CIVIL AVIATION SAFETY AUTHORITY OF PAPUA NEW GUINEA

SAFETY ALERT BULLETIN

NO: 01/2016

DATE: 19/02/2016

A SAB contains important safety information and may include recommended action. SAB content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest degree of safety in the public interest. Besides the specific action recommended in a SAB, an alternative action may be as effective in addressing the safety issue named in the SAB.

TITLE: Risks of Fire or Explosion when transporting Lithium ion or Lithium metal batteries as cargo on passenger or cargo aircraft.

OBJECTIVE: This SAB serves to alert Civil Aviation Rule Part 119-121, 125, 135, 136 and 129 Air Operators of the potential risk of a potential hull loss due to significant identified dangers surrounding the transport of lithium batteries as cargo on both passenger and cargo aircraft.

This SAB also contains information and recommended actions that the Civil Aviation Safety Authority of Papua New Guinea (CASA PNG) strongly recommends, for air operators to consider when developing risk mitigation measures before transporting lithium ion or lithium metal batteries as cargo on both passenger and cargo aircraft.

> **NOTE:** This SAB only addresses lithium batteries not contained in or packed with equipment when offered for cargo and is not intended to cover the provisions concerning passengers and crew.

BACKGROUND: Due to recent findings of the FAA and he International Civil Aviation Organization (ICAO), both Boeing and Airbus aircraft manufacturers have issued communications to advise operators of the dangers associated with transporting lithium batteries as cargo on passenger and cargo aircraft. Lithium batteries are currently covered as Class 9 hazardous materials under ICAO Technical Instructions. The term 'lithium batteries' as used in this SAB include the following:

1. **Lithium Ion batteries (UN3480)** – These are rechargeable lithium batteries similar to those found in cameras, cell phones, laptop computers and radio controlled toys. Lithium polymer batteries are types of lithium ion batteries.
2. **Lithium Metal batteries (UN3090)** – These cannot be recharged and are designed to be discarded once their initial charge is used up.

This SAB recognizes that ICAO Technical Instructions on dangerous goods prohibit the carriage of lithium metal batteries (UN3090) as cargo on passenger aircraft. However, this prohibition does not

Civil Aviation Safety Authority of PNG
P O Box 1941
Boroko
National Capital District

Telephone: + 675 325 7320
Fax: + 675 325 1919
Website: www.casapng.gov.pg

mitigate the risks of carriage of lithium ion batteries (UN3480) as cargo on passenger aircraft, nor mitigate the risks with carrying either lithium ion batteries or lithium metal batteries onboard a cargo aircraft.

> **NOTE**: For clarity, UN3480 and UN309 do not include lithium batteries contained in or packed with equipment.

DISCUSSION: FAA testing has shown that a single lithium battery (cell), whether metal or ion, in thermal runaway will spread to neighbouring batteries in the package and to adjacent packages. Thermal runaway is initiated by an internal short within the battery that may be caused by a manufacturing contaminant, battery damage during handling or from heat produced in the environment, such as by an adjacent fire.

In 2015, FAA Tech Center testing showed that the ignition of the unburned flammable gases associated with a lithium battery fire could lead to catastrophic explosion. The current design of the Halon 1301fire suppression system (concentration 5%) in a Class C cargo compartment in passenger airplanes is incapable of preventing such an explosion. In addition, tests also revealed that the ignition of a mixture of flammable gases could produce an over pressure, dislodging pressure relief panels, and thereby allowing leakage from the associated cargo compartment. This could lead to the spread of smoke and gases from the fire into occupied areas of the airplane. The number of cells necessary to produce this condition is small and can occur with just a few packages.

CASA PNG RECOMMENDED ACTIONS: Based on the above, CASA PNG strongly recommends the following action(s):

1. Operators who engage in the transport of lithium ion batteries as cargo on passenger aircraft, or lithium ion or lithium metal batteries on cargo aircraft must perform safety risk assessments in order to establish whether, or how, they can manage the risk(s) associated with the transport of these batteries. This is in line with the ICAO and major airframe manufacturers (Boeing and Airbus) recommendations.
2. Operators who have previously performed a risk assessment are encouraged to re-evaluate their assessment in light of further evidence gained through the recent testing of lithium batteries. Operators that have implemented a formal Safety Management System (SMS) should accomplish a Safety Risk Assessment (SRA), in accordance with their Safety Risk Management process in its SMS.
3. CASA will work with operators to ascertain what actions they take in response to the ICAO recommendations and manufacturer publications to eliminate or reduce the risk. When considering risk mitigation strategies, CASA recommends cargo and passenger operators who wish to carry lithium ion batteries as cargo, review and consider the following:

    - All lithium batteries must comply with appropriate packaging and shipping requirements of CAR Part 92, Subpart B.

    - High density packages of lithium batteries and cells increases risk;

    - Training of personnel who handle lithium batteries must be included in the Dangerous Good Acceptance and awareness Training programmes per CAR 92.203 and 92.205;

- CAR 92.179 must include information on the dangers associated with any lithium battery; the proper labelling; the proper loading; the proper rejection criteria for damaged shipments; and emergency response procedures in the event of a heat/smoke/fire event involving lithium batteries.

When transporting lithium batteries, operators should consider (not limited to) the following:

- The types, quantities and the frequency of carriage of lithium batteries (including state of charge of the battery, if known);

- Evaluation of the fire protection features of each model of aircraft they operate;

• The operator's specific lithium battery acceptance requirements for packaging, state of charge, and any other limitations placed upon the shipper;

• The history of the shipper's compliance with dangerous goods transport regulations;

• The means of loading and limitations on lithium battery shipments within the cargo compartment of cargo aircraft or lithium ion batteries within the cargo compartment of passenger aircraft, e.g., bulk loaded, containers, covered pallets;

• The containment characteristics of Unit Load Devices (ULD);

• The specific hazards and safety risks associated with each battery and cell type to be carried alone or in combination;

• The chemical composition of the batteries and cells;

• Location of batteries in the cargo compartment, including:
  o Proximity to other batteries, and
  o Proximity to other dangerous goods

• Notification procedures for the flight-crew:
  o Location of the batteries in the cargo compartment;
  o Accessibility of the batteries to the crew;
  o Quantity of items being shipped;
  o The capability of the crew to fight an in-flight lithium battery fire.

OTHER REFERENCE INFORMATION: Other related information on the above can be found in:

1. FAA SAFO 10017, Risks in Transporting Lithium Batteries in Cargo by Aircraft. 10/8/10. http://www.faa.gov/news/press_releases/media/safo10017.pdf. Boeing operators can reference Boeing Multi Operator message, MOM-MOM-15-0469-01B, dated July 17, 2015
2. EASA Safety Information Bulletin – Operations – SIB No.: 2015-19; 05 October 2015; Transport of Lithium Batteries as Cargo by Air
3. FAA SAFO 15010, Carriage of Spare Lithium Batteries in Carry-on and Checked Baggage. 10/8/15. https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/media/2015/SAFO15010.pdf.
4. FAA SAFO 16001