Standards & Engagement

TRIP: Thermal Runaway Incident Program

Cabin / Flight Deck Fire Protection Session

October 20, 2022

Safety Science in Action™

The Problem

The US Federal Aviation Administration reports that as of July 22, 2022, there have been 399 air/airport incidents involving lithium batteries carried as cargo or baggage recorded since January 23, 2006.*

US Airline stakeholders and the FAA indicate that this number is not comprehensive, and details about these incidents are lacking.

A thermal runaway incident on an aircraft can result in the total loss of the aircraft, including loss of life.

Additional data is needed to understand the scope, scale, and complexity of the problem. A better understanding of the problem will facilitate the identification of mitigation actions through research, standards and education/outreach.

*Source: *Lithium Battery Air Incidents involving smoke, fire or extreme heat*, US FAA, 22 July 2022

TRIP

A secure, Lithium battery incident surveillance system.

- Replaces an incident capture and reporting process administered by American Airlines
- Capture incident data and aggregate information from multiple sources
- Maintain data in a more granular and consistent manner
- Provide participant airline-specific and anonymized industry data views based on user permissions
- ***Provided pro bono to participants***

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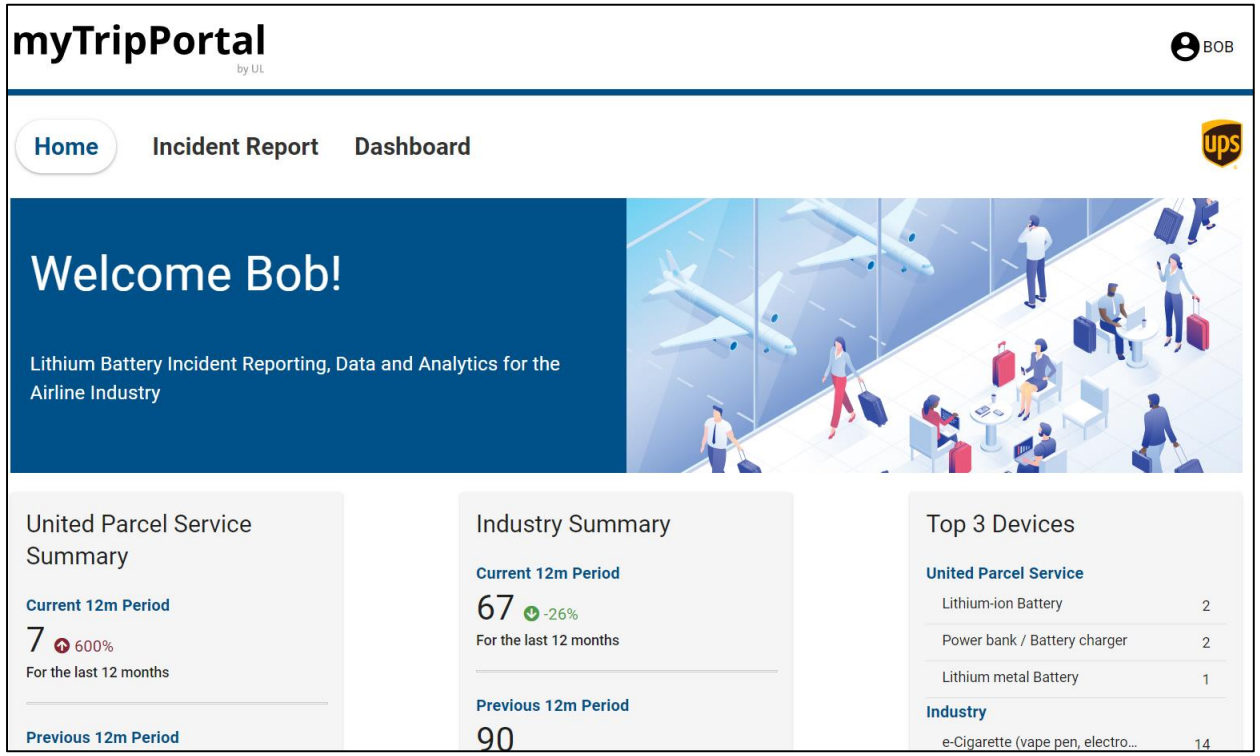
***T**hermal*
***R**unaway*
***I**ncident*
***P**rogram*

https://mytripportal.org

Participants



TRIP is designed ***with*** the industry ***for*** the industry.

