



STS-131
KSC S&MA

STS-130 Launch-On-Need (LON) Assessment

G

LON Status GREEN

STS-132 is processing as the LON for STS-131

- SRB middle center sections are in work.
- ET-136 mate is 3/29.
- OV-104 processing in OPF-1 is on schedule with a Ready-to-Roll date of 4/13.
- SSV Rollout to Pad-A: 4/20.
- The Launch of STS-132 as LON would occur 39 days from the STS-131 launch: 5/14.

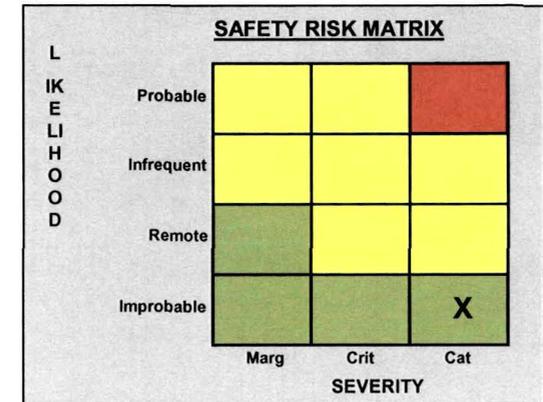


TSM Bonnet Closure Timing		Presenter KSC- Ed. Jezierski
Date 03/22/10	Page 1	

RISK TYPE: Safety
 HAZARD REPORTS: N/A
 CRITICALITY: N/A
 ORGANIZATION: KSC S&MA

RISK DESCRIPTION / STATEMENT:

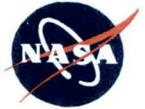
- **STS-130 LH2 Bonnet closure timing was out of family fast (but within Spec.) at: 1.121 seconds.**
 - Expected range: approx 1.2 seconds
 - Specification range: 1.1 to 1.3 seconds
 - The 1.3 seconds is to ensure the bonnet is closed before the SSME nozzle exit plane passes the door at approx. 1.38 seconds to eliminate GSE damage
 - 1.1 seconds is to ensure bonnet does not contact umbilical and produce FOD
- **Concern: bonnet contacting carrier plate during closure if too fast (Bellow 1.1 Sec.)**
 - Bonnet contacting Umbilical Carrier Plate during closure could generate FOD
- **Cause: Different lot of bonnet closure thrusters is providing more closing thrust**
 - Inventory indicates that all Lot EAJ thrusters have been used and must now use Lot EAK thrusters for the TSM bonnet.
- **Consequences:**
 - **Catastrophic**
- **RISK MITIGATION:**
 - Install longer bonnet closure wires for MLP3 LO2 and LH2 TSM to extend closing time by 70 milliseconds and return to a nominal closure time of 1.2 seconds
- **CONSTRAINTS:** None
- **S&MA RATIONALE & RECOMMENDATION:**
 - Not a Constraint to flight
 - At worst, change will extend TSM bonnet closure time too much and damage GSE
 - Change will error on the side of not producing FOD





KSC SAFETY AND MISSION ASSURANCE DIRECTORATE

Launch Vehicle Processing Division
 NASA Kennedy Space Center, Florida



LC-39A High Pressure Gas Storage Facility (HPGF) Net Damage	Presenter R. Margasahayam	
	Date 03/08/2010	Page 1

RISK TYPE: Safety
HAZARD REPORTS: N/A
CRITICALITY: N/A
ORGANIZATION: KSC S&MA
ASSIGNED TO: Ravi Margasahayam/ KSC / SA-B3

L I K E L I H O O D	Probable			
	Infrequent			
	Remote			
	Improbable	X		
		Marg	Crit	Cat
		SEVERITY		

RISK DESCRIPTION / STATEMENT:

- During STS-130 launch High Pressure Gas Facility (HPGF) netting was damaged due to plume pressures and heat radiation
- Damage involved heat shrinkage and tearing of the netting during Space Shuttle lift-off; possible FOD concern
- Consequence: Marginal

