

# PPE CASE



## Personal Protective Equipment Conformity Assessment Studies and Evaluations

### Evaluation of Three Self-Contained Breathing Apparatus Involved in a Near Miss While Operating at a Structure Fire

The National Institute for Occupational Safety and Health (NIOSH) conducts the [Fire Fighter Fatality Investigation and Prevention Program](#). In support of this Program, NIOSH's National Personal Protective Technology Laboratory (NPPTL) inspects and evaluates the self-contained breathing apparatus (SCBA) used by a firefighter or firefighters during a fatality or a serious injury.

*This report provides a summary of NPPTL's inspection and evaluation methods, as well as findings, for three SCBAs used by firefighters. Three firefighters became trapped during a serious injury incident of a rapid-fire progression. The NIOSH Division of Safety Research requested this evaluation to verify that the SCBAs were configured in an approved manner and functioning as intended, ensuring they did not contribute to firefighters becoming trapped. The SCBAs were Scott® Safety Air-Pak Model 4.5, 45-minute, 4500 psi units.*

NIOSH received three SCBA units used by firefighters involved in a serious injury. The SCBAs were not found to contribute to the incident.

A qualified service technician must inspect, repair, test, clean, and replace damaged components of any SCBA involved in an incident before it may be returned to service.

### What NIOSH Did to Protect the Worker

After receiving SCBAs (A, B, and C) used by firefighters, NPPTL managed the custody of evidence throughout the inspection and evaluation process at its Pittsburgh, Pennsylvania, facility. Staff conducted a thorough inspection of all SCBA components, documenting their findings with written and photographic evidence. NPPTL also tested two of the SCBAs to determine conformance to NIOSH approval requirements as outline in [Title 42, Code of Federal Regulations, Part 84 \(42 CFR 84\)](#). The initial investigation determined that the SCBA units did not contribute to the incident. If the inspection or evaluation data indicated that the SCBA units may have contributed to the incident, NPPTL would have engaged in corrective action to prevent similar incidents for other users. In this case, no such corrective action was necessary. Following the evaluation, NPPTL managed the disposition of the SCBAs.

## Chain of Custody

The initial investigation determined that the SCBA units did not contribute to the incident. If the inspection or evaluation data indicated that the SCBA units may have contributed to the incident, NPPTL would have engaged in corrective action to prevent similar incidents for other users. In this case, no such corrective action was necessary. Following the evaluation, NPPTL managed the disposition of the SCBAs

## SCBA Inspection

On July 2, 2025, NPPTL staff met with representatives from 3M Scott® and the International Association of Fire Fighters to determine if the SCBAs were in an approved configuration. On July 29, 2025, NPPTL employees conducted an inspection of the units. The SCBAs were identified as belonging to the Houston Fire Department and were visually examined, component by component, in their received condition to document both their state and the individual elements of the NIOSH Approved® configuration. They were identified as the Scott® Safety Air-Pak Model 4.5, 45-minute, 4500 psi unit, NIOSH approval number TC-13F-76CBRN

## As Received

- SCBA A, SCBA B, and SCBA C were received.
- All three SCBAs exhibited visible signs of extensive heat damage.
- The cylinders had air in them and were closed.
- SCBA B and SCBA C did not have a facepiece.
- The mask-mounted regulator was missing its cover and was found melted to the facepiece of SCBA A.
- The bypass was open on all three SCBAs.



**Figure 1: SCBAs as received**

## Components and Observations for SCBA

- When reviewing the components and observations below, note the following definitions:
- “Right” or “left” are from the user’s perspective
- “Good” means functional and may show signs of dirt/soot
- “Fair” means functional, but with signs of some damage
- “Bad” means not functional, needs to be inspected by technician to possibly replace part(s)

### SCBA A

#### Facepiece AV 3000 (Figures 3, 4)

- Facepiece seal P/N: 31001740 B; Large; MFG date: 10/2022
- Nosecup P/N: 201128; Size: Large; MFG date: 2nd Quarter 2022
- Retaining ring: not readable bottom: 31002810; Large; MFG date: 10/2022; top: 31002809; Large; MFG 09/2023
- Facepiece assembly 8053713/-33/-36/-39; Large
- Lens information was not readable. Lens was crazed.
- No cracks in facepiece retaining ring.
- Overall condition was bad, extreme heat damage.
- Hairnet (size: M/L) was sooty but good, straps moved freely held in place, held securely to facepiece. Hairnet had stitched in hole that looked fabricated (ponytail).
- Attachment points for straps were good.
- The facepiece seal was in good condition.
- Regulator interface area was melted to the mask-mounted regulator.
- Voice amplifier present.

#### Mask-Mounted Regulator (Figures 5, 6)

- E-Z Flow with Vibralert and with Heads-Up Display (HUD)
- Regulator assembly S/N: 115R0000423905
- Other markings; A3Q10
- Overall condition was bad.
- Missing the outside cover and melted to the facepiece.
- Donning switch was non-operational due to fire damage.
- Bypass found open, bypass knob was melted.
- HUD rubber housing was melted and cracked.

#### Low Pressure Regulator Hose (Figures 7, 8)

- P/N: N/A
- Overall condition was bad, showing signs of extensive heat damage.
- Had a functional Quick Disconnect.

#### Pressure Reducer Assembly (Figures 9, 10)

- P/N: was unreadable; S/N: 1724031108
- MFG date: N/A
- Overall condition was bad, very sooty.
- All airline connections were secure with signs of heat damage to the low-pressure hose.

## SCBA A (cont.)

### High Pressure Hose and Cylinder Attachment

(Figures 11, 12)

- Overall condition was bad with soot.
- Cylinder attachments threads good and "O" ring in place
- RIC/UAC system connector markings: Parker RCX-NH-0523FD
- RIC/UAC system connector cover heavily charred and brittle.
- RIC/UIC connector was extremely difficult to remove.
- Marking on hose crimp: 5500P318

### PASS Console Assembly (Figures 13, 14)

- Labels burned and unreadable. Overall condition was bad, severely burned and sooty.
- Lines—pressure/electrical—insulation burned through on electrical lines; pressure lines were fair.
- Gauge lens was melted.
- No protective casing; had rubber attachment.