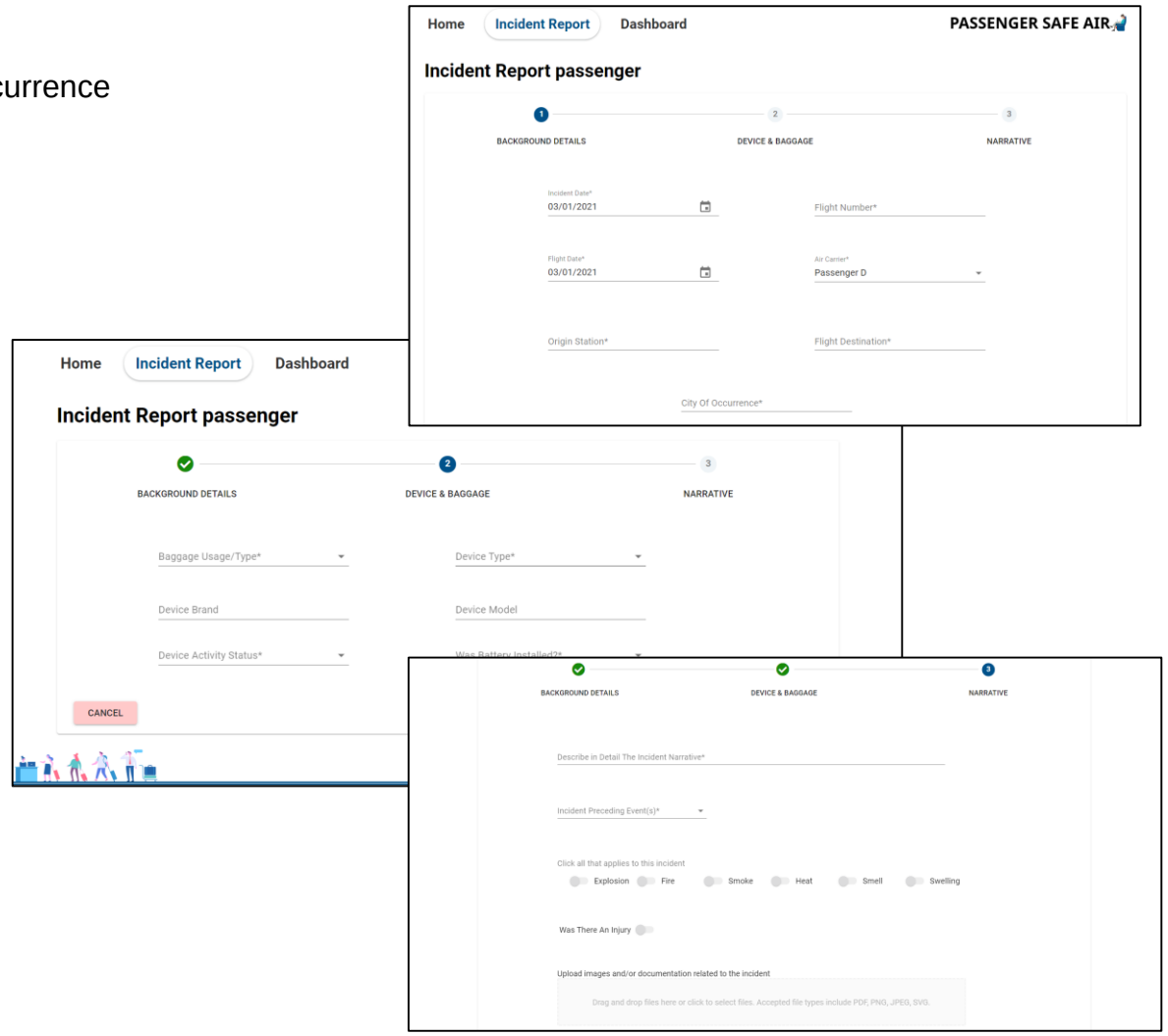
Current state: Data Sources

- TRIP Participant Reports
- FAA Report

Note: TRIP currently does not include data from the 5800.1

Data Collection

- Background details*
  - ✓ Date, Carrier, Flight #, Origin Station, Flight Destination, City of Occurrence
- Movement type*
  - ✓ Passenger: Checked baggage, Carryon bag/on person
  - ✓ Cargo
- Location of incident*
  - ✓ Specific to movement type
  - ✓ If on aircraft, includes specific location and phase of flight
- Event preceding incident*
- Device type*
- Device activity status*
- Device Brand and Model
- Incident narrative*
- Incident characteristics*
- Battery installation status*
- Injury and injury detail (if applicable)
- Images / documentation upload



Data Accessibility

Participants

- Have full access to all incidents they enter
- Images
- Reports
  - Organization summaries
  - Industry summaries (de-identified)
- No access to detailed incidents from other participants

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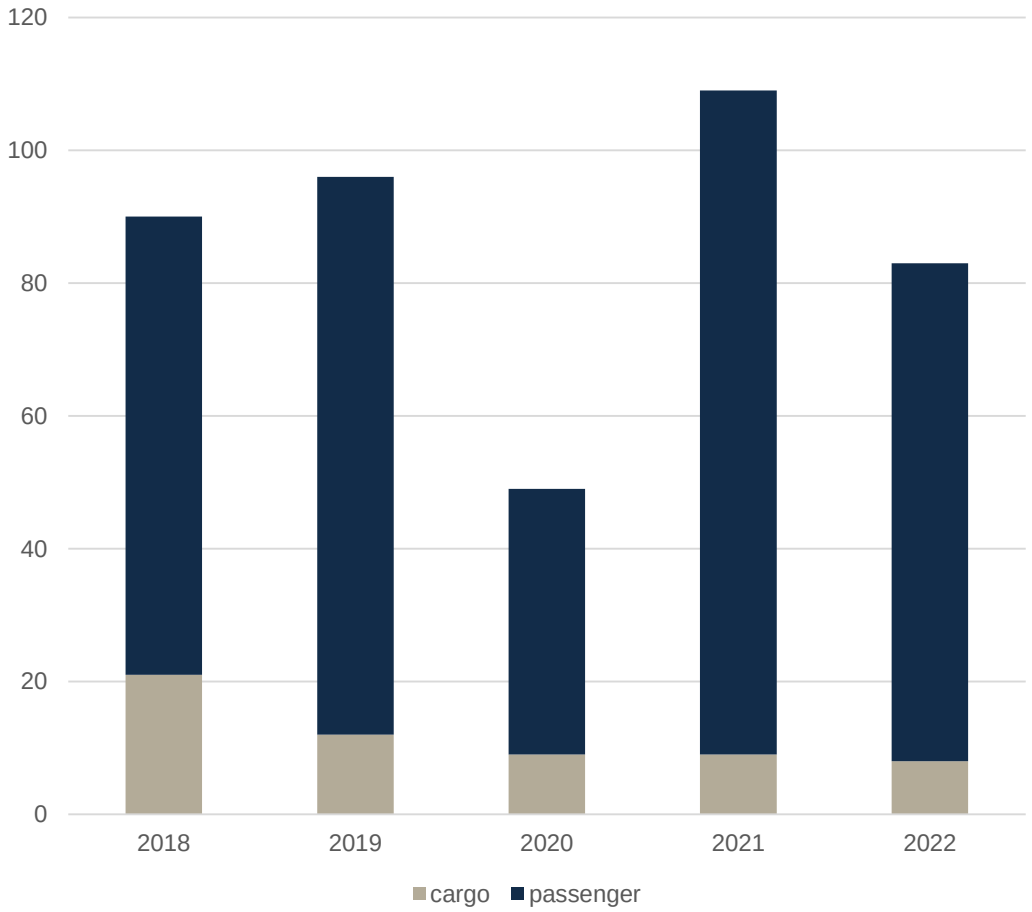
- Full access to all incidents
- Images
- Industry level reports
- Participants grant UL authorization to use data for research, standards and education/outreach.
- Data use agreement in place (click-through on first use of site)

