weight ~35 pounds.

Objective 3

Objective 4

MSA SCBA Videotape
(optional)

- (2) A fully charged (green) cylinder contains approximately 4,000 – 4,500 psi of breathing air.



- (3) Cylinders are “rated” for 60 minutes. Some factors that can affect the time a cylinder will last are:

i. degree of physical activity

(INPO Network Item SER 35-98)

ii. physical condition of wearer

iii. condition of unit

iv. breathing rate

v. degree of training or experience

- b. Cylinder valve - must be turned all the way on when in use.

- c. Cylinder gauge - graduated in hundreds of psi (not minutes) and shows how much air is in cylinder at all times.

- d. Connecting nut - for use during cylinder change out. Hand tighten only. Should be inspected to check for deterioration during storage and that it is tight.

- e. “Audi-larm device” (Audio-alarm)

- (1) Rings when first opening cylinder - 0 to ~1100 psi.
(2) Rings again when air supply drops to ~1/4 of full bottle pressure and continues to ring until all air is exhausted. This indicates 10-15 minutes of air remaining in cylinder.

Wearer should be prepared to leave the area immediately when alarm sounds.

- f. High pressure hose - delivers air from the cylinder to the regulator. Inspect hose and connections to ensure all are tight and that the rubber has not deteriorated during storage.

X. LESSON BODY:**INSTRUCTOR NOTES**

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|--|--|
| <p>g. Regulator - reduces high pressure air from the cylinder. Consists of two valves:</p> <p>(1) The main-line valve is gold, round and knurled. It must be turned all the way on when in use. It allows a proper flow of air into the face mask. It must be turned off when unit is in storage.</p> <p>(2) The bypass valve is red, smooth, and hexagon shaped. It totally by-passes the regulator during a regulator failure and should be used only in an emergency. Never block the outlet when by-pass is open, as doing so can damage the regulator and violently eject the regulator cover.</p> <p>(3) Air enters the high pressure side of the regulator and is reduced to intermediate pressure. The low pressure stage reduces air pressure to approximately .63 psi. which maintains a low air pressure within the face mask that creates a positive pressure or outward leakage only.</p> | <p>Most units are equipped with the dual purpose regulator utilized primarily by Post Accident Sampling responders.</p> <p>Caution participants regarding the high air pressure entering the facepiece when the bypass valve is opened.</p> <p>Emphasize the different shapes of the regulator valves.</p> |
| <p>h. Breathing tube port - the breathing air tube from the respirator is attached here.</p> | |
| <p>i. Regulator gauge - is graduated in hundreds of psi and indicates remaining air in cylinder.</p> | <p>Indicates pressure when main-line valve is on.</p> |
| <p>j. Face mask -</p> <p>(1) Lens - polycarbonate, replaceable.</p> <p>(2) Strap assembly.</p> | <p>Inspect the face mask to ensure the rubber has not deteriorated during storage.</p> <p>Show the class the difference between a supplied air respirator and an SCBA respirator (exhalation valves are different).</p> <p>Self-checking</p> |
| <p>(3) Speaking diaphragm. (Some units may be equipped with the ESP communication system.)</p> <p>(4) Exhalation valve (spring loaded), allows air to exit, not enter the face mask.</p> | <p>The ESP communication device is intrinsically safe. The device should help ensure communication is clear, concise, and complete.</p> <p>Effective Communication</p> |
| <p>k. Harness assembly - consists of waist and shoulder straps made of nylon. It must fit snugly.</p> | |

X. LESSON BODY:**INSTRUCTOR NOTES**

2. Storage locations

- a. At WBN: El. 713 (5w/Comm) Comm devices are for UOs/Incident Commander; 10 w/Comm for Control Room are in Relay Room cabinet; El. 729, 6 units; El. 757, 6 units; Fire Engine, 5 units.
- b. At BFN: storage locations are specified in EPIP-12.
- c. At SQN: per RMD RP-01 units are staged throughout the plant ready for use.
- d. Identify storage locations for spare cylinders if different.

