

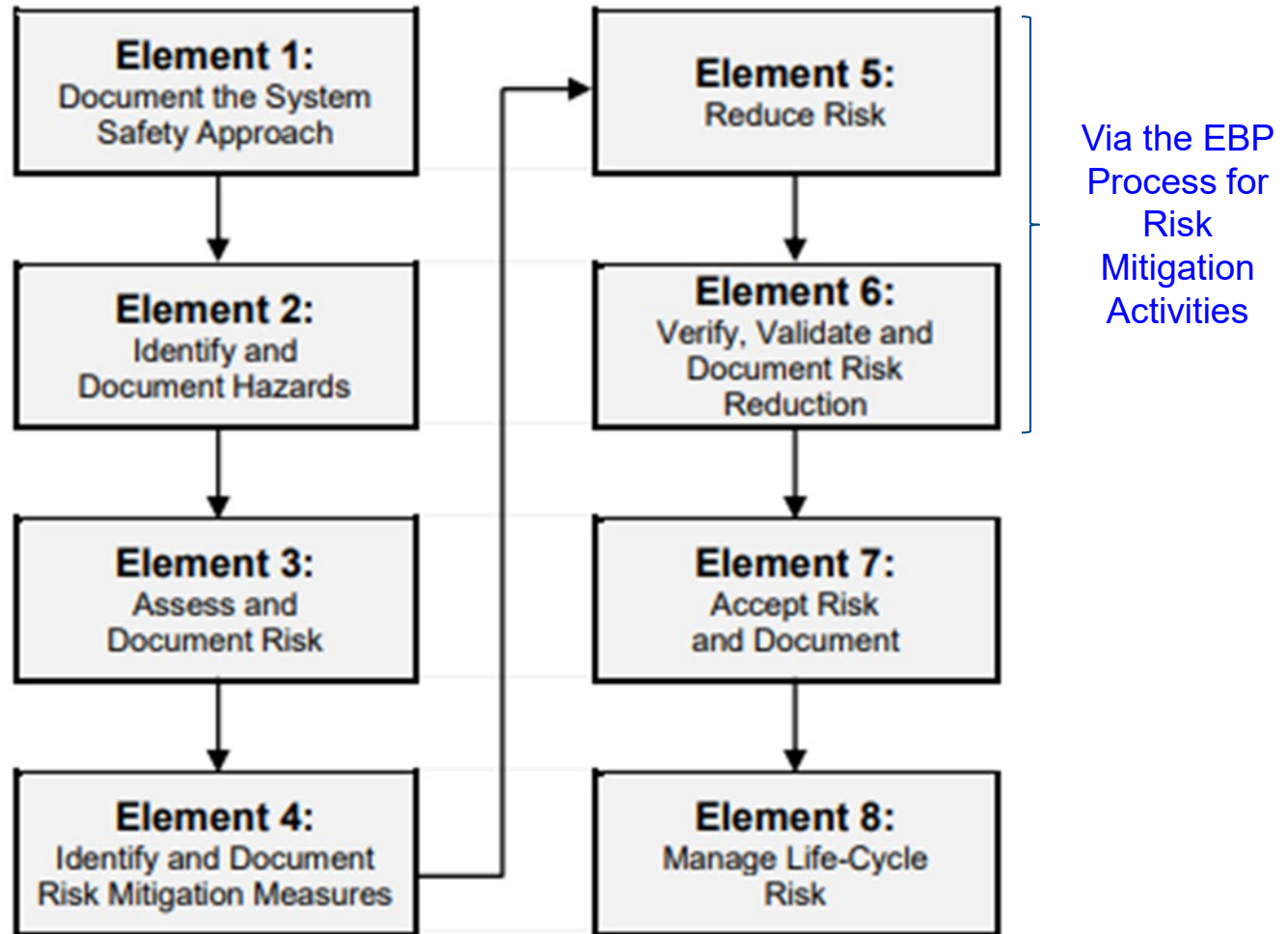


# Module 6: Hazard Tracking & Reporting

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- Designed in accordance with MIL-STD-882E, the purpose of the Hazard Tracking Module (HTM) is to efficiently manage and track program hazard data from hazard identification through risk mitigation and hazard disposition.
  - Provides means for effectively organizing, managing, and updating hazard-related data
  - Documents approaches, decisions and actions taken to eliminate or reduce risks of hazards
  - Provides a means to effectively influence design to ensure that safety is optimized in a system
  - Provides a method for closed loop tracking of actions and/or decisions

