



National Transportation Safety Board

Investigative Update of Battery Fire Japan Airlines B-787 - Jan 7, 2013

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Chairman
January 24, 2013



Timeline – JAL Battery Incident

- 10:06am - aircraft arrived at gate in Boston from Narita, Japan
 - 183 passengers and 11 crew deplaned
- 10:32am - Cleaning and maintenance crew noticed smoke in cabin
- 10:35am - Mechanic noted flames coming from APU battery in aft electronics bay

Timeline, cont.

- 10:37am – Airport Rescue & Fire Fighting notified
- 10:40am – Fire and rescue personnel arrive on scene
- 12:19pm – Fire and rescue personnel report event was “controlled”

APU Battery

Exemplar Battery

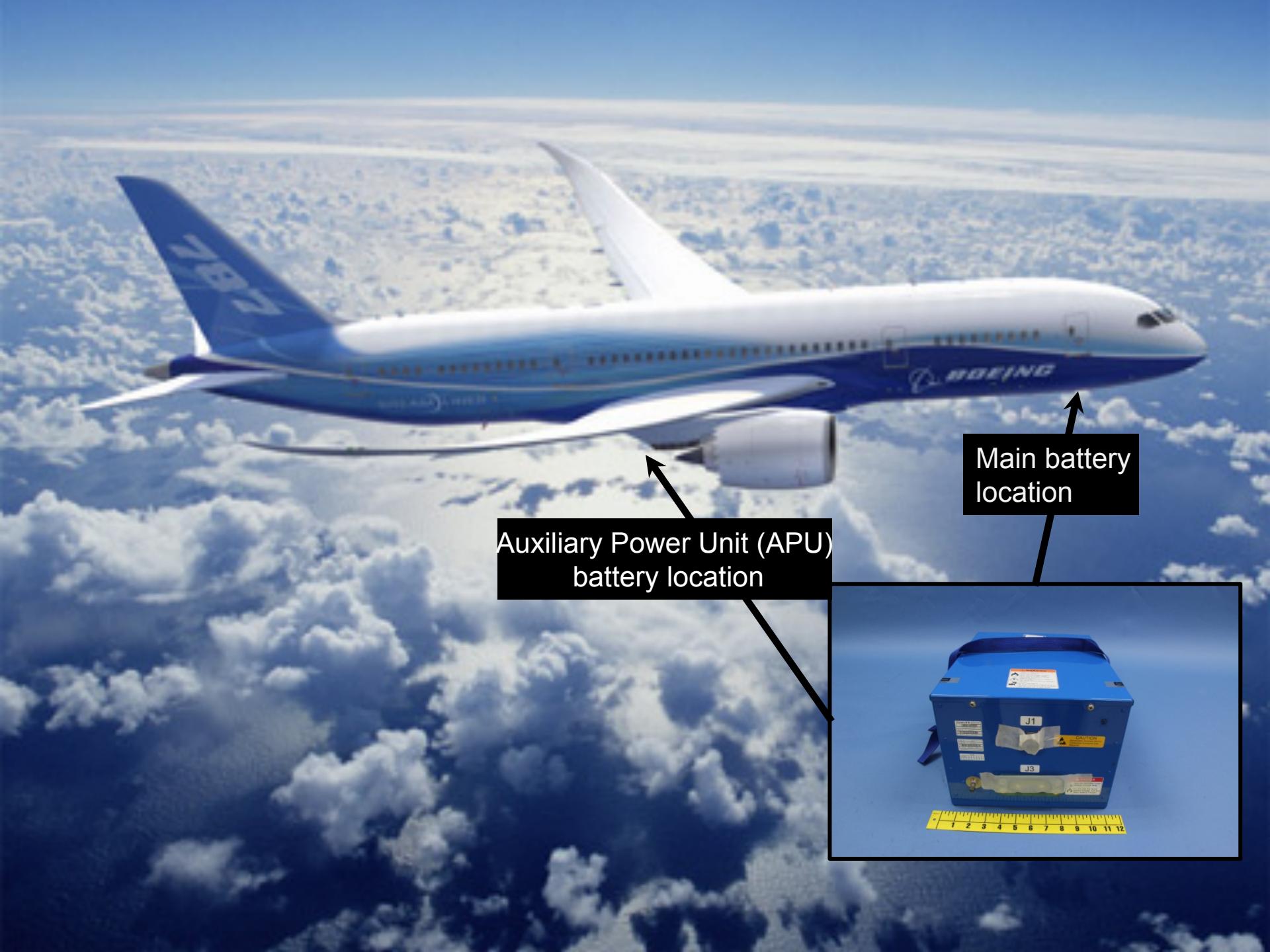


JAL Event Battery



Damage to Aft Electronics Bay





Auxiliary Power Unit (APU)
battery location

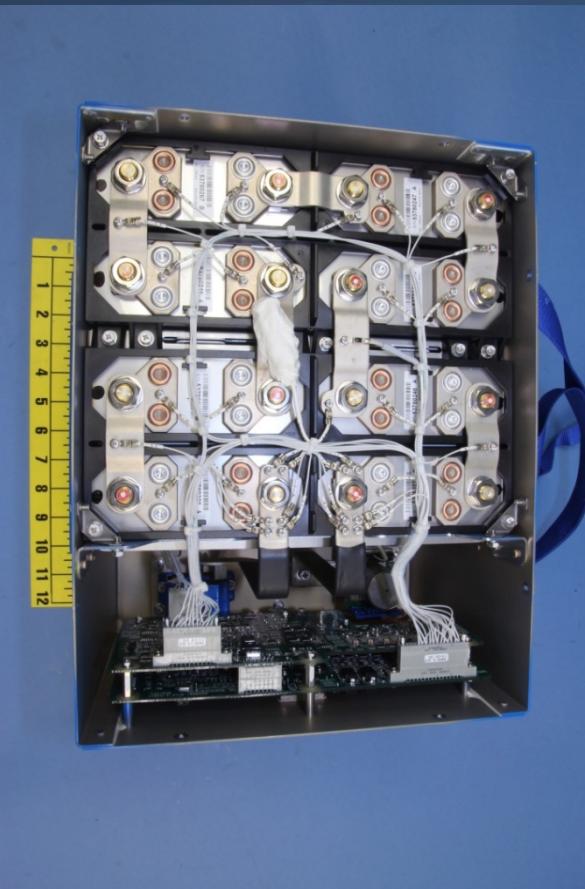
Main battery
location



Investigative Activities

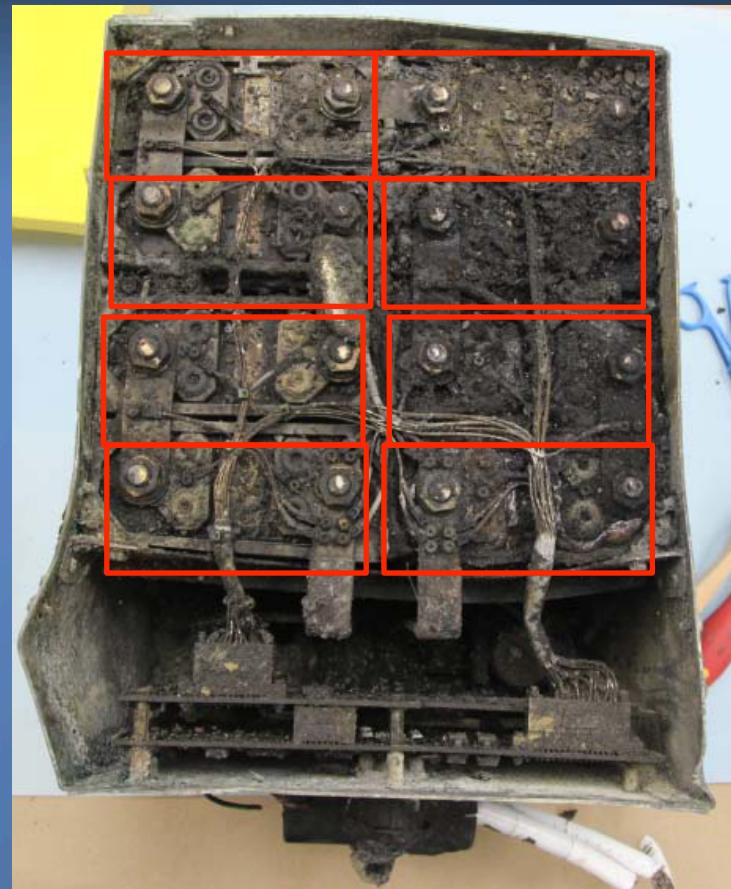
- Battery exam and teardown at NTSB Materials Laboratory
- Component exam and teardown
 - Tucson, AZ – Battery Charger Unit and Start Power Unit (Securaplane Technologies)
 - Phoenix, AZ – APU Controller (United Technology Aerospace Systems)
 - Seattle, WA – Two General Purpose Modules (Boeing Commercial Airplanes)
 - Fujisawa, Japan – Battery Monitoring Unit (Kanto Aircraft Instrument)

