



**SPACE SHUTTLE PROGRAM**  
**Space Shuttle KSC Integration Office**  
NASA Kennedy Space Center, Florida



# STS-134 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-21-10**

## Program Freeze Point

## PRCB Presentation

## S115134B



# STS-134 Launch Site Flow Review

Presenter	Kenneth Nowak	
Date	01-21-10	

**Baseline the STS-134 Mission Specific Requirements and Flow Plans.**

The STS-134 Integrated Launch Site Requirements were established by PRCBD S115134 dated 12-03-09. This CR and the Associated Data Package were reviewed at the 01-15-10 FRWG.

**Flight Operation & Integration\***

**Orbiter Engineering\***

**Payload/Cargo Engineering\***

**Launch Vehicle Processing\***

**Requesting Approval**

**MO3/USA-PI**

**USA-OE**

**USA-PI**

**PH-A**

**Status in BackUp**

**KSC Integration\***

**Flight Software**

**Orbiter GFE**

**EVA**

**KSC ISS and Payload Processing\***

**SSME**

**Baseline at DLSFR**

**MK-SIO**

**USA-FSW**

**MV5**

**XA**

**UB-R3**

**MP21**

\*Backup material included



**SPACE SHUTTLE PROGRAM**  
**Space Shuttle Flight Operations and Integration Office**  
NASA Johnson Space Center, Houston, Texas



## **STS-134/ULF6**

# **Launch Site Flow Review (LSFR)**

## **Flight Requirements Status**

**PRCB January 21, 2010**

**Shelby Lawson, STS-134 MIM**

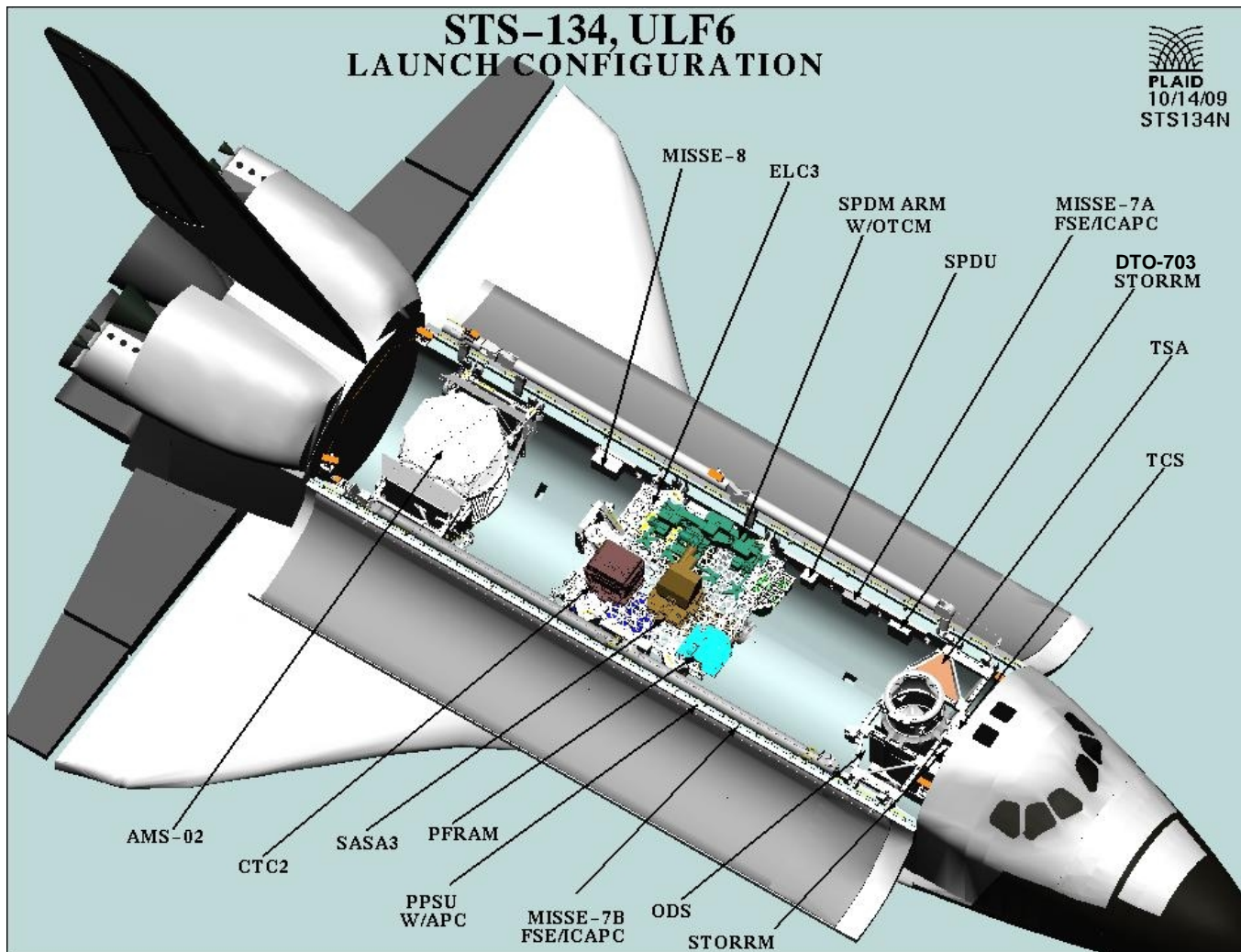
**Frank Richmond, USA Flight Mgr.**

**Adam Richards/Boeing Mass Properties**



<b>STS-134 LAUNCH SITE FLOW REVIEW</b>		Presenter <b>Shelby Lawson/MO3</b>
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*Acronyms & Abbreviations:*



- Payload Bay*
- AMS-02 – Alpha Magnetic Spectrometer -02
  - APC – Adaptive Payload Carrier
  - ELC3 – ExPRESS Logistics Carrier 3
  - ExPRESS – Expedite the Processing of Experiments to Space Station
  - ICAPC – Increased Capacity APC
  - MISSE – Materials on ISS
  - ODS – Orbiter Docking System
  - PPSU – Payload Power Switching Unit
  - SPDU – Station Power Distribution Unit
  - TCS – Trajectory Control System
  - TSA – Tool Stowage Assembly
- Middeck*
- GLACIER – General Laboratory Active Cryogenic on ISS Experiment Refrigeration Apparatus
- Payload of Opportunity*
- MAUI – Maui Analysis of Upper Atmosphere Injections
  - RAMBO-2 – Ram Burn Observations-2
  - SEITE – Shuttle Exhaust Ion Turbulence Experiment
  - SIMPLEX – Shuttle Ionspheric Modification with Pulsed Local Exhaust
- Development Test Objective (DTO)*
- DTO 805 – Crosswind Landing Performance
  - DTO 703 – Sensor Test for Orion Relative-Navigation Risk Mitigation (STORRM)



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<b>STS-134 LAUNCH SITE FLOW REVIEW</b>	Presenter <b>Shelby Lawson/MO3</b>	
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**LAUNCH**

07/29/10  
 39A/ MLP 3  
 CREW SIZE: 6UP/6DN

**ORBIT**

51.6 DEG  
 122 NM  
 DIRECT INSERTION (200 NM altitude)  
 DURATION: 12 + 1 + 2 DAYS (3 EVAs)

**CONFIGURATION**

OV-105 (25)  
 LP03;RP04  
 ET-137  
 BI-144  
 RSRM-112  
 (1) TBD (2) TBD (3) TBD  
 OI-34  
 SRMS, OBSS<sup>(a)</sup>, ODS, SSPTS

**CONSUMABLES**

CRYO TANK SETS 5 (500# offload)  
 GN2 TANKS 5 (FULL)  
 FWD RCS 2175# (MIDPOINT)  
 AFT RCS 4970# (FULL)  
 OMS 22760# (STANDARD)

**PAYLOAD**

ISS-ULF6  
 AMS-02  
 ELC3  
 MISSE 8  
 MISSE 7a & 7b <sup>(b)</sup>  
 STORM DTO-703

ISS-ULF6  
 GLACIER (2)  
 CGBA  
 MAUI <sup>(c)</sup>  
 RAMBO-2 <sup>(c)</sup>  
 SEITE <sup>(c)</sup>  
 SIMPLEX <sup>(c)</sup>

**LANDING**

SITE  
 TAL  
 ALT. TAL  
 SCA

KSC  
 ZARAGOZA  
 MORON & ISTRES  
 TBD

- Rescue Flight for STS-132
- (a) OBSS remains on ISS
- (b) MISSE 7a & 7b return only
- (c) Payload of Opportunity – no hardware



<b>STS-134 LAUNCH SITE FLOW REVIEW</b>	Presenter <b>Shelby Lawson/MO3</b>	
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**PERFORMANCE MARGIN**

- **SIMULATION MARGIN (CIRAF134) +2569**
  
- **WEIGHT CHANGES SINCE SIMULATION**
  - **PAYLOAD +1021**
  - **OPERATOR -192**
  - **ORBITER +112**
  - **NPC -66**
  - **CREW COMPARTMENT +260**
  - **TOTAL WEIGHT CHANGES +1135 -1135**
  