3. Donning and Inspection Procedure

- a. Verify security seal on case and open. Do not use if security seal is missing. Security seal indicates unit should be ready for use.
- b. Place apparatus on flat surface.
- c. Verify face mask has been inspected. Package should contain form indicating inspection.
- d. Wearer should inspect the face mask, hose and harness assembly.
- e. Check air pressure in cylinder. Do not use if less than full. (Greater than 4,200 psi)
- f. Check O-ring for condition and then connect high pressure hose to cylinder (if not already done). Hand tighten only. Inspect the hose for any deterioration during storage.
- g. Verify that both valves on the regulator are closed and open the cylinder (tank) valve. The bell should ring when the cylinder valve is opened.
- h. Place the palm of your hand over the regulator outlet to block any leakage and open the main-line valve (yellow knob). The pressure on the regulator gauge and cylinder gauge should read the same ($\pm 10\%$). If the difference is $>10\%$, remove the SCBA from service. Close the cylinder valve and allow 30 seconds to pass. A drop in regulator gauge pressure would indicate a leak in the regulator. If the drop is >100 psi, remove SCBA from service.

Use Two-minute Rule, Self-checking, and Stop When Unsure as error prevention tools.

Verify operation. If the alarm does not sound, the problem may be that pressure was left on the regulator by the last wearer. Close the cylinder valve and open the main-line valve, then repeat step g. If there is still no alarm, remove the unit from service.

X. LESSON BODY:**INSTRUCTOR NOTES**

- i. Loosen the grip on the regulator and slowly bleed off the pressure. The bell should sound when the pressure gauge on the regulator reaches approximately 1,000 psi. If the bell does not alarm during this check, do not use the SCBA.
- j. Close the main line valve and open the tank valve fully.
- k. Don the apparatus by one of the following methods:

- (1) Overhead method

- (a) Lift the cylinder by grasping it with both hands, making sure both hands and arms are through the shoulder straps.
- (b) Bend slightly forward and pass the apparatus over your head onto your back.
- (c) As you stand, tighten both shoulder straps at the same time.
- (d) Fasten the waist belt securely and snap the chest strap.

Safety -Ensure you do not injure yourself when taking the SCBA over your head.

- (2) Coat or vest method

- (a) Extend the shoulder straps.
- (b) Don the apparatus like a coat or vest.
- (c) Lean forward while tightening the shoulder straps.
- (d) Fasten the waist belt securely and snap the chest strap.

- l. Procedure for donning the face mask:

- (1) Connect the hose to the face mask, if not already done, and don the mask.
- (2) Check the face mask seal by placing your hand over the breathing tube opening and inhale slowly. Perform the negative pressure test for ten seconds. A bad seal will result in quicker loss of air. If this occurs, obtain another face mask.

X. LESSON BODY:**INSTRUCTOR NOTES**

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- (3) If the unit is equipped with the ESP Communications System:
- (a) Activate it by placing the switch on the user's left side in the ON (up) position. The lighted LED (Light Emitting Diode) indicates the unit is on. If the switch is activated while off the user's face, a high shrill noise may be heard. This should cease once the facepiece is donned.
- (b) High voice projection can be made by raising your voice as you would without the facepiece donned. In an extremely noisy environment, hold the switch in the PTT (Push To Talk) or down position. When released, the system will deactivate.
- (c) Deactivate the system before removing the respirator by placing the switch in the OFF (middle) position.
- (4) Connect the face mask air hose to the regulator as you open the main-line valve on the regulator. (Hand tighten only.)
- m. Periodically monitor the air pressure on the regulator gauge. This will allow you to keep up with your remaining air supply. Concentrate on controlled breathing. Practice the half-way rule. Do not proceed into an IDLH atmosphere beyond the point where the regulator pressure gauge indicates one-half of your air supply is remaining. You must keep enough air for your exit.
- n. Test the emergency by-pass valve by slightly opening it briefly. A rush of air should be felt during this test. The emergency by-pass valve should only be used in an emergency situation. Workers should exit the area immediately as the air supply will be depleted rapidly.
- A 9-volt battery provides power. The LED will blink when the battery needs to be replaced. If the battery is installed incorrectly, the LED will not light when the unit is turned on.
- This device does not constitute an explosive triggering hazard, and its use is allowed in explosive atmospheres.