JAL APU Battery Cells



Exemplar Battery

9



JAL Event Battery

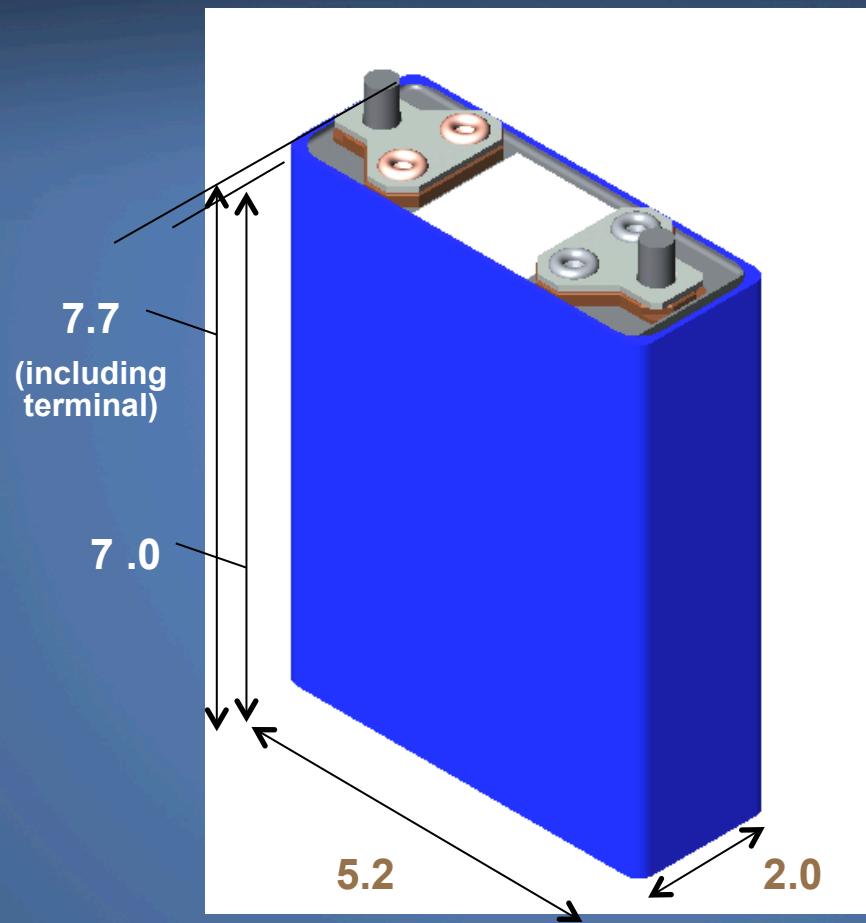


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Cell and Battery Specifications

	Cell	Battery
Nominal capacity (Ah)	75	75
Nominal voltage	3.7	29.6
Operational voltage range (V)	2.5 – 4.025	20 – 32.2
Weight (lb.)	6.0	63
Dimensions (in.)		
	W 5.2	10.9
	D 2.0	14.2
	H 7.7	8.5

