NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

Hazardous Materials Factual Report

November 18, 2002
DCA-02-MA-054

A. Accident Identification

Location:	Tallahassee, Florida
Date and Time:	July 26, 2002; 0540 (EDT)
Hazardous Materials:	Misc. See list below.
Injuries:	3 – Flight Crew
Carrier:	Federal Express Corp.
Shipper:	See list below.
Transportation Mode:	Air

B. Group Members

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C. The Accident

On July 26, 2002, at approximately 0537 EDT, a Boeing B-727-232, N497FE, operating as Federal Express Corp. (FedEx) flight 1478, crashed into trees on short final approach to runway 9 at the Tallahassee Regional Airport (TLH), Tallahassee, Florida. The flight was operating under provisions of Title 14 Code of Federal Regulations Part 121, as a scheduled cargo flight from Memphis, Tennessee (MEM) to TLH. Night visual meteorological conditions prevailed at the time of the accident. The three flight crewmembers were injured, two seriously, and the aircraft was destroyed by impact and resulting fire.

D. Hazardous Materials Emergency Response Information

The captain of FedEx flight 1478 supplied the form, *Notification of Dangerous Goods*[1] *Loading* (Part A)[2] for the aircraft to the on-scene incident commander (the lead responder on scene) as the commander approached the aircraft. According to the dispatch log, this occurred about 0542 EDT.

Several ramp agents were at the FedEx ramp on the Tallahassee Regional Airport when the accident occurred and heard the crash. One ramp agent immediately drove a tug to the accident site where he assisted the emergency responders in interpreting the Part A. Shortly after the first ramp agent left, a second ramp agent retrieved from a waste basket a printed copy of the Flight Dispatch Report Dangerous Goods (FDR DG) screen[3] for

[1] "Dangerous goods" is the term used in air transportation that is synonymous with hazardous materials.

[2] This form is provided to and reviewed by the pilot before the aircraft departs. The form provides a loading summary for the aircraft. It identifies the location of all hazardous materials on the aircraft by their DOT classification (i.e.: Class 3 –flammable liquid) and their location by compartment. It also includes the hazard materials compatibility grid (materials that may not be loaded together are identified), and totals for radioactive material transport indexes (T.I.) and dry ice. It does not contain an exact description of any other hazardous materials, the number of packages, or the weight.

[3] The FDR DG screen is an electronic record created by FedEx that records all hazard classes and the total quantity by weight (radioactive materials are shown by T.I.) of each class in each compartment or

FedEx flight 1478 and drove to the firehouse to get an escort to the site. He stated that after about 5 minutes, he ran across the airport active area to the accident. (All available fire personnel were responding to the accident.) He carried the copy of the FDR DG screen to the emergency responders on site.

The Tallahassee Haz Mat Lieutenant and the incident commander stated that they had a document (the FDR DG screen), provided by a FedEx employee, with a description of the hazardous materials classifications, including the weights at about 15 to 20 minutes into the incident. They began to question the FedEx employee on specifics about the hazardous materials who in turn passed on the questions through the Tallahassee office via telephone to the FedEx Global Operations Center in Memphis, TN. At the same time, FedEx employees in Memphis retrieved from FedEx's Memphis hub copies of the shipping documents for each hazardous materials shipment including: dangerous goods separation pouch labels, shipping papers (390 Part C and CR), shipper's declaration/air waybills, and U.S. Department of Transportation (DOT) exemptions,[4] when applicable. The shipping documents provided the actual shipping names, product information, and emergency contact phone numbers for the hazardous materials on the aircraft. These shipping documents were carried to FedEx Global Operations Center in Memphis, TN. At the operations center the information on the documents was reviewed and information was verbally provided via the phone to the emergency responders. Also, several copies were made of each document.

At 0811 EDT (0711 CDT- Memphis time), the operations center began faxing copies of the shipping documents to their Tallahassee ramp office. The first attempt was too light to read; therefore, by 0846 EDT a second darker copy was sent from another fax machine. Most of the documents received in Tallahassee from this second attempt were legible. Several additional fax attempts were made between 0846 and 0915 EDT to ensure that all the received documents were legible. During each fax attempt the documents received were taken from the ramp office to the incident command.

Beginning about 1055 EDT the FedEx operations center began scanning the documents and sending them as an attachment on an e-mail document. According to FedEx, these images were as close to the original appearance as possible, however, the entire process from scanning to printing at Tallahassee took over 1-½ hours to complete. (Appendices G, H & I)

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container. This record is maintained on the FedEx internal information database and can be accessed on all company computer terminals. A copy prints automatically at both departure and destination airport when the flight is closed. Other copies can be readily printed from the database.

[4] A DOT exemption is a document issued under the authority of 49 U.S.C. 5117 by the Associate Administrator of the Research and Special Programs Administration that authorizes a person to perform a function that is not otherwise authorized by the Hazardous Materials Regulations (49 CFR Subchapter C).

E. Hazardous Materials Information

The following information was extracted from shipping papers provided by FedEx, and interviews with shippers and consignees of the explosives and radioactive materials. The unit load device (ULD) AWX0108FM, a full width ULD, in position 1 (The first compartment behind the cockpit on the main deck.), contained a shipment of explosives, one of flammable liquids, two of corrosive materials, and several shipments of different miscellaneous hazardous materials.