- **OTHER PERFORMANCE PROJECTIONS**
  - **RENDEZVOUS ALT OF 200 NM +580**
  - **PROTECTION FOR DOL DISPERSIONS -700**
  - **SRB – M.P. UPDATES - 108**
  - **SRB – BR / 0.33 MIL LOWER THAN 0.3705 AVG -108**
  - **PROJ TO 5 MIN WINDOW FROM INPLANE -600**
  - **PERFORMANCE CHANGES ADJUSTMENT +79**
  
- **CURRENT BASELINED APM (01/19/10) +577**

**VOLUME III: ASCENT PERFORMANCE MANAGER'S RESERVE GUIDELINE AT FPSR/CIR IS 800 LBS**



<b>STS-134 LAUNCH SITE FLOW REVIEW</b>		Presenter <b>Shelby Lawson/MO3</b>
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## **FLIGHT MASS PROPERTIES**

<u><b>CASE</b></u>	<b>TOUCHDOWN</b>	<b>MACH 3.5</b>
	<u><b>WEIGHT pounds (LIMIT)</b></u>	<u><b>X C.G. inches (LIMIT)</b></u>
<b>NOMINAL</b>	<b>202430 (233000)</b>	<b>1081.6 (1075.7)</b>
<b>RTLS</b>	<b>237708 (245000)</b>	<b>1081.8 (1077.2)</b>
<b>TAL</b>	<b>236267 (244000)</b>	<b>1082.1 (1077.2)</b>
<b>AOA</b>	<b>232306 (242000)</b>	<b>1080.3 (1075.7)</b>
<b>CONT RTRN**</b>	<b>233473 (233000)</b>	<b>1082.0 (1075.7)</b>

\*\* Contingency Return Case exceeds 233K NEOM weight limit (See Vol. X Bk. 1 Sec. 3.3.1.1.9)  
 - Contingency Return Case is AMS-02 in PLB, ELC3 Deployed, Full Middeck, Fwd CG Case

**NOTE: RTLS INCLUDES 185 SEC ARCS & 25 SEC FRCS DUMPS**  
**TAL INCLUDES 120 SEC ARCS & 65 SEC FRCS DUMPS**

**ESTIMATES BASED ON CIRAF134 AND MODIFIED FOR WEIGHT CHANGES THRU 01/19/10.**

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# **STS-134 OV-105 Flight 25 LSFR Orbiter Element**

Kim Guodace  
Scott Copenhaver

USA / OE  
Boeing / VMMO

**January 21, 2010**



# STS-134 OV-105 Flight 25 LSFR Orbiter

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## Purpose:

- Present summary of modifications and other requirements to be performed prior to STS-134, OV-105 Flight 25.
  - One Orbiter and Three Mission Kit modifications were previously baselined at the STS-134 Launch Site Readiness Review (LSRR)
  - One Potential Mission Kit modification was previously reviewed at LSRR and is still pending
  - Summary of other requirements
    - RCNs / Chits
- No new modification requirements are being brought forward for program authorization at this time
- Obtain program authorization for STS-134 MECSLSI update to include tech order (M072-755113-002) for MEI Instrumentation added to left OMS pod stinger

## Back-up:

- Modifications Matrix
- Open Mod Certification
- BRI-18 priority status
- Description of baselined mods

# STS-134 OV-105 Flight 25 - LSFR Baseline

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The following modifications have been baselined at a previous review (LSRR)

- **30274 – Fuel Cell CPM Dedicated Power Feed Circuit Fuse Mod**
  - Installs a dedicated power feed to the Fuel Cell H2 Flowmeter separate from the Cell Performance Monitor (CPM) to protect against power loss of the CPM
- **Mod Details in Back-up**

## Mission kit modifications baselined

- **30180 – IBA Boom Configuration Change for STS-134**
  - Modifies IBA (Inspection Boom Assembly) Tech Orders and MECSLSI to reflect new boom and sensor pack 1 installation changes as well as Orbiter return without Boom
- **30191 – STORRM (Sensor Test for the Orion ReINav Risk Mitigation)**
  - Revises installation blanket Tech Order and MECSLSI to accommodate test of Orion Vision Navigation Sensor (VNS) and Docking Camera during ISS dock and undock (DTO 703 Implementation)
- **30180 – Payload Cable Harness Mod for ROEU and AMS**
  - Updates MECSLSI to include two longer ELC3 ROEU Power/Control cables to allow the ELC Sill Latch cables to be mated further forward on the starboard sill
- **Mission Kit Mod Details in Back-up**

# STS-134 OV-105 Flight 25 - LSFR Baseline

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## Potential modifications reviewed

- **Port LWTSA Cushion Mod to Return IBA EFGF**
  - Modifies the port LWTSA (Light Weight Tool Stowage Assembly) cushion to accommodate the return of the IBA (Inspection Boom Assembly) EFGF (Electrical Flight Grapple Fixture)
- **Potential Mod Details in Back-up**

# STS-134 OV-105 Flight 25 – Attrition Mods

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## Significant Attrition Modifications

- BRI-18 and other TPS priorities
  - To be addressed at Delta LSFR

# RCNs/Chits

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The following are presented for information only

Pending RCNs No.	Title/Description	Notes
None		

Chit No.	Title	Description
J6275A	Orbiter Structure IML Surface Corrosion Sampling Inspection	Approved
J6514A	Putty Repair Tile Replacement for Risk Reduction	Approved
J6527	FRCS Thruster Canister Stud Inspections – F5R and F5L	Closed – Thruster canister studs have been re-torqued, inspections no longer required
J6543	ET Ferry Flight Door Attach Fitting Inspection	Approved – Ferry flight only
J6559	Upper Aft Stub Tile Inspection for In-Plane Cracks	Approved
J6577	Ames Gap Filler Removal and Replacement	In Assessments
J6580	Capture OV-105 Output Waveforms to Address 1N3600 Diode Concerns	Approved
J6582	Rudder Speed Brake Thermal Tab Inspection	Approved
JXXXX	Window Torque Checks	In Draft

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**STS-134**  
**ISS – ULF6 – AMS STORRM MISSE 7&8**  
**Launch Site Flow Review**

**Payload Cargo Engineering Status**

**Michael Barido**

**281.212.6072**

**01-21-2010**

# STS-134 LSFR

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## Engineering Flight Product Status

<u>Drawing Title</u>		<u>Rev</u>	<u>EO</u>		<u>Released</u>
V072-200214	MECSLSI	A	A01		01/04/10
VA72-200214	Cargo Arrangement	A	A01		01/06/10
VD72-200214	Avionics Diagram	A	A01		01/06/10
VS72-200214	Integrated Schematic	A	A01		01/06/10
VS70-540375	Retention Schematic	A	A01		12/16/09

## Engineering Open Work

- Product updates for addition of ROEU SIP Bracket

ECD: U/R

## Standardization

- Mission Configuration complies with Orbiter/Payload Integration Standardization Document NSTS 60523 except as defined in PRCB CR S070046 STS-134 Mission Unique Waiver (currently being processed OSB, awaiting final approval):
  - Non- standard cabling installed in aft flight deck and payload bay
  - Addition of T-0 110 VAC & 120 VDC services and T-0 monitoring of RTD signal
  - Unique FSW monitoring (1553 interface to OIU, one MDM PF-01 DOL, two MDM PF-2 AIDs)

# STS-134 LSFR

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## Cargo Integration Hardware Status

### Delivery Status

- New Cargo Integration Harnesses (Qty 10) 02/23/10

### Issues/Concerns

- None

## Cargo Close-Clearance Process

- The following Close-Clearance areas have been identified:
  - None



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# KSC Launch and Landing Project

## STS-134

### Launch Site Flow Review

January 21, 2010

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STS-134 LSFR  
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# Multi Flow