### PASS Control Module with PAK-Alert

(Figures 15, 16)

- PAK-Alert SE7 Pass Device present but not readable.
- All labels and manufacturer information were unreadable due to extensive fire and heat damage.
- Overall condition was bad with heavy fire damage.
- Held securely to backframe.
- Wire connection connected to PASS device.
- Wire held secure to backframe and ran to console assembly.

### Backframe Assembly (Figures 17, 18)

- P/N: N/A; S/N: N/A
- SEI label was present; 2013 Edition NFPA

1981.

- NIOSH Approval Number: TC-13F0705-CBRN
- NIOSH white/black CBRN approval sticker.
- Overall condition was bad and dirty.
- Shoulder straps were attached to the frame but heavily coated in soot.
- Cylinder strap latch was in decent condition with soot, functional.

### Straps and Buckles (Figure 19)

- Overall strap condition was bad with heavy charring.
- Both shoulder straps were attached at the top of the backframe.
- Hose lines and wires passed through shoulder straps.
- All adjustable buckles moved and held in place.
- Waist area buckle was latched and released.
- Lumbar strap in fair condition but sooty.

### Compressed Air Cylinder and Cylinder Valve Assembly (Figures 20 - 22)

- Minute Duration: 45 minutes
- DOT –Number: DOT-SP-10915-4500
- TC-3CCM-310
- Scott logo visible
- Manufacture date: 07/2022 4500 PSIG
- Overall condition was bad with heavy charring and sooty.
- Gauge was unreadable and completely melted.
- Threads were clean.
- As received, cylinder valve was fully closed with air remaining.
- Rubber bumper at base on cylinder valve was melted.

## SCBA B

### Facepiece

- Facepiece was not included.

### Mask-Mounted Regulator (Figure 23, 24)

- E-Z Flow with Vibralert and with Heads-Up Display (HUD).
- Other markings; Scribed 1723029742.
- Overall condition was bad, signs of melting and heavy charring.
- Outer case was sooty and front label was unreadable.
- Donning switch was on.
- Bypass found open; bypass knob was melted.
- Sealing area was dirty.
- Regulator could be attached and removed.
- Locking assembly functioned.
- HUD fully intact.

### Low Pressure Regulator Hose (Figures 25, 26)

- P/N: N/A
- Overall condition was bad, with severe heat damage to the outer sheath material.
- Quick Disconnect melted but functional.

### Pressure Reducer Assembly (Figures 27, 28)

- S/N: 1724017653
- MFG date was not readable.
- Overall condition was sooty and bad.
- All airline connections were secure with signs of heat damage to the low-pressure hose.

### High Pressure Hose and Cylinder Attachment (Figures 29 - 31)

- Overall condition was bad and extremely sooty.
- Cylinder attachment threads were good, and "O" ring was in place.
- RIC/UAC system connector markings: Parker RGX-N-05 03CE
- RIC/UAC system connector cover charred in condition.
- RIC/UIC connector was difficult to remove.
- Marking on hose crimp: 306P

### PASS Console Assembly (Figures 32, 33)

- Scott label and all labels burned off.
- Overall condition was bad with signs of melting and soot.
- Lines were fair and sooty—pressure/ electrical.
- Gauge lens was fair and readable.
- No protective casing, had rubber attachment

### PASS Control Module with PAK-Alert (Figures 34, 35)

- PAK-Alert SE7 Pass Device present but not readable.
- All labels and manufacturer information were unreadable due to extensive fire and heat damage.
- Overall condition was bad with heavy fire damage.
- Held securely to backframe.
- Wire connection connected to PASS device.
- Wire held secure to backframe and ran to console assembly.

## SCBA B (cont.)

### Backframe Assembly (Figures 36, 37)

- P/N: 804172-09; S/N: 000000100007
- SEI label was present. 2013 Edition NFPA 1981.
- NIOSH Approval Number: TC-13F0705-CBRN
- Fire Tech and Safety flow test date sticker: not there.
- NIOSH white/black CBRN approval sticker.
- Overall condition was bad, broken wire in frame
- Shoulder straps were attached to the frame but coated with heavy soot.
- Cylinder strap latch was in good condition, and functional.

### Straps and Buckles (Figure 38)

- Overall strap condition was heavily charred.
- Both shoulder straps were attached at the top of the backframe.
- Hose lines and wires passed through shoulder straps.
- All adjustable buckles moved and held in place, except the lumbar buckle.
- Waist area buckle did not latch.
- Lumbar strap in fair condition but sooty.
- Waist area buckle was latched and released.

### Compressed Air Cylinder

#### and Cylinder Valve Assembly (Figures 39 - 41)

- Minute Duration: 45 minute
- DOT: SP109154500
- REE106
- Scott logo visible.
- Other markings: IL1013803
- Manufacture date: 06/2020 4500 PSIG
- Overall condition was bad, as there was heat damage to the exterior of the cylinder.
- Gauge was melted and only partially readable.
- Threads were sooty.
- As received, cylinder valve was fully closed with air remaining.
- Rubber bumper at base on cylinder valve was in bad condition, melted.
- Distinguishing markings were not readable or missing.

## SCBA C

### Facepiece

- Facepiece was not included.

### Mask-Mounted Regulator (Figures 42, 43)

- E-Z Flow with Vibralert and with Heads-Up Display (HUD)
- Other markings; Scribed 1724003327
- Overall condition was bad, signs of melting and heavy charring.
- Outer case was sooty and front label was unreadable.
- Donning switch was on and cracked and ripped.
- Bypass found open; bypass knob was melted.
- Sealing area fair, with one tear.
- Regulator could be attached and removed.
- Locking assembly functioned.
- HUD fully intact with tears in rubber housing.

### Low Pressure Regulator Hose (Figures 44, 45)

- P/N: N/A
- Overall condition was bad, with severe heat damage to the outer sheath material.
- Quick Disconnect was melted but functional.