The explosives were described as 6 ea. fuzes, detonating, 1.4S, UN 0367. The weight of the explosives is 188 mg per each fuze. (The total weight of the explosives was shown as 1128 mgs). The Department of the Air Force identified the fuzes as a guided missile test fuzes. The explosives were shipped by Kayman Dayron, Inc., Orlando, Florida, and consigned for Lockheed Martin (Pike County Facility), Troy, Alabama. The consignee for the explosives stated that these fuzes were designed for training missiles and that they contained only minute quantities of explosives that activate mechanisms within the fuze. They fuzes were designed and tested to be "hand-safe, " or able to be activated while being held without injury to the holder.

The flammable liquid was described as one fiberboard box[5] of adhesives, 3,UN1133, II. The quantity was shown as 0.46 L. The flammable liquid was shipped by PCR-DHSOTO International, Inc. Indianapolis, Indiana, and consigned to General Dynamics Land System, Tallahassee.

One corrosive material shipment was described as 2 plywood boxes of batteries, wet, filled with alkali, 8, UN 2795. The weights of the two boxes were shown as 243 Kg and 244 Kg. A third box on the same waybill was not loaded on the aircraft. The batteries were shipped by SAFT Bordeaux, Bordeaux, France, and consigned to SAFT America Inc., Valdosta, Georgia, USA.

A second corrosive shipment was described as one fiberboard box[5] of corrosive liquid, acidic, organic, NOS (contains acetic acid), 8, UN3265, III. The quantity was shown as 0.004 L. The acetic acid solution was shipped by Beckman Coulter, Somerset, New Jersey, and consigned to Thomasville, Georgia.

There were three different types of miscellaneous hazardous materials: seat belt pretensioners, chemical kits, and air bag inflators.

There were three shipments of seat belt pretensioners[6], 9, UN3268, III. The first seat belt pretensioner quantity was shown as 1.00 kg. It was shipped by Mazda, Olive

[5] The fiberboard box is the outer container. The regulations require hazardous liquids to be contained in inner glass, plastic, earthenware, or metal containers, depending on the material.

[6] Seat belt pretensioners are devices intended to tighten a seat belt in order to restrain a car occupant as early as possible during a crash. They contain a small pyrotechnic device that generates gas that results in tightening the seatbelt. The actuator or squib charge generally is zirconium perchlorate or boron potassium nitrate (approx. 0.1 g) and the pyrotechnic propellant is nitrocellulose (approx 1 g.).

Branch, Mississippi, and consigned to Mitchell Mazda, Enterprise, Alabama. The second quantity was shown as 1.00 kg. It was shipped by Ford Motor Co., Livonia, Michigan, and consigned to Albany Ford, Albany, Georgia. The third quantity was shown as 1.6 kg. It was shipped by Mercedes-Benz, Fontana, California, and consigned to Hentschel Motor Cars, Albany, Georgia.

There were three shipments of chemical kits, 9, UN3316. The first chemical kit was shown as 0.04 kg. It was shipped by Beckman Coulter, Chaska, MN, and consigned to Medical Group North Florida, Tallahassee, FL. The second chemical kit was shown as 220 ml. The shipper was Abbott Labs, North Chicago, IL, and it was consigned to Southeast Alabama Med Center, Dothan, AL. The third was shown as 110 ml. The shipper was Abbott Labs, North Chicago, IL, and it was consigned to Southeast Alabama Med Center, Dothan, AL.

There was one shipment of an air bag inflator, pyrotechnic, 9, UN3268, III. The quantity was show as 4 g. The shipper was Mazda North America, Sandston, VA, and it was consigned to Sunshine Mazda, Albany, GA.

The unit load device (ULD) AWX0108FM, a half width ULD, in position 3 right (The third compartment back from the cockpit, and on the right side of the main deck.), contained four shipments of radioactive materials, three of nonflammable gas, and two of miscellaneous hazardous materials.

The first shipment of radioactive material was described as radioactive I material, Type A package, phosphorus 32, 7, UN2915. The material was further described as a solid salt, 7.19000 GBq,[7] TI 0.0,[8] with dimensions: 25 X 46 X 63 cm. The radioactive material was shipped by Guidant VI, Pearland, Texas, and consigned to Tallahassee Community Hospital, Tallahassee, Florida.

The second shipment of radioactive material described as Yellow II radioactive material, Type A package, phosphorus 32, 7, UN2915. The material was further described as a liquid, 59.2 MBq,[9] TI 0.1 Dimensions, 28 X 28 X 25 cm. The radioactive material was shipped by ICN Radiochemicals Irvine, CA, and consigned to Tallahassee, Florida.

The third and fourth shipments of radioactive materials were described as Yellow II radioactive material, TL (thallium) 201 Liquid/Salt, 5.47 GBq, Yellow II, 0.3. Bristol-Myers Squibb Med. Img, Inc., North Billerica, Massachusetts, shipped both shipments.

[7] The symbol GBq stands for gigabecquerel which is a unit for radioactivity that equates to the disintegration of $1x10^9$ atoms per second. This unit replaces the Curie. 1 Curie = 37 GBq.

[8] The symbol TI stands for "Transport Index" which is "the dimensionless number (rounded up to the next tenth) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation." The greater the number the greater control is necessary.

[9] MBq – Megabecquerel = disintegration of $1x10^6$ atoms per second.

One was consigned to Numed, Inc., Albany, Georgia, and the other was consigned to Mediscan, Inc., Valdosta, Georgia.