S. Ford

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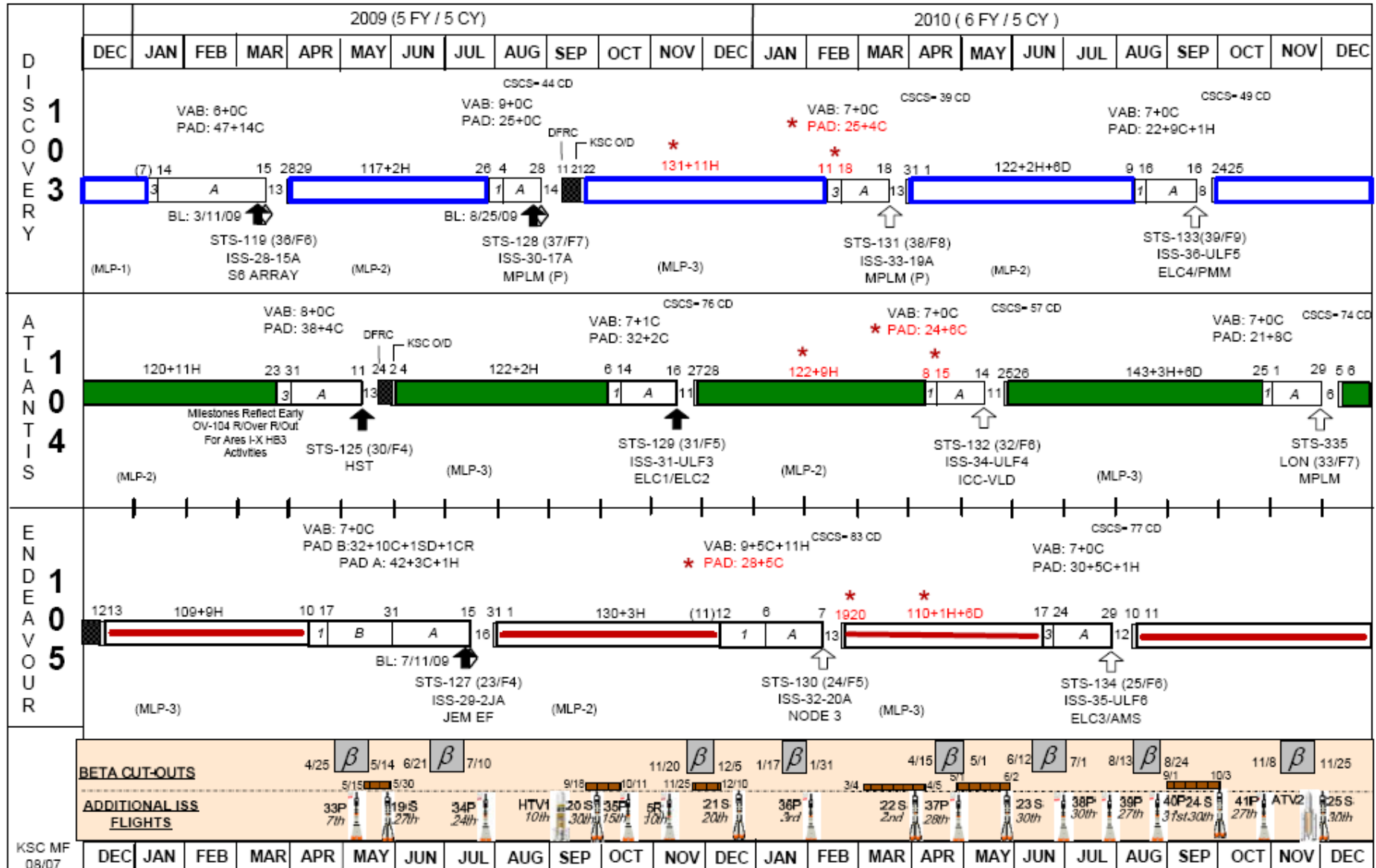


# KSC ASSESSMENT / ORB MULTI-FLOW

## SSP APPROVED MANIFEST

### MANIFEST REF. 09B-9

0700 EST, 14 JAN 2010



KSC MF 08/07

**LEGEND**  
 H - HOLIDAY    D - DRYDEN RESERVE    C - PAD CONTINGENCY    Wx - WEATHER OUTAGE    OPF-1    OPF-2    OPF-3    Vehicle out of service    S - SOYUZ    P - PROGRESS  
 CR - CREW REST DAY    DFRC OPS    1/3 VAB OPS    A/B PAD OPS    MILESTONE    LAUNCH    SOYUZ Outcut

Contact: S. Wierszalowski, USA Near-Term Manifest Planning (321)861-8701

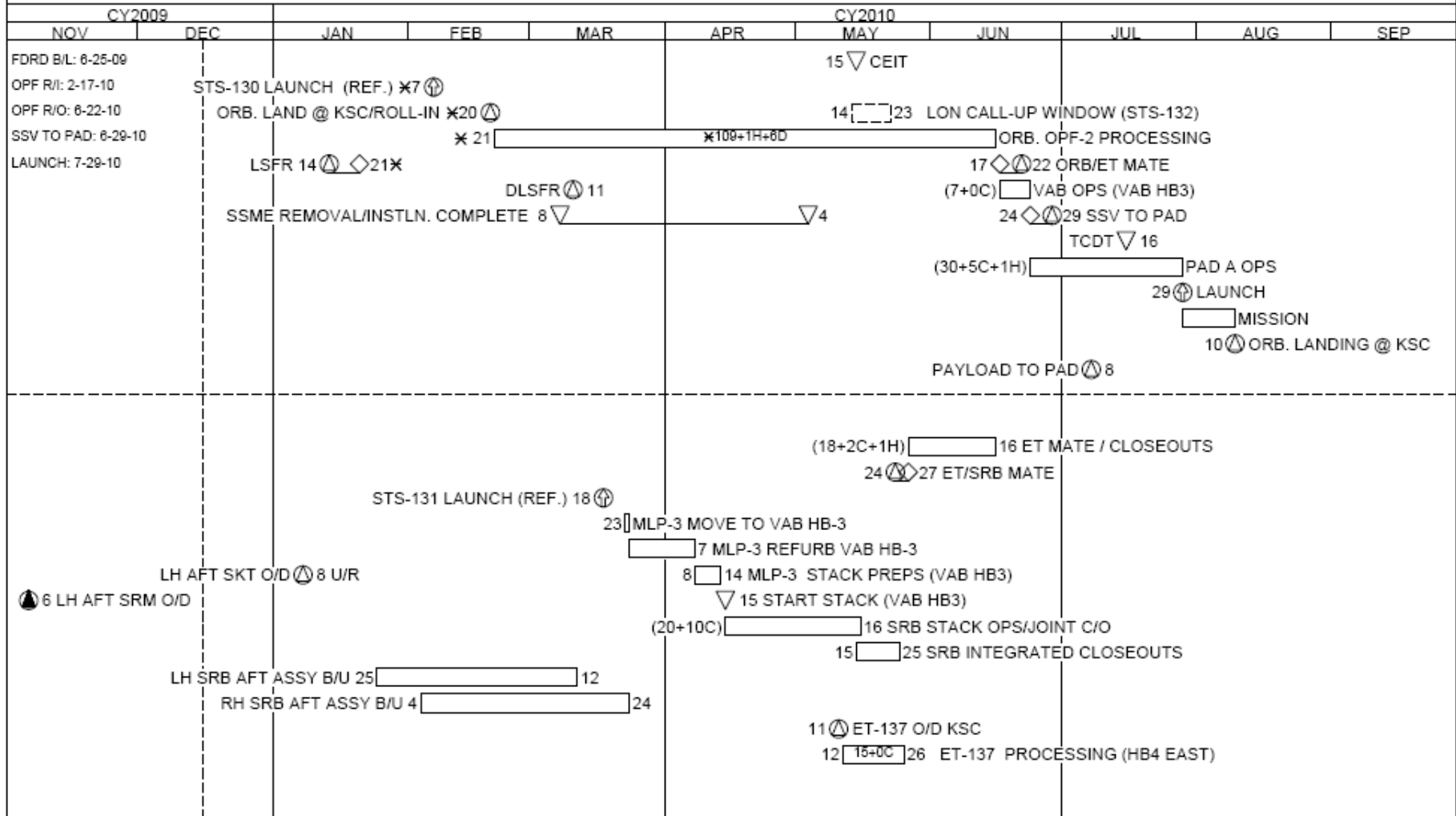
MLP TO VAB / START STACK / ET - SRB MATE / ET - MATE CLOSEOUTS COMPLETE

# STS-134 KSC Milestone Interface Chart

OPR: USA - R. GILLETTE, INTEG. OPS.  
NASA - C. FORD, PH-O

OV-105/25/ ISS-35-ULF6-AMS  
CREW / DURATION: 6 / 12  
ET 137/ BI144 / RSRM 112 / MLP-3/ PAD-A / VAB HB-3

SSP APPROVED PRCB 6-25-09 (REF. CR #SO72134)  
Status as of:  
12/17/2009



**THREATS:**  
1. OPF FLOW DURATION  
2. ET PROCESSING

**NOTES:**  
1. THIRTY-FIFTH ISS/SSP FLIGHT  
2. INCORPORATED AMS PAD REQUIREMENTS

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# Flight Element Processing

R. Goodman

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STS-134 LSFR  
J. F. Kennedy Space Center



# Flight Element Processing Overview

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- **OPF Flow Milestones** **Presented**
- **Processing Deltas** **Presented**
- **TPS Work Content** **Presented**
- **Issues and Concerns** **Presented**
- **Integrated Operations Summary** **Presented**
- **STS-134 Flow Breakdown** **Backup**
- **BRI Summary STS-134 (Flight 25)** **Backup**
- **Configuration/Facilities** **Backup**