Limitations & constraints

- TRIP has limited participants – data may not be representative of full industry
- Voluntary reporting – not all incidents are recorded
- Data gaps – while working towards more granularity in data, detailed data on incident characteristics is still sparse

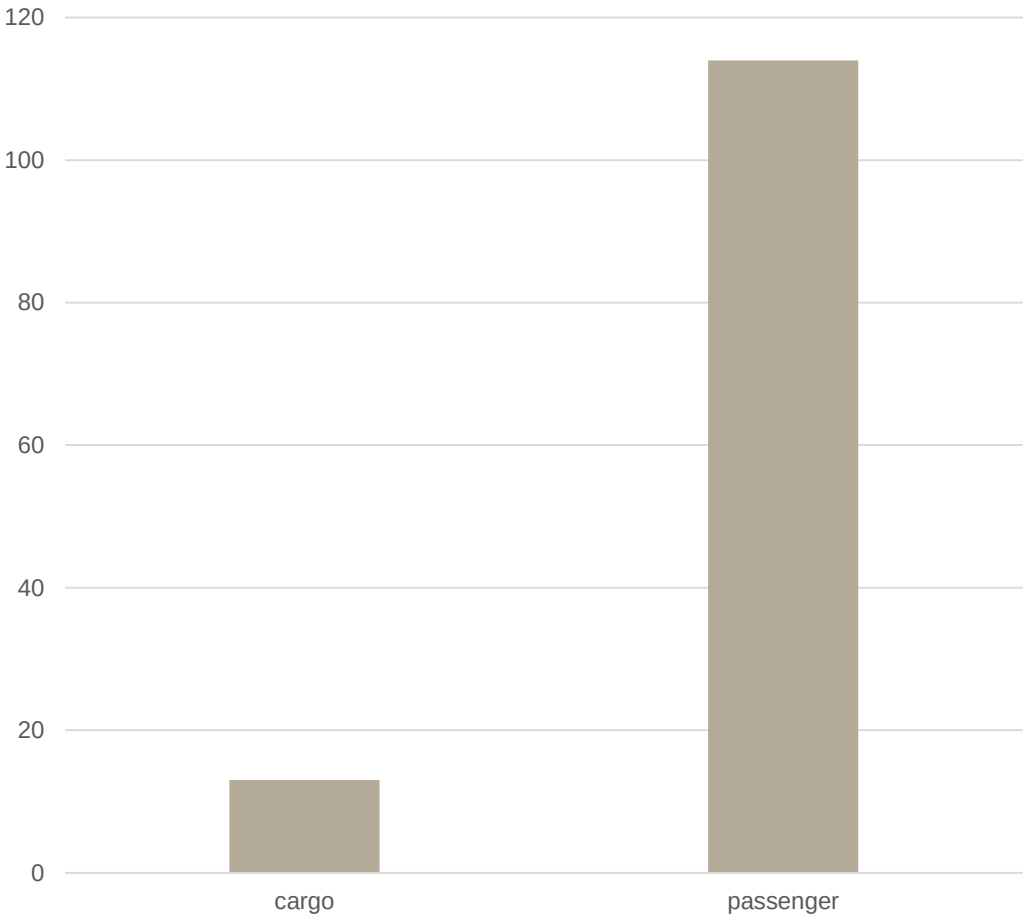
TRIP reports – 5-year trend



- 428 reports from Jan 2018 through Aug 2022
- Significant drop in reports in 2020 was related to Covid-19 travel restrictions. Passenger volume decreased by more than 61% on participating airlines.
- Passenger incidents returned to an increasing trend with relaxing of travel restrictions in 2021

Source: ULSE TRIP database, 2018-01-01 through 2022-09-30.