The first shipment of nonflammable gas was described as one fiberboard box (containing a cylinder) of 1,1,1,2-tetrafluoroethane, 2.2, UN3159. The quantity was shown as 13.61 kg. The gas was shipped by Johnson Industries, Norcross, Georgia, and consigned to Panama City Toyota, Panama City, Florida.

A second shipment of nonflammable gas was described as one fiberboard box (containing a cylinder) of compressed gas, NOS (bromotrifluoromethane, nitrogen), 2.2, UN 1956. The weight was shown as 1.13 kg. The shipment was offered by Defense District Depot Susquehanna East, New Cumberland, Pennsylvania, and consigned to SR WOU9 Aviation Maintenance Cont AWCF SARSS, Fort Rucker, Alabama.

The third shipment of nonflammable gas was described as one fiberboard box of fire extinguishers, 2.2, UN1044. The weight was shown as 6.10 kg. The fire extinguishers were shipped by Johnson Industries, Norcross, Georgia, and consigned to FedEx, Tallahassee, Florida.

The first miscellaneous hazardous material was described as one fiberboard box of life-saving appliances, self-inflating, 9, UN2990. The quantity was shown as 26.78 kg. The life-saving appliances were shipped by Eastern Aero Marine, Miami, Florida, and consigned to Andrews AFB, Maryland.

The second miscellaneous hazardous material was described as seat belt pretensioners, 9, UN3268, III. The quantity was shown as 1.6 kg. It was shipped by Mercedes-Benz, Fontana, California, and consigned to Hentschel Motor Cars, Albany, Georgia.

The aft belly compartment contained a shipment of nonflammable gas, and a shipment of miscellaneous hazardous materials. The nonflammable gas was described as fiberboard box (containing a cylinder) of 1,1,1,2-tetrafluoroethane, 2.2, UN3159. The quantity was shown as 13.61 kg. The gas was shipped by Johnson Industries, Norcross, Georgia, and consigned to Panama City Toyota, Panama City, Florida.

The miscellaneous hazardous materials was described as 1 fiberboard box of dangerous goods in apparatus, 9, UN3363. The quantity was shown as 0.01 L. A Pratt Whitney Canada invoice shows this item was a fuel pump. The fuel pump was shipped by Pratt Whitney Canada, Longueuil, Canada, and consigned to Raytheon Aerospace LLC, Panama City, Florida.

Two (2) items were recovered from the wreckage in the general area of the material that was identified as being loaded in the full width ULD, in position 1. These were one-gallon metal cans; one round paint can and one rectangular can. The marking

on these items identified them as coming from Tempo Aerospace Inc., Toronto, Ontario. Neither was shown on the list of hazardous materials on the airplane provided by FedEX.

Interviews with a customer service representative at Tempo Aerospace, Canada, and shipping documents they provided indicated that these two items were offered by Tempo Aerospace to FedEX in Toronto on July 25, 2002. The shipment was described as one fiberboard box of paint, 3 (flammable liquid), UN1263, III. The quantity was shown as 4 L., and two fiberboard boxes of paint related material, 3 (flammable liquid), UN1263, II. The quantity was shown as 4 L. The shipment was consigned to King Aerospace, Inc., Tyndall, AFB, Florida.

The investigation revealed the FedEx carried the Tempo Aerospace shipment to Memphis as declared hazardous materials. In Memphis the shipment was placed on a baggage cart and taken to the DG building. That was the last record that FedEx could locate regarding this shipment. However, other FedEx records indicate that at about the same time the baggage cart containing the Tempo Aerospace shipment arrived at the DG building, the load for the Tallahassee bound FedEX flight 1478 was being completed. Also before loading the airplane, ULD AWX0108FM was determined to be too heavy to be placed on the airplane. To reduce its weight, one of three heavy plywood boxes containing batteries, wet, filled with alkali, 8, UN 2795, was removed from the ULD. The ULD was then loaded on the airplane. There was no record of, nor do FedEx employees recall, placing the Tempo Aerospace shipment in the ULD.

FedEx records also indicated that 76.9 lbs of dry ice was loaded in the half width ULD in position 3 right, and 3.5 lbs were loaded in the aft belly compartment.
(Appendices A, B, C, E, F, M, N & P)

F. Hazardous Materials Packaging

The hazardous materials packaging was damaged by crash impact, fire and emergency response efforts. Each package is described in the condition it was taken from the aircraft. Not all packages were retrieved.

The explosives/ fuzes were found inside 3 metal containers. Each container held 2 fuzes guided missile units. The exterior was charred with light fire damage. Markings on the fuzes:

Fuze, Guided Missile
FMU – 156(T-2)/B
(Functional Trainer)
PN: 029K9SOCN7960039Z-010
MFR: 30163
Serial Number _____
Contract No. JADA S98036
DOM 2002/07
NEW: 188mg

The corrosive/ batteries were found resting on the charred remains of a plywood box. There were 10 batteries, and each battery had 5 cells. All batteries had extensive external fire damage. The following marking were observed on the batteries:

Type SRX 1500P
Designation
KH 156 P
Date
Ni-Cd
Saft
Nife

Two nonflammable gas cylinders were found. One was intact, full and undamaged about 100 feet west of the aircraft nose cone. A fiberboard box with marking indicating that it may have contained that cylinder was found a few feet away. The second cylinder was found in the aircraft near or within position 1. It was empty, burned and had no visible information or fiberboard box. Each cylinder had a center-welded, 2 piece steel construction. The box was marked:

Dupont
SUVA 134a
Refrigerant
1,1,1,2-tetrafluoroethane
Class 2.2 Nonflammable gas
UN3159

A life raft with a 2-foot long by 5-inch diameter cylinder was found with 4 signal distress day and night flares number 1, mark 4. The outer packaging was damaged by fire and water but the cylinder and flares appeared to be intact.