BACKGROUND

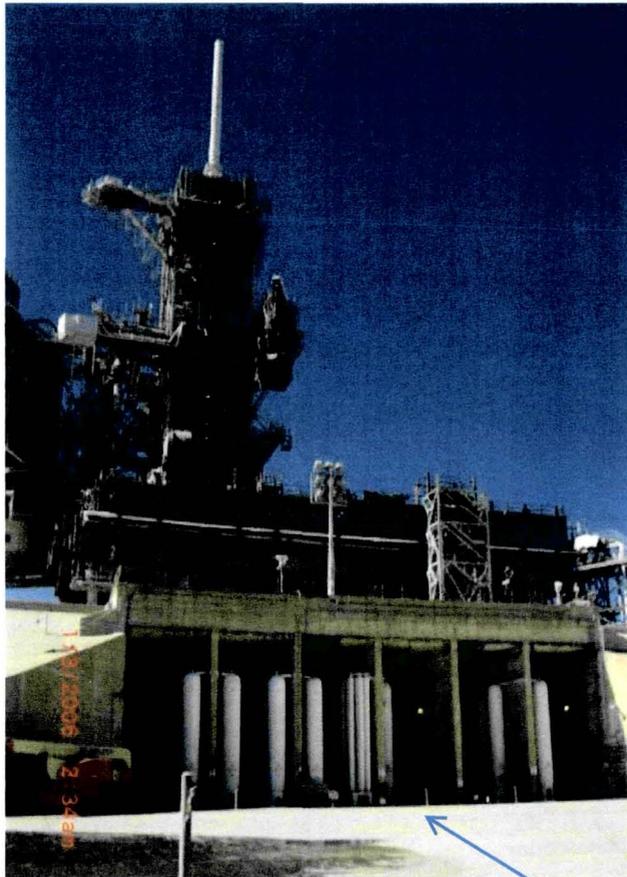
- HPGF netting was placed for the first time during STS-130 launch for 'extra' safety (area was already controlled properly)
- Netting was intended to protect personnel working below from falling debris in the form of spalled concrete from the roof
- Most probable cause of damage is attributed to lift-off plume pressures acting on sail-type netting coupled with radiant heat
- Net damage most likely lasted for 3-5 seconds at lift-off (T+0 seconds) and as the vehicle cleared the tower at T+6 seconds
- Net damage was observed in all six (6) cells of the High Pressure Gas Storage Facility

RATIONALE / RECOMMENDATION

- STS-131 and subsequent are safe to fly
- Safety evaluated several risks affecting personnel working in the cells and tube tank equipment within cells; all controlled properly
- Risks due to concrete spalling from roof and SRB/SSME exhaust contacting ground support equipment were reviewed
 - Corrosion-induced concrete spalling is limited to 2"x2" only; occurs at random and not during lift-off
 - Review of launch videos showed no evidence of fire or direct plume impingement on the tanks; handrails on top show no damage
 - Thick tube banks likely experienced transient temperature excursions in the range of 200-220 degree F; not an issue
 - Corrective action: netting for STS-131 and subsequent launches will not be installed
 - Post-launch inspection and repairs have mitigated the problem; no large concrete pieces observed per EG&G
 - Tube banks show no flight damage experience since Apollo; thick walls can sustain transient temperatures
 - Hard hat policy is in effect for all personnel entering controlled area within HPGF.
 - Netting was made of flame retardant material and was designed to deform rather than burn



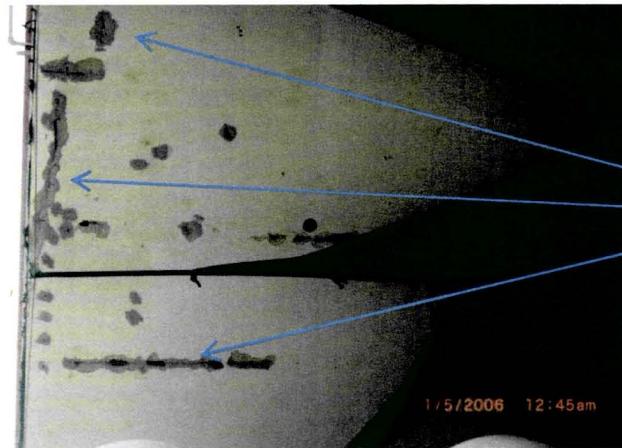
LC-39A High Pressure Gas Storage Facility (HPGF) Net Damage	Presenter	
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**HIGH PRESSURE GAS FACILITY –
EAST SIDE PAD 39A WITH SIX TUBE
BANK CELLS**



**TUBE TANK WITH TORN,
DEFORMED NETTING**



**ROOF CONCRETE
SPALLING - TYPICAL**



KSC SAFETY AND MISSION ASSURANCE DIRECTORATE

Launch Vehicle Processing Division

NASA Kennedy Space Center, Florida



STS-130 Ice Detection Camera FOD concern

Presenter **D. McCarter**

Date **03/22/10**

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RISK TYPE: Safety

HAZARD REPORTS: N/A

CRITICALITY: N/A

ORGANIZATION: KSC S&MA

ASSIGNED TO: Dallas McCarter / KSC / SA-B1

RISK DESCRIPTION / STATEMENT:

- If used improperly, ice detection equipment can liberate FOD during pre-launch ice inspections
- Consequence: Marginal (after controls in place, catastrophic without controls due to FOD and personnel injury)

SAFETY RISK MATRIX			
L I K E L I H O O D	Probable	Yellow	Red
	Infrequent	Yellow	Yellow
	Remote	Green	Yellow
	Improbable	Green with X	Green
		Marg	Crit Cat
SEVERITY			

BACKGROUND

- During the STS-130 pre-launch ice inspections, an LCD readout screen from the prototype ice detection camera broke, liberating small pieces of glass on the 255' level of the fixed service structure
- All FOD was collected prior to launch
- A close call/mishap investigation was performed. The immediate cause was overpressure from the GN2 purge bottle. The root causes were determined to be procedural as well as operator error.

RATIONALE / RECOMMENDATION

- STS-131 and subsequent are safe to fly
- KSC-PH has decided to never use the prototype equipment again for shuttle launches
 - The equipment is not required for ice inspections