Cell Design

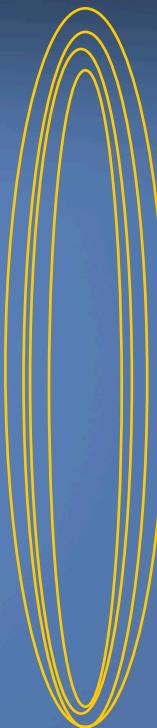
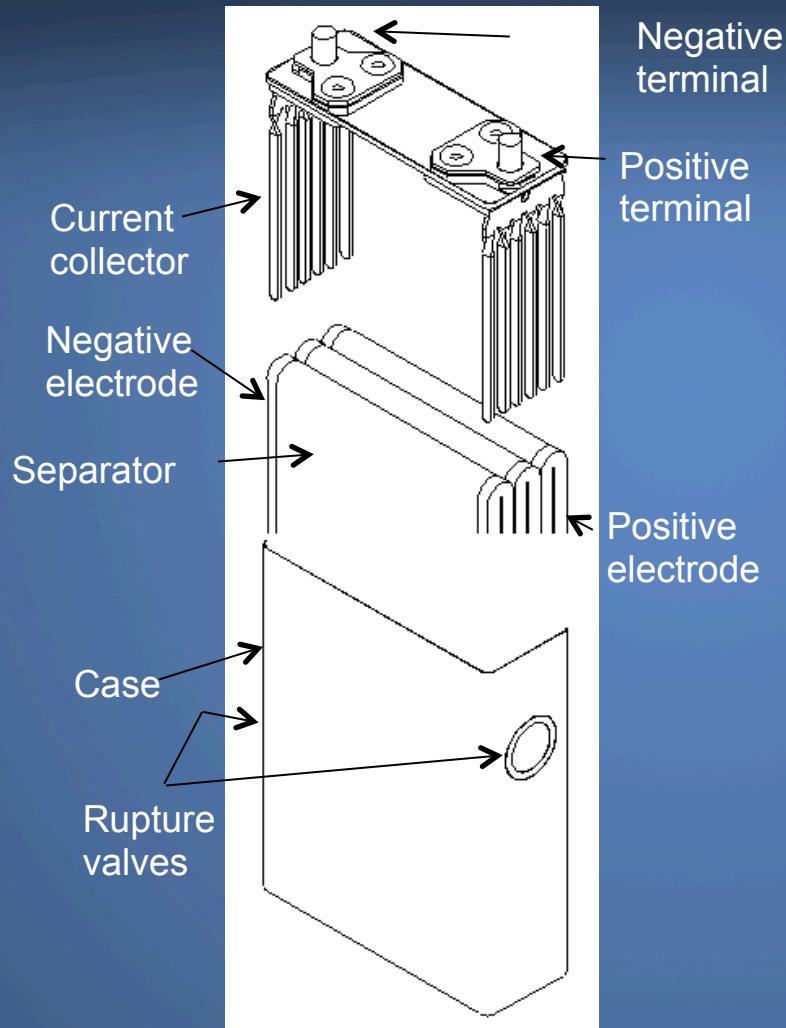


(Unit : inch)