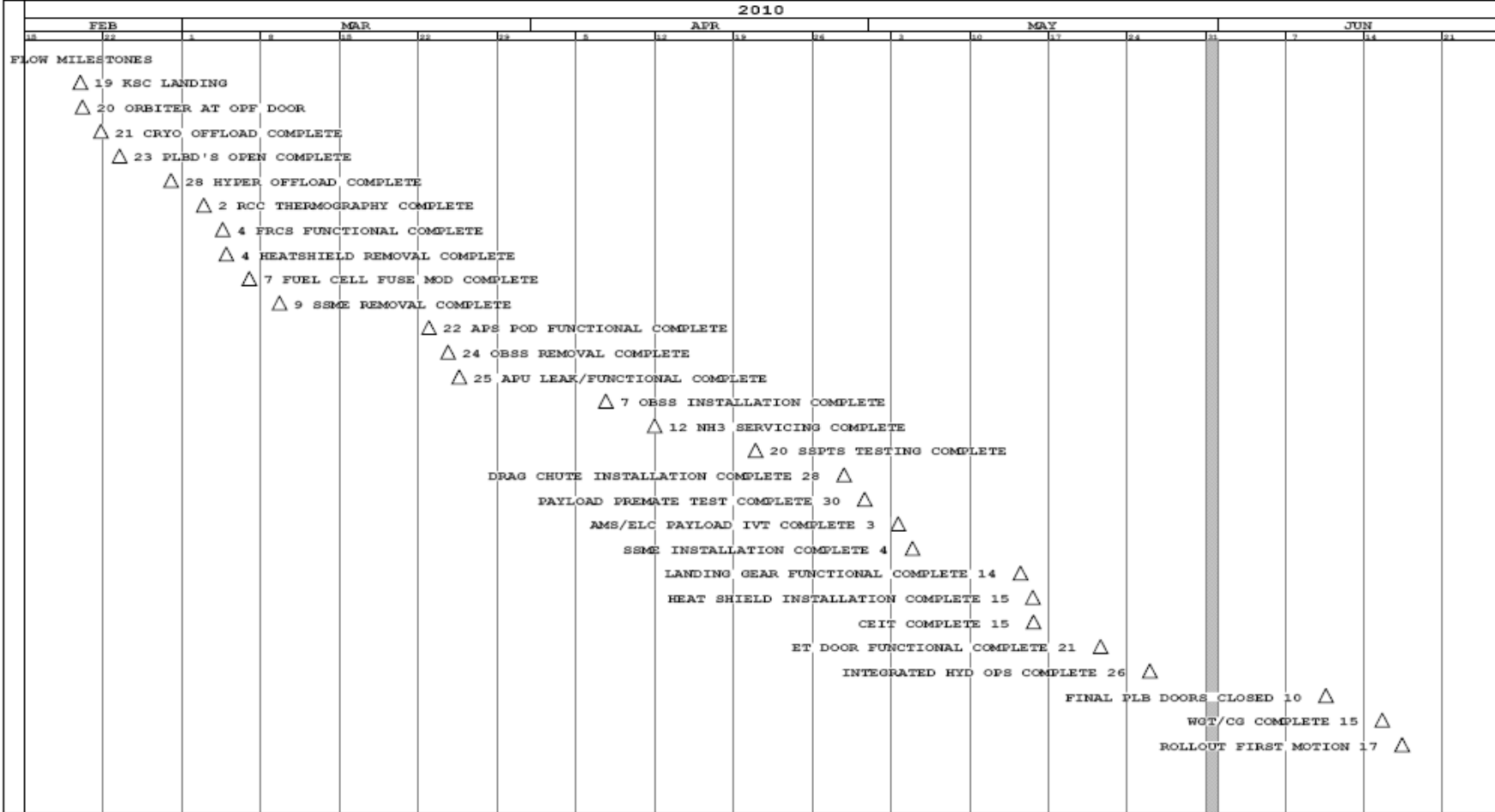


<b>STATUS</b>	
USA	NASA
C	C
00000000	00000000

Creation Date:12-JAN-2010  
Revision Date:14-JAN-2010  
Revision :B

**STS-134/OV-105 OPF FLOW MILESTONES**  
DOWN PAYLOAD:ISS-32-20A|NODE 3 / UP PAYLOAD:ISS-34-ULF6

OPR:USA-GOODMON, RANDAL D  
NASA-HUTCHERSON, DANA M



△ PLAN/BASELINE    ◇ DEVIATION FROM BASELINE    ▲ ◆ ACTIVITY COMPLETED    △ ACTIVITY CANCELED    △-△ ACTIVITY DURATION \*\*\*\* SCHEDULE CHANGE

STATUS DATE: 15-JAN-2010:1    PLOT DATE: 15-JAN-2010, 12.16 pm    NETWORK: OPF134.706    CONTACT: L.P. TUTEN ,1-0673    OPF BAY-2    EXE:CUSOPFSU.27

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STS-134 LSFR  
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# Processing Deltas

- **Mods:**
  - Fuel Cell CPM Dedicate Power Feed
  - Integrated Boom Assembly Configuration Change

- **CHITs:**

Chit No.	Title	Description
J6275A	Orbiter Structure IML Surface Corrosion Sampling Inspection	Approved
J6514A	Putty Repair Tile Replacement for Risk Reduction	Approved
J6527	FRCS Thruster Canister Stud Inspection - F5R and F5L	Not Required
J6543	ET Ferry Flight Door Attach Fitting Inspection	Approved – Ferry Flight Only
J6559	Upper Aft Stub Tile Inspection for In-Plane Cracks	Approved
J6577	Ames Gap Filler Removal and Replacement	Pending
J6580	Capture OV-105 Output Waveforms to Address 1N3600 Diode Concerns	Approved
J6582	Rudder Speed Brake Thermal Tab Inspection	Approved
JXXXX	Window Torque Checks	Need Draft





# Processing Deltas (cont'd)

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- **Time & Cycle:**
  - Av Bay Fire Bottles Weight (Infra Red)
  - OMS/RCS Regs & ISO Leak Test
  - LHMLG Inboard Brake
  - Drag Chute Pyro Canister
  
- **Deferred to Flight 25:**
  - RMLG Cracked Bracket
  - ECL Flex duct Worn
  - Body Flap Tile Putty Repair Loose
  - INS Vertical Tail MADS Measurement (Bay 8 T/S)
  - Mid-Deck Closeout Panel Repair (Post MAR Removal)
  - PLBD Bulb Seal Retainer Cracked
  - MEI Data Downloads and Battery Change Out



# TPS Work Content

## Projected TPS Removals (STS-134)

<u>Priority</u>	<u>Description</u>	<u>LSFR</u>
Mand	Deferred Tile/ Fib For 1 Flight (Minimum)	5 (1F/1M/3A)
Mand	In-flight Tile/Blanket Damage (Estimate)	25
Mand	Operational Damage (Estimate)	20
Mand	Putty Repair Grindouts (Estimate)	14
Mand	Putty Repair Removals (Chit)	10
Mand	Corrosion Sampling (Chit)	5
13	Nose Area 9lb/090 Sip Tile Upgrade	7
<b><u>BRI Implementation</u></b>		
11	ET Door Remaining STR Side	12
<b>TPS Removals TOTAL (Estimate)</b>		<b>* 98</b>

**\* Final TPS Work Content Will Be Baselined At The Delta LSFR**



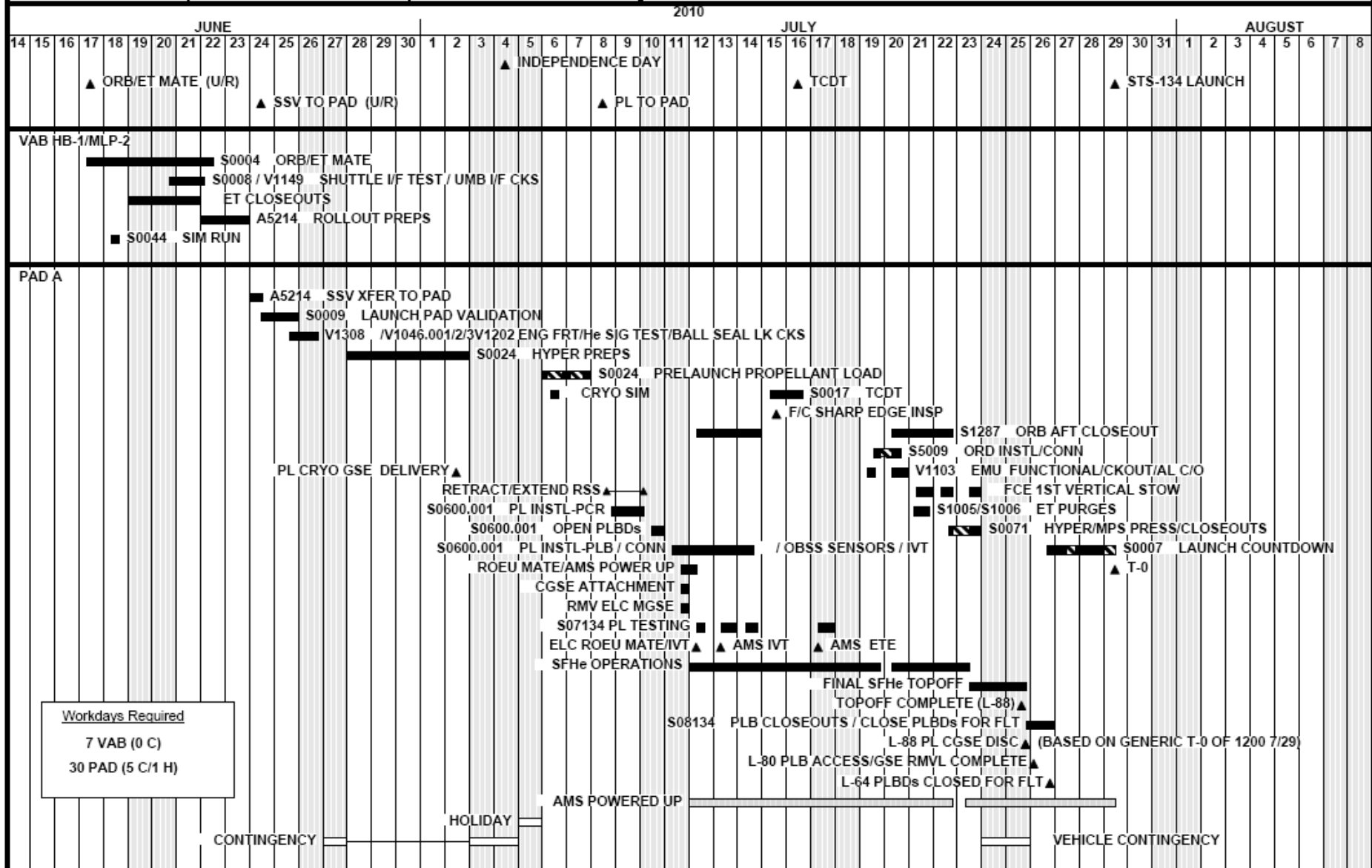
# Issues and Concerns

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- **Concern with OPF Flow duration and unplanned work**
- **Concern with unique Vertical Payload Operations installing and servicing AMS**