### Pressure Reducer Assembly (Figures 46, 47)

- P/N and S/N labels burned off.
- MFG date was not readable.
- Overall condition was bad and sooty.
- All airline connections were secure with signs of heat damage to the low-pressure hose.
- S/N (1724031136) was scribed on the pressure reducer assembly.

### High Pressure Hose and Cylinder Attachment (Figures 48, 49)

- Overall condition was bad and extremely sooty.
- Cylinder attachment threads were good, and "O" ring was in place.
- RIC/UAC system connector markings: Parker RGX-N-05 03CE.
- RIC/UAC system connector cover was heavily charred.
- RIC/UIC connector was extremely difficult to remove.

### PASS Console Assembly (Figures 50, 51)

- All labels burned off.
- Overall condition was bad with signs of melting and soot.
- Lines were fair and sooty—pressure/electrical.
- Gauge lens was fair and readable.
- No protective casing, had rubber attachment

### PASS Control Module with PAK-Alert (Figures 52, 53)

- PAK-Alert SE7 Pass Device present but not readable.
- All labels and manufacturer information were unreadable due to high fire and heat damage.
- Overall condition was bad with heavy fire damage.
- Held securely to backframe.
- Wire connection connected to PASS device.
- Wire held secure to backframe and ran to console assembly.

## SCBA C (cont.)

### Backframe Assembly (Figures 54, 55)

- P/N: N/A; S/N: N/A
- SEI label was present. 2013 Edition NFPA 1981.
- NIOSH Approval Number: TC-13F0705-CBRN
- Fire Tech and Safety flow test date sticker: not there.
- NIOSH white/black CBRN approval sticker.
- Overall condition was good, but very sooty.
- Shoulder straps were attached to the frame but coated with heavy soot.
- Cylinder strap latch was non-functional with the strap intact but the buckle melted.

### Straps and Buckles (Figure 56)

- Overall strap condition was bad and heavily charred.
- Both shoulder straps were attached at the top of the backframe.
- Hose lines and wires passed through shoulder straps.
- All adjustable buckles moved and held in place, except the lumbar buckle.
- Waist area buckle did not latch.
- Lumbar strap in fair condition but sooty.

### Compressed Air Cylinder and Cylinder Valve Assembly (Figures 57 - 59)

- Minute Duration: 45 minute
- Scott logo visible, but the label was not readable.
- Other markings visible: 4500 PSIG
- Overall condition was bad; there were clear signs of burnout of the fiber resin causing the fraying of the cylinder.
- Gauge was not readable.
- Threads were sooty.
- As received, cylinder valve was fully closed with air remaining.
- Rubber bumper at base on cylinder valve is in bad condition, melted.
- Distinguishing markings were not readable or missing.

The SCBAs were tested using NIOSH test methods. A description of each method and the associated test results are provided in Tables 1 and 2 for SCBAs B and C, respectively.

SCBA A was not functional due to the missing cover on the mask-mounted regulator; therefore, it could not be tested.

**Table 1. Summary of results from testing SCBA B.**

NIOSH Tests	Description of Results	PASS/FAIL
<p><b>Positive Pressure Test - NIOSH Test Procedure Number 120 42 CFR Part 84 Reference: Subpart H, § 84.70 (a) (2)(ii)</b></p> <p><b>Requirement:</b> The pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation.</p> <p><b>Procedure:</b> A breathing machine with a 622 kg.-m./min. cam operating at 24 RPM with a 40 L/min. flow rate (115 L/min. peak flow) is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for determining the pressure in the facepiece.</p>	<p>The SCBA met the test requirement. The inhalation breathing resistance did not become negative during the test. *The PASS unit functioned, the digital remote functioned and there was a HUD.</p> <p><b>Inhalation Breathing Resistance: (in. of water column) = 0.67</b></p> <p>After test, red light in HUD remained on.</p>	<p><b>PASS</b></p>

NIOSH Tests	Description of Results	PASS/FAIL
<p><b>Rated Service Time Test - NIOSH Test Procedure Number 121 42 CFR Part 84 Reference: Subpart F, § 84.53 (a) and Subpart H, § 84.95 (a) and (b)</b></p> <p><b>Requirement:</b> Service time will be measured while the apparatus is operated by a breathing machine as described in § 84.88. The open-circuit apparatus will be classified according to the length of time it supplies air or oxygen to the breathing machine. Classifications are listed in § 84.53.</p> <p><b>Procedure:</b> A breathing machine with a 622 kg.-m./min. cam operating at 24 RPM with a 40 L/min. flow rate is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for determining the pressure in the facepiece. The breathing machine is run until the inhalation portion of the breathing curve falls below the minimum requirement.</p>	<p>The SCBA met the test requirement. The measured service time (adjusted to correspond with the recorded breathing cycles) was more than the rated service time of 45 minutes. The PASS unit functioned during the test. The SCBA did not go negative on inhalation; therefore, positive pressure was maintained in the facepiece.</p> <p><b>Measured Service Time: 47 Minutes 23 Seconds</b></p>	<p><b>PASS</b></p>
<p><b>Static Pressure Test - NIOSH Test Procedure Number 122 42 CFR Part 84 Reference: Subpart H, § 84.91 (d)</b></p> <p><b>Requirement:</b> The static pressure (at zero flow) in the facepiece shall not exceed 38 mm. (1.5 in.) water-column height.</p> <p><b>Procedure:</b> The facepiece is fitted to an anthropometric head for testing. A pressure tap in the head is connected to a calibrated manometer. Full cylinder pressure is applied to the SCBA at zero flow and a reading from the manometer is recorded.</p>	<p>The SCBA did not meet the test requirement.</p> <p><b>Facepiece Static Pressure: (in. of water column) = 1.84</b></p>	<p><b>FAIL</b></p>