The Florida Department of Health Bureau of Radiological Control identified several packages of radioactive materials. 8 small packages of radioactive materials were found in plastic bottles: 7 were identified as thallium 201 solution, and 1 was phosphorus 32 in solution. All of the plastic bottles containing thallium 201 solution had fire damage; much of the damage was severe although the bottles were still recognizable despite melting. The plastic bottle containing phosphorous 32 and a small cardboard box that held the bottle were still intact. The Department of Health Bureau of Radiological Control also identified one device about the size of a VCR recorder as emitting radiation. This was believed to be a medical device that contained the phosphorus 32 solid salt. The device was severely fire damaged. All exterior nonmetal components were destroyed by the fire. The Department of Health Bureau of Radiological Control stated that there was no evidence of contamination and believed that no public health threat existed from the radioactive materials.

The two items recovered from the wreckage that were not on the list of hazardous materials on the airplane provided by FedEx had the following information marked on them:

One 1-gallon metal can (round paint can) (3.78 liters).
Tempo Aerospace Inc.
Flammable liquid Class 3
Paint Related Material UN1263

This can had severe fire damage and was empty.
One 1-gallon metal container (rectangular can) (3.78 liters)
Tempo Aerospace Inc.
Flammable liquid Class 3
Paint Related Material UN1263
Thinner

This can's label was damaged but it showed no evidence of fire exposure. The pour spout and cap for the can was missing however about 20 percent of the contents of the can still remained. (Appendices K, L, O & P)

G. Federal Express Hazardous Materials Program Overview

FedEx is a Part 121 cargo-only air carrier that will accept shipments of hazardous materials for carriage on their aircraft. The air overnight service of FedEx is called FedEx Express. FedEx Express has a hazardous materials, called dangerous goods or DG, program that oversees what materials are accepted for carriage, how they are packaged and marked, their proper loading on aircraft, track their movement, and ensure that FedEx employees are trained in the program. The program involves about 150 personnel in the following management and support groups:

- Corporate Safety / DGADMIN (Administers the DG program as well as offers approximately eighty five DG Seminars per year, to shippers of DG.)
- Corporate Safety Specialists (one per district)
- Regional DG Instructors
- District DG Analysts
- Customer Support DG Hotline (to assist customers with questions about how to prepare DG Shipments.)

FedEx Express also currently has approximately 8,700 employees trained as DG Specialists.

Hazardous Materials Package Acceptance-FedEx Express utilizes the DOT provision in Title 49 Code of Federal Regulations, §171.11, which allows all hazardous materials (dangerous goods) shipments to be offered in accordance with the International Civil Aviation Organization (ICAO) regulations. (See Section H "Federal Regulations")

The only exceptions to FedEx's requirement to use ICAO regulations are shipments offered in accordance with the small quantity exceptions (§173.4), ORM-D Consumer Commodities (§173.144), and shipments using DOT Exemptions that are not recognized in ICAO.

FedEx Express transports hazardous materials packages for all types of industry. Although FedEx transports most hazardous materials, they first must be within the type and quantity authorized for air transportation in accordance with the ICAO regulations. For this reason, the average hazardous materials package quantity is less than 4 liters.

In addition to the Federal and ICAO requirements, FedEx Express has established additional internal requirements on the hazardous materials that may be accepted for carriage. There are some commodities that FedEx will not accept i.e.: hazardous waste, toxic inhalation hazard, and acids capable of igniting organic materials without external ignition sources. FedEx has also received a carrier restriction, FX 12, from the International Air Transport Association (IATA) that requires shippers of hazardous materials to use only shipper declarations that are "typed" or generated from a computer.

Transport and On-Going Inspection- Hazardous materials packages are tentatively accepted at customer locations, and are transported by road to the local FedEx terminal where a DG Specialist inspects for compliance. If all markings, labels, and shipping papers are correct, a 390 B or 390BR Pilot Notification form is then completed for the shipment.

Hazardous Materials Forms-

The following 390 series forms are carried on the airplane, and FedEx requires that a copy of the forms be maintained at the departure airport's FedEx ramp:

390A Form - This form is basically a cover sheet that has a summary of the information about the hazardous materials on the flight. It is used in combination with the other 390 series forms. FedEx's 390A form combines the federally required elements of the notification to pilot with other elements that are not required by the regulations. It has a spread sheet that shows the location of each of the hazardous materials by hazard class, a hazard class compatibility grid, a total of the radioactive material transport indexes (T.I.) on the airplane, and a total of the weight of dry ice broken down by main deck and the belly compartments. The quantity limits for radioactive materials and dry ice are also provided on the form, which provide a visual check to ensure compliance with applicable requirements. Except for the information provided on the radioactive materials and dry ice, the form does not provide the number or the weight of the hazardous materials shipments. Also the form does not have any specific information, other than hazard class, of the exact nature of each hazardous materials shipment.

Each shipment has one of the following forms: One copy of the appropriate form for each shipment is on the package and is used to identify the package during transfers, and one copy is provided to the pilot with the form 390A .