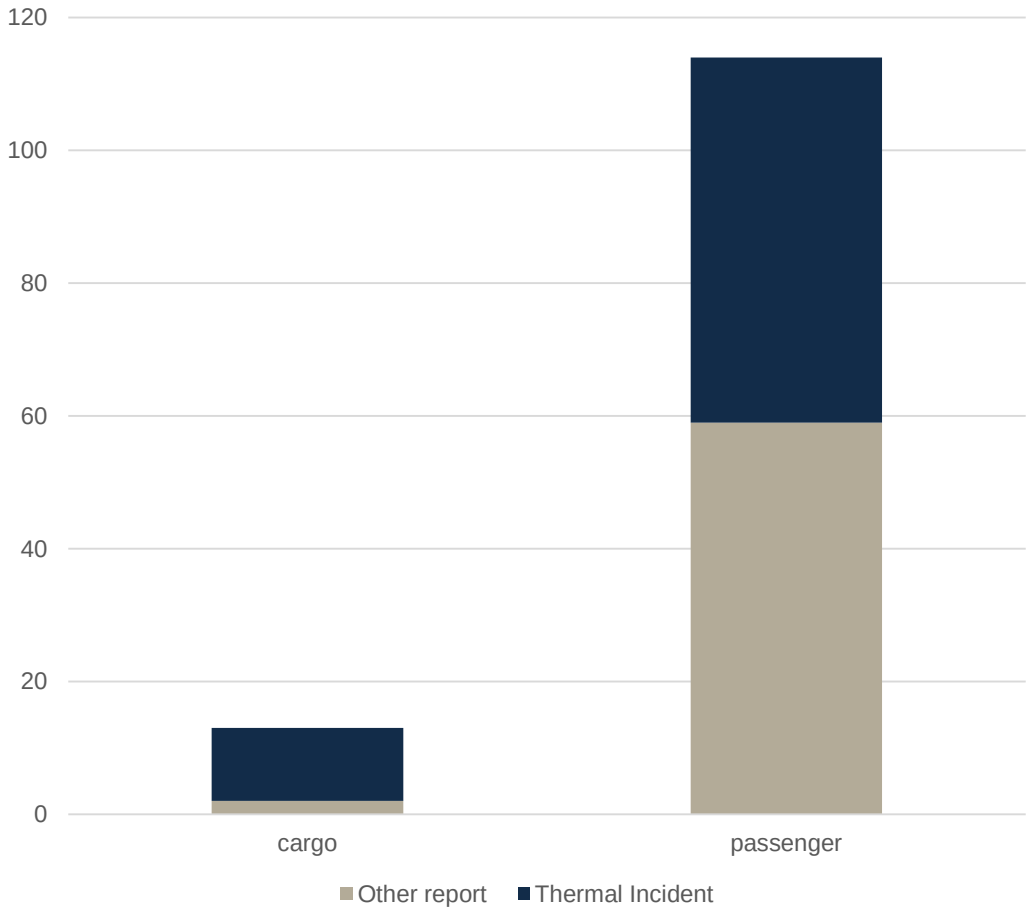
TRIP reports – last 12 months



- 18 airlines participate in TRIP
- 127 reports from 10 airlines from Oct 2021 through Sep 2022
- 90% of reports from passenger airlines

Source: ULSE TRIP database, 2021-10-01 through 2022-09-30.

TRIP reports – thermal vs. other, past 12 months



- 66 thermal incidents
  - Thermal incidents are defined as a fire, violent rupture, explosion or dangerous evolution of heat that occurs as a direct result of a battery or battery-powered device (49 CFR § 171.15)
- 61 other reports include procedural issues, near-misses and incidents of battery swelling without other characteristics
  - Procedural example: hoverboard found in checked luggage
  - Near-miss example: material handling equipment penetrated package of batteries, causing damage; did not result in a thermal event
  - Swelling example: TSA removed device during screening due to safety concern

