NTSB
National Transportation Safety Board
490 L'Enfant Plaza, SW
Washington, DC 20594-0001
www.ntsb.gov

Report Date: October 17, 2006

Addendum to Hazardous Materials Group Chairman's Factual Report

A. Accident Identification

Operator:	United Parcel Service Company (UPS)
Airplane:	DC-8-71F, N748UP
Location:	Philadelphia International Airport (PHL), Philadelphia, PA
Time/Date:	11:59 p.m. Eastern Standard Time (EST)
Date:	February 7, 2006
NTSB No.:	DCA06MA022

B. Hazardous Materials Group Members

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C. Accident Summary

On February 7, 2006, at 2359 eastern standard time, a Douglas DC-8-71F, N748UP, operated by United Parcel Service Company (UPS) as flight 1307, landed at Philadelphia International Airport (PHL), Philadelphia, Pennsylvania, after the crew reported a cargo smoke indication. The three crewmembers were able to evacuate the airplane using the L1 slide. The airplane later became engulfed in flames and was substantially damaged by fire. The three flight crewmembers received minor injuries. Night visual meteorological conditions prevailed and an instrument flight rules flight plan had been filed for the flight from Hartsfield-Jackson Atlanta International Airport (ATL), Atlanta, Georgia, to PHL. The scheduled cargo flight was conducted under 14 CFR Part 121.

D. Availability of Hazardous Materials Information

At the time of the Accident

Due to the amount of smoke inside the cabin, the flight-crew was unable to locate the Notification to Captain (NOTOC) upon egress from the aircraft. Similarly, when emergency responders made initial entry into the aircraft, they too were unable to find the NOTOC onboard. At approximately 00:05, the Incident Commander (IC) notified PHL Airport Operations that "they have a report of (hazardous materials) on the aircraft, but they are not able to get to the envelope at the pilots seat yet to find out what it is." About 4 minutes later, at 00:09, the IC requested that Airport Operations obtain a flight manifest from UPS so that the hazardous materials could be identified, as is standard practice. At this time an Airport Operations agent drove to the UPS ramp to locate appropriate personnel. At approximately 00:22 the agent returned to the aircraft with two UPS representatives, at which time the IC inquired about onboard hazardous materials. The UPS representative provided the positions of hazardous materials on the aircraft as listed on the prediction, a UPS document that identifies the locations of hazardous materials only. He stated that only the NOTOC would provide specific identification information for the hazardous materials. At approximately 00:25 emergency responders re-entered the aircraft to search for the NOTOC a second time. During this search effort various items were thrown out of the aircraft. At about 00:35 the UPS representative noticed the NOTOC lying on the ground near the aircraft, at which time he retrieved, hand-delivered and explained the information contained therein to the IC[1].

After the original NOTOC was recovered, UPS did not offer an electronic version of this information to either the IC or Airport Operations, and on-scene parties made no requests for such documents.

[1] Supporting documentation is available in the Survival Factors/Airport and Emergency Response Group Factual Report.

UPS Procedures

UPS charges their Flight Control Group in Louisville, KY with the responsibility of providing required hazardous materials information to the appropriate parties, upon request (ATTACHMENT 1). The Corporate Regulated Goods Manager for UPS indicated that the responsibility of contacting Flight Control to request such information however, does not rest on a single individual. Depending on the scenario, the request could come from Air Traffic Control, the flight-crew, or the management team at a UPS gateway (ATTACHMENT 2). Once a request is received, Flight Control retrieves the requested information via UPS' Hazardous Materials Information System (HMIS), and proceeds to either email or fax this information to the desired destination so that it may be relayed to emergency responders. In this case there is no record of any UPS personnel at PHL making a telephone call to Flight Control on the day of the accident (ATTACHMENT 3).

The HMIS system used by Flight Control in Louisville, KY to retrieve hazardous materials information was available at PHL when this accident occurred. Access to this system was however restricted and those few individuals who were authorized to use HMIS had limited access that allowed them to view only the number and location of dangerous goods shipments onboard an aircraft. Further, in the event of an emergency, personnel at PHL were not directed to retrieve information from this system, as all inquiries were to go through Flight Control in Louisville, KY (ATTACHMENT 4).