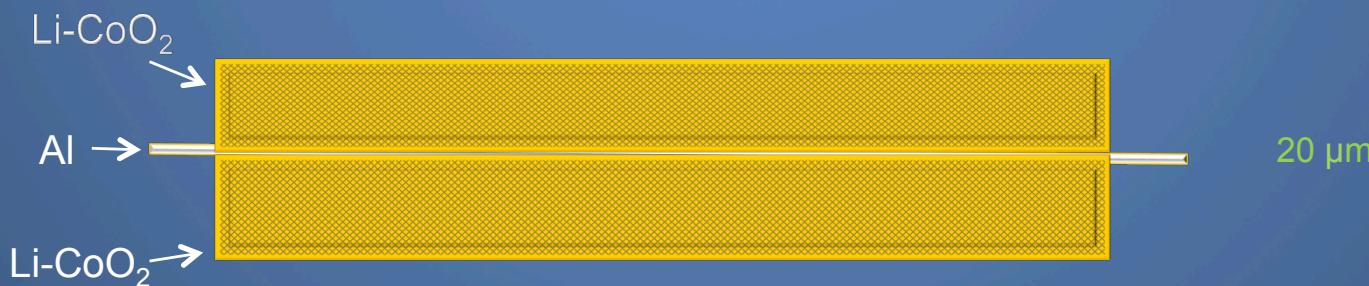
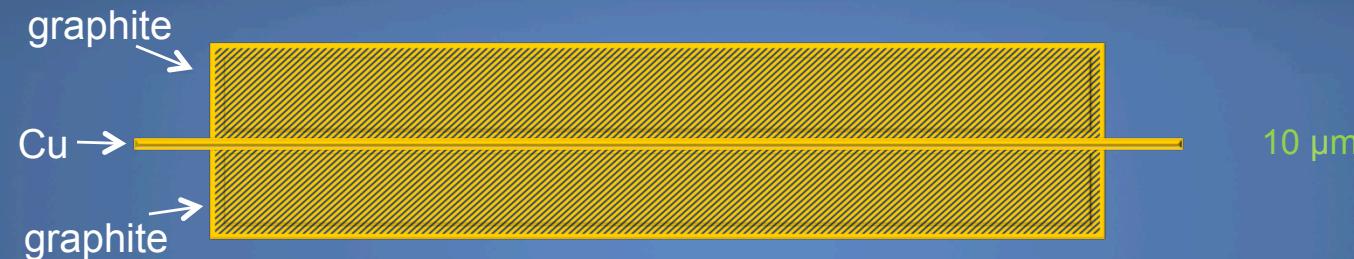