Systems Engineering fundamentals ensure safety remains an integral part of day-to-day program execution throughout the program lifecycle



Mil-STD-882E Figure 1. Eight elements of the system safety process

Assigned by iRIS  
Admin

User Type	Read	Add	Edit	Delete
iRIS Administrator	X	X	X	X
HTM Administrator	X	X	X	X
User	X			

# HTM Access

Home

Administration

Imports

Deletions

Program

Requirements

Cybersecurity

Verification

Hazards

Reporting

Help

Logoff

Hazards

Requirements

Verification

Hazard Listing

Drag a column header here to group by that column

Hazard Status	Hazard ID	Contractor Haz...	Hazard Name	Program	Hazard Risk	Current / ...	Mishap Type
Complete	Battery-HAZ-001	HR-1	Structural Failure	FT-1	Electric shock could occur when ...	Low	Personnel Injury,Death,Dama...
Complete	Battery-HAZ-002	HR-2	Propulsion Hazards	FT-1	Loss of integrity of the signal in ...	Medium	Personnel Injury,Equipment D...
Complete	Battery-HAZ-003	HR-3	Rupture/Leakage ...	FT-1	Transition is the ability to depla...	Medium	Personnel Injury
Complete	Battery-HAZ-004	HR-4	Inadvertent Activ...	FT-1	Electric shock could occur when ...	Medium	Personnel Injury
Complete	Battery-HAZ-005	HR-5	Inadvertent Trans...	FT-1	This hazard record was rejecte...	Low	Personnel Injury
Complete	Battery-HAZ-006	HR-6	Flammable/Incomp...	FT-1	Electric shock could occur when ...	Medium	Personnel Injury,Equipment D...
Complete	Battery-HAZ-007	HR-7	Personnel Hazards	FT-1	Electric shock could occur when ...	Medium	Personnel Injury,Death
In-Process	Battery-HAZ-008	Vendor 123-001	Battery Case Rupt...	FT-1	Transition is the ability to depla...	Serious	Loss of System,Equipment Da...
Complete	Battery-HAZ-009	Booster 53	NAP Antenna mec...	FT-1	This hazard record was rejecte...	Low	Loss of System,Equipment Da...
In-Process	Battery-HAZ-010	Booster 2	RCS tank explosio...	FT-1	Transition is the ability to depla...	Serious	Loss of System,Equipment Da...
In-Process	Battery-HAZ-011	Booster 39	Structural failure o...	FT-1	Electric shock could occur when ...	Medium	Equipment Damage
In-Process	Battery-HAZ-012	Missile - FDC-005	Solar Array mecha...	FT-1	Electric shock could occur when ...	Medium	Loss of System,Equipment Da...
In-Process	Battery-HAZ-020	Booster 10	Battery rupture/I...	FT-1	Failure to properly initialize a sa...	High	Personnel Injury,Damage to F...
In-Process	Battery-OPP--001	Batt-001	Battery Case Tem...	123	Potential schedule delay due to ...	Low	
In-Process	Booster-HAZ-001	Payload-1	Sturctural Failure	FT-1	This hazard record was rejecte...	Low	Personnel Injury,Loss of Syst...
Complete	Booster-HAZ-002	HR-7	Inadvertent depla...	FT-1	Dropping hardware during a re...	Medium	Personnel Injury,Equipment D...
In-Process	Booster-HAZ-003	Payload-1	Inadvertent activ...	FT-1	System could explode if over he...	None	Personnel Injury,Equipment D...
In-Process	Booster-HAZ-004	HR-6	Separation/struct...	FT-1	This hazard record was rejecte...	Medium	Personnel Injury,Equipment D...
In-Process	Booster-HAZ-006	Payload-1	Inadvertent thrus...	FT-1	Racks used to hosts various Mis...	Medium	Personnel Injury,Loss of Syst...
In-Process	Booster-HAZ-007	Payload-1	Heat pipe failure	FT-1	Transition is the ability to depla...	Serious	Personnel Injury,Loss of Syst...

