National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 8, 2000

In reply refer to: A-00-54

Honorable William Henderson
Postmaster General and Chief Executive Officer
U.S. Postal Service
475 L'Enfant Plaza, S.W.
Washington, D.C. 20260-0010

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation addresses the adequacy of U.S. Postal Service procedures for responding to hazardous material spills. The recommendation is derived from the Safety Board's investigation of the October 28, 1998, spill of hydrogen peroxide in a cargo compartment on Northwest Airlines (Northwest) flight 957 while it was en route from Orlando, Florida, to Memphis, Tennessee, and is consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued ten safety recommendations, one of which is addressed to the U.S. Postal Service. Information supporting the recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

On the morning of October 28, 1998, 2 gallons of a 35-percent hydrogen peroxide solution in water, an oxidizer[1] with corrosive properties, spilled in a cargo compartment of Northwest flight 957, a passenger-carrying airplane en route from Orlando to Memphis. The solution leaked from two undeclared 1-gallon plastic bottles that had split. The bottles were in an ice chest that belonged to a passenger on the flight. The leaking hydrogen peroxide contaminated three mail sacks and an undetermined number of bags.

[1] The Department of Transportation defines an oxidizer as "a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials."

The leak was not discovered until cargo handlers in Memphis began to unload the baggage on flight 957. Thinking that the spilled liquid was water, the cargo handlers ignored it and transferred some of the baggage to other Northwest passenger-carrying flights, including flight 7, which then departed for Seattle, Washington. When flight 7 arrived in Seattle, two bags in a cargo compartment were smoldering, including one that had come from flight 957.

As a result of the spill, several people required treatment. In Memphis, 11 employees were treated at the airport's first aid station because their hands had been exposed to the hydrogen peroxide, and 2 more employees went to a local clinic, where they were treated and released. In Seattle, the employee who removed the smoldering bags from the cargo compartment was exposed to fumes. He went to a hospital for treatment and was released. None of the injuries were serious. Northwest estimated that the total cost of the damage to and the downtime on the aircraft and of the damage to the baggage was more than $40,000.

The National Transportation Safety Board determines that the probable cause of the release of undeclared hazardous material aboard Northwest Airlines flight 957 was the passenger's failure to properly package and identify the hazardous material and inadequate inquiries from the Northwest Airlines agent about the contents of the cooler offered by the passenger. Contributing to the consequences of the incident were inadequate carrier procedures for handling a hazardous materials cargo spill.

The passenger who had checked the ice chest at Orlando was a nurse. She had bought the hydrogen peroxide containers several years earlier and stored them unopened at an assisted care facility for the elderly in Fort Pierce, Florida, that she had once owned. Before her trip on flight 957, she had packed the two plastic bottles of hydrogen peroxide in a plastic ice chest with some sand and a bag of rolls.

She arrived at the airport at 0600 eastern standard time (EST); the flight was scheduled to depart at 0630 EST. She attempted to check seven items, including the ice chest, at Northwest's roadside skycap service. According to the skycap, he had been reluctant to check the bags because Northwest allows a passenger to have only two items checked without paying additional fees. He had told her that the fees must be paid at the ticket counter inside the terminal, but she explained that she was late and persuaded him to check all seven of her items. She tipped him $20 dollars and rushed off.[2]

The skycap said that he had asked the woman whether the ice chest contained dry ice, a hazardous material with special limitations in air transportation.[3] She did not declare that there were any hazardous materials in her baggage[4] and later told investigators that she was not aware that hydrogen peroxide was a hazardous material. She checked in with Northwest at the gate and

[2] Northwest management indicated that the skycap was a Northwest employee and was authorized to collect the fees for extra baggage. Northwest took disciplinary action against the skycap.

[3] Northwest hazardous materials training specifically addresses questioning passengers about hazardous materials in ice chests.

[4] A search of her other baggage in Seattle revealed other undeclared hazardous materials, including small arms ammunition, an aerosol can of lubricant (a flammable gas), and a tube of gun oil (a combustible liquid).

left Orlando on flight 957. There were no reports of incidents or injuries at the Orlando airport involving her baggage.

After flight 957 arrived in Memphis, two Northwest ramp employees entered the cargo compartments, between 0730 and 0745 central standard time, and began transferring the baggage to other aircraft in the morning bank of flights.[5] Both employees noted wet baggage and a clear liquid on the floor. They assumed the liquid was water that had leaked from the ice chest or from a shipment of tropical fish.[6]

About 10 minutes after the baggage was unloaded, the employees who had handled the wet baggage and mail sacks began to complain that their hands were tingling and turning white. By then, some of the baggage had been transferred to other airplanes, and some had been returned to passengers. The ice chest and several bags had been loaded onto flight 7.

Because employees were complaining about their hands, Northwest contacted the airport's fire station, and it responded to the site. Northwest also contacted the airport's post office, which sent a postal employee to pick up the wet mail sacks. A ramp employee retrieved the ice chest from flight 7. When he was told that the ice chest probably contained a hazardous material, he left to seek medical attention. After he left, the pilot of flight 7 noticed that there was a cluster of emergency responders and Northwest employees near the airplane. The pilot asked them about the nature of the emergency. They told him that the ice chest might contain a hazardous material. The pilot asked whether the ice chest had been on flight 7. Not knowing that the chest had been on flight 7, several Northwest employees told the pilot that it had not. Thinking that his airplane was not affected by the incident, the pilot of flight 7 departed as scheduled.