ATTACHMENT 1 – E-NOTOC TRAINING – EMERGENCY REPORTING RESPONSIBILITY
ATTACHMENT 2 – SUMMARY OF TELEPHONE INTERVIEW WITH SAM ELKIND, UPS
ATTACHMENT 3 – EXECUTIVE SUMMARY: UPS1307 FEB 8, 2006 INCIDENT IN PHL
ATTACHMENT 4 – SUMMARY OF TELEPHONE INTERVIEW WITH UPS PERSONNEL

Post-Accident Actions Taken by UPS

In an effort to achieve a more efficient transfer of hazardous materials information, UPS updated several of their internal procedures since the time of the accident in Philadelphia. While these changes do not change the fact that the Flight Control Group in Louisville, KY should be the point of contact in the event of an emergency, they do clarify UPS personnel's responsibilities, and the role and capabilities of Flight Control. Revisions were made to the sections of the Flight Operations Manual (FOM), the Airport Operations Methods Manual (AOMM), and the Airline Emergency Response Manual (AERM), which guide flight-crews, ground personnel at UPS gateways, and Flight Control personnel, respectively. (ATTACHMENT 4)

UPS revised their FOM on April 15, 2006 to include additional language regarding Flight Control capabilities. This change was issued in the form of a "Must Read Bulletin", however it is awaiting FAA approval so it has yet to be finalized. The new paragraph reads:

"From the duration of block-out to block-in, SDF Flight Control personnel have access to an electronic database regarding the type, quantity and load position of Dangerous Goods aboard each aircraft. If necessary during an in-flight emergency, the Flight Crew can provide the following telephone contact number; 1-502-359-5100 when addressing outside inquiries from Crash/Fire/Rescue personnel or other persons deemed necessary as to the Dangerous Goods being transported aboard the aircraft."

Effective June 23, 2006 the AOMM by which UPS ground personnel at their gateways operate under was revised to include the addition of the following language:

"Contact Flight Control for an inventory of any hazardous material transported aboard the aircraft involved in the incident. This information should be made available to airport rescue, firefighting and/or control tower personnel upon request.

NOTE: *Flight Control personnel have access to the type, quantity and load position of any hazardous material utilizing the Hazardous Material Information System (HMIS).* ***Flight Control*** *– 1-502-359-0300"*

As of June 30, 2006 the Flight Control Shift Manager's emergency response checklist was revised to assure that hazardous materials information is disseminated to the appropriate parties as quickly as possible. The checklist now requires that individual to perform the following actions immediately after starting an emergency log in the event of an emergency:

- *Check HMMS, HMIS, and COMAT for hazardous materials*
- *Advise ARFF: If unable to contact ARFF then contact the Tower*
- *Also advise if no hazardous materials on board*
- *Record the name and time of contact*

On another note, UPS indicated that select personnel at PHL were granted more comprehensive access to the HMIS system since the time of the Philadelphia accident on a trial basis. This allows authorized personnel to view hazardous materials information in its entirety, as Flight Control is already able to, but does not negate current ground personnel's responsibility to contact Flight Control for hazardous materials information in the event of an emergency. UPS stated that depending on the results of this trial, similar authorizations may be granted at other major gateways as well. (ATTACHMENT 4)

E. PHMSA Proposals to the ICAO and UN

The Pipeline and Hazardous Materials Safety Administration (PHMSA) submitted several proposals to the United Nations (UN) and the International Civil Aviation Organization (ICAO), regarding lithium-ion batteries. Four papers were submitted to the upcoming session of the ICAO Dangerous Goods Working Group and 3 papers submitted to the UN Sub-Committee of Experts on the Transport of Dangerous Goods. These meetings are scheduled for October and December 2006, respectively.

Papers submitted to ICAO by the United States of America propose the following: reporting of all incidents involving batteries, prohibition of damaged, defective or recalled lithium batteries, elimination of passenger exception for certain lithium batteries, and the establishment of quantity limits for lithium batteries contained in equipment.

The 3 papers submitted to the UN were done so on behalf of the International Federation of Air Line Pilots Association (IFALPA), the Portable Rechargeable Battery Association (PRBA) and the United States of America. The topic areas covered in these proposals include the assignment of a distinct UN Number for lithium-ion batteries, an amendment to lithium-ion battery size limits, and amendments to the provisions set forth Special Provision (SP) 188[2] to address the risk of lithium batteries and cells due to their potential to short circuit, respectively.

F. Lithium Battery Recalls

Since August 2006, the Consumer Product Safety Commission (CPSC), in cooperation with Dell, Apple, Lenovo and IBM, has recalled more than five million lithium-ion batteries. Consumers were warned of the potential for the batteries overheating in laptop computers and the possible fire hazard to their users. A total of sixteen reports of batteries overheating prompted these major product recalls. Two minor injuries and several cases of property damage resulted from these incidents.

In Philadelphia, the Safety Board's examination of cargo debris found in the area of the aircraft with the heaviest fire damage, uncovered 9 laptop computers and 10 loose battery packs that had sustained significant fire damage. Subsequent telephone calls to shippers, revealed that at least 2 of the laptops found were potentially part of the Dell recall. Verification of the serial numbers however could not be done due to the damage to the laptops.