Source: ULSE TRIP database, 2021-10-01 through 2022-09-30. As of 2022-09-30

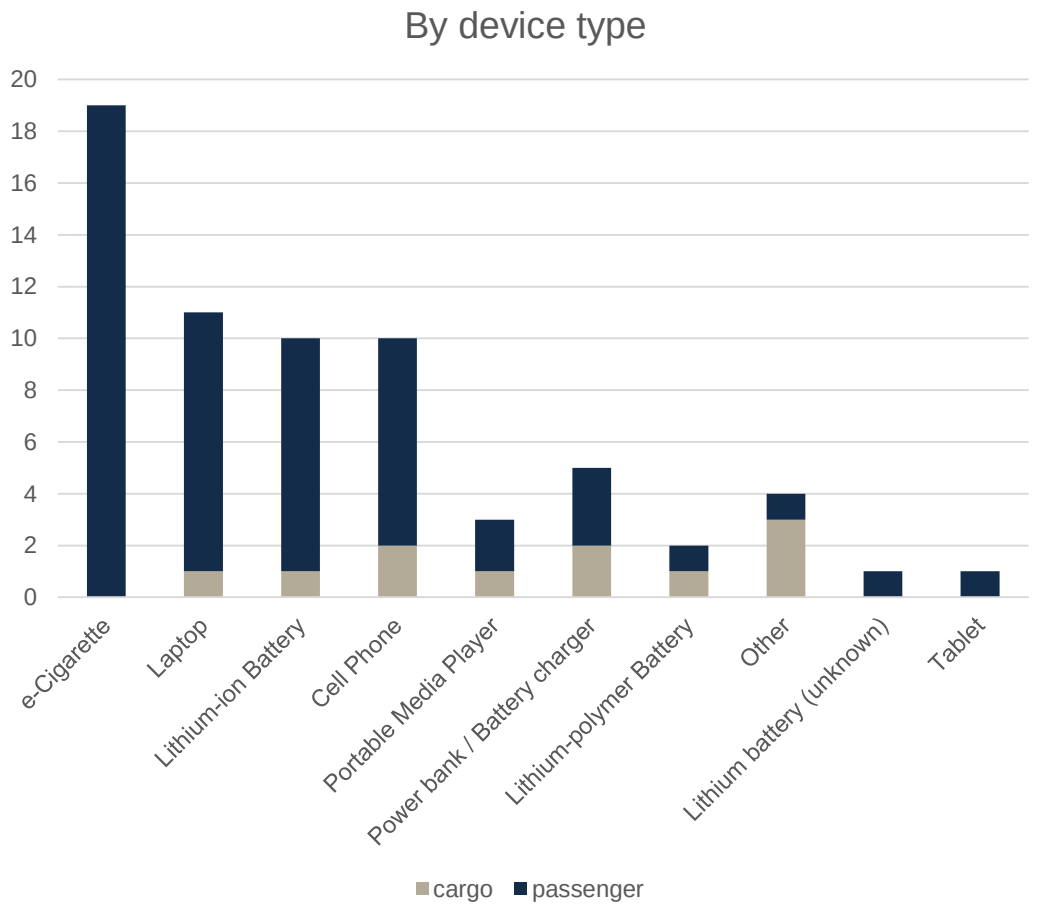
Example reports

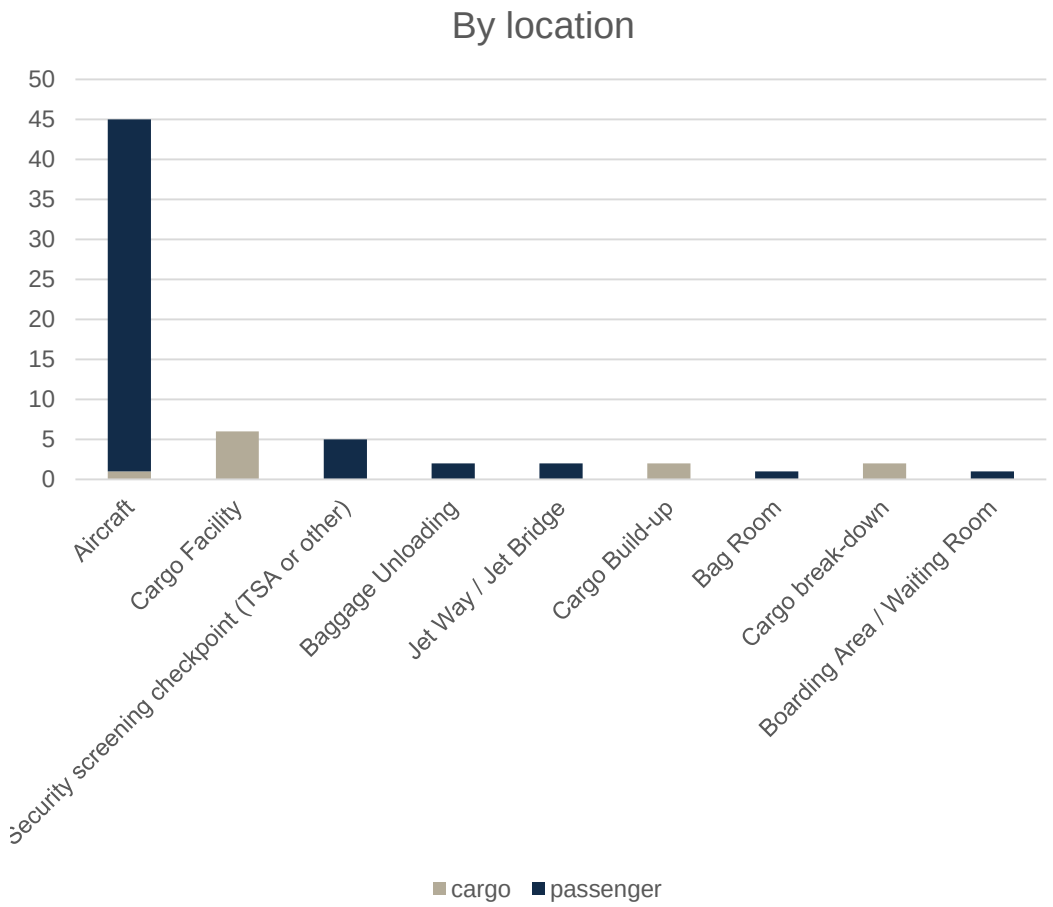
Example of thermal incident (spare e-cigarette batteries)

Example of thermal incident (open tray charger)

Example of swollen device (power bank)

