



June 6, 2016

The Honorable Christopher A. Hart  
Chairman  
National Transportation Safety Board  
490 L'Enfant Plaza, SW  
Washington, DC 20594

Dear Chairman Hart:

Thank you for your February 9, 2016 letter concerning Safety Recommendations A-16-001 and A-16-002. The recommendations were issued following the National Transportation Safety Board's (NTSB's) participation in the Republic of Korea's Aviation and Railway Accident Investigation Board (ARAIB) investigation of the July 28, 2011 in-flight fire and crash of Asiana Airlines Flight 991. In that accident, Asiana Airlines Flight 991, a B747-400F airplane, crashed into international waters about 130 km west of Jeju International Airport, to which the flight crew had attempted to divert after reporting a cargo fire. The two pilots aboard the flight were fatally injured in the accident. The ARAIB investigation determined that the cause of this accident was a fire that developed on or near two pallets that contained lithium ion batteries (used in hybrid electric vehicles) and flammable liquids. As a result of the investigation, the NTSB issued two safety recommendations to the Pipeline and Hazardous Materials Safety Administration (PHMSA).

**A-16-001**

*Require that Class 3 flammable liquids and fully regulated Class 9 lithium batteries be physically segregated when stowed on board an aircraft such that packages containing these materials may not be placed on the same or adjacent pallets or ULDs.*

**A-16-002**

*Establish maximum loading density requirements that restrict the quantities of Class 3 flammable hazardous materials or Class 9 lithium batteries stowed on a single pallet or ULD, or on a group of pallets or ULDs, within an aircraft such that cargo fires can be effectively managed by on-board fire suppression capabilities.*

PHMSA concurs with the intent of both safety recommendations to enhance the safe transportation of lithium batteries by air and shares your concerns regarding the potential for lithium batteries to initiate and contribute to the severity of a fire in the cargo compartments of aircraft in the presence of flammable liquids. The safe transport of lithium batteries by air has

been an ongoing concern for PHMSA, the Federal Aviation Administration (FAA), and the U.S. Department of Transportation. PHMSA participates in a number of international forums, including the International Civil Aviation Organization (ICAO) Dangerous Goods Panel (DGP), as part of the ongoing process of harmonizing the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) with international standards and regulations and is committed to ensuring the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air and the HMR provide a level of safety such that lithium batteries can be carried without putting an aircraft or its occupants at risk.

As you stated in your letter, the ICAO DGP met in Montréal, Quebec, Canada in October 2015 to consider the development of further measures to mitigate the risks associated with the transport of lithium batteries when carried as cargo. With respect to Safety Recommendation A-16-001, temporary measures to mitigate the hazards of lithium battery transport by cargo aircraft were proposed (pending a comprehensive solution that would mitigate these hazards) to the DGP. These measures included, among others, the segregation of lithium batteries from other dangerous goods (e.g., flammable liquids). Given the complex nature of the safety problem that underlies Recommendation A-16-001, segregation or the other identified measures may or may not provide the ultimate solution to the problem. The DGP may also consider measures that are in addition to or in lieu of segregation, such as those that recognize that different operators have different mitigating tools available to them based on the size of their operation and the types of cargo compartments and fire suppressions systems available on their aircraft. Such measures would also need to provide enough flexibility to allow for the use of fire containment covers, fire resistant containers and unit load devices that could contain or suppress a lithium battery fire. PHMSA, in cooperation with the FAA, will continue to work within the ICAO DGP to address this issue during the current 2016-2017 biennium. Decisions taken by the DGP would be considered for adoption within the HMR in the earliest possible rulemaking once this work is complete.

With respect to Safety Recommendation A-16-002, PHMSA has been engaged with FAA in determining the best course of action to address this recommendation. Discussions and collaboration are ongoing and we plan to provide you with a more detailed plan of action on this recommendation in a follow-up response to this letter.

We note that recent measures approved by the ICAO Governing Council may provide for an alternative approach that would address the NTSB's concerns of stowage of lithium batteries with flammable liquids. Based on recommendations from the ICAO Air Navigation Commission, as well as the Dangerous Goods, Flight Operations, and Airworthiness panels, the ICAO Governing Council approved three new measures to enhance lithium battery safety, effective April 1, 2016. These measures include: (1) prohibiting the transport of lithium ion batteries as cargo aboard passenger aircraft; (2) requiring lithium ion batteries to be transported at not more than a 30 percent state of charge; and (3) limiting current provisions for small lithium batteries to no more than one package per consignment. PHMSA supports ICAO's measures and intends to incorporate these amendments into the HMR in an interim final rule anticipated for publication in September 2016. The timeline for this rulemaking may be reviewed at: <https://www.transportation.gov/regulations/report-on-significant-rulemakings>.

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In addition, the ICAO Dangerous Goods and Flight Operations panels recommended that operators conduct a safety risk assessment on the transport of dangerous goods and lithium batteries. The safety risk assessment process should include the implementation of necessary mitigation measures in order to ensure the safe transport of dangerous goods including lithium batteries as cargo on aircraft.

In summary, PHMSA is engaged in a number of important actions to further ensure the safety of lithium batteries on aircraft. PHMSA will continue to coordinate with FAA through the international standards organizations in consultation with industry and research institutions to assess incident data focusing on root causes and ongoing research to gauge any necessary changes to lithium battery transport requirements. Finally, PHMSA will follow-up with the NTSB with greater detail on all of its initiatives affecting lithium battery safety with respect to Safety Recommendations A-16-001 and A-16-002 when we have collectively determined a planned course of action to further address the recommendations.

If we can be of further assistance please contact Dirk Der Kinderen, NTSB Program Manager for the Office of Hazardous Materials Safety by phone at 202-366-8553 or by e-mail at [Dirk.DerKinderen@dot.gov](mailto:Dirk.DerKinderen@dot.gov).

Sincerely,



Marie Therese Dominguez