<b>STATUS</b>		OPR: USA - J. Taylor, INTEG FM (1-7420) NASA - D. Hutcherson, PH-A (1-9105)		<b>STS-134 / OV-105</b>	
USA	NASA	<b>CONCUR</b>			
C	C			Creation Date: 05 AUG 09 Revision Date: 21 OCT 09 Revision: B	
C=Concur NC=Non-Concur				Payloads: ISS-35-ULF6 AMS / ELC 3 (VERT)	



Workdays Required  
7 VAB (0 C)  
30 PAD (5 C/1 H)



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## STS-134 Launch Site Flow Review

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Date **01-21-10**

### Backup Material

### FRWG Presentation (With Minor Changes)



	Presenter <b>Shelby Lawson/MO3</b>
	Date <b>01/21/10</b>   Page <b>6</b>

# Flight Operations and Integration (FO&I)

## Flight Requirements:

**MIP & PIPs**

**FDRD**

**FRD**

**Backup Charts**



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<b>STS-134/ULF6</b>		Presenter <b>Shelby Lawson/MO3</b>
<b>Mission Requirements Status</b>		Date <b>01/21/10</b>   Page <b>7</b>

**Documentation**

**ECD/Date**

**MIP – NSTS 21507, Basic, Chg 1-4 (12/02/09)**  
**CR-0010: STS-134 AMS LCC and T-0 Changes**

**02/02/10**

**FDRD:**

**None pending**

**PIP – MAUI, NSTS 21530, Basic, Chg 1-2 (5/5/08)**  
**PIP – RAMBO-2, NSTS 21530, Basic, Chg 1 (05/06/02)**  
**PIP – SEITE, NSTS 21542, Basic , Chg 1-2 (10/19/09)**  
**PIP – MISSE 7a and 7b, NSTS 21548, Basic (07/14/08)**  
**PIP – MISSE 8, NSTS 21557, Basic (06/26/09)**

**None pending**  
**None pending**  
**None pending**  
**None pending**

**CR-002: Update Misse-8 Payload Content**

**01/28/10**

**IP-DTO-703 Orion Relative Navigation Sensors Experiment (STORRM),**  
**NSTS 21551, Basic, Chg 1 (09/15/09)**

**CR-003: Update DTO-703 Integration Plan**

**01/28/10**



<b>STS-134/ULF6 FRD Status</b>		Presenter <b>Frank Richmond/USA</b>
Date <b>01/21/10</b>	Page <b>8</b>	

- **STS-134 Latest FRD Revision**
  - Rev 003: Dated, December 7, 2009 (<http://sspweb.jsc.nasa.gov/efrd>)
- **Open CRs**
  - FRD 17462-134-016 - Add Starboard TSA to STS-134
  - CR evaluations due 1/21/10; to be incorporated in Revision 004.
- **Closed CRs**
  - FRD 17462-134-014 - Add DTO 900 to STS-134
  - Approved 12/16/09; to be incorporated into Revision 004.
- **Pending CRs**
  - None



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# Orbiter Element Back-up

# Modifications Matrix

MCR NO.	MCR TITLE	KIT/ MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
<b>Mission Kit Modifications to be Baselined at LSRF</b>				
30283	<b>MEI, Installation of 2 Acoustic Sensors in Left OMS Stinger</b> Installs 2 acoustic microphones on the left OMS pod stinger for OV-105 to provide additional Main Engine Ignition (MEI) overpressure measurement.	<b>030283, 0105, 1</b> - Installs MEI acoustic microphones (2) to the left OMS pod stinger.	Model MV0886A Add M072-755113-002	MECSLSI Impact
<b>Mandatory Modifications Baselined at LSRR</b>				
30274	<b>Fuel Cell CPM Dedicated Power Feed Circuit Fuse Mod</b> Modifies Fuel Cell Mid Power Control Assemblies (MPCAs) to provide a dedicated power feed to the Fuel Cell H2 Flowmeter separate from the Cell Performance Monitor (CPM).	<b>TCTIV7030274REF, 0105, 0</b> - Utilizes spare MPCA pin locations and 1-amp fuses to provide H2 Flowmeter with a dedicated power feed	No Tech Order Impact	No MECSLSI Impact
	<b>Fuel Cell Flowmeter/Cell Performance Monitor Wiring Mod</b> Modifies wiring harness between the Fuel Cell Mid Power Control Assembly (MPCA) and the Fuel Cell H2 Flowmeter/Cell Performance Monitor (CPM) to provide separate power feed wiring to the H2 Flowmeter for all Fuel Cells.	<b>TCTIV7930274REF, 0105, 0</b> - Installs dedicated/seperate power feed wiring from the spare MPCA pin locations to the Fuel Cell H2 Flowmeters	No Tech Order Impact	No MECSLSI Impact
	<b>Mid Power Control Assy (MPCA) Interchangeability</b> Allows interchangeability of different dash number MPCAs between Orbiters.	<b>INT-EO-30274, 0105, 0</b> - Allows MPCA dash number interchangeability between Orbiters	N/A	For Information Only
<b>Mission Kit Modifications Baselined at LSRR</b>				
30180	<b>IBA Boom Configuration Change for STS-134</b> IBA (Inspection Boom Assembly) Boom is being reconfigured into the Enhanced IBA (EIBA) to be delivered to and left on the ISS during STS-134.	<b>TCTIM0030180REF, 0003, 0</b> - Updates configuration of the Orbiter Boom Sensor System IBA to the EIBA for delivery to the ISS on STS-134	Model MV0092A M072-544506-007 was -003 (for Launch config only)	MECSLSI Impact
30180	<b>Payload Cable Harness Mod for ROEU and AMS</b> Lengthens ELC3 ROEU Pwr/Control cables to reach available starboard sill locations	None Required	Model MV0073A Add M072-794085-019	MECSLSI Impact
30191	<b>Rel Nav (STORRM) Impl. DTO-703</b> Performs an early flight test of the Vision Navigation Sensor (VNS) and docking camera planned for Orion. Rel Nav will be mounted on the ODS truss next to the Trajectory Control System (TCS).	<b>030191, 0105, 0</b> - Test of the Vision Navigation Sensor for Orion.	Model MV0828A M072-363838-003 was -001	MECSLSI Impact
<b>Potential Mission Kit Mods</b>				
	<b>Port LWTS A Cushion Mod to Return IBA EFGF</b> IBA EFGF (Electrical Flight Grapple Fixture) will be removed from the IBA as part of the EIBA mod on-orbit and the EFGF is to be returned in the Port LWTS A.	TBD	Model MV0849A M072-660853 (Launch) M072-660853 (Return)	MECSLSI Impact Final dash number configuration to be determined post fit check

# Open Mod Certification

## STS-134 Open Mod Certification (as of 01/19/10)

### • 11 open CRs/CARs

Document #	Part Name	CR	CAR	QSA	ERR	Subm Date	Aprvl Date	Comments/Description of Change
03-73A000015-1001G	OMS/RCS Pod Structural Instl. (MEI)	X				2/15/10P	3/15/10P	Updates CR and submits CAR with formal analysis report for the technical data approved at QSA's for STS-129 & STS-130.
131-03-73A000015-1001G			X					
07-396001-002S	OMS/RCS Pod TPS Instl. (MEI)	X				2/15/10P	3/15/10P	Formal Certification (CAR) submittal for the OMS Pod TPS mods approved under STS-130 QSA.
22-07-396001-002S			X					
25-660300-001D	Starboard LWTSAs Tool Tray Mod	X				2/05/10P	3/05/10P	Mod to forward tool tray to install the handle on opposite end of the tray to facilitate use in the starboard TSA.
05-25-660300-001D			X					
21-764430-001K	Mid Power Control Assembly (MPCA)	X				1/14/10A	2/04/10P	Modification to MPCA's for Fuel Cell Performance Monitors (CPMs) Dedicated Power Feed. Ref. TAD 30274.
08-21-764430-001K			X					
05-11-421534-001G	RCS Tyvek Rain Covers		X			2/15/10P	3/15/10P	Submittal of formal Test Report for F3D/F4D Tyvek Cover Redesign Testing approved under previous QSA submittal.
04-341002J	Airlock/Truss Structure Assy	X				1/27/10P	2/24/10P	Certification for Rel Nav Sensor Installation on External Airlock Truss Structure. Ref. TAD 30191.
120-04-341002J			X					

Open STS-131 Certs (affecting subs) = 8 (6 still to be submitted)  
 Open STS-132 Certs (affecting subs) = 1 (Still to be submitted)  
 Open STS-134 Certs = 2 (Still to be submitted)