Thermal incidents by device type and location past 12 months

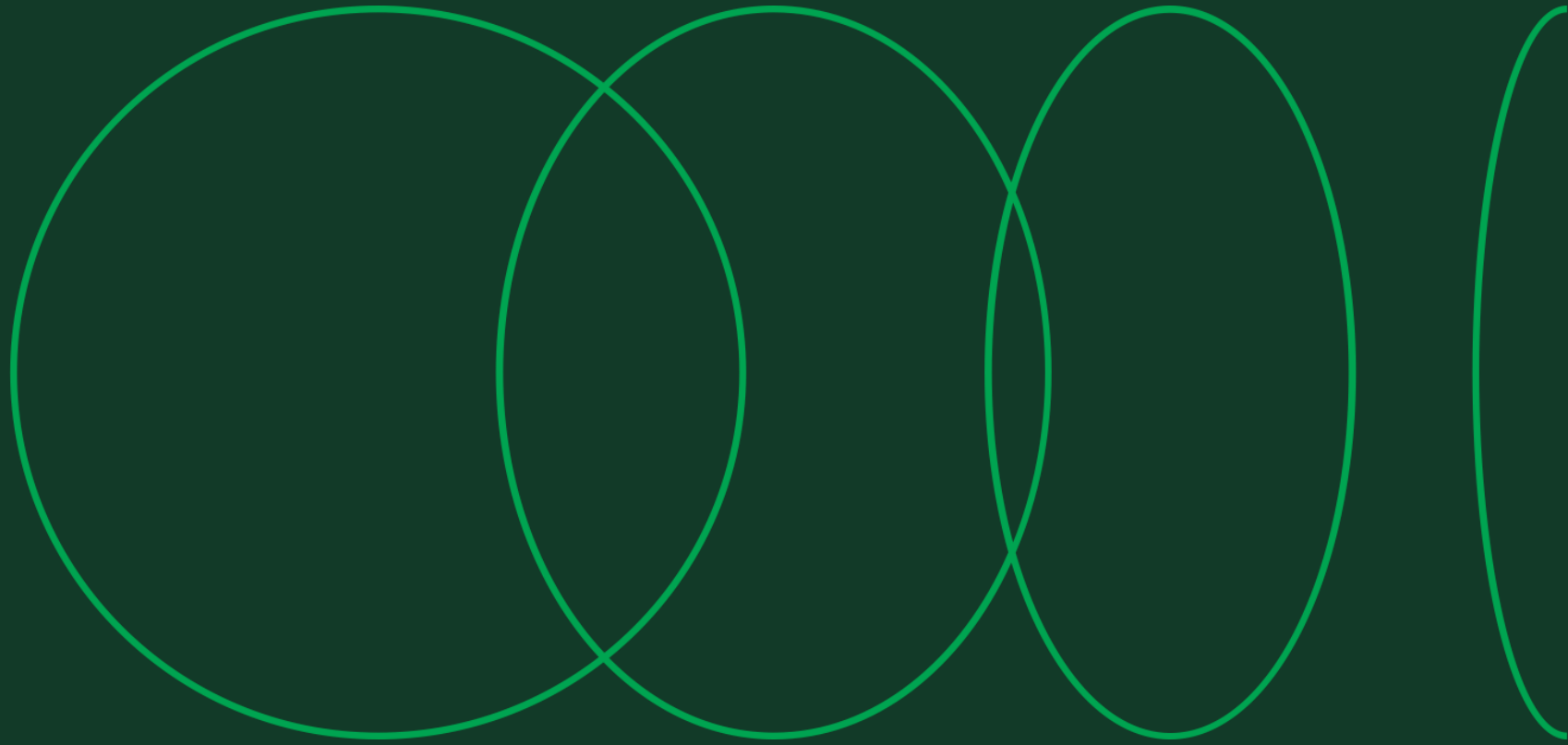




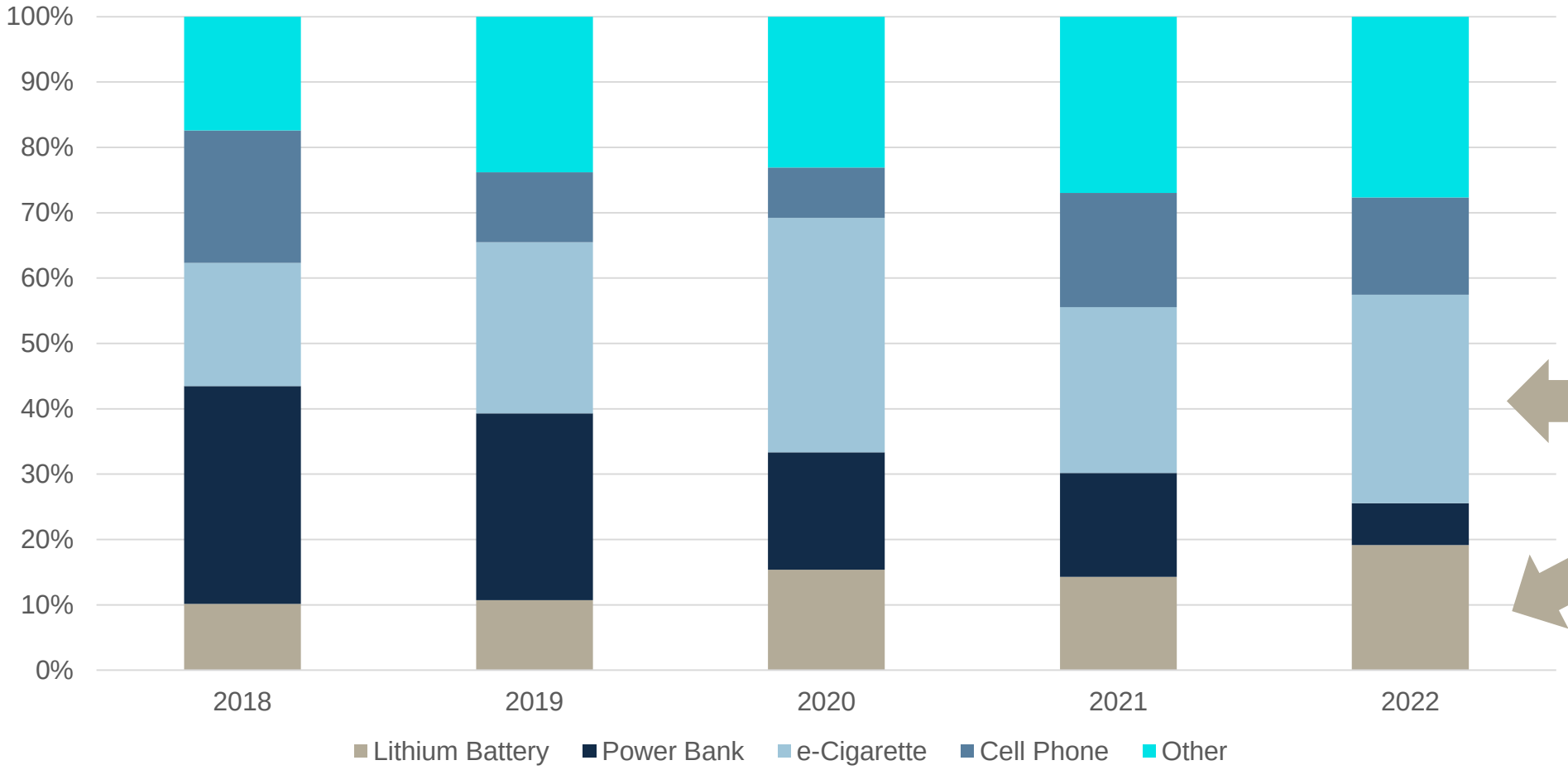
Source: ULSE TRIP database, 2021-10-01 through 2022-09-30. As of 2022-09-30.

Passenger operations

(including flight crew / cabin / cockpit incidents)



Passenger thermal incidents, by top 5 device types, % of total



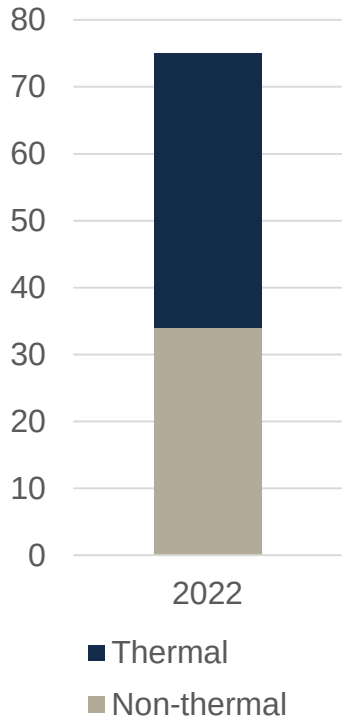
E-cigarettes and their spare batteries are the most common device involved in thermal runaway incidents!

Source: UL TRIP Database, participant reported incidents from 2018 – 2022. As of 2022-09-30.

