Dangerous Goods Panel Working Group on Energy Storage Devices

DATE: May 11, 2022
TIME: 0800 – 1000 EDT
LOCATION: Virtual – TEAMS

The rapporteur of the Energy Storage Devices Working Group, Mr. Duane Pfund held the first meeting of the 2022-2023 biennium virtually on May 11, 2022. Members of the ICAO Safety Management Section who will be assisting the working group introduced themselves.

I. Work Plan Review

Following introductions, Mr. Pfund reviewed the progress since the DGP/28 meeting. The DGP assigned the working group a task to complete a safety risk assessment on lithium batteries packed with or contained in equipment. The rapporteur coordinating with the DGP chair and vice chair met with ICAO staff from Cargo Safety and Safety Management to identify suitable objectives, a risk assessment methodology, and a reasonable timeline to complete its tasks. The working group is expected to complete the initial analysis over a series of ½ day workshops. These workshops would be guided by ICAO safety management experts and facilitated by an external consultant. The workshops themselves will use structured forms and templates and require preparation by workshop attendees to familiarize themselves with the methodology and terminology. Initial projections were for two workshops in May 2022 and two workshops in June 2022. The actual dates and number of workshops needed will be adjusted based on schedules and the progress of the working group.

Objectives:

- Using the bow-tie methodology, assess the risk of uncontrolled fire involving batteries packed with or contained in equipment, and identify existing proactive and reactive safety measures.
- Take into consideration the perspectives of States, operators, and stakeholders from the entire supply chain to ensure a global view is considered.
- Quantify the resulting risks in terms of likelihood and severity to understand risk in the system in the context of expected continued growth in shipments (depending on quality of information available).
- Document the safety risk assessment in a MS word document to support the Dangerous Goods Panel in their assessment of appropriate mitigation measures that can be applied globally to support the safe carriage of lithium batteries.

Methodology:

The bow-tie method was selected as a risk assessment tool for its ability to visualize the hazard, the risk, the resulting consequences, and the reactive and proactive controls/measures designed to prevent unwanted outcomes. Initially the analysis would focus on three configurations: 1) lithium batteries packed with equipment, 2) lithium batteries contained in equipment, and 3) lithium battery powered vehicles. The analysis would identify hazards and existing mitigating

measures. Depending on the quality of information available, the risk may also be quantified in terms of likelihood and severity. The assessment will help the DGP make an informed decision on the appropriate risk mitigation measures to be considered.

The bow-tie analysis would identify hazard mitigating measures currently in place and utilize currently available data and data that can be reasonably obtained. A question was raised regarding whether physical testing would be done to inform the analysis. The FAA Technical Center has done some testing on portable electronic devices and external groups have also inquired about conducting fire tests on portable electronic devices. Determinations on what types of devices should be tested and what information would be collected should be considered prior to conducting any tests.

The group reviewed the remainder of the workplan including considerations for the safety risk assessment and workshop tasks. The group identified several improvements to the workplan.

The group discussed whether separate bow-tie analyses should be conducted for each aircraft type, cargo compartment type, or consignment. For example, large batteries (>35kg), untested batteries transported in accordance with competent authority approvals, passenger baggage, and batteries transported in accordance with postal requirements. Another suggestion was made to complete a separate analysis on the transport of portable electronic devices in passenger baggage. The group was reminded that the DGP tasked the working group based on specific proposals raised during DGP/28 that focused on equipment and vehicles as prepared for transport as cargo in accordance with the Technical Instructions. It was recognized that each of these different scenarios are important, and the outcomes of this analysis may guide future discussions. For example, additional interventions identified as suitable for cargo transport might also apply to shipments by the post. Similarly, different cargo compartments and aircraft types offer different safety features that could inform the analysis. It was noted that in integrated cargo networks, the type of aircraft is not always known prior to loading and a single consignment may be transported on various types of aircraft. It was also noted that a similar bow-tie analysis assessment of portable electronic devices in the passenger cabin is already underway, and that group may be consulted.

The top event was then discussed. In the Bow-tie methodology the “Top event” is the point in time when control is lost over the hazard. Said another way, the top event is the event we are trying to prevent. Uncontrolled Fire, Thermal Runway and Loss of Aircraft were all considered as potential top events. It was noted that thermal runaway could be limited to a single cell and hazardous effects contained in the package. In that case, design aspects that prevent thermal runaway propagation or packaging that contains thermal hazards are mitigating measures. For reference, the working group analyzing hazards of portable electronic devices in the passenger cabin identified thermal runaway as the top event. A question was raised regarding how damage to a battery or device, short circuit, or internal damage to a cell would be worked into a bow-tie analysis. These conditions could be captured in a bowtie analysis as “threats” (conditions that can cause the top event).

II. Training Opportunity

ICAO informed the group of an opportunity for members of the working group to attend the ICAO sponsored Safety Management Fundamentals course. The course focuses on competencies required at Civil Aviation Authorities to conduct State-level safety risk assessments and evaluate service provider safety risks assessments. ICAO can provide a limited number of seats to interested working group members provided the attendee would be willing to 1) validate a future or existing course, 2) assist in the development of a future course, or 3) teach a course. The next course will be May 19. The next scheduled offering is September. ICAO will inquire about whether additional course offerings may be available.

The group decided to hold the next meeting as a workshop facilitated by an external consultant. The next meeting will be determined based on the availability of the consultant but expect sometime in June 2022.

ACTION ITEMS:

- The rapporteur will incorporate amendments to the work plan and resend the work plan to the working group.
- Virgilio will make the bow-tie analysis under development for portable electronic devices in the passenger cabin available to Duane Pfund who can distribute to the group.
- Doug Ferguson and Richard Hill will coordinate in providing the working group information on different cargo compartment and configurations and capabilities.
- Interested working group members are requested to notify lmcguigan@icao.int of 1) their general interest in attending the safety management fundamentals course, 2) their availability to attend the May 19th course, and 3) their preferred time zone.
- The rapporteur will survey the working group on availability for the next meeting.

III Attendance:

The participants in the meeting were:

Last Name	First name	State/Affiliation
Cascardo	Leonardo	Brazil
Macário	Paulo Fabrício	Brazil
Bolton	David	Canada
Yang	Qiang	China
Inose	Takanori	Japan
Nakano	Katsuhiro	Japan
Tsutomu	Tabata	Japan
Vermeersch	Kristel	Netherlands
Cowlishaw	Michael	Qatar
Howard	Trevor	United Arab Emirates
Ranito	Mario	United Kingdom
Hill	Richard	United States of America
Givens	Michael	United States of America
Leary	Kevin	United States of America
Pfund	Duane	United States of America
Ranck	Keith	United States of America
Calleja Barcena	Lia	European Union Aviation Safety Agency (EASA)
McCulloch	Alex	Global Express Association (GEA)
Brennan	David	International Air Transport Association (IATA)
Chan	Candy	International Air Transport Association (IATA)
Alegría	Virgilio	International Civil Aviation Organization (ICAO)
Gnehm	Elizabeth	International Civil Aviation Organization (ICAO)
McGuigan	Lynn	International Civil Aviation Organization (ICAO)
Panchal	Devan	International Civil Aviation Organization (ICAO)

Ferguson	Doug	International Coordinating Council of Aerospace Industries Associations (ICCAIA)
Schwartz	Scott	International Federation of Air Line Pilots' Associations (IFALPA)