# Mod Deliverables

MCR / TAD NO.	MCR / TAD TITLE	Est. Engr Release (MM/DD/YY)	G.O. Engr Need (MM/DD/YY)	Est. Hdwe Delivery (MM/DD/YY)	G.O. Hdwe Need (MM/DD/YY)	MOD/CERT GO / NO-GO	CERT SUBMITTAL DATE	CERT APPROVAL DATE (ESTIMATE)	CERTIFICATION CR / CAR (BOEING)	REMARKS
<b>Mandatory Mods Baselined at LSRR</b>										
30274	<b>Fuel Cell CPM Dedicated Power Feed Circuit Fuse Mod</b> Modifies Fuel Cell Mid Power Control Assemblies (MPCAs) to provide a dedicated power feed to the Fuel Cell H2 Flowmeter separate from the Cell Performance Monitor (CPM)	Released 12/15/09	12/15/09	N/A	N/A	Go	1/14/10	2/4/10	CR 21-764430-001K CAR 08-21-764430-001K	Modification to MPCAs for Fuel Cell Performance Monitors (CPMs) dedicated power feed.
<b>Mission Kit Mods Baselined at LSRR</b>										
30180	<b>IBA Boom Configuration Change for STS-134</b> IBA (Inspection Boom Assembly) Boom is being reconfigured into the Enhanced IBA (EIBA) to be delivered to and left on the ISS during STS-134	Released 11/04/09	11/4/09	N/A	N/A	Go	N/A	Not Req'd	None	Modifies IBA (Inspection Boom Assembly) tech order (M072-544506-007) and MECSLSI to reflect new boom and sensor pack 1 installation changes as well as Orbiter return without Boom.
30180	<b>Payload Cable Harness Mod for ROEU and AMS</b> Lengthens ELC3 ROEU Pwr/Control cables to reach available starboard sill locations	Released 12/11/09	12/11/09	N/A	N/A	Go	N/A	Not Req'd	None	Updates MECSLSI to include two longer ELC3 ROEU Power/Control cables (tech order M072-794085-019) to allow the ELC sill latch cables to be mated further forward on the starboard sill
30191	<b>STORRM (Sensor Test for the Orion RelNav Risk Mitigation) - DTO 703</b> Performs an early flight test of the Vision Navigation Sensor (VNS) and docking camera planned for Orion. Rel Nav will be mounted on the ODS truss next to the Trajectory Control System (TCS)	Released 10/08/09	10/8/09	N/A	N/A	Go	1/27/10 P	2/24/10	CR 04-341002J CAR 120-04-341002J	Certification for Rel Nav sensor installation on external airlock.
<b>Potential Mission Kit Mods</b>										
	<b>Port LWTSA Cushion Mod to Return IBA EFGF</b> IBA EFGF (Electrical Flight Grapple Fixture) will be removed from the IBA as part of the EIBA mod on-orbit and the EFGF is to be returned in the port LWTSA (Light Weight Tool Stowage Assembly)	TBD	TBD	N/A	N/A	Go	N/A	Not Req'd	None	Modifies the port LWTSA (Light Weight Tool Stowage Assembly) cushion (tech order M072-660853) to accommodate the return of the IBA (Inspection Boom Assembly) EFGF (Electrical Flight Grapple Fixture)

# TPS Priorities - STS-134 LSFR

STATUS AS OF 1-08-2010

Priority Number	Total	OV-103	OV-104	OV-105
1. BRI-18 Tile - MLGD FWD O/B Corner	28	complete	complete	complete
2. BRI-18 Tile - MLGD FWD Edge	22	complete	complete	complete
3. BRI-18 Tile - MLGD O/B Side	18	complete	complete	complete
4. BRI-18 Tile - STR side of ET Doors	20	complete	complete	complete
5. BRI-18 Tile – LESS Carrier Panels 8-10 (103 & 104)	24	complete	complete	n/a
6. BRI-18 Tile – STR side of ET Doors I/B	8	complete	complete	complete
7. Inboard Elevon “Hub” Tile Mod	4	complete	2	complete
8. I/B Elevon 9lb/90 SIP	34	complete	complete	complete
9. O/B Elevon 9lb/90 SIP	6	complete	complete	complete
10. MLGD – Outboard Middle 1/3	24	complete	complete	complete
11. ET Door remaining STR side	40	1	10	0
12. MLGD - Outboard AFT 1/3	22	0	0	9
13. Nose Area 9lb/90 SIP	14 (16 <sup>OV103</sup> )	3	complete	7
14. Base Heat Shield 9lb/90 SIP	42	22	complete	complete
15. Body Flap Stub "Piano Key" tiles	40	18	20	18
16. Gap fillers in Subset 2B	5 Zones	2	1	0
17. Remaining BRI-18 - MLGD (top priority) / ET / LESS carrier panels / NLGD	MLGD 100	MLGD 0	MLGD 1	MLGD 0
	NLGD 123	NLGD 19	NLGD 22	NLGD 52
	LESS 68 (92 <sup>OV-105</sup> )	LESS 8	LESS 10	LESS 22
	ET Door 28	ET Door 5	ET Door 4	ET Door 1
18. Mod work LESS internal	44 locations	41	complete	complete
20. Remaining Gap Fillers & Window BRI-18	124	3	2	19

# STS-134 OV-105 Flight 25 - LSFR Baseline

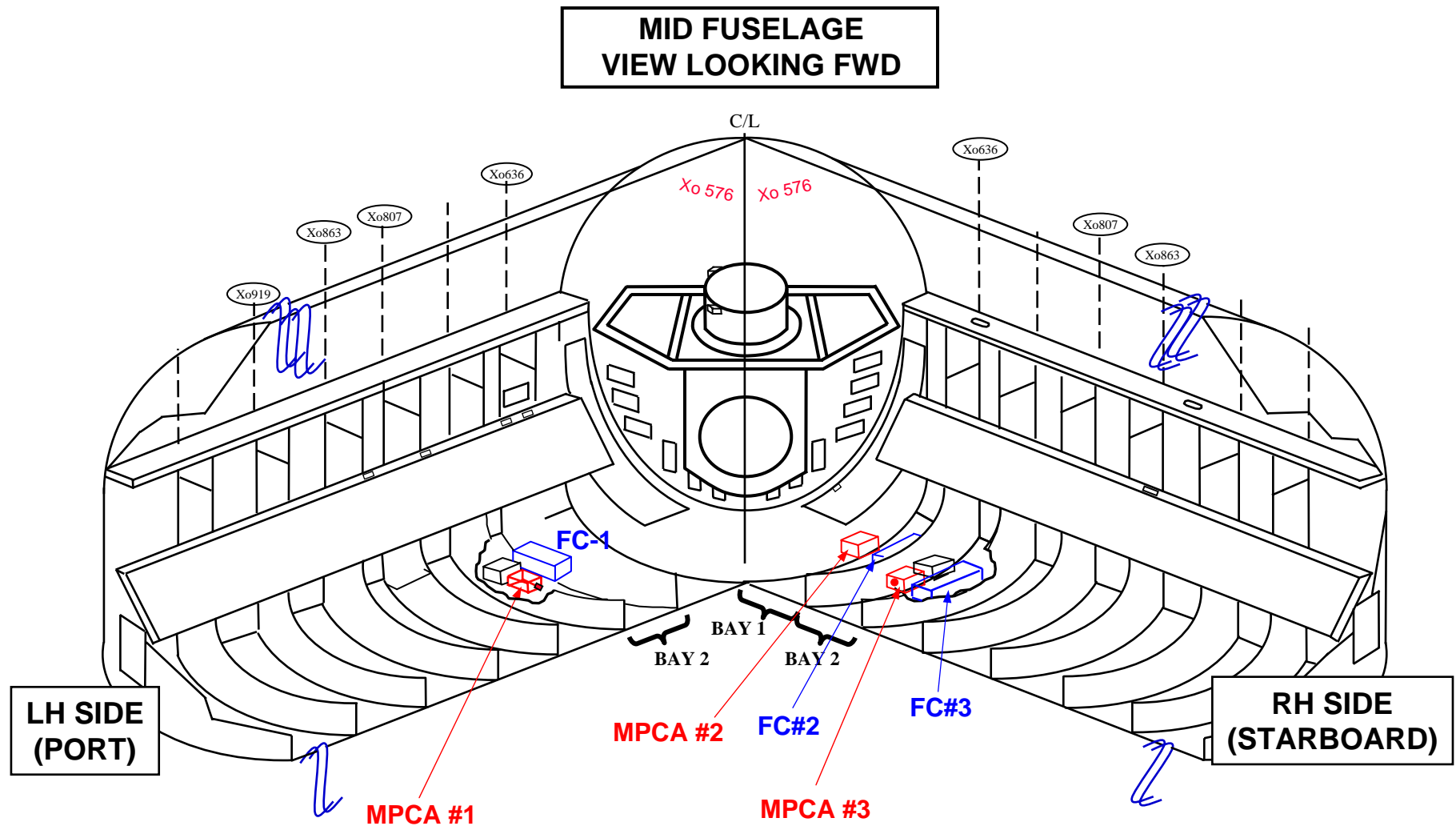
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The following modification was baselined at a previous review (LSRR)