NIOSH Tests	Description of Results	PASS/FAIL
<p><b>Gas Flow Test - NIOSH Test Procedure Number 123 42 CFR Part 84 Reference: Subpart H, § 84.93 (b) and (c)</b></p> <p><b>Requirement:</b> The flow from the apparatus shall be greater than 200 L/min. when the pressure in the facepiece of demand apparatus is lowered by 51 mm. (2 in.) water column height when full container pressure is applied. Where pressure-demand apparatus are tested, the flow will be measured at zero gage pressure in the facepiece.</p> <p><b>Procedure:</b> A pressure tap in the anthropometric head is connected to a manometer for determining when the pressure inside the facepiece is at zero. A mass flow meter is connected in line between the anthropometric head and an adjustable vacuum source to measure flow. The SCBA cylinder is replaced by a test stand which is adjusted initially to full cylinder pressure. The vacuum source is adjusted during the test to maintain the desired pressure inside the facepiece. Once the proper facepiece pressure has stabilized, a flow reading is recorded. The procedure is then repeated with the test stand adjusted to 500 psig.</p>	<p><b>The SCBA met the test requirement.</b></p> <p><b>Applied Pressure</b> <b>Air Flow (liters per min.)</b></p> <p><b>4500 psig.....410.6</b></p> <p><b>500 psig.....410.6</b></p>	<p><b>PASS</b></p> <p><b>PASS</b></p>

NIOSH Tests	Description of Results	PASS/FAIL
<p><b>Exhalation Resistance Test - NIOSH Test Procedure Number 122 42 CFR Part 84 Reference: Subpart H, § 84.91 (c)</b></p> <p><b>Requirement:</b> The exhalation resistance of pressure-demand apparatus shall not exceed the static pressure in the facepiece by more than 51 mm. (2 in.) water-column height.</p> <p><b>Procedure:</b> The facepiece is mounted on an anthropometric headform. A probe in the headform is connected to a slant manometer for measuring exhalation breathing resistance. The air flow through the apparatus is adjusted to a rate of 85 L/min and the exhalation resistance is recorded</p>	<p>The SCBA did not meet the test requirement.</p> <p><b>Exhalation Breathing Resistance: (in. of water column) = 2.07</b></p> <p><b>Static Pressure: (in. of water column) = 1.84</b></p> <p><b>Difference: (in. of water column) = 0.23</b></p>	<p><b>FAIL</b></p>

NIOSH Tests	Description of Results	PASS/FAIL																								
<p><b>Remaining Service Life Indicator Test - NIOSH Test Procedure Number 124 42 CFR Part 84 Reference: Subpart H, § 84.83 (f) and Subpart G, § 84.63 (c) Requirement:</b></p> <p>Each remaining service-life indicator or warning device must give an alarm when the remaining service life is reduced to a minimum of 25 percent of its rated service time, or any higher minimum percent value or values as specified in the approval. Open-circuit demand and pressure-demand respirators must alarm continuously until depletion of the breathing air supply. The percent value set for indicator activation must be identified by labels and/or markings on each respirator unit.</p> <p><b>Procedure:</b></p> <p>A calibrated gauge is connected in line between the air supply and the first-stage regulator. The unit is then allowed to gradually bleed down. When the low-air alarm is activated, the pressure on the gauge is recorded. This procedure is repeated six times. The average of the six readings is calculated and recorded.</p>	<p>The values specified in the approval are 33% (1485 psi) - 31% (1395 psi) of its 4500 psi remaining rated service time.</p> <table border="1" data-bbox="690 394 1266 913"> <thead> <tr> <th data-bbox="690 436 803 472">Run #</th> <th data-bbox="820 401 1031 472">Electric Alarm Point (psi)</th> <th data-bbox="1047 401 1258 472">Vibralert Alarm Point (psi)</th> </tr> </thead> <tbody> <tr> <td data-bbox="690 499 803 535">1.</td> <td data-bbox="820 499 1031 535">1592</td> <td data-bbox="1047 499 1258 535">1555</td> </tr> <tr> <td data-bbox="690 562 803 598">2.</td> <td data-bbox="820 562 1031 598">1583</td> <td data-bbox="1047 562 1258 598">1568</td> </tr> <tr> <td data-bbox="690 625 803 661">3.</td> <td data-bbox="820 625 1031 661">1621</td> <td data-bbox="1047 625 1258 661">1562</td> </tr> <tr> <td data-bbox="690 688 803 724">4.</td> <td data-bbox="820 688 1031 724">1635</td> <td data-bbox="1047 688 1258 724">1568</td> </tr> <tr> <td data-bbox="690 751 803 787">5.</td> <td data-bbox="820 751 1031 787">1620</td> <td data-bbox="1047 751 1258 787">1556</td> </tr> <tr> <td data-bbox="690 814 803 850">6.</td> <td data-bbox="820 814 1031 850">1616</td> <td data-bbox="1047 814 1258 850">1562</td> </tr> <tr> <td data-bbox="690 877 803 913"><b>Average</b></td> <td data-bbox="820 877 1031 913"><b>1611</b></td> <td data-bbox="1047 877 1258 913"><b>1562</b></td> </tr> </tbody> </table>	Run #	Electric Alarm Point (psi)	Vibralert Alarm Point (psi)	1.	1592	1555	2.	1583	1568	3.	1621	1562	4.	1635	1568	5.	1620	1556	6.	1616	1562	<b>Average</b>	<b>1611</b>	<b>1562</b>	<p><b>FAIL</b></p> <p><b>FAIL</b></p>
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**Table 2. Summary of results from testing SCBA C.**

NIOSH Tests	Description of Results	PASS/FAIL
<p><b>Positive Pressure Test - NIOSH Test Procedure Number 120 42 CFR Part 84 Reference: Subpart H, § 84.70 (a) (2)(ii)</b></p> <p><b>Requirement:</b> The pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation.</p> <p><b>Procedure:</b> A breathing machine with a 622 kg.-m./min. cam operating at 24 RPM with a 40 L/min. flow rate (115 L/min. peak flow) is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for determining the pressure in the facepiece.</p>	<p>The unit met the test requirement. The inhalation breathing resistance did not become negative during the test. *The PASS unit functioned, the digital remote functioned and there was a HUD.</p> <p><b>Inhalation Breathing Resistance: (in of water column) = 0.74</b></p>	<p><b>PASS</b></p>