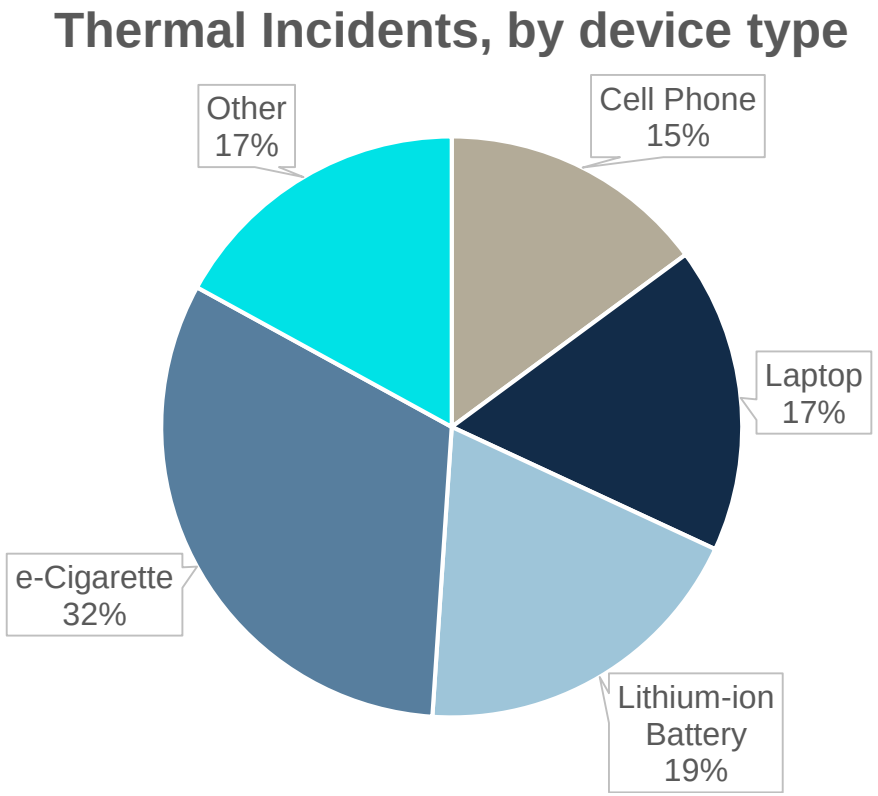
TRIP participants have identified at least 10 incidents involving Flum e-cigarettes in the last 12 months.

Six events have occurred during August and September 2022.

2022 summary, passenger incidents



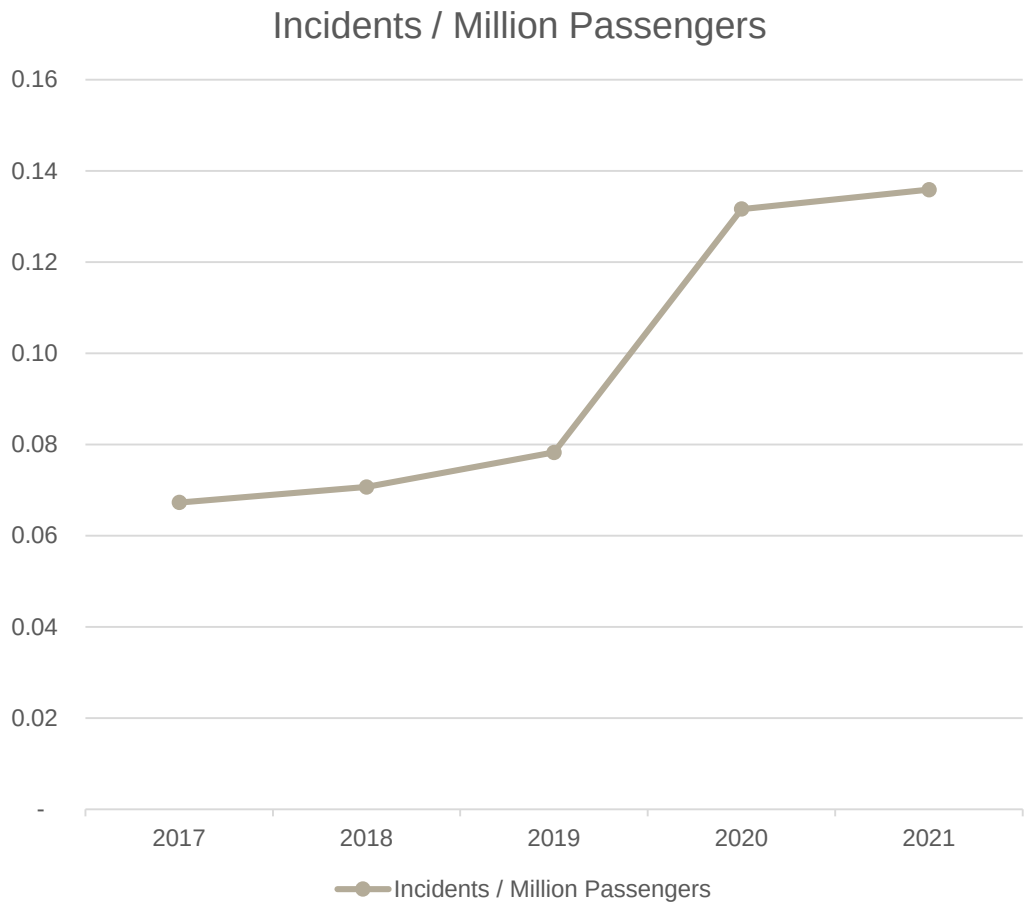
32 non-thermal events involved swollen laptop/tablet batteries identified by TSA during security screening. 2 were procedure violations in handling.