The emergency responders did an on-site examination and found that each bottle had split open and that the hydrogen peroxide had leaked from the bottles and the ice chest. Each bottle had a label that said "Vero Chemical Distributors, Inc.," and had generic warnings about flammable materials. The words "Hydrogen Peroxide" were handwritten in an upper corner of each label. When the responders questioned the passenger who had checked the ice chest, she told them that the bottles had contained a 35-percent solution of hydrogen peroxide.

During the emergency, the fire station responders used the *North American Emergency Response Guide* and a material safety data sheet[7] about hydrogen peroxide as references. Northwest stated that it also contacted the Minnesota Poison Control Center.[8] (While there is no record of the information provided by the center, a previous employee indicated that, given the nature of the center,

[5] Memphis is one of Northwest's hub airports. Northwest has 3 daily banks of about 40 flights; the planes are at the airport for only 1 to 2 hours.

[6] According to the ramp employees, it is common to discover ice chests leaking due to melting ice. Also, live fish are shipped in plastic bags inside fiberboard boxes, and the bags occasionally break, spilling the water from the box.

[7] A material safety data sheet is developed by the producer of a chemical product and contains general information about it, including a description of its chemical and physical properties, a description of the health and environmental hazards it poses, and guidelines for responding to its release.

[8] At the time of the incident, the Minnesota Poison Control Center was under contract to Northwest to provide hazardous materials information.

its information would have focused on the medical hazards, including the fact that hydrogen peroxide can damage skin.) Some of the information gathered described hazards posed by hydrogen peroxide, but much of it did not point out that hydrogen peroxide that has dried on certain materials is a fire hazard. A fire station responder stated that the responders were concerned about the danger of fire from materials exposed to the oxidizing properties of hydrogen peroxide and had warned the Northwest employees.

Hydrogen peroxide is a very powerful oxidizing agent that can oxidize all organic compounds and a wide range of inorganic ones. It is not flammable, but it can readily cause other materials to burn. Natural materials like wood, paper, cotton, and leather are very susceptible to fire when exposed to hydrogen peroxide. These reactions are enhanced when the material contains dirt, especially metallic compounds of copper, silver, or mild steel.[9] If a hydrogen peroxide solution is allowed to evaporate, the water evaporates more quickly than the hydrogen peroxide does, causing the solution to become more concentrated. As a hydrogen peroxide solution becomes more concentrated and is exposed to organic materials and dirt or metallic compounds, the hydrogen peroxide begins to decompose. This decomposition results in an exothermic reaction[10] and the release of oxygen, which will support combustion.

The post office employee who picked up the wet mail sacks called a post office safety officer in the central Memphis post office to report that the mail sacks were contaminated with a liquid. The safety officer told him to isolate the mail sacks on the docks until he, the safety officer, arrived. By the time he arrived, the contamination had been identified as hydrogen peroxide. He then said that the mail should be dumped from the nylon sacks into large open wire bins and allowed to dry outside. That evening, after the mail had dried outside, it was shipped by ground transportation to its destination, Kansas City, Missouri. The safety officer said that he was familiar with hydrogen peroxide and did not refer to any specific information on the hazards or properties of the chemical in determining the actions to be taken.[11] The Postal Service did not have any subsequent incidents involving the contaminated mail.

Given that two bags on flight 7 began to smolder and given the fact that allowing hydrogen peroxide to dry on materials, including paper, can result in a fire, a hydrogen peroxide spill can present a serious fire hazard in the mail if it is allowed to dry on letters or packages. The Safety Board concludes that the post office safety officer did not follow Postal Service training that instructed him to determine the hazards of chemical spills by using technical information, including material safety data sheets, about the hazards and the chemical properties of materials before he responded to the hydrogen peroxide contamination on the mail. As a result, the Safety Board believes that the Postal Service should reinforce the training provided to its hazardous materials emergency responders concerning the need to use technical information, including material safety data sheets, about the hazards and the chemical properties of materials when responding to a spill instead of relying solely on memory or previous experience.

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[9] Mild steel is a carbon steel with a maximum of about 0.25 percent carbon.

[10] A chemical reaction that results in the generation and release of heat.

[11] Postal Service training material about hazardous materials emergency response states that postal employees responding to a hazardous materials spill should determine the hazards of the material by using material data safety sheets and other information.

The Federal Aviation Administration has initiated enforcement action against the Northwest passenger for violating the Hazardous Materials Regulations.[12]

As a result of this investigation, the National Transportation Safety Board recommends that the U.S. Postal Service:

> Reinforce the training provided to your hazardous materials emergency responders concerning the need to use technical information, including material safety data sheets, about the hazards and the chemical properties of materials when responding to a spill instead of relying solely on memory or previous experience. (A-00-54)

The Safety Board also issued safety recommendations to the Federal Aviation Administration, the Hydrogen Peroxide Safety Producers Committee, Northwest Airlines, Inc., and the Air Transport Association. In your response to the recommendation in this letter, please refer to Safety Recommendation A-00-54. If you need additional information, you may call (202) 314-6170.

Chairman HALL and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

Original Signed

By: Jim Hall
Chairman

[12] Title 49 *Code of Federal Regulations* (CFR) Subchapter "C."