NIOSH Tests	Description of Results	PASS/FAIL
<p><b>Rated Service Time Test - NIOSH Test Procedure Number 121 42 CFR Part 84 Reference: Subpart F, § 84.53 (a) and Subpart H, § 84.95 (a) and (b)</b></p> <p><b>Requirement:</b> Service time will be measured while the apparatus is operated by a breathing machine as described in § 84.88. The open-circuit apparatus will be classified according to the length of time it supplies air or oxygen to the breathing machine. Classifications are listed in § 84.53.</p> <p><b>Procedure:</b> A breathing machine with a 622 kg.-m./min. cam operating at 24 RPM with a 40 L/min. flow rate is connected to an anthropometric head for cycling. A pressure tap in the head is connected to a transducer which in turn is connected to a strip chart recorder for determining the pressure in the facepiece. The breathing machine is run until the inhalation portion of the breathing curve falls below the minimum requirement.</p>	<p>The SCBA did not meet the test requirement. The measured service time (adjusted to correspond with the recorded breathing cycles) was less than the rated service time of 45 minutes. The PASS unit functioned during the test. The SCBA did not go negative on inhalation; therefore, positive pressure was maintained in the facepiece.</p> <p><b>Measured Service Time: 43 Minutes 14 Seconds</b></p>	<p><b>FAIL</b></p>
<p><b>Static Pressure Test - NIOSH Test Procedure Number 122 42 CFR Part 84 Reference: Subpart H, § 84.91 (d)</b></p> <p><b>Requirement:</b> The static pressure (at zero flow) in the facepiece shall not exceed 38 mm. (1.5 in.) water-column height.</p> <p><b>Procedure:</b> The facepiece is fitted to an anthropometric head for testing. A pressure tap in the head is connected to a calibrated manometer. Full cylinder pressure is applied to the unit at zero flow and a reading from the manometer is recorded.</p>	<p>The SCBA met the test requirement.</p> <p><b>Facepiece Static Pressure: (in. of water column) = 0.95</b></p>	<p><b>PASS</b></p>

NIOSH Tests	Description of Results	PASS/FAIL						
<p><b>Gas Flow Test - NIOSH Test Procedure Number 123 42 CFR Part 84 Reference: Subpart H, § 84.93 (b) and (c)</b></p> <p><b>Requirement:</b> The flow from the apparatus shall be greater than 200 L/min. when the pressure in the facepiece of demand apparatus is lowered by 51 mm. (2 in.) water column height when full container pressure is applied. Where pressure-demand apparatus are tested, the flow will be measured at zero gage pressure in the facepiece.</p> <p><b>Procedure:</b> A pressure tap in the anthropometric head is connected to a manometer for determining when the pressure inside the facepiece is at zero. A mass flow meter is connected in line between the anthropometric head and an adjustable vacuum source to measure flow. The SCBA cylinder is replaced by a test stand which is adjusted initially to full cylinder pressure. The vacuum source is adjusted during the test to maintain the desired pressure inside the facepiece. Once the proper facepiece pressure has stabilized, a flow reading is recorded. The procedure is then repeated with the test stand adjusted to 500 psig.</p>	<p>The SCBA met the test requirement.</p> <table border="1" data-bbox="672 336 1287 567"> <thead> <tr> <th data-bbox="672 336 941 420">Applied Pressure</th> <th data-bbox="941 336 1287 420">Air Flow (liters per min.)</th> </tr> </thead> <tbody> <tr> <td data-bbox="672 441 941 493">4500 psig</td> <td data-bbox="941 441 1287 493">467.2</td> </tr> <tr> <td data-bbox="672 514 941 567">500 psig</td> <td data-bbox="941 514 1287 567">399.2</td> </tr> </tbody> </table>	Applied Pressure	Air Flow (liters per min.)	4500 psig	467.2	500 psig	399.2	<p><b>PASS</b></p> <p><b>PASS</b></p>
Applied Pressure	Air Flow (liters per min.)							
4500 psig	467.2							
500 psig	399.2							

NIOSH Tests	Description of Results	PASS/FAIL																								
<p><b>Remaining Service Life Indicator Test - NIOSH Test Procedure Number 124 42 CFR Part 84 Reference: Subpart H, § 84.83 (f) and Subpart G, § 84.63 (c)</b></p> <p><b>Requirement:</b> Each remaining service-life indicator or warning device must give an alarm when the remaining service life is reduced to a minimum of 25 percent of its rated service time, or any higher minimum percent value or values as specified in the approval. Open-circuit demand and pressure-demand respirators must alarm continuously until depletion of the breathing air supply. The percent value set for indicator activation must be identified by labels and/or markings on each respirator unit.</p> <p><b>Procedure:</b> A calibrated gauge is connected in line between the air supply and the first-stage regulator. The unit is then allowed to gradually bleed down. When the low-air alarm is activated, the pressure on the gauge is recorded. This procedure is repeated six times. The average of the six readings is calculated and recorded.</p>	<p>The values specified in the approval are 33% (1485 psi) - 31% (1395 psi) of its 4500 psi remaining rated service time.</p> <table border="1" data-bbox="695 317 1256 829"> <thead> <tr> <th data-bbox="695 317 808 394">Run #</th> <th data-bbox="808 317 1052 394">Electric Alarm Point (psi)</th> <th data-bbox="1052 317 1256 394">Vibralert Alarm Point(psi)</th> </tr> </thead> <tbody> <tr> <td data-bbox="695 394 808 457">7.</td> <td data-bbox="808 394 1052 457">1555</td> <td data-bbox="1052 394 1256 457">1050</td> </tr> <tr> <td data-bbox="695 457 808 520">8.</td> <td data-bbox="808 457 1052 520">1546</td> <td data-bbox="1052 457 1256 520">1050</td> </tr> <tr> <td data-bbox="695 520 808 583">9.</td> <td data-bbox="808 520 1052 583">1533</td> <td data-bbox="1052 520 1256 583">1050</td> </tr> <tr> <td data-bbox="695 583 808 646">10.</td> <td data-bbox="808 583 1052 646">1544</td> <td data-bbox="1052 583 1256 646">1050</td> </tr> <tr> <td data-bbox="695 646 808 709">11.</td> <td data-bbox="808 646 1052 709">1536</td> <td data-bbox="1052 646 1256 709">1050</td> </tr> <tr> <td data-bbox="695 709 808 772">12.</td> <td data-bbox="808 709 1052 772">1538</td> <td data-bbox="1052 709 1256 772">1050</td> </tr> <tr> <td data-bbox="695 772 808 829"><b>Average</b></td> <td data-bbox="808 772 1052 829"><b>1542</b></td> <td data-bbox="1052 772 1256 829"><b>1050</b></td> </tr> </tbody> </table>	Run #	Electric Alarm Point (psi)	Vibralert Alarm Point(psi)	7.	1555	1050	8.	1546	1050	9.	1533	1050	10.	1544	1050	11.	1536	1050	12.	1538	1050	<b>Average</b>	<b>1542</b>	<b>1050</b>	<p><b>FAIL</b></p> <p><b>FAIL</b></p>
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<b>Average</b>	<b>1542</b>	<b>1050</b>																								