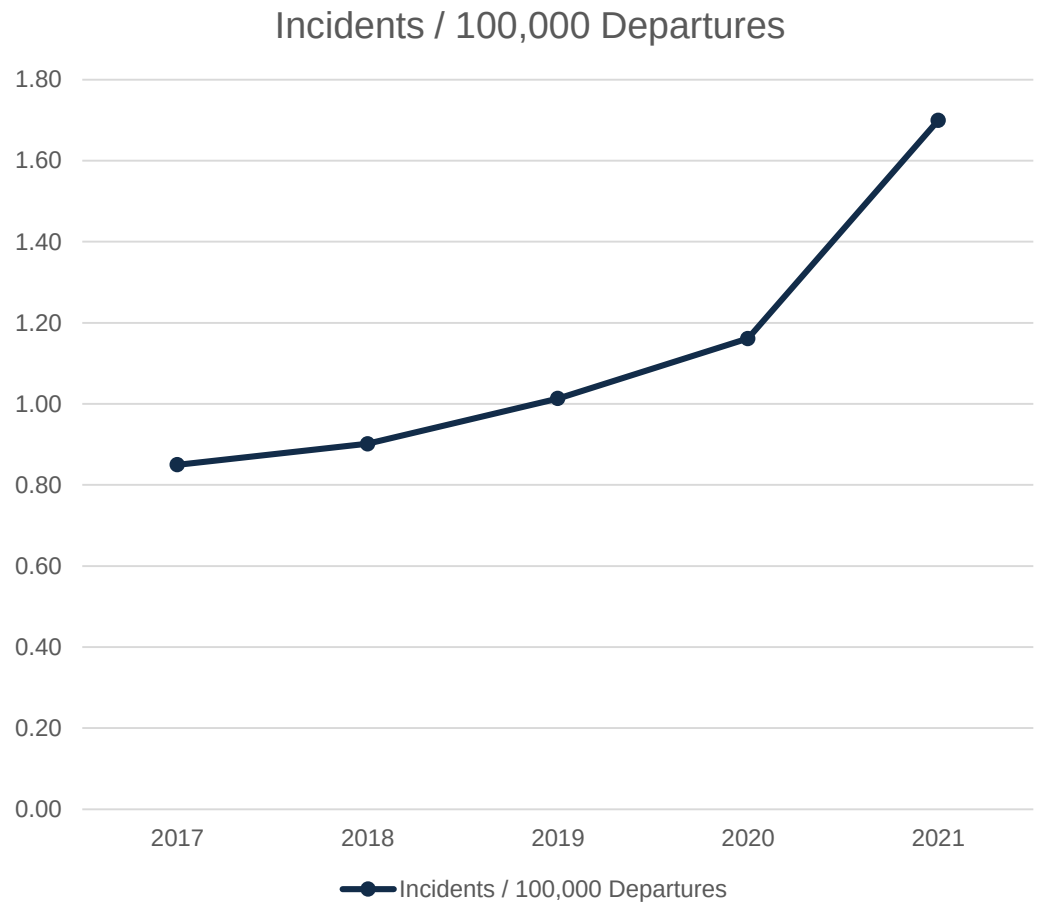


Thermal incidents, by location	Count
Aircraft	33
Bag room	1
Boarding area	1
Jet way	2
Security screening	4
Total	**41**

Source: UL TRIP Database, participant reported incidents from 2022. As of 2022-09-30.

Incident rates, passenger operations, 2017 - 2021





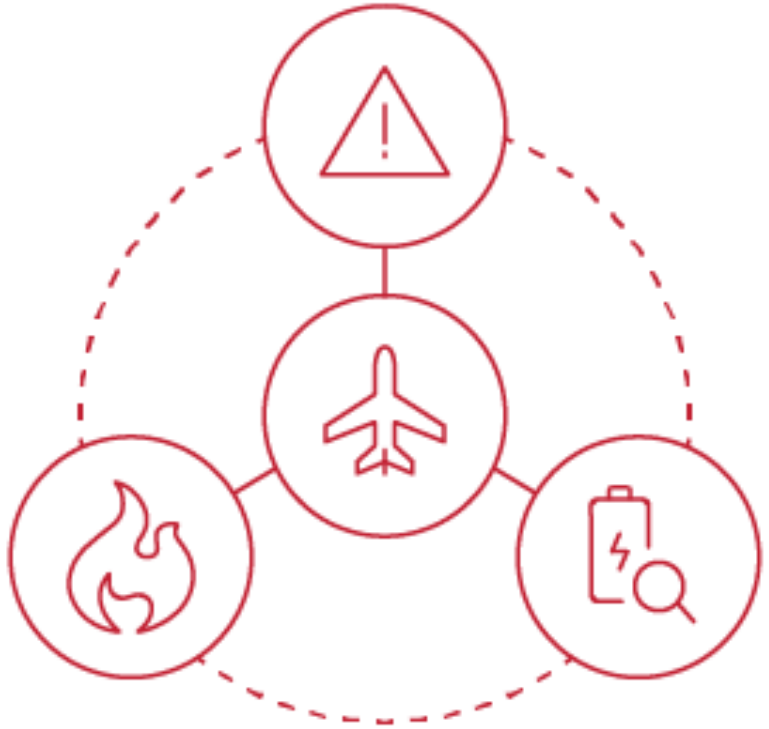
Sources: UL TRIP Database, participant reported incidents from 2017 – 2021. As of 2022-09-30
U.S. Department of Transportation, Bureau of Transportation Statistics, Office of Airline Information. Passenger and departure volumes 2017-2021. Accessed 2022-09-11

Passenger Insights

- Normalized rates of incidents continue to increase.
- e-Cigarettes and the spare batteries associated with them continue to account for the largest category of incidents.
- Most incidents occur in the passenger cabin, with the device being stored in a bag or carried by the person.
- Charging of devices is not a significant fraction of the incidents in the cabin.

What else?

- Grow participation: Continue to recruit additional carriers to capture more incident data
- Continually improve: TRIP platform enhancements
  - ✓ An initial wave of 2022 enhancements was introduced in March
  - ✓ A second wave of enhancements to be introduced shortly
- Monthly TRIPWire communication provides data summaries and incident updates
- In-person TRIP Summit being planned for February 2023



Learn more

- Schedule a demo
- Send questions
- Contact

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Thank you

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