X. LESSON BODY:**INSTRUCTOR NOTES**

4. Emergency procedures: leave the hazardous area when any of the following occurs

Questioning Attitude
Peer Checking

a. Equipment Malfunction

(1) Regulator fails to deliver air

- (a) If this occurs, you should open the bypass valve slowly. This will give you a constant flow of air directly from the cylinder through a separate bypass port in the outlet of the regulator.
- (b) Push in the release and close the main-line valve (clockwise) to prevent air leakage through damaged parts.
- (c) Adjust the bypass valve for a controlled air flow from the cylinder to the facepiece.
- (d) Exit the area and return to fresh air immediately. Your air supply is greatly reduced in such an emergency.

Use extreme caution when opening the bypass valve.

b. Damage to the Breathing Tube

- (1) Use the hand-over-hand procedure to check for leaks.
- (2) Once a leak is discovered, keep your hand over the opening to reduce the loss of air while exiting.

c. Depletion of Breathing Air

- (1) Remove the breathing tube from the regulator.
- (2) Place the breathing tube inside your clothing.
- (3) Exit area immediately.

Stop When Unsure - A user should secure the work and leave the area when the bell sounds even though they may think they have enough time to finish the job.

d. Communication problems occur.

e. Physical problems occur with any team member.

f. Work conditions change.

NOTE: Do not remove the face mask. However, if any condition develops which may jeopardize your safety, and you are not in an IDLH atmosphere, remove the respirator if necessary and leave the area immediately (example: possible aspiration as a result of nausea. If experiencing nausea while in an IDLH atmosphere, lift the mask long enough to empty the contents and exit the area).

Conservative Decision
Making

You should leave the area as soon as you feel nauseous in order to prevent vomiting into the mask.

X. LESSON BODY:**INSTRUCTOR NOTES**

5. Removal Procedure:

- a. Exit the hazardous area.
- b. Disconnect the face mask air hose from the regulator as you close the main-line valve on the regulator. Do not try to force the mainline valve closed without pushing in button (if equipped with locking device). This can cause equipment damage and render the SCBA regulator inoperative.
- c. Deactivate the ESP Communications System, if equipped and then remove the face mask.
- d. Unbuckle the waist strap and loosen the harness straps.
- e. Remove the SCBA one shoulder strap at a time (like a jacket).
- f. Turn off the cylinder valve.
- g. Bleed the remaining pressure in the high pressure hose by slowly opening the main-line valve.
- h. Close the main-line valve.
- i. Return the unit to proper it's location for reuse or follow RADCON instructions.

Bag the face mask separately and return it to RADCON, if instructed to do so.

Do not try to remove the SCBA over the head.

6. Changing Cylinders:

- a. One person procedure
 - (1) Exit the hazardous area and remove the unit.
 - (2) Close the cylinder valve.
 - (3) Bleed the remaining pressure in the high pressure hose by slowly opening the main-line valve.
 - (4) Close the main-line valve.
 - (5) Place the unit on the ground with the cylinder valve pointing away from the wearer.
 - (6) Disconnect the high pressure hose from the cylinder.
 - (7) Lift and turn the latch wing to loosen the cylinder band and remove the used cylinder.

As a minimum either demonstrate a cylinder change out or have a participant demonstrate a cylinder change out.