390B & 390BR- ***Notification to Pilot*** – These forms contain specific shipment details (hazardous materials description, classification, number of packages, and weight) and the location the shipment is loaded in the airplane. However, this form must have a separate federally required shipping paper or shipper's declaration form attached. The 390B form is used for all hazardous materials except radioactive materials; the 390BR is used for radioactive materials.

390C & 390CR - Combination ***Shipping Paper (Shipper's Declaration)*** **and** ***Notification to Pilot*** – These forms are a combination of a shipping paper or shipper's declaration form, and a notification to pilot form. FedEx's higher volume customers use these forms. These forms eliminate the need to duplicate the shipment details provided by the shipper on the shipping paper. Like the 390B forms, the 390C form is used for all hazardous materials except radioactive materials; the 390CR is used for radioactive materials.

390U – This form serves identical functions as a 390C or 390CR form. It is an intermediary or "migration" form for the transition from FedEx's current system to FedEx's planned hazardous materials electronic entry and reporting system, called AUTO DG (discussed later). Several high volume customers are currently using this form.

Dangerous Goods Separation Pouch- A dangerous goods separation pouch is created for each ULD or compartment on the aircraft that contains hazardous materials. The pouch contains a collection of the 390 series forms for each hazardous materials shipment in the ULD or compartment. The pouch also contains information about the total T.I. of radioactive materials, total weight of dry ice, and indicates whether a ULD must be loaded in a position that is accessible to the flight crew, or may be loaded in an inaccessible position. The contents of the pouches are reviewed by the flight crew prior to departing the gate. The pouches are then placed in the DG document pouch attached permanently to the interior surface of the cockpit door. The flight crew maintains the 390A form during the flight.

FDR (Flight Dispatch Report) DG Screen/ Data – This is an electronic form that provides an internal on-line summary of all hazardous materials on FedEx flights. Information is manually transferred from the 390 series forms to the FDR DG screen. The screen contains the number of the ULD and its position on the airplane or an identification of the aircraft compartment, and a list of all hazard classes and the total quantity by weight (T.I. for radioactive materials) of each hazard class in each ULD or compartment. The FDR DG screen does not have any specific information, other than hazard class and quantity, of the exact nature of each hazardous materials shipment.

The FDR DG screen is set to automatically print a copy of the screen at both the departure and destination airports when the flight is closed. FedEx requires that the flight be closed within 30 minutes of the push back of the aircraft. In the event of an accident, a copy of the FDR DG data is available at both airports. Further, any FedEx Express

employee may access the FDR DG data or print the screen information on their FedEx computer terminal (worldwide).

The FDR DG screen was developed after FedEx's September 5, 1996, incident in Newburgh, New York. The FDR DG screen was brought on-line around July 1998.

Hazardous Materials Loading- FedEx Express requires all class 1 (explosives), 2.1 (flammable gases), 3 (flammable liquids), 4 (flammable solids or substances), 5 (oxidizing substances), & 8 (corrosives) materials to be loaded in a location that is accessible[10] to the flight crew during flight. Classes 2.2 (non-flammable gases), 6 (poisonous and infectious substances), 7 (radioactive substances), and 9 (miscellaneous hazardous materials) are permitted to be loaded in an inaccessible location and usually in an aft loaded location.

On domestic flights, FedEx typically places all hazardous materials classes that are required to be accessible are loaded in an accessible ULD. FedEx identifies this ULD as the DG ULD. This ULD is usually position 1, but may be in a different location as long as that location is accessible to the flight crew. The DG ULD has a halon fire suppression coupler installed in the front top of the container. When the DG ULD is placed in the airplane, a DG specialist briefs one of the crewmembers, the container is closed, and a halon fire extinguisher in the airplane is connected to the coupler. On internationals flights, the dangerous goods may be palletized instead of being placed in a ULD. Pallets containing hazardous materials classes that are required to be accessible are placed in an accessible location. In this case fire extinguishers, in addition to the standard aircraft support fire extinguishers, are placed by the smoke curtain separating the cockpit from the cargo.

Note- Activation of the halon fire suppression system within the DG ULD, is dependent on aircraft type. Initiation of the fire suppression is from the cockpit on the 727 aircraft and located just forward of the smoke curtain or bulkhead on all other aircraft types operated. The halon extinguishers for the DG ULD's are in addition to other Federal requirements for the standard fire suppression on board each aircraft.
(Appendix I)

Training - All FedEx employees with any role in package acceptance or handling are required to take an annual four-hour course in hazardous materials awareness. They are trained in hazardous materials package recognition and handling, and in detecting undeclared hazardous materials by examining the packaging, its markings, and the description on the shipping documents.

[10] Title 49 CFR §175.85(b) describes accessible to the flight crew as being loaded on the aircraft in a manner that a crew member or other authorized person can see, handle and when size and weight permit, separate such packages from other cargo during flight.

All FedEx locations that accept, sort, or transload hazardous materials packages must have individuals trained as DG Specialists. The DG Specialists take an initial 40 hours course in hazardous materials and annual recurrent training.

AUTO DG - Project in Development – FedEx considered the FDR DG Screen, mentioned earlier, a short-term solution to the need for immediate access to aircraft or vehicle contents during an emergency. Therefore, also in response to FedEx's September 5, 1996, incident in Newburgh, New York, after implementing the FDR DG Screen, a multi-disciplined task group was formed to develop a hazardous materials electronic entry and reporting system, called AUTO DG, which will be used to provide electronic manifesting and immediate access to aircraft or vehicle contents, and to eliminate FedEx's 390 type forms.