- **TAD 30274 – Fuel Cell CPM Dedicated Power Feed Circuit Fuse Mod**
  - Modifies Mid Power Cell Assemblies (MPCAs) 1 and 3 to utilize spare MPCA pin locations and 1-amp fuses to provide a dedicated power feed to the Fuel Cell H2 flowmeter separate from the Cell Performance Monitor (CPM) to protect against power loss of the CPM
    - Existing design has the Fuel Cell H2 flowmeter and the CPM receiving power from the same 1-amp fused circuit
    - Erratic flowmeter behavior has been observed on previous missions for all vehicles including STS-124 (OV-103) where a blown fuse resulted in loss of power to CPM
    - Corrective action has been to de-pin the #1 and #3 H2 flowmeters and fly them unpowered on subsequent missions of OV-103 (STS-128) and OV-105 (STS-127) per MR
    - Separation of H2 flowmeter and CPM power feed would eliminate impact to CPM
      - Loss of CPM during count results in Launch scrub (LCC-FCP03)
      - Loss of measurement in flight results in crew impact for alternate data collection to verify Fuel Cell health

# STS-134 OV-105 Flight 25 - LSFR Baseline

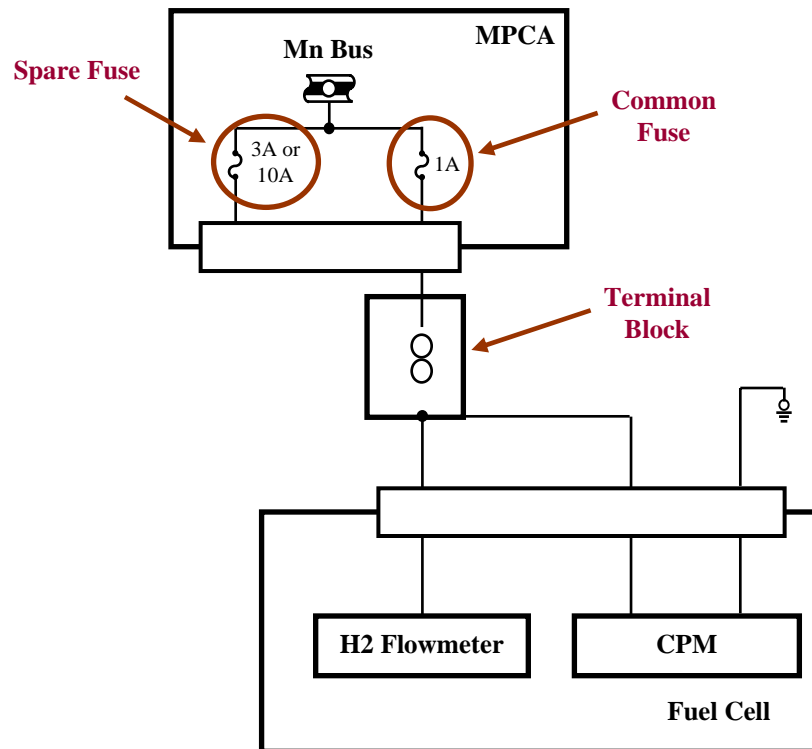
- Fuel Cell / MPCA Locations in Mid-Body



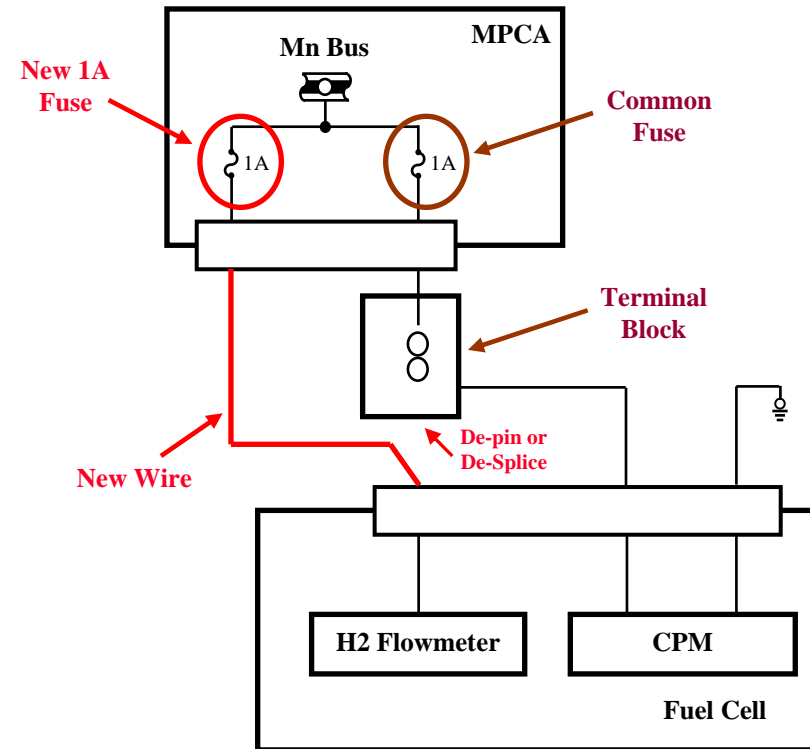
# STS-134 OV-105 Flight 25 - LSRR Baseline

- Simplified schematic showing current and proposed configurations

(Current)



(Proposed)





# STS-134 OV-105 Flight 25 - LSFR Baseline

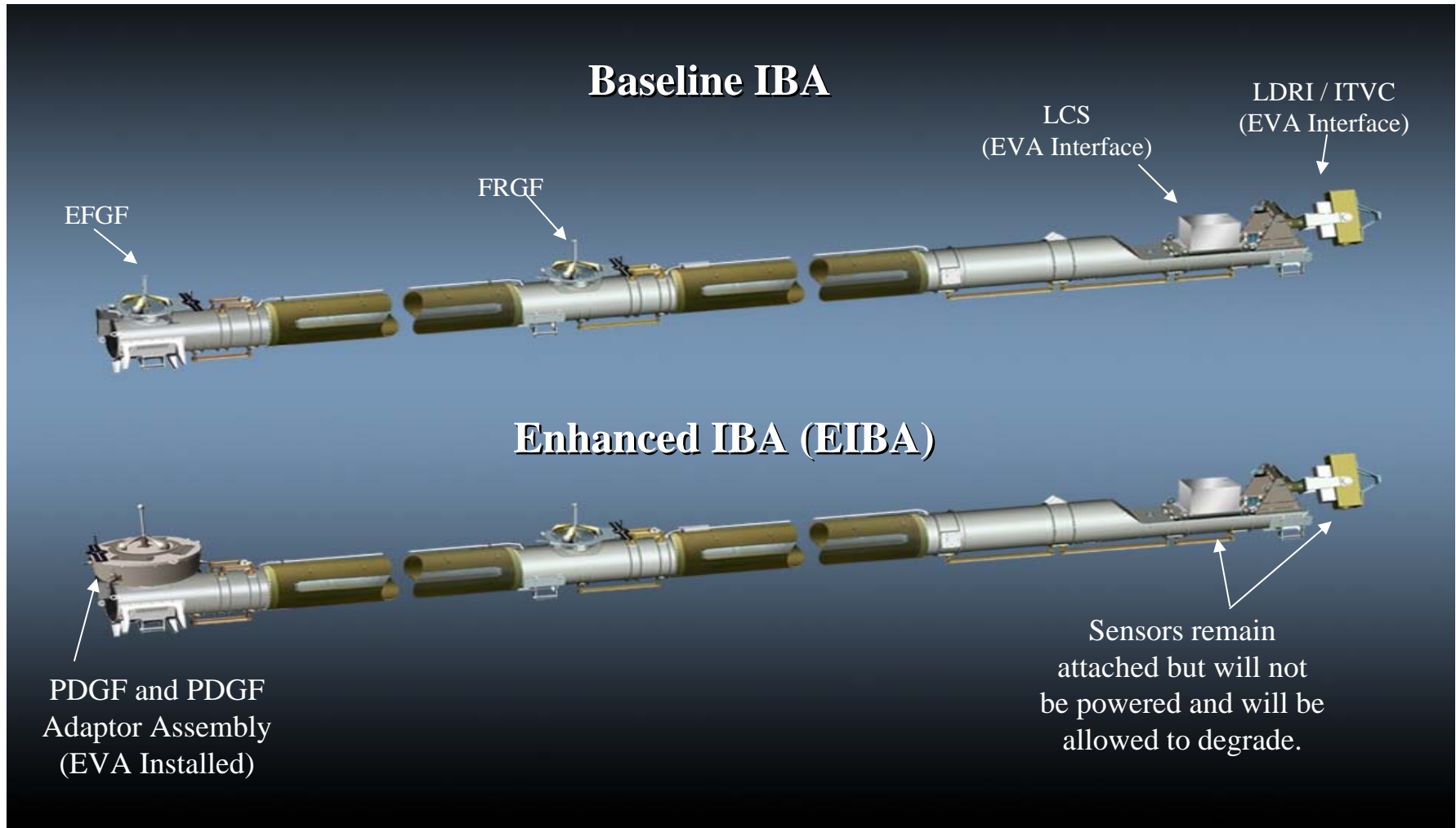
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The following mission kit mod was baselined at a previous review (LSRR)

- **TAD 30180 – IBA (Inspection Boom Assembly) Boom Configuration Change for STS-134**
  - Boom is scheduled to be left on ISS (-5515)
  - IBA will be replaced with EIBA (Enhanced IBA)
    - EIBA is more compatible with ISS RMS
      - Modified grapple fixture interface
      - Several minor hardware modifications
  - MECSLSI reflects new boom and sensor pack 1 installation Tech Orders as well as Orbiter return without Boom