Export

Open

Add

Delete

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5

# Hazard Record Addition

**Hazard Listing**

Drag a column header here to group by that column

Hazard Status	Hazard ID	Contractor Haz...	Hazard Name	Program	Hazard Risk	Current / ...	Mishap Type
Complete	Battery-HAZ-001	HR-1	Structural Failure	FT-1	Electric shock could occur when ...	Low	Personnel Injury,Death,Dama...
Complete	Battery-HAZ-002	HR-2	Propulsion Hazards	FT-1	Loss of integrity of the signal in ...	Medium	Personnel Injury,Equipment D...
Complete	Battery-HAZ-003	HR-3	Rupture/Leakage ...	FT-1	Transition is the ability to depla...	Medium	Personnel Injury
Complete	Battery-HAZ-004	HR-4					
Complete	Battery-HAZ-005	HR-5					
Complete	Battery-HAZ-006	HR-6					
Complete	Battery-HAZ-007	HR-7					
In-Process	Battery-HAZ-008	Vendor 123-001					
Complete	Battery-HAZ-009	Booster 53					
In-Process	Battery-HAZ-010	Booster 2					
In-Process	Battery-HAZ-011	Booster 39					
In-Process	Battery-HAZ-012	Missile - FDC-005					
In-Process	Battery-HAZ-020	Booster 10					
In-Process	Battery-OPP--001	Batt-001					
In-Process	Booster-HAZ-001	Payload-1					
Complete	Booster-HAZ-002	HR-7					
In-Process	Booster-HAZ-003	Payload-1					
In-Process	Booster-HAZ-004	HR-6	Separation/struct...	FT-1	This hazard record was rejecte...	Medium	Personnel Injury,Equipment D...
In-Process	Booster-HAZ-006	Payload-1	Inadvertent thrus...	FT-1	Racks used to hosts various Mis...	Medium	Personnel Injury,Loss of Syst...
In-Process	Booster-HAZ-007	Payload-1	Heat pipe failure	FT-1	Transition is the ability to depla...	Serious	Personnel Injury,Loss of Syst...

**HazardStub**

HazardID:

Hazard Title:

Hazard Description:

Fill in the hazard ID and name (Hazard description is optional at his point) and click Save.  
The new record will appear in the HTM list and is now ready for editing.

Save Cancel

Export Open Add Delete

# Hazard Record Editing

### Hazard Listing

Drag a column header here to group by that column

Hazard Status	Hazard ID	Contractor Hazard ID
Complete	Battery-HAZ-001	HR-1
Complete	Battery-HAZ-002	HR-2
Complete	Battery-HAZ-003	HR-3
Complete	Battery-HAZ-004	HR-4
Complete	Battery-HAZ-005	HR-5
Complete	Battery-HAZ-006	HR-6
Complete	Battery-HAZ-007	HR-7
In-Process	Battery-HAZ-008	Vendor 123-00
Complete	Battery-HAZ-009	Booster 53
In-Process	Battery-HAZ-010	Booster 2
In-Process	Battery-HAZ-011	Booster 39
In-Process	Battery-HAZ-012	Missile - FDC-0
In-Process	Battery-HAZ-020	Booster 10
In-Process	Battery-OPP--001	Batt-001
In-Process	Booster-HAZ-001	Payload-1
Complete	Booster-HAZ-002	HR-7
In-Process	Booster-HAZ-003	Payload-1
In-Process	Booster-HAZ-004	HR-6
In-Process	Booster-HAZ-006	Payload-1
In-Process	Booster-HAZ-007	Payload-1

Export

## Hazard Battery-HAZ-008: Battery Case Rupture

General Causal / Mitigation Risks, Probabilities and Severities Requirements Events Artifacts / Hyperlinks Comments Change History

