

**FEDERAL RAILROAD ADMINISTRATION GUIDANCE FOR
DEVELOPING AN ATMOSPHERE-SUPPLYING EMERGENCY
ESCAPE BREATHING APPARATUS PROGRAM**



**U.S. Department of Transportation
Federal Railroad Administration
Office of Railroad Safety**

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GUIDANCE FOR DEVELOPING AN EEBA PROGRAM

I. INTRODUCTION

This document provides guidance to railroads developing and implementing an atmosphere-supplying emergency escape breathing apparatus (EEBA)¹ program to protect railroad employees who transport hazardous materials posing an inhalation hazard.² In this guidance, the Federal Railroad Administration (FRA) highlights factors to consider when selecting an appropriate EEBA and explains various programmatic components to evaluate when developing an EEBA program. FRA recommends considering the following factors when developing an EEBA program and addresses each item below:

- Identification of individuals or positions covered by an EEBA program;
- Selection and procurement of the devices;
- Provision/accessibility/storage of devices;
- Inspection, maintenance, and replacement of the devices; and
- Training employees how to use the devices and about the program.

The above is not an exhaustive list of the factors a railroad may want to consider prior to adopting an EEBA program and is only meant to serve as guidance to the railroad industry.

II. BACKGROUND

Between 1995 and 2014, railroads transported approximately 760,000 railroad tank cars containing chlorine, a poisonous by inhalation (PIH) material, in North America.³ During this same period, FRA's accident data shows catastrophic loss of chlorine lading resulted in two railroad employee fatalities. The first fatality occurred near Macdona, Texas on June 28, 2004, when two freight trains traveling on the same main line collided. The second fatality occurred on January 6, 2005, near Graniteville, South Carolina, when a freight train encountered an improperly lined switch. Both employees were in the cab of the locomotive at the time of the incident and died as a result of chlorine inhalation.

¹ An EEBA is an atmosphere-supplying respirator supplying breathing air from a source independent from the ambient atmosphere. Unlike air-purifying respirators that only remove dangerous gases and vapors, EEBA atmosphere-supplying respirators remove dangerous gases and vapors and supply breathing air.

² Materials "posing an inhalation hazard" are identified as asphyxiants and poisonous by inhalation (PIH) materials. This includes materials that are flammable gases; non-flammable, nonpoisonous compressed gases; gases poisonous by inhalation; and certain other materials classified as poisonous by inhalation within the meaning of the Pipeline and Hazardous Materials Safety Administration's Hazardous Materials Regulations. See 49 C.F.R. parts 171–180.

³ See 75 F.R. 61386, Oct. 5, 2010; Association of American Railroads' 2014 Annual Report of Hazardous Materials Transported by Rail (available at www.aar.org).

Following these two fatalities, the National Transportation Safety Board (NTSB) issued Recommendation R-05-17 to FRA recommending that FRA:

[d]etermine the most effective methods of providing emergency escape breathing apparatus for all crewmembers on freight trains carrying hazardous materials that would pose an inhalation hazard in the event of unintentional release, and then require railroads to provide these breathing apparatus to their crewmembers along with appropriate training.

FRA responded to the NTSB recommendation by initiating a study on potential EEBA's for crewmembers to use on freight trains transporting hazardous materials that would pose an inhalation hazard if unintentionally released.⁴ The study, published in 2009, provided information and recommendations on the use of EEBA's by train crews who may be exposed to hazardous materials that pose an inhalation hazard. The study concluded that railroads should consider using EEBA's on trains transporting hazardous materials that pose an inhalation hazard.

Meanwhile, in 2008, Congress passed the Rail Safety Improvement Act (RSIA). Section 413 of the RSIA requires the Secretary to issue regulations requiring railroad carriers to:

provide emergency escape breathing apparatus suitable to provide head and neck coverage with respiratory protection for all crewmembers in locomotive cabs on freight trains carrying hazardous materials that would pose an inhalation hazard in the event of release. * * *

Public Law 110-432, Division A, 49 U.S.C. § 20166.

FRA published a Notice of Proposed Rulemaking (NPRM) in 2010 proposing standards for EEBA's on certain trains. In drafting the NPRM, FRA considered input and standards developed by other entities, including the National Institute for Occupational Safety and Health (NIOSH) and the International Organization for Standardization (ISO).

III. TOOLS

Identification of individuals or positions covered by the EEBA programs

Railroads employ a large number of employees engaged in a wide range of duties. If a railroad is developing an EEBA program, FRA recommends considering which employees and/or positions the program should cover. To that end, railroads may want to consider which employees are at the greatest risk of exposure and whether providing EEBA's to certain employees is practical. For example, employees working in a yard where there is a train containing material posing an inhalation hazard are at low risk of exposure and it is difficult to

⁴ See "Emergency Escape Breathing Apparatus," FRA Office of Research and Development, Final Report, May 2009 (available at <http://www.fra.dot.gov>).

make EEBA's readily available to each of these employees. Alternately, a train crew in the cab of a locomotive has a higher risk of exposure (as they are likely to be present during an unintentional release) and a plan to provide access is more feasible (the EEBA could be located in the cab).

