

December 5, 2003

NIOSH - 002  
Robert A. Taft Laboratories  
Mail Stop 34  
4676 Columbia Parkway  
Cincinnati, OH 45226

Dear Docket Officer:

I would like to request that a docket be opened to initiate a change to the NIOSH rule 42 CFR part 84 section 84.83 (f). The current rule reads as follows:

*Each remaining service-life indicator or warning device shall give an alarm when the remaining service life of the apparatus is reduced within a range of 20 to 25 percent of its rated service time.*

This general regulation covers all users of self-contained breathing apparatus (SCBA). The flaw of this rule is that it has an upper limit of alarm (25%). By limiting the alarm period to this range, an SCBA cannot be made to warn the user prior to 25 percent of remaining service time. This rule does not meet the needs of the fire service.

This stipulation predates the adoption of 42 CFR 84 in 1995. In fact, the 25 percent upper limit has been in place prior to 1960 (an exact date is not known). Although it is difficult to know for certain the rationale for including an upper limit in the rule, Sam Terry of the NIOSH NPPTL has speculated that the 25 percent stipulation is probably due to the following:

- When the respirator rules and regulations were originally written, they were written based upon the 'what is' of the day (i.e. if a respirators remaining service life indicator alarmed between 20 and 25 percent, then that is what made it into the regulation).
- The original regulations reflected the technology of the day:
  - Early SCBA cylinder technology limited bottle pressure to 1800psi, resulting in limited air volume that could be reasonably carried. The result was a compromise in exit time in order gain maximum benefit of the SCBA for firefighting purposes. Today's air bottles do not pose this same limitation.
  - Prior to the 1980's, firefighting strategy consisted of limited offensive firefighting. Today, deep offensive firefighting is the norm.

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- Firefighting protective clothing has evolved considerably since that time, allowing for much deeper offensive firefighting to occur.
- The large and complex (vertical and horizontal) structures of today were uncommon at the time this regulation was established.

The size and complexity of today's structures, advances in structural firefighter clothing, current firefighting tactics, and the ability to carry larger volumes of air all underscore why this rule does not meet the needs of today's fire service.

The fire service continues to kill firefighters who become trapped, caught, or lost inside a structure. A long-term study by the U.S. Fire Administration identified this as the second leading cause of fatal injury to firefighters, accounting for 18.2% of firefighter fatalities<sup>1</sup>.

Past experience has shown that 25 percent may not be enough to exit a structure fire. Twenty-five percent of the common 30-minute SCBA bottle is 1100scf of air. This will provide most users with four to six minutes of air. Is this really enough time for a firefighter to exit any structure? Is it enough time to effect the rescue of a lost or trapped firefighter? Despite calls for the fire service to have better 'situational awareness' and improved 'air management' skills, the remaining service-life indicator is the method by which most firefighters are warned to exit the hazard zone.

Although structure fires have declined by 54 percent since the late 1970's<sup>2</sup>, the rate of traumatic firefighter deaths inside of structures has actually increased from 1.8/100,000 structure fires in the late 1970's to 3/100,000 structure fires in the late 1990's, with sixty-three percent of these deaths the result of smoke inhalation<sup>3</sup>.

These facts, paired with the fact that firefighters are more than twice as likely to be killed while fighting a fire in a non-residential structure<sup>4</sup>, highlight the need to amend this rule to better address the inadequate air volumes that most firefighters carry with them into the hazard zone.

The following addition should be implemented for fire service users of SCBA's:

*Each remaining service-life indicator or warning device shall give an alarm when the remaining service life of the apparatus is reduced to no less than 25 percent of its rated service time.*

This change would allow the fire service, through NFPA 1981, to better address when the remaining service-life indicator should be set to alarm. It would also result in 'opening the windows' of Exit, Self-Rescue and Rapid Intervention Team

<sup>1</sup> USFA, "Firefighter Fatality Retrospective Study 1990-2000", April 2002: 23

<sup>2</sup> Fahy, Rita F. "U.S. Fire Service Fatalities in Structure Fires, 1977-2000", NFPA, July 2002: 1

<sup>3</sup> Fahy, Rita F. "U.S. Fire Service Fatalities in Structure Fires, 1977-2000", NFPA, July 2002: 2

<sup>4</sup> LeBlanc, Paul R, and Fahy, Rita F. "Firefighter Fatalities in the United States – 2002", NFPA, July 2003: 5

(RIT) rescue. If the remaining service-life indicator were allowed to be set to 50%, these 'windows' would be widened as follows:

| <b>25% Remaining Service-Life Indicator (Current Rule)</b> |                   |                   |                     |                    |                       |
|--|-------------------|-------------------|---------------------|--------------------|-----------------------|
| <b>Rated Time</b>  | <b>Air Volume</b> | <b>HZ* Volume</b> | <b>Avg. HZ Time</b> | <b>Exit Volume</b> | <b>Avg. Exit Time</b> |
| 30 minutes   | 4400              | 3300              | 12-18 min           | 1100               | 4-6 min               |
| 45 minutes   | 6600              | 4950              | 18-27 min           | 1650               | 6-9 min               |
| 60 minutes   | 8800              | 6600              | 24-36 min           | 2200               | 8-12 min              |

Air volumes are measured in square cubic feet of air (scf). \*HZ= Hazard Zone. Average times are estimates based on .218-.327 seconds/scf; actual time will vary by user.

| <b>50% Remaining Service-Life Indicator</b> |                   |                  |                     |                    |                       |
|---|-------------------|------------------|---------------------|--------------------|-----------------------|
| <b>Rated Time</b>                           | <b>Air Volume</b> | <b>HZ Volume</b> | <b>Avg. HZ Time</b> | <b>Exit Volume</b> | <b>Avg. Exit Time</b> |
| 30 minutes                                  | 4400              | 2200             | 8-12 min            | 2200               | 8-12 min              |
| 45 minutes                                  | 6600              | 3300             | 12-18 min           | 3300               | 12-18 min             |
| 60 minutes                                  | 8800              | 4400             | 16-24 min           | 4400               | 16-24 min             |

Air volumes are measured in square cubic feet of air (scf). \*HZ= Hazard Zone. Average times are estimates based on .218-.327 seconds/scf; actual time will vary by user.

Under the current rule, the only way to increase exit time (as indicated by the remaining service-life indicator) is to increase bottle size, which in turn increases time in the hazard zone. The fire service has shunned this solution due to work stress and depth of entry issues. The fire service has clearly demonstrated (through the continued widespread use of 30-minute bottles) the desire for a work period equal to the 3300scf air volume. It is for this reason, that the adoption of this amendment is the only reasonable option to provide the fire service with adequate breathing air for exit or rescue, while maintaining a reasonable hazard zone operational period.

Approval of this proposed change would better serve the needs of the fire service in its quest to eliminate line-of-duty death and injury.

Respectfully Submitted,



David T. Bernzweig