Hazard ID: Battery-HAZ-008 Contractor Hazard ID: Ver Revision: B

Hazard Name: Battery Case Rupture

Hazard Description

Rupture of the battery during operation resulting in the loss of the system. The venting mechanisms of five different commercial 18650 cell designs and one prototype cell design were examined via high-speed radiography during thermal runaway. The specifications of the tested cells are presented in Table 1, where the cells contain one or more of four different electrode materials, LiNiMnyCozO2 (NMC), LiNiCoyAlzO2 (NCA), LiMn2O4 (LMO), and LiCoO2 (LCO). The six cells represent a wide range of chemistries, capacities, and cell designs. The two LG cells, LG ICR 18650-S3 and LG ICR 18650-B4, will henceforth be referred to as LG-S3 and LG-B4. The vent region of each cell design was imaged using X-ray CT (imaging conditions are provided in the following sections), and exploded 3D segmentations are presented in Figure 1.

Applicability

Program: FT-1

Segment: Subsystem

Vehicle Number:

System: System-1

Subsystem:

SW Applicability:

HW Applicability: Battery

Flight Test Phase

☒ Missile Power-up

☐ Prelaunch Built in

☐ Missile Go/No-go

Created Date: 3/27/2017 3:52:41 PM

Modified Date: 8/25/2021 11:29:40 AM

Hazard Status

☐ Appr ☐ Subm ☐ Disap ☒ In-Pr ☐ Comp

Mishap Type

☐ Personnel Injury

☒ Loss of System

☒ Equipment Damage

☐ Death

☐ Damage to Facilities

Originator: John Gordon (6/12/2020)

Assignee: Fred Jones (SE&I)

User Operations

Save View History Save and Close Close

# Hazard Record Report

Hazard Battery-HAZ-008: Battery Case Rupture

**Battery-HAZ-008: Battery Case**

Click for change history

General Causal / Mitigation Risks, Probabilities and

Hazard ID Battery-HAZ-008 Contractor

Hazard Name Battery Case Rupture

Rupture of the battery during operation resulting in the mechanisms of five different commercial 18650 cell designs examined via high-speed radiography during thermal tests. The six cells represent a wide range of chemistries, materials, LiNiMnCoO<sub>2</sub> (NMC), LiNiCoAlO<sub>2</sub> (NCA), LG ICR 18650-S3 and LG ICR 18650-B4, will hence the vent region of each cell design was imaged using the following sections), and exploded 3D segmentations.

Originator John Gordon (6/12/2020)

Assignee Fred Jones (SE&I)

**Hazard Record**

GP Hazard ID	Battery-HAZ-005	Contractor Hazard ID	HR-5	Created On	3/27/2017
Hazard Title	Inadvertent Transmission of RF				
Hazard Status	Complete				
<b>Hazard Risk Status</b>					
Initial Prob.		Final Prob.	Remote (D)	Target Prob.	
Initial Sev.		Final Sev.	Negligible (4)	Target Sev.	
Initial Risk		Final Risk	Low	Target Risk	
System Phase					
Assignee	Fred Jones (SE&I)				
Description	Personnel exposure to excessive RF Radiation				
Effects	Personnel injury, damage to program equipment.				
Originator	John Gordon (9/12/2016)				
<b>Applicability</b>					
Program	Segment	System	Hardware	Software	
FT-1	Missile	Missile			
<b>Causal Factors</b>			<b>Mitigations</b>		
1) Sharp edges, pinch points, moving/rotating equipment.			1) SE designed to minimize sharp edges/pinch points. Moving parts and rotating equipment will be isolated by guards/barriers/interlocks.		
<b>Requirements</b>					
EWR 127-1 Para. 3.74					
Risk Assessment	Hazard Risk:	This hazard record was rejected as exclusively being an Missile hazard.			
	Risk Assessment:				
Risk Acceptance	Risk Accepted by:				

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Page: 1 / 2

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☒ In-Process

☐ Complete

User Operations

Save

View History

Save and Close

Close