Selection and procurement of the devices

There are a variety of EEBA's available to railroads. If a railroad is developing an EEBA program, FRA recommends considering which EEBA is appropriate to ensure protection from an unintentional release.

- Respiratory protection: Atmosphere-supplying respirators remove dangerous gases and vapors as well as supplying clean breathing air.
- Minimum breathing capacity: Protective devices breathing capacity is different depending upon their intended use. A firefighter's protective device is intended to protect and sustain them for long time periods while a railroad employee would need to use a protective device for a short period to escape an emergency situation.
 - The single function of an EEBA in the railroad environment is to allow sufficient time for an individual working in a normally safe environment to escape from suddenly occurring respiratory hazards. As such, EEBA's need to be small and light weight to avoid impeding escape yet they must contain a sufficient supply of oxygen to allow for escape.⁵ FRA recommends railroads consider using EEBA's containing at least a 15-minute supply of clean breathing air when fully charged.
- Performance and reliability: If a railroad is selecting an EEBA, FRA recommends determining if the device is reliable. Both NIOSH and ISO have developed and maintained standards for EEBA's. NIOSH also maintains a list of certified respirators designed to provide protection from the specific respiratory hazards which are the subject of this guidance and workplace and user factors that affect respirator performance and reliability. In addition, NIOSH and ISO have promulgated standards related to protection devices. These are two good resources for railroads developing an EEBA program.
- Adequate body protection: In addition to respiratory protection, consideration should be given to preventing exposure of the rest of the body to the hazardous materials. Not all devices are designed to cover the head and neck of an employee and are not versatile enough to accommodate different body profiles. If a railroad is selecting an EEBA, FRA recommends considering the level of coverage the device provides and the number of individuals who may use the same device.

⁵ The nominal capacity of supplied air respiratory protection is based on assumed respiration and air consumption (or level of physical exertion) rates.

- *Head and neck protection:* Depending on the hazards of the material being transported, unprotected skin could become irritated when it comes into contact with the material. Some devices protect only the head or part of the head while other devices protect the employee's entire head and neck.
- *Versatility:* No two employees have exactly the same size head or neck. Certain devices are designed for specific users under specific conditions (meaning beards or hair on any given day may change the usefulness of the devices and the devices are not easily shared among different individuals). Other devices are designed to accommodate and protect individuals regardless of size or shape and can accommodate a wide variety of facial features and eyeglasses. The type of device selected will help the railroad decide how many devices it needs to purchase.

Provision/accessibility/storage of devices

When providing EEBA's to their employees, FRA recommends railroads determine how to distribute the EEBA's to covered individuals. Some examples of distribution options are:

- Treat EEBA's as part of an employee's permanently issued equipment, similar to eye protection, radios, hard hats, and lanterns.
- Permanently assign EEBA's to an individual as a dedicated personal item issued at the start of each shift and returned at the end of each shift.
- Treat EEBA's as "pool" items not assigned to a specific individual but, rather, issued randomly at the start of each shift and recovered at the end of each shift. If a railroad selects this option, it should use an EEBA that does not require a fit test.
- Permanently or temporarily mount EEBA's in each locomotive cab in the railroad's fleet. Again, if a railroad selects this option, it should use an EEBA that does not require a fit test.

In choosing a method for distributing EEBA's, FRA recommends railroads consider where to place the EEBA within the cab so railroad employees can easily access it if an unintentional release occurs.

Inspection, maintenance, and replacement of the devices

When developing an EEBA program, FRA recommends railroads consider the following elements:

- Cleaning and disinfecting: Consider methods to ensure each EEBA user is provided a device that is clean, sanitary, and in good working order. This plan may vary depending on whether the device is used by one individual or multiple individuals (in addition to how often the device is exchanged).
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- Storage: Consider ways to ensure EEBA's are safely stored and protected from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals, or any other condition that may degrade the equipment's condition.
- Inspection and maintenance: Consider implementing programs for inspecting and maintaining EEBA's consistent with the manufacturer's recommendations. FRA recommends that the program identify who is responsible for inspecting the device and the frequency of inspections.
- Training: Consider including a training program for employees on the proper use and maintenance of an EEBA.

IV. CONCLUSION

FRA is providing this guidance to assist railroads who decide to implement an EEBA program. FRA recommends considering the above factors to ensure that a program addresses not just selection of an EEBA but also supports the long-term effectiveness of the program. Again this is not an exhaustive list of factors to consider and FRA recommends consulting the other resources identified in this document and the NPRM for further information. If you have any questions, please contact Michael Watson, FRA Industrial Hygienist, at 202-493-1388.