G. Polyacrylonitrile (O-Pan) Felt Shipment

The Safety Board received an anonymous letter theorizing the involvement of a shipment of oxidized polyacrylonitrile felt in the UPS cargo plane accident. The proposed theory suggests that the material was shipped before being properly cooled after heat treatment, which may have resulted in the hot material igniting its packaging as the aircraft descended into PHL. No information about the processing of the material or the shipping company was however provided. (ATTACHMENT 5) A thorough investigation by the Board revealed that a package of this type of material was shipped via UPS by MTLS International, Inc. (MTLS), Atlanta, Georgia onboard flight 1307. Further investigation revealed that this shipment was placed in ULD number 10; one of the ULD's thoroughly examined following the accident. (ATTACHMENTS 6 & 7)

[2] SP 188 provides an exception from the provisions of the UN Model Regulations for lithium cells and batteries provided certain conditions are met.

The follow-up investigation revealed that this material had been oxidized to a fiber density of 1.37g/cc (grams per cubic centimeter) by Zoltek Corporation, Saint Charles, MO, and shipped to American Felt and Fiber Company (AFFCO), New Windsor, NY, on December 14, 2005. AFFCO processed this material into a felt that was to be used as a fire inhibitor for welding operations.

AFFCO was concerned about the level of hydrogen cyanide off-gassing that resulted when weld spatter contacted this material. Therefore, on January 31, 2006, they sent a test sample of the material via Yellow Transportation, Inc. to MTLS to experiment with whether their "carborizing" process would reduce the amount of hydrogen cyanide off-gassing. The material arrived at MTLS on Friday, February 3, 2006. (ATTACHMENTS 8, 9 & 10)

The owner and technical director of MTLS described their processing and cooling procedures to the Safety Board upon request. Essentially, oxidized polyacrylonitrile felt is heated in a continuous oven to 575º C. Given the length and feed rate of this oven, the felt is heated for roughly 4 ½ minutes in the controlled nitrogen environment. The felt is next chilled to 50º F in an in-line chiller, and then heated once again to about 90º C by hot air in a curing oven for 48 hours. Following these processes, the felt is allowed to cool for 24 hours before it is rolled onto a paper core and packaged for shipment. No records of actual times and temperatures used for processing the polyacrylonitrile felt were kept or provided by MTLS. (See ATTACHMENT 6)

The material was shipped back to AFFCO on February 7, 2006. (See ATTACHMENT 6)

ATTACHMENT 5 – ANONYMOUS LETTER REGARDING O-PAN SHIPMENT
ATTACHMENT 6 – INFORMATION FROM MTLS INTERNATIONAL, INC
ATTACHMENT 7 – INFORMATION FROM UPS
ATTACHMENT 8 – INFORMATION FROM AFFCO
ATTACHMENT 9 – INFORMATION FROM ZOLTEK CORPORATION
ATTACHMENT 10 – INFORMATION FROM YELLOW TRANSPORTATION, INC

H. Polyacrylonitrile Processing and Hazards

According to a research and development member and leader in carbon fiber research at Oak Ridge National Laboratories, the polyacrylonitrile material oxidizing process converts linear polymer precursor fibers into a cross-linked chain structure. This process, which is exothermic in nature, is divided into 4 steps to prevent fragmentation of the polymer chains, each of which occurs in a separate furnace or divided sections within a furnace(s). The temperature in each furnace is increased slightly, and times vary minimally, but are around 25 minutes per step.

The precursor fiber has a fiber density of 1.20 g/cc and is off-white in color. The first furnace is heated to about 200º C. This first step increases the fiber density to 1.235 g/cc and turns the material black; no other significant color changes occur during the process. The

second furnace increases the fiber density to 1.288 g/cc, and the third further increases it to 1.325 g/cc. The fourth and final furnace is heated to 275º C and additional oxygen is supplied to the environment. This ultimately takes the fiber density up to roughly 1.39 g/cc, at which point it is considered fully oxidized.

The Oak Ridge carbon fiber expert indicated that fully oxidized polyacrylonitrile materials are very stable. In fact, they are used in flame retardant suits for fire fighters and racecar drivers, and for mattresses and other commercial goods requiring fire retardant properties. He commented that if the density of the material delivered to MTLS was already about 1.37 g/cc the reaction was nearly complete. He went on to say that a reaction could have began as the material was removed from the oven, but it would have had to been rolled hot immediately upon its removal to continue reacting. The use of the in-line chiller would have however stopped the reaction. Also, the air heating to 90º C for 48 hours would not restart the reaction; as that temperature is not hot enough.

The expert believes that if the material was certified and handled as MTLS claims it was, then a reaction that could have started the packaging on fire would not have occurred. (ATTACHMENT 11)

ATTACHMENT 11 – INFORMATION FROM OAK RIDGE NATIONAL LABORATORY

Crystal G. Thomas
Hazardous Materials Group Member

ATTACHMENTS

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