Once implemented, the hazardous materials shipment data will be entered using a relational database with UN numbers as the reference. It will have all the federally required hazardous materials shipping information including: proper shipping name, hazard class, UN number, packing group, quantity, and applicable exemptions. It will also have the shipper's 24 hr emergency contact phone number. The information will be electronically linked to the FedEx Express tracking number. The printout will be computer generated, eliminating issues associated with hand written legibility problems. The printout will consolidate the information for sixteen to twenty shipments onto one page. Like the FDR DG Screen, any FedEx Express employee will be able to access the data or print the screen information on their FedEx computer terminal (worldwide). The project's current implementation date is approximately March 31, 2003. (Appendix I)

H. Federal Regulations

Excerpts from Title 49 Code of Federal Regulations, Subchapter C, "The Hazardous Materials Regulations" follow:

Part 171 – General Information, Regulations, and Definitions

171.2 General requirements.

(a) No person may offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance with subpart G of part 107 of this chapter, if applicable, and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by applicable requirements of this subchapter, or an exemption, approval or registration issued under this subchapter or subchapter A of this chapter.

171.11 Use of ICAO [International Civil Aviation Organization] Technical Instructions.

Notwithstanding the requirements of parts 172 and 173 of this subchapter, a hazardous material may be transported by aircraft, and by motor vehicle either before or after being transported by aircraft, in accordance with the ICAO Technical Instructions if the hazardous material:

(a) Is packaged, marked, labeled, classified, described and certified on a shipping paper and otherwise in a condition for shipment as required by the ICAO Technical Instructions;

(b) Is within the quantity limits prescribed for transportation by either passenger-carrying or cargo aircraft, as appropriate, as specified in the ICAO Technical Instructions;

(c) Is not a forbidden material or package according to §173.21 of this subchapter or column 3 of the §172.101 Table; and

(d) Fulfills the following additional requirements as applicable: (See Appendix J)

Part 172 – Hazardous Materials Table, Special Provisions…

172.101 ***Hazardous Materials Tables*** (Excerpts in Appendix J)

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Subpart G - Emergency Response Information

172.600 Applicability and general requirements.

(a) *Scope.* Except as provided in paragraph (d) of this section, this subpart prescribes requirements for providing and maintaining emergency response information during transportation and at facilities where hazardous materials are loaded for transportation, stored incidental to transportation or otherwise handled during any phase of transportation.

(b) *Applicability.* This subpart applies to persons who offer for transportation, accept for transportation, transfer or otherwise handle hazardous materials during transportation.

(c) *General requirements.* No person to whom this subpart applies may offer for transportation, accept for transportation, transfer, store or otherwise handle during transportation a hazardous material unless:

(1) Emergency response information conforming to this subpart is immediately available for use at all times the hazardous material is present; and

(2) Emergency response information, including the emergency response telephone number, required by this subpart is immediately available to any person who, as a representative of a Federal, State or local government agency, responds to an incident involving a hazardous material, or is conducting an investigation which involves a hazardous material.

(d) *Exceptions.* The requirements of this subpart do not apply to hazardous material which is excepted from the shipping paper requirements of this subchapter or a material properly classified as an ORM-D.

172.602 Emergency response information.

(a) *Information required.* For purposes of this subpart, the term ``emergency response information" means information that can be used in the mitigation of an incident involving hazardous materials and, as a minimum, must contain the following information:

(1) The basic description and technical name of the hazardous material as required by §§172.202 and 172.203(k), the ICAO Technical Instructions, the IMDG Code, or the TDG Regulations, as appropriate;

(2) Immediate hazards to health;

(3) Risks of fire or explosion;

(4) Immediate precautions to be taken in the event of an accident or incident;

(5) Immediate methods for handling fires;

(6) Initial methods for handling spills or leaks in the absence of fire; and

(7) Preliminary first aid measures.

(b) *Form of information.* The information required for a hazardous material by paragraph (a) of this section must be:

(1) Printed legibly in English;

(2) Available for use away from the package containing the hazardous material; and

(3) Presented-

(i) On a shipping paper;

(ii) In a document, other than a shipping paper, that includes both the basic description and technical name of the hazardous material as required by §§172.202 and 172.203(k), the ICAO Technical Instructions, the IMDG Code, or the TDG Regulations, as appropriate, and the emergency response information required by this subpart (e.g., a material safety data sheet); or

(iii) Related to the information on a shipping paper, a written notification to pilot-in-command, or a dangerous cargo manifest, in a separate document (e.g., an emergency response guidance document), in a manner that cross-references the description of the hazardous material on the shipping paper with the emergency response information contained in the document. Aboard aircraft, the ICAO ``Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods" and, aboard vessels, the IMO ``Emergency Procedures for Ships Carrying Dangerous Goods", or

equivalent documents, may be used to satisfy the requirements of this section for a separate document.

(c) *Maintenance of information.* Emergency response information shall be maintained as follows:

(1) *Carriers.* Each carrier who transports a hazardous material shall maintain the information specified in paragraph (a) of this section and § 172.606 of this part in the same manner as prescribed for shipping papers, except that the information must be maintained in the same manner aboard aircraft as the notification of pilot-in-command, and aboard vessels in the same manner as the dangerous cargo manifest. This information must be immediately accessible to train crew personnel, drivers of motor vehicles, flight crew members, and bridge personnel on vessels for use in the event of incidents involving hazardous materials.