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Electrodes



Electrode Construction



Not to scale

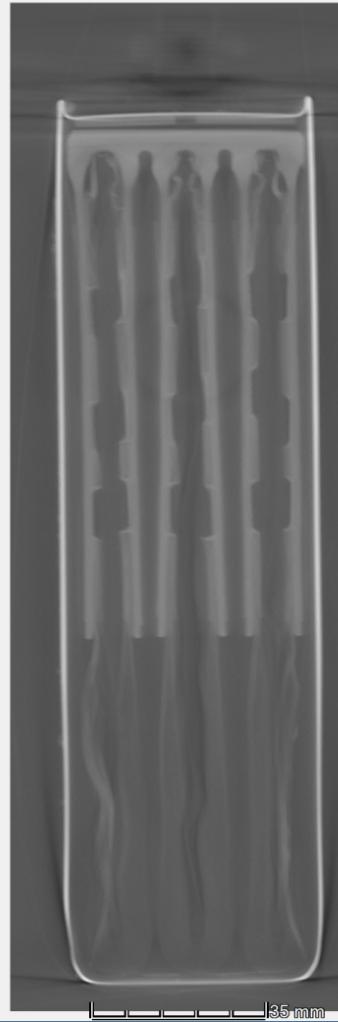
Example of a Cell CT Scan

DCA13IA037 - JAL 787 - Boston

Volume 1 grid coordinate system

9.14 mm \pm 0.50 mm

Right 1



83%

NTSB Lab Activities



Cell Examinations To Date

SEM –
Scanning Electron
Microscopy

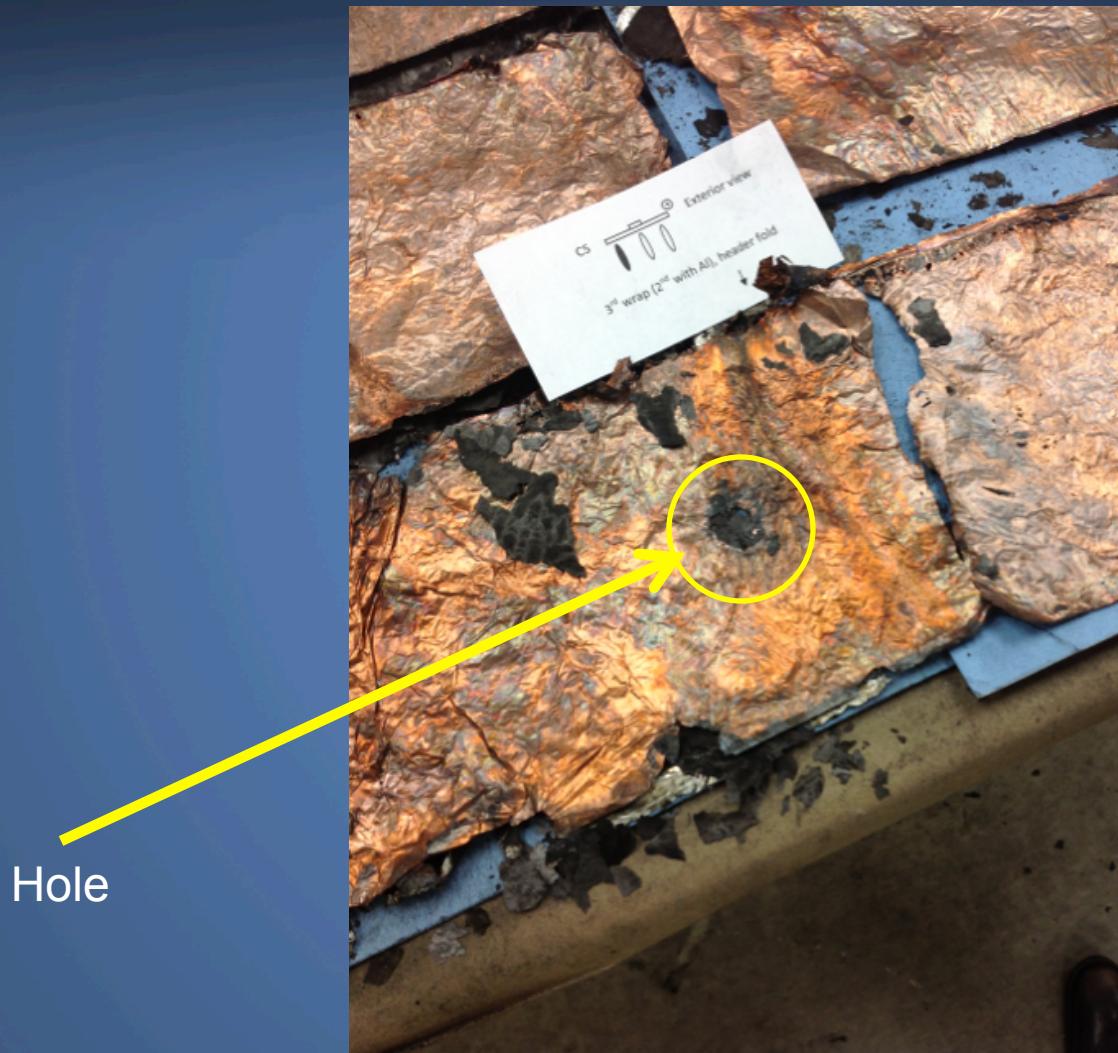
EDS –
Energy Dispersive
Spectroscopy

	<ul style="list-style-type: none">• CT scan of entire assembly	
8	<ul style="list-style-type: none">• disassembled	1
7	<ul style="list-style-type: none">• CT scan• disassembled• SEM	2
6	<ul style="list-style-type: none">• CT scan• disassembled	3
5	<ul style="list-style-type: none">• CT scan• disassembled• SEM• EDS	4

We Are Looking For:

- Signs of thermal runaway
- Signs of electrical short circuiting
- Manufacturing defects
- “Anything unusual”