X. LESSON BODY:**INSTRUCTOR NOTES**

- (8) Place a full cylinder on the harness assembly and refasten the cylinder lock.
- (9) Re-attach the high pressure hose to the full cylinder.
- (10) Open the cylinder valve fully.
- (11) Open main-line valve on the regulator as you reconnect the breathing tube to the regulator.

b. Two person procedure

Peer Checking

- (1) Exit the hazardous area.
- (2) The wearer loosens the breathing tube hand nut but does not remove the breathing tube from the regulator.
- (3) The assistant unlocks the cylinder lock and closes the cylinder valve.
- (4) The wearer breathes until the air supply is exhausted then:
 - (a) Removes the breathing tube from the regulator while closing the main-line valve.
 - (b) Releases his waist belt and leans forward with his hands on his knees.
- (5) The assistant will:
 - (a) Disconnect the high pressure hose from the cylinder.
 - (b) Unlatch the cylinder lock and remove the used cylinder, upward and out of cylinder band.
 - (c) Slide a full cylinder in the cylinder band from above and refasten the cylinder lock.
 - (d) Hand tighten the high pressure hose to the full cylinder.
 - (e) Open the cylinder valve fully.
- (6) The wearer will stand and refasten the waist belt. He can then place the unit in operation by attaching the breathing tube to the regulator while opening the main-line valve.

Verify alarm bell ring.

X. LESSON BODY:**INSTRUCTOR NOTES**

- E. Toxic Environment Cylinder Change (for Unit Operators, Unit Supervisors, and Shift Managers ONLY)
1. Set up when a long duration task is forecast.
 2. Uses extra regulator and cylinders (spare kit).
 3. Procedure
 - a. Both persons move to the spare kit.
 - b. Each used cylinder is checked to determine the lowest pressure. The lowest pressure cylinder is changed first.
 - c. The person with the lowest pressure is stationed where he/she can hook up to the spare kit.
 - d. The person with the lowest pressure ensures that the spare kit is serviceable and disconnects it from his/her regulator and connects to the spare kit regulator.
 - e. The changer may assist the person with lowest pressure by providing light on the spare kit and/or holding the spare kit regulator in a position where the connection is easier and quicker.
 - f. It may be of benefit to the person with the lowest pressure to leave his/her air supply slightly escaping during this change. This would allow a quicker reconnection if needed.
 - g. It is suggested that the person with the lowest pressure establish air supply from the spare kit regulator prior to tightening the connection on the tube to the spare kit regulator.
 - h. With the air supply established, the changer may begin his/her operation.
 - i. The changer moves to the cylinder of the person with the lowest pressure and isolates the valve.
 - j. The changer requests the person with the lowest pressure to bleed off the pressure through the regulator.
 - k. The changer may ask for the person with the lowest pressure to assume an "ALL FOURS" position for easier access to the cylinder valve.

Objective 4.f

As a minimum have two participants demonstrate the method for changing cylinders while in a toxic environment.

Three-way Communication

X. LESSON BODY:**INSTRUCTOR NOTES**

- l. The changer loosens and removes the low cylinder and replaces it with a full cylinder.
- m. The changer fastens the cylinder strap and checks to ensure that the regulator valves are isolated on the person that had the lowest pressure.
- n. The changer then opens the cylinder valve and the person that had the lowest pressure is ready to connect his/her own air supply.
- o. Once the person who originally had the lowest pressure has connected back to his/her own air supply, the procedure can be repeated for the other person.

X. LESSON BODY:**INSTRUCTOR NOTES**

F. Practical Exercise:

Objective 6

1. Each student must perform a practical exercise utilizing the SCBA Practical Factors Checklist.
2. Students exhibiting undue distress while wearing a SCBA are to be referred to Medical for further evaluation. Referral may be by the instructor, or student's supervisor (Form TVA 1444 may be used).

Use Appendix 1 as a guide for the practical exercise.

Discuss Appendices 2 & 3 if not previously discussed during presentation.

XI. SUMMARY:

Students in this course have demonstrated or discussed the purpose and characteristics of the SCBA to include:

PER SQ94-0073

Remind students that SCBAs are used for emergency response purposes or when granted permission from the Fire Protection Section. Fire Protection must maintain a minimum number of units available for use at any given time.

- A. Requirements that workers must meet
- B. Components
- C. Donning Procedure and Use
- D. Emergency Procedures
- E. Changing Cylinders
- F. Removal Procedure
- G. Capabilities and Limitations

In conclusion, personnel assigned duties which could require the use of a SCBA must be familiar with its operation; there is no room for error when entering an atmosphere that is immediately dangerous to life or health. Through proper training, rigorous use of error prevention tools and techniques, and cooperation of the workers involved, the errors associated with the operation and use of the apparatus can be corrected.