(2) *Facility operators.* Each operator of a facility where a hazardous material is received, stored or handled during transportation, shall maintain the information required by paragraph (a) of this section whenever the hazardous material is present. This information must be in a location that is immediately accessible to facility personnel in the event of an incident involving the hazardous material.

172.604 Emergency response telephone number.

(a) A person who offers a hazardous material for transportation must provide an emergency response telephone number, including the area code or international access code, for use in the event of an emergency involving the hazardous material. The telephone number must be -

(1) Monitored at all times the hazardous material is in transportation, including storage incidental to transportation;

(2) The number of a person who is either knowledgeable of the hazardous material being shipped and has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information; and

(3) Entered on a shipping paper, as follows:

(i) Immediately following the description of the hazardous material required by subpart C of this part; or

(ii) Entered once on the shipping paper in a clearly visible location. This provision may be used only if the telephone number applies to each hazardous material entered on the shipping paper, and if it is indicated that the telephone number is for emergency response information (for example: ``EMERGENCY CONTACT: * * *).

(b) The telephone number required by paragraph (a) of this section must be the number of the person offering the hazardous material for transportation or the number of an agency or organization capable of, and accepting responsibility for, providing the detailed information concerning the hazardous material. A person offering a hazardous material for transportation who lists the telephone number of an agency or organization shall ensure that agency or organization has received

current information on the material, as required by paragraph (a)(2) of this section before it is offered for transportation.

(c) The requirements of this section do not apply to-

(1) Hazardous materials that are offered for transportation under the provisions applicable to limited quantities; and

(2) Materials properly described under the following shipping names: …

Carbon dioxide, solid…Consumer commodity, Dry ice…

172.606 Carrier information contact.

(a) Each carrier who transports or accepts for transportation a hazardous material for which a shipping paper is required shall instruct the operator of a motor vehicle, train, aircraft, or vessel to contact the carrier (e.g., by telephone or mobile radio) in the event of an incident involving the hazardous material.

Part 175 – Carriage by Aircraft

175.30 Accepting and inspecting shipments.

(a) No person may accept a hazardous material for transportation aboard an aircraft unless the hazardous material is:

(1) Authorized, and is within the quantity limitations specified for carriage aboard aircraft according to §172.101 of this subchapter or as otherwise specifically provided by this subchapter.

(2) Described and certified on a shipping paper prepared in duplicate in accordance with subpart C of part 172 or as authorized by §171.11 of this subchapter. The originating aircraft operator must retain one copy of each shipping paper for 90 days;

(3) Labeled and marked in accordance with subparts D and E of part 172 or as authorized in §171.11 of this subchapter, and placarded (when required) in accordance with subpart F of part 172 of this subchapter; and,

(4) Labeled with a ``CARGO AIRCRAFT ONLY" label (see §172.448 of this subchapter) if the material as presented is not permitted aboard passenger-carrying aircraft.

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175.33 Notification of pilot-in-command.

(a) Except as provided in § 175.10, when a hazardous material subject to the provisions of this subchapter is carried in an aircraft, the operator of the aircraft must provide the pilot-in-command with accurate and legible written information as early as practicable before departure of the aircraft, which specifies at least the following:

(1) The proper shipping name, hazard class and identification number of the material as specified in §172.101 of this subchapter or the ICAO Technical

Instructions. In the case of Class 1 material, the compatibility group letter also must be shown. If a hazardous material is described by the proper shipping name, hazard class, and identification number appearing in:

(i) Section 172.101 of this subchapter, any additional description requirements provided in §§172.202 and 172.203 of this subchapter must also be shown in the notification.

(ii) The ICAO Technical Instructions, any additional information required to be shown on shipping papers by §171.11 of this subchapter must also be shown in the notification.

(2) The total number of packages;

(3) The net quantity or gross weight, as applicable, for each package except those containing Class 7 (radioactive) materials and those for which there is no limit imposed on the maximum net quantity per package;

(4) The location of the packages aboard the aircraft;

(5) Confirmation that no damaged or leaking packages have been loaded on the aircraft;

(6) For Class 7 (radioactive) materials, the number of packages, overpacks or freight containers their category, transport index (if applicable), and their location aboard the aircraft;

(7) Confirmation that the package must be carried on cargo aircraft only if its transportation aboard passenger-carrying aircraft is forbidden; and

(8) An indication, when applicable, that a hazardous material is being carried under terms of an exemption.

(b) A copy of the written notification to pilot-in-command shall be readily available to the pilot-in-command during flight. Emergency response information required by subpart G of part 172 of this subchapter must be maintained in the same manner as the written notification to pilot-in-command during transport of the hazardous material aboard the aircraft.

175.35 Shipping papers aboard aircraft.

(a) A copy of the shipping papers required by §175.30(a)(2) must accompany the shipment it covers during transportation aboard an aircraft.

(b) The documents required by paragraph (a) of this section and §175.33 may be combined into one document if it is given to the pilot-in-command before departure of the aircraft.

175.85 Cargo location.

(a) Except as provided in § 175.10, no person may carry a hazardous material subject to the requirements of this subchapter in the cabin of a passenger-carrying aircraft or on the flight deck of any aircraft. Hazardous materials may be carried in a main deck cargo compartment of a passenger aircraft provided that the compartment is inaccessible to passengers and that it meets all certification

requirements for a Class B aircraft cargo compartment in 14 CFR 25.857(b)or for a Class C aircraft cargo compartment in 14 CFR 25.857(c).