Damaged Electrode - Internal Short Circuit

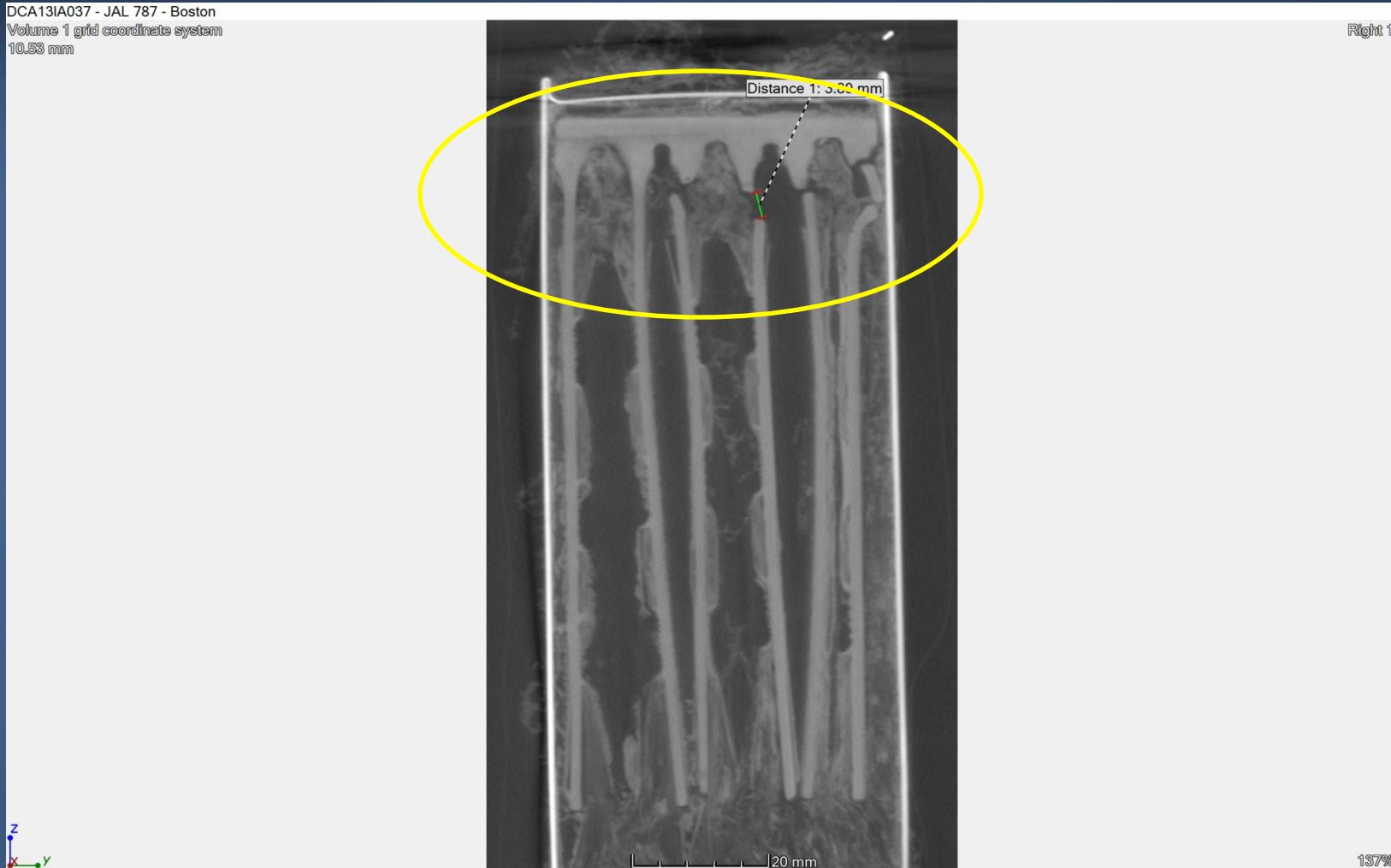


Hole

Cell 6 CT Scan

DCA13IA037 - JAL 787 - Boston
Volume 1 grid coordinate system
10.53 mm

Right 1



x
y
z

20 mm

137%



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CT Scan of Battery



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Findings To Date

- Fire was present
- Signs of thermal runaway
- Signs of electrical short circuiting

Next Steps

- Complete the in-house laboratory examinations
- Conduct examinations and testing of exemplar batteries
- Synthesize lab examination findings with fire forensics and aviation systems investigation

Parties to Investigation

- Federal Aviation Administration
- Boeing Commercial Airplanes
- Accredited Representatives
 - Japan – JTSB
 - GS Yuasa
 - Japan Airlines
 - France – BEA
 - Thales Avionics Electrical Systems
- Technical assistance provided by Carderock Division, Naval Surface Warfare Center

JTSB Investigation ANA Battery Event



Photo by *Reuters/Kyodo/Landov*



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