

Safety & Health Advisory



Reporting Adverse Conditions Involving Self-Contained Breathing Apparatus – Thermal Degradation and Failure of Facepiece Lens

NIOSH continues to identify instances where certain facepiece lens materials on self-contained breathing apparatus (SCBA) fail before other components of the firefighter's SCBA and personal protective equipment ensemble.

Since 2009, several [Fire Fighter Fatality Investigation and Prevention Program](#) reports have identified the severe thermal degradation and failure of SCBA facepiece lenses which led to holes, melting, and other deformities. The SCBAs in these incidents were approved by NIOSH and certified as meeting the National Fire Protection Association (NFPA) 1981 standard on Open-circuit SCBA for Emergency Services, 2007 edition by a third-party certification body. NIOSH is the approval body for respiratory protective devices under the U.S. Code of Federal Regulations (CFR), 42 CFR 84 and applicable Chemical, Biological, Radiological, and Nuclear (CBRN) Statement of Standards. A third-party certification body assesses the additional requirements and associated signaling devices covered by NFPA standards.

WHAT FIRE DEPARTMENTS CAN DO

- ❑ Recognize that that SCBA facepiece lenses meeting the 2007 or earlier edition of NFPA 1981 will undergo thermal degradation when exposed to intense heat faster than lenses meeting the 2013 or later editions
- ❑ Understand that the tests added to the 2013 edition of NFPA 1981 increase SCBA facepiece lens integrity
- ❑ Upgrade or replace current SCBAs to meet the 2013 or more recent edition of the NFPA 1981 standard
- ❑ Report any conditions involving an SCBA or SCBA components that lead to failure, near-failure, or a significant degradation of performance according to the relevant edition of NFPA 1852



**An SCBA facepiece with severe deformation and failure.
Photo by NIOSH.**

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QUESTIONS & ANSWERS

What issues have been identified involving SCBA facepiece lenses?

Since 2009, several NIOSH Fire Fighter Fatality Investigation and Prevention Program reports suggest that:

- Certain SCBA facepiece lens materials may be failing before other components of the firefighter's SCBA and personal protective equipment ensemble.
- SCBA facepiece lenses certified to the 2007 NFPA 1981 standard, or earlier editions, may undergo thermal degradation when exposed to intense heat and energy while operating in the modern flow path. This may include bubbling, crazing, holes, or other severe deformation developing in the lens.

A 2012 NFPA [Safety Alert](#), along with research by the [National Institute of Standards and Technology](#) and other entities, helped establish the *Lens Radiant Heat Test* and the *Elevated Temperature Heat and Flame Resistance Test*. NFPA added these tests in 2013 to its testing procedures to reduce future occurrences of these severe failures.

What actions can fire departments take?

Fire departments can upgrade or replace their current SCBA to meet the 2013 or more recent edition of the NFPA 1981 standard. Testing by organizations such as the [Fire Safety Research Institute](#) has shown that SCBA models manufactured with more radiant heat and flame-resistant materials that are compliant with at least the 2013 edition of NFPA 1981 have improved thermal performance when exposed to radiant heating.

How can fire departments report adverse conditions involving SCBAs?

When an SCBA or its components fail, nearly fail, or significantly degrade during use, fire departments can follow the procedure in NFPA 1852 for reporting adverse conditions which includes:

- Notifying the SCBA manufacturer and the organization that certified the SCBA to NFPA requirements in writing of the specific condition(s) or cause(s) and the circumstances involved with the specific condition(s) or cause(s).
- Providing a copy of the notification to NIOSH by emailing PPEConcerns@cdc.gov.

Why is it important that fire departments notify NIOSH?

Upon notification, NIOSH works with the SCBA manufacturer to address any identified non-conformances to 42 CFR 84 or the CBRN Statement of Standards and may initiate a [Nonconforming Respirator Investigation](#). These investigations may result in [user notices](#), voluntary stop sales, recalls, retrofits, changes to the SCBA manufacturer's quality control process or design of the approved product, or revocation of the NIOSH approval. These actions ensure respirators offer the level of protection that manufacturers claim. NIOSH publishes [PPE Case Reports](#) to share findings from [post-market SCBA tests, evaluations, and investigations](#).

REFERENCES

NIOSH [2009]. [Career probationary fire fighter and captain die as a result of rapid fire progression in a wind-driven - Texas](#). By Merinar T., Tarley J, and Miles S. Morgantown, WV: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, F2009-11.

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