## Disposition of SCBA Units

On August 7, 2025, the SCBAs were returned to secure storage in Building 40 at the NIOSH facility in Pittsburgh, Pennsylvania after testing.

## Synopsis of Findings

### Unit SCBA A

The SCBA inspected by NPPTL was a Scott® Safety Air-Pak Model 4.5, 45-minute, 4500 psi unit with NIOSH approval number TC-13F0705-CBRN. A facepiece and cylinder were present with the SCBA in the initial shipment. Overall, the SCBA was in bad condition. The NFPA approval label was present and readable.

The mask-mounted regulator was not functional due to the cover being missing; therefore, the SCBA could not be tested and evaluated.

Considering the information obtained during this investigation, NIOSH NPPTL proposed no further action on its part at this time. NPPTL returned the SCBA to the shipping container pending return shipment to the Houston Fire Department.

### Unit SCBA B

The SCBA inspected, tested, and evaluated by NPPTL was a Scott® Safety Air-Pak Model 4.5, 45-minute, 4500 psi unit with NIOSH approval number TC-13F0705-CBRN. This SCBA did not come with a corresponding facepiece or cylinder. These components were later shipped to the NPPTL facility to conduct testing. Overall, the SCBA was in bad condition. The NFPA approval label was present and readable. The PASS, HUD, and alarm systems functioned as designed; however, a red light in the HUD remained on after the Positive Pressure Test.

The SCBA met the requirement of the NIOSH Positive Pressure Test, as the SCBA maintained a positive pressure for the 45-minute minimum duration of the test. It passed the Rated Service Time and Gas Flow Tests but failed all the other NIOSH tests.

Considering the information obtained during this investigation, NIOSH NPPTL proposes no further action on its part at this time. NPPTL returned the SCBA to the shipping container pending return shipment to the Houston Fire Department.

### Unit SCBA C

The SCBA inspected, tested, and evaluated by NPPTL was a Scott® Safety Air-Pak Model 4.5, 45-minute, 4500 psi unit with NIOSH approval number TC-13F0705-CBRN. This SCBA did not come with a corresponding facepiece or cylinder. These components were later shipped to the NPPTL facility to conduct testing. Overall, the SCBA was in bad condition. The NFPA approval label was present and readable. The PASS, HUD, and alarm systems functioned as designed.

The SCBA met the requirement of the NIOSH Positive Pressure Test, as the SCBA maintained a positive pressure for the 45-minute minimum duration of the test, but failed the Rated Service Time Test. It also failed the Remaining Service Life Indicator Test but passed all the other NIOSH tests.

Considering the information obtained during this investigation, NIOSH NPPTL proposed no further action on its part at this time. NPPTL returned the SCBA to the shipping container pending return shipment to the Houston Fire Department.

## CASE Conclusion

The evaluation found no evidence indicating that the inspected and tested SCBAs (SCBA B and C), that failed some NIOSH post-incident testing, contributed to the firefighters becoming trapped during the near-miss of a rapid-fire progression. .

NIOSH concluded that no corrective actions were needed for the approval holder or users of the SCBAs manufactured under this product's approval number.

## Actions to be Taken by Fire Departments with SCBA units Involved in an Incident

- Any SCBA involved in an incident may not be placed back in service until it has been repaired, tested, and cleaned, and all damaged components have been replaced and inspected by a qualified service technician. All required testing and maintenance must be performed in accordance with the SCBA manufacturer's prescribed schedule.
- All SCBAs, even those not involved in an incident, must undergo a flow test on at least an annual basis.

## Actions PPE Users, Selectors, and Purchasers May Take to Further Protect Themselves and Others from Hazards

- Sign up for NPPTL's Listserv at <https://www.cdc.gov/niosh/ppe/about/index.html> to receive email notifications relevant to personal protective equipment. To request additional information about this report, contact NPPTL at [ppeconcerns@cdc.gov](mailto:ppeconcerns@cdc.gov), and reference NIOSH Task Number 27934 in your request.
- For more information related to personal protective equipment, visit NIOSH's website at <https://www.cdc.gov/niosh/ppe/index.html>.
- For more information related to the NIOSH Respirator Approval Program, visit NIOSH's website at <https://www.cdc.gov/niosh/rap/index.html>.

NIOSH Approved is a registered certification mark of the U.S. Department of Health and Human Services (HHS) in the United States and [several other countries](#).