SCBA
PRACTICAL FACTORS
CHECKLIST

HPT063.002
Revision 7
Appendix 1
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Utilize Two-minute Rule, Self-Checking, and Stop When Unsure when performing these steps.

1. Inspection of SCBA
 - a. Face mask and hose
 - b. Air supply in cylinder
 - c. All valves are closed
 - d. Air supply in the cylinder and regulator gauge are the same
 - e. Harness assembly
2. Donning of SCBA
 - a. Assembly of apparatus
 - b. Shoulder straps and waist belt tightened properly
 - c. Cylinder valve open
3. Donning of face mask
 - a. Verify proper face mask seal
 - b. Connect breathing hose to regulator
4. Normal operation of SCBA
 - a. Mainline valve open
 - b. Practices "controlled breathing"
 - c. Monitors air pressure on regulator
5. Respond properly to simulated problems such as:
 - a. Regulator failure
 - b. Tear in breathing hose
 - c. Depletion of air supply
 - d. "Audi-alarm" sounds
 - e. Use of bypass valve
6. Removal of face mask
 - a. Bend slightly forward
 - b. Place hands behind speaking diaphragm
 - c. Push face mask out and away from face
7. Performance during practical exercise
 - a. Face mask not removed during exercise
 - b. Trainee should be able to perform the following activities while wearing a SCBA:
 - (1) Walking, crawling, or standing for prolong periods.
 - (2) Climbing stairways and/or ladders (2-3 flights).

Trainees having undue distress while wearing a SCBA are to be referred back to Medical for further evaluation. Referral may be by the instructor, or the trainee's supervisor. Form TVA 1444 may be used.

INPO NETWORK ITEM
SER 35-88

UNIT (TYPE): CALVERT CLIFFS (PWR)
DOC NO/LER NO: 50-317/NA
EVENT DATE: 09/15/88
NSSS/AE: COMBUSTION ENGINEERING BECHTEL
REFERENCE: INPO GOOD PRACTICE 0A-101, October 1983,
"Safe Work Procedures for Enclosed Volumes"

SUMMARY:

During maintenance on a nitrogen blanketed condensate storage tank, a diver entered the tank without donning his scuba equipment. The diver lost consciousness and fell from an internal ladder into the water. The backup diver who entered the tank to assist the diver also lost consciousness. The diver was pulled to safety by his tether line. The backup diver, who was not wearing a tether line or scuba equipment, drowned. This event is significant because failure to follow standard work practices and controls for entering a hazardous work area and to make adequate rescue preparations contributed to premature initiation of work and a fatality.

SUMMARY

Purpose:

This information notice was provided to alert addresses to potential problems with worn or distorted hose clamps on SCBAs. A Department of Health and Human Services "NIOSH Respirator User's Notice" described two events in which retraining clamps on the breathing tube of a SCBA failed, causing the tube to separate from the facepiece.

Event No. 1:

A firefighter was killed during a training fire in an abandoned building. The retaining clamp which secured the low pressure breathing tube to the facepiece assembly had opened, allowing the breathing tube to separate from the facepiece of his SCBA. The clamp at the facepiece end of the breathing tube was found to be distorted and worn.

Event No. 2:

A firefighter suffered injury as a result of a separation of the breathing tube from his facepiece because of a clamp failure. NIOSH has been advised that in this incident, there may have been use of an unapproved clamp at that point.

Discussion:

Hose clamp failures on SCBAs can result in serious personnel safety hazards. In order to help prevent these failures, it is important that personnel pay particular attention while performing maintenance on the SCBAs. It is important that maintenance personnel perform careful visual inspections of hose clamps to identify worn or deformed ones and, when replacing these defective clamps, adhere strictly to the manufacturer's instructions. Care when disassembling or reassembling breathing tube clamps will also minimize failures.