(b) Each package containing a hazardous material acceptable only for cargo aircraft must be loaded in such a manner that a crew member or other authorized person can see, handle and when size and weight permit, separate such packages from other cargo during flight.

(c) Notwithstanding the provisions of paragraph (b) of this section:

(1) When packages of the following hazardous materials are carried on cargo aircraft only, they may be carried in a location which is inaccessible to a crewmember during flight and are not subject to the weight limitation specified in paragraph (a)(2) of §175.75 of this subchapter.

(i) Class 7 (radioactive) materials,

(ii) Division 6.1 (poisonous) materials (except those labeled FLAMMABLE),

(iii) Materials in Division 6.2 (etiologic or infectious substances),

(iv) Class 3 (flammable liquid) materials with a flashpoint above 23 °C (73 °F) that do not meet the definition of another hazardous class,

(v) Class 9 (miscellaneous hazardous) materials, and ORM-D materials.

(Appendix J.**)**

I. Previous Safety Recommendations

As a result of the September 5, 1996, in-flight fire on FedEx flight 1406, and emergency landing at Stewart International Airport, Newburgh, New York, the Safety Board recommended that the Federal Aviation Administration (FAA) and the Research and Special Programs Administration (RSPA):

> Require, within 2 years, that air carriers transporting hazardous materials have the means, 24 hours per day, to quickly retrieve and provide consolidated specific information about the identity (including proper shipping name), hazard class, quantity, number of packages, and location of all hazardous materials on an airplane in a timely manner to emergency responders. [A-98-75 (FAA) & A-98-80 (RSPA)]

On October 27, 1998, a letter from the FAA indicated that had RSPA agreed that RSPA, not the FAA, was in the best agency to accomplish this task because it is within RSPA's regulatory responsibility. Therefore, on April 22, 1999, because of RSPA's assumption of the lead agency responsibility, the Safety Board classified A-98-75 to the FAA: Closed—No longer applicable. In a November 13, 2000, letter to RSPA the Safety Board noted that in the 2 years since the recommendation had been issued, little or no progress had been made to satisfied the intent of the recommendation, and therefore, the Safety Board classified Safety Recommendation A-98-80, "Open—Unacceptable Action."

J. Federal Rulemaking

RSPA published an Advanced Notice of Proposed Rulemaking (ANPRM) docket no. HM-206-C on August 15, 2000. The ANPRM summary stated, "RSPA solicits comments and suggestions on ways to implement a recommendation from the National Transportation Safety Board (NTSB) to require that air carriers transporting hazardous materials have the means to quickly retrieve and provide information about the identity of a hazardous materials on an airplane." On February 13, 2002, after reviewing the comments received from the ANPRM, RSPA issued a Notice of Proposed Rulemaking (NPRM) within the same docket that proposed to amend the Hazardous Materials Regulations by adopting new requirements for aircraft operators to make readily available a copy of the Notification of the Pilot-in-Command (NOPC), or the information contained in it, at the departure and arrival points for each aircraft carrying hazardous materials. The NPRM also would require that an air carrier provide a 24-hour telephone number on the NOPC that could be communicated by the flight crew to air traffic controllers in the event of an in-flight emergency.

In its April 26, 2002, comments to the NPRM, the Safety Board stated that the notice failed to address the fundamental purpose of Safety Recommendation A-98-80, which is "to ensure that the air carrier has the ability to quickly provide emergency responders with a consolidated list that not only identifies each hazardous material on board the aircraft but also the quantity and location of each hazardous materials packaging on the aircraft." The intent of the recommendation was to require specific information about the identity (including proper shipping name), hazard class, quantity, number of packages, and location of all hazardous materials on an airplane to be consolidated so that emergency responders can rapidly identify the materials on board, and develop effective responses to the hazards posed. The proposed rules would still allow information to be retained by the air carriers as individual shipping documents, which would result in the emergency responders having to review numerous shipping papers, or the carrier taking the time to assemble a list after the emergency has occurred, and then transmit the list to the responders. The Safety Board stated that it believed that to satisfactorily address Safety Recommendation A-98-80, the final rule under that docket should include an explicit requirement that an air carrier must have the capability to provide emergency responders with a consolidated list of the hazardous materials on any of its aircraft and appropriate information about those materials as specified in the recommendation.

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James E. Henderson
Hazardous Materials Group Chairman

List of Appendices

A. 390A Notification To Pilot Cover Sheet
B. Hazardous Materials Information: FedEx 390B, BR, C, CR or U Forms
C. FDR DG Screen Printout
D. Dangerous Goods Separation Pouch Labels
E. FedEx Compiled List of DG Shipments (Post accident)
F. Shipping Papers or Shipper's Declaration Forms
G. Interview of Mike Mitchell and John Wesley (Wes) Hollington FedEx Ramp Agents
H. Tallahassee Fire Department Dispatch Log & Misc Interview Notes
I. FedEx DG Program Overview& Misc Notes
J. Title 49 CFR Regulatory Information
K. TSA Notes
L. ALPA Notes
M. Tempo Aerospace Shipment Information
N. Radioactive Materials Information
O. Florida Department of Health Information (Radioactive Materials)
P. Photographs (on disk)
Q. Seat-belt Pretensioner Information