To receive documents or other information about occupational safety and health topics, contact NIOSH:

Telephone: 1-800-CDC-INFO (1-800-232-4636)

TTY: 1-888-232-6348

CDC INFO: [www.cdc.gov/info](http://www.cdc.gov/info)

Or visit the NIOSH website at <https://www.cdc.gov/niosh/>

For a monthly update on news at NIOSH, subscribe to NIOSH eNews by visiting <https://www.cdc.gov/niosh/eNews/>

All photos by NIOSH.

## Appendix 1: Acronyms and Abbreviations

CBRN	Chemical, Biological, Radiological, and Nuclear
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
DOT	Department of Transportation
FD	Fire Department
HUD	Heads-Up Display
in.H2O	Inches of water column height
kg-m/min	Kilogram Meter per Minute
L/min	L/MINs per Minute
M/N	Manufacturer Number
MFG	Manufacturing Date
mm	Millimeters
mmH2O	Millimeters of Water
MMR	Mask-Mounted Regulator
MSA	Mine Safety Appliances
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NPPTL	National Personal Protective Technology Laboratory
P/N	Part Number
PASS	Personal Alert Safety System
PSI	Pounds per Square Inch
PSIG	Pounds per Square Inch Gauge
RFID	Radio Frequency Identification
RIC/UAC	Rapid Intervention Crew/Universal Air Connection
RPM	Revolutions per minute
SCBA	Self-Contained Breathing Apparatus
SEI	Safety Equipment Institute
STP	Standard Testing Procedure

## Appendix: Photographs to Support Inspection Findings for SCBA

### List of Figures

**Figure 1:** SCBA as received ..... [2](#)

#### SCBA A

**Figure 2:** Front of facepiece ..... [22](#)

**Figure 3:** Inside of facepiece..... [22](#)

**Figure 4:** Mask-mounted regulator ..... [23](#)

**Figure 5:** Side view of mask-mounted regulator..... [23](#)

**Figure 6:** Low-pressure hose..... [24](#)

**Figure 7:** Low-pressure hose quick disconnect..... [24](#)

**Figure 8:** Pressure reducer, top view ..... [25](#)

**Figure 9:** Pressure reducer, side view..... [25](#)

**Figure 10:** High-pressure hose from cylinder attachment and RIC UAC connector..... [26](#)

**Figure 11:** Cylinder attachment and o-ring..... [26](#)

**Figure 12:** PASS control console ..... [27](#)

**Figure 13:** Back of PASS control console..... [27](#)

**Figure 14:** PASS control module under cylinder attachment..... [28](#)

**Figure 15:** PASS Control battery compartment lid ..... [28](#)

**Figure 16:** Overall of backframe, SEI label ..... [29](#)

**Figure 17:** NIOSH label on backframe..... [29](#)

**Figure 18:** Overall of straps and buckles..... [30](#)

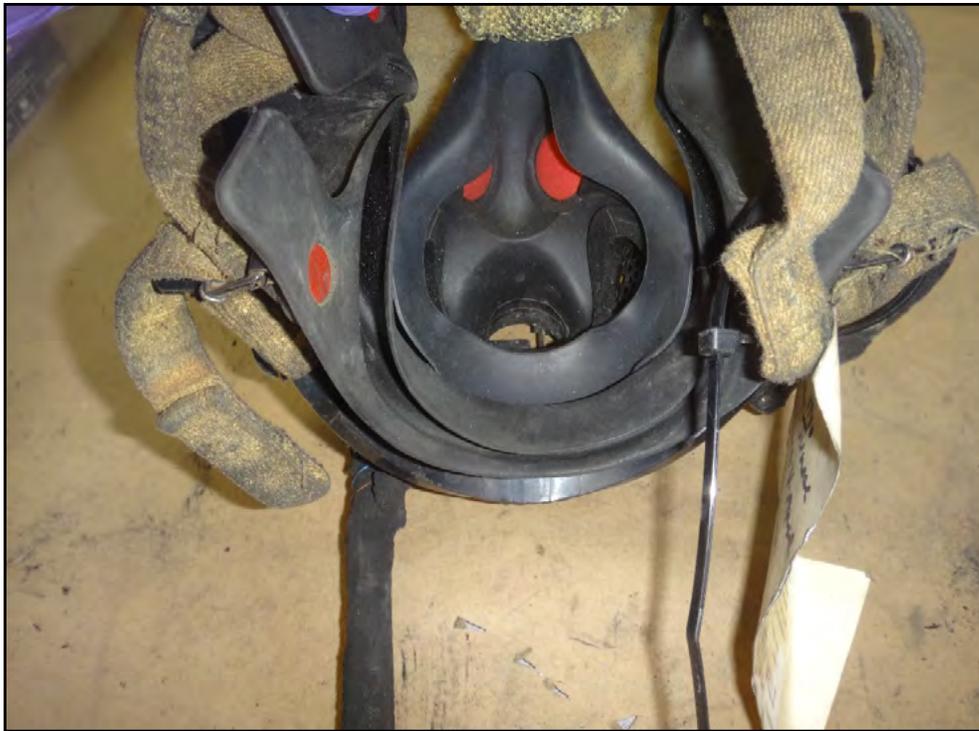
**Figure 19:** Overall of cylinder ..... [30](#)

**Figure 20:** Cylinder label..... [31](#)

**Figure 21:** Cylinder valve assembly ..... [31](#)



**Figure 2: Front of facepiece**



**Figure 3: Inside of facepiece**



**Figure 4: Mask-mounted regulator**



**Figure 5: Side view of mask-mounted regulator**



**Figure 6: Low-pressure hose**



**Figure 7: Low-pressure hose quick disconnect**



**Figure 8: Pressure reducer, top view**



**Figure 9: Pressure reducer, side view**



**Figure 10: High-pressure hose from cylinder attachment and RIC UAC connector**



**Figure 11: Cylinder attachment and o-ring**



**Figure 12: PASS control console**



**Figure 13: Back of PASS control console**



**Figure 14: PASS control module under cylinder attachment**



**Figure 15: PASS Control battery compartment lid**



Figure 16: Overall view of backframe, SEI label



Figure 17: NIOSH label on backframe



**Figure 18: Overall view of straps and buckles**



**Figure 19: Overall view of cylinder**



**Figure 20: Cylinder label**



**Figure 21: Cylinder valve assembly.**

## SCBA B

<b>Figure 22:</b> Mask-mounted regulator.....	<a href="#">33</a>
<b>Figure 23:</b> Inside seal of mask-mounted regulator and HUD.....	<a href="#">33</a>
<b>Figure 24:</b> Low-pressure hose .....	<a href="#">34</a>
<b>Figure 25:</b> Low-pressure quick disconnect.....	<a href="#">34</a>
<b>Figure 26:</b> Pressure reducer, top view .....	<a href="#">35</a>
<b>Figure 27:</b> Pressure reducer, side view.....	<a href="#">35</a>
<b>Figure 28:</b> Cylinder attachment and RIC UAC connector .....	<a href="#">36</a>
<b>Figure 29:</b> Cylinder attachment and o-ring.....	<a href="#">36</a>
<b>Figure 30:</b> High-pressure hose from cylinder attachment to reducer .....	<a href="#">37</a>
<b>Figure 31:</b> PASS control console .....	<a href="#">37</a>
<b>Figure 32:</b> Back of PASS control console.....	<a href="#">38</a>
<b>Figure 33:</b> PASS control module under cylinder attachment .....	<a href="#">38</a>
<b>Figure 34:</b> PASS Control battery compartment lid .....	<a href="#">39</a>
<b>Figure 35:</b> Overall of backframe, SEI label .....	<a href="#">39</a>
<b>Figure 36:</b> NIOSH label on backframe.....	<a href="#">40</a>
<b>Figure 37:</b> Overall of straps and buckles.....	<a href="#">40</a>
<b>Figure 38:</b> Overall of cylinder .....	<a href="#">41</a>
<b>Figure 39:</b> Cylinder label .....	<a href="#">41</a>
<b>Figure 40:</b> Cylinder valve assembly .....	<a href="#">42</a>



**Figure 22: Mask-mounted regulator**



**Figure 23: Inside seal of mask-mounted regulator and HUD**



**Figure 24: Low-pressure hose**



**Figure 25: Low-pressure hose quick disconnect**



**Figure 26: Pressure reducer, outside view**



**Figure 27: Pressure reducer, inside view**



**Figure 28: Cylinder attachment and RIC UAC connector**



**Figure 29: Cylinder attachment and o-ring**



**Figure 30: High-pressure hose from cylinder attachment to reducer**



**Figure 31: PASS control console**



**Figure 32: Back of PASS control console**



**Figure 33: PASS control module under cylinder attachment**



**Figure 34: PASS Control battery compartment lid**



**Figure 35: Overall view of backframe, SEI label**



**Figure 36: NIOSH label on backframe**



**Figure 37: Overall view of straps and buckles**



Figure 38: Overall view of cylinder



Figure 39: Cylinder label



**Figure 40: Cylinder valve assembly.**

## SCBA C

<b>Figure 41:</b> Mask-mounted regulator .....	<a href="#">44</a>
<b>Figure 42:</b> Inside seal of mask-mounted regulator and HUD.....	<a href="#">44</a>
<b>Figure 43:</b> Low-pressure hose .....	<a href="#">45</a>
<b>Figure 44:</b> Low-pressure hose quick disconnect.....	<a href="#">45</a>
<b>Figure 45:</b> Pressure reducer, top view .....	<a href="#">46</a>
<b>Figure 46:</b> Pressure reducer, side view.....	<a href="#">46</a>
<b>Figure 47:</b> High-pressure hose from cylinder attachment to reducer .....	<a href="#">47</a>
<b>Figure 48:</b> Cylinder attachment and o-ring.....	<a href="#">47</a>
<b>Figure 49:</b> PASS control console .....	<a href="#">48</a>
<b>Figure 50:</b> Back of PASS control console.....	<a href="#">48</a>
<b>Figure 51:</b> Pass control module under cylinder attachment.....	<a href="#">49</a>
<b>Figure 52:</b> PASS control battery compartment lid.....	<a href="#">49</a>
<b>Figure 53:</b> Overall of backframe, SEI label .....	<a href="#">50</a>
<b>Figure 54:</b> NIOSH label on backframe .....	<a href="#">50</a>
<b>Figure 55:</b> Overall of straps and buckles.....	<a href="#">51</a>
<b>Figure 56:</b> Overall of cylinder .....	<a href="#">51</a>
<b>Figure 57:</b> Cylinder label.....	<a href="#">52</a>
<b>Figure 58:</b> Cylinder valve assembly.....	<a href="#">52</a>



**Figure 41: Mask-mounted regulator**



**Figure 42: Inside seal of mask-mounted regulator and HUD**



**Figure 43: Low-pressure hose**



**Figure 44: Low-pressure hose quick disconnect**



**Figure 45: Pressure reducer, top view**



**Figure 46: Pressure reducer, side view**



**Figure 47: High-pressure hose from cylinder attachment to reducer**



**Figure 48: Cylinder attachment and o-ring**



**Figure 49: PASS control console**



**Figure 50: Back of PASS control console**



**Figure 51: PASS control module under cylinder attachment**



**Figure 52: PASS Control battery compartment lid**





**Figure 55: Overall view of straps and buckles**



**Figure 56: Overall view of cylinder**



**Figure 57: Cylinder label**



**Figure 58: Cylinder valve assembly.**

## Disclaimer

The purpose of this effort was to determine the conformance of a respirator to the NIOSH approval requirements found in Title 42, Code of Federal Regulations, Part 84. A number of performance tests are selected from the complete list of Part 84 requirements, and each respirator was tested in its “as received” condition to determine its conformance to those performance requirements. Each respirator is also inspected to determine its conformance to the quality assurance documentation on file at NIOSH.

Selected tests are conducted only after it has been determined that each respirator is in a condition that is safe to be pressurized, handled, and tested. Respirators whose condition has deteriorated to the point where the health and safety of NIOSH personnel and/or property are at risk will not be tested .



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