# STS-134 OV-105 Flight 25 - LSFR Baseline

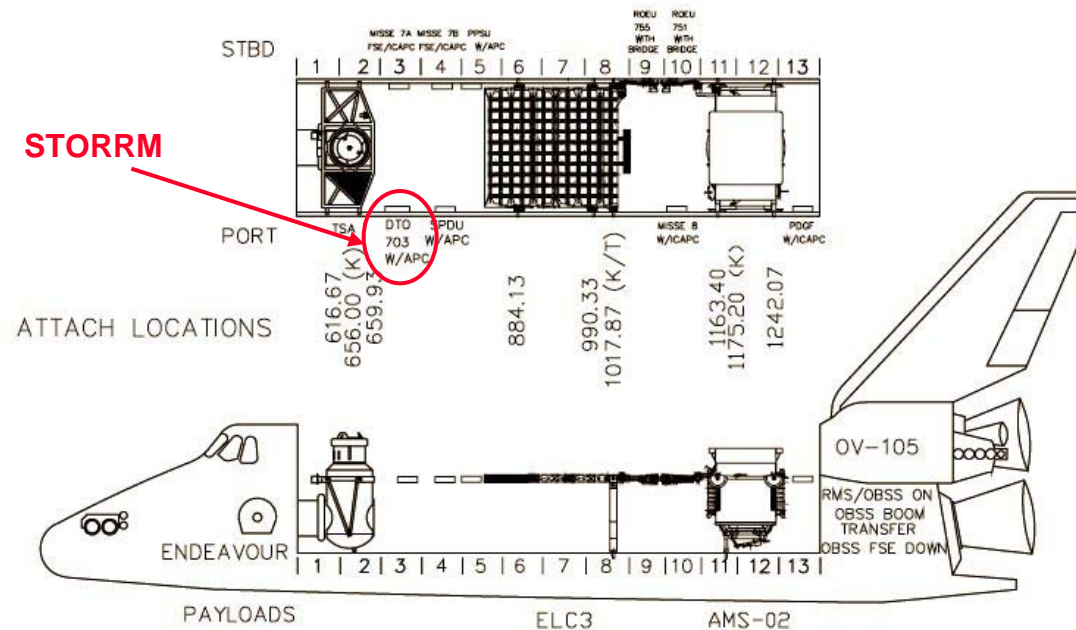
- IBA (Inspection Boom Assembly)



# STS-134 OV-105 Flight 25 - LSFR Baseline

The following mission kit mod was baselined at a previous review (LSRR)

- **TAD 30191 – STORRM (Sensor Test for the Orion ReINav Risk Mitigation) DTO 703 Implementation**
  - Will test the Vision Navigation Sensor (VNS) and Docking Camera planned for Orion both during dock and undock of Shuttle to ISS
  - Revision to Tech Order blanket installation and MECSLSI planned



# STS-134 OV-105 Flight 25 - LSFR Baseline

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The following mission kit mod MECSLSI update was authorized at a previous review (LSRR)

- **TAD 30180 – Payload Cable Harness Mod for ROEU and AMS**
  - STS-134 requires all 12 Payload Retention Stbd Sill location connections
    - Each ROEU Pwr/Ctrl requires 6 cables for 3 Sill connector locations
  - STS-134 is the first Flight manifested with 2 ROEU's on the same side (Stbd)
    - ELC3 and AMS-02 each require 2 Stbd Sill Latch connection locations
    - ELC3 ROEU Pwr/Control cable lengths are short for 2 available Stbd Sill connector locations
  - This mod will lengthen the ELC3 ROEU Pwr/Control CIH cables and will mate the ELC3 Sill Latch cables further fwd to allow for the ELC ROEU Pwr/Control cable connections on the stbd sill

# STS-134 OV-105 Flight 25 - LSFR Baseline

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The following potential mission kit mod was reviewed at a previous review (LSRR)

- **Port LWTSA Cushion Mod to Return IBA EFGF**
  - IBA EFGF (Electrical Flight Grapple Fixture) will be removed from the IBA as part of the EIBA mod and the EFGF is to be returned in the Port LWTSA
  - Fit check planned for January 2010

**BACKUP**

# STS-134 LSFR

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## Payload ICDs/PIRNs

All Payload-Unique ICDs are baselined

### PIRNS that impact Flight Products

<u>PIRN #</u>	<u>ICD/Payload</u>	<u>Title</u>	<u>ECD</u>
A05826	ICD-A-21507-AMS-02	Add T-0 Pwr for DV09B valve	02/08/10
A05828	ICD-A-21507-AMS-02	Designate GSE 110 vac safety crit	02/15/10
A05815	ICD-A-21507-ELC3A	Update Fusing and Pwr Reqmts	01/15/10
A05821	ICD-A-21507-ELC3A	Wire tray configuration	01/22/10

### Issues/Concerns

A05815 (ELC3) requires MIP update authorizing power allocation.

# STS-134 LSFR

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## Operations Maintenance and Requirement Specifications (OMRS)

### File II, Vol. 2 Payload Post-Mate Testing

ECD

#### P507 ISS-ULF6

- Customer Submittal
- RCN baseline

08/19/09A

01/26/10

#### P557 MISSE 8

- Customer Submittal
- RCN baseline

10/08/09A

01/19/10

### File II, Volume 4 Pre-Mate Testing

#### Requirement Baseline

- RCN Release
- RCN Baseline

01/22/10

02/09/10

### File II, Vol. 6 Shuttle Experiments

- RNS DTO-703 Submittal
- RCN baseline

10/27/09A

01/26/10

### Time-Critical Ground Handling Requirements (TGHR)

- Customer Submittal
- Baseline Approval

03/29/10

05/28/10



# STS-134 LSFR

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## Annex 1: ISS-ULF6 NSTS 21507-A01

### Annex 1 Baseline\*

- Customer Submittal
- Mass Properties Submittal
- CR Approval

### ECD

08/28/09A  
08/28/09A  
10/28/09A

### Post-CIR Update

- Customer Submittal
- CR approval

01/29/10  
01/29/10

### L-4 mo Update

- Customer Submittal
- CR approval

03/08/10  
03/29/10

### L-1 mo Update

- Customer Submittal
- CR Approval
- Final weight log

06/15/10  
06/29/10  
07/15/10

\*Based on 7/29/2010 Launch Date

# STS-134 LSFR

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## Annex 1: MISSE 8 NSTS 21557-A01

### Annex 1 Baseline\*

- Customer Submittal
- Mass Properties Submittal
- CR Approval

### ECD

10/16/09A  
09/15/09A  
01/29/10

### L-4 mo Update

- Customer Submittal
- CR approval

03/08/10  
03/29/10

### L-1 mo Update

- Customer Submittal
- CR Approval
- Final weight log

06/15/10  
06/29/10  
07/15/10

\*Based on 7/29/2010 Launch Date

# STS-134 LSFR

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## Annex 1: RNS DTO-703 NSTS 21551-A01

### Annex 1 Baseline\*

	<u>ECD</u>
• Customer Submittal	01/29/10
• Mass Properties Submittal	01/29/10
• CR Approval	01/29/10

### L-4 mo Update

• Customer Submittal	03/08/10
• CR approval	03/29/10

### L-1 mo Update

• Customer Submittal	06/15/10
• CR Approval	06/29/10
• Final weight log	07/15/10

\*Based on 7/29/2010 Launch Date

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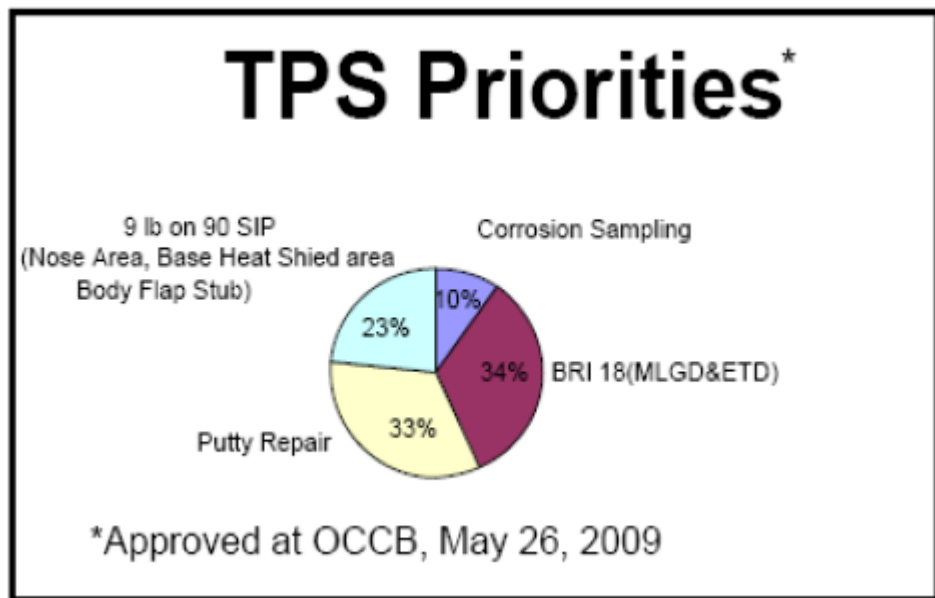
# BACKUP

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STS-134 LSFR  
J. F. Kennedy Space Center



# STS-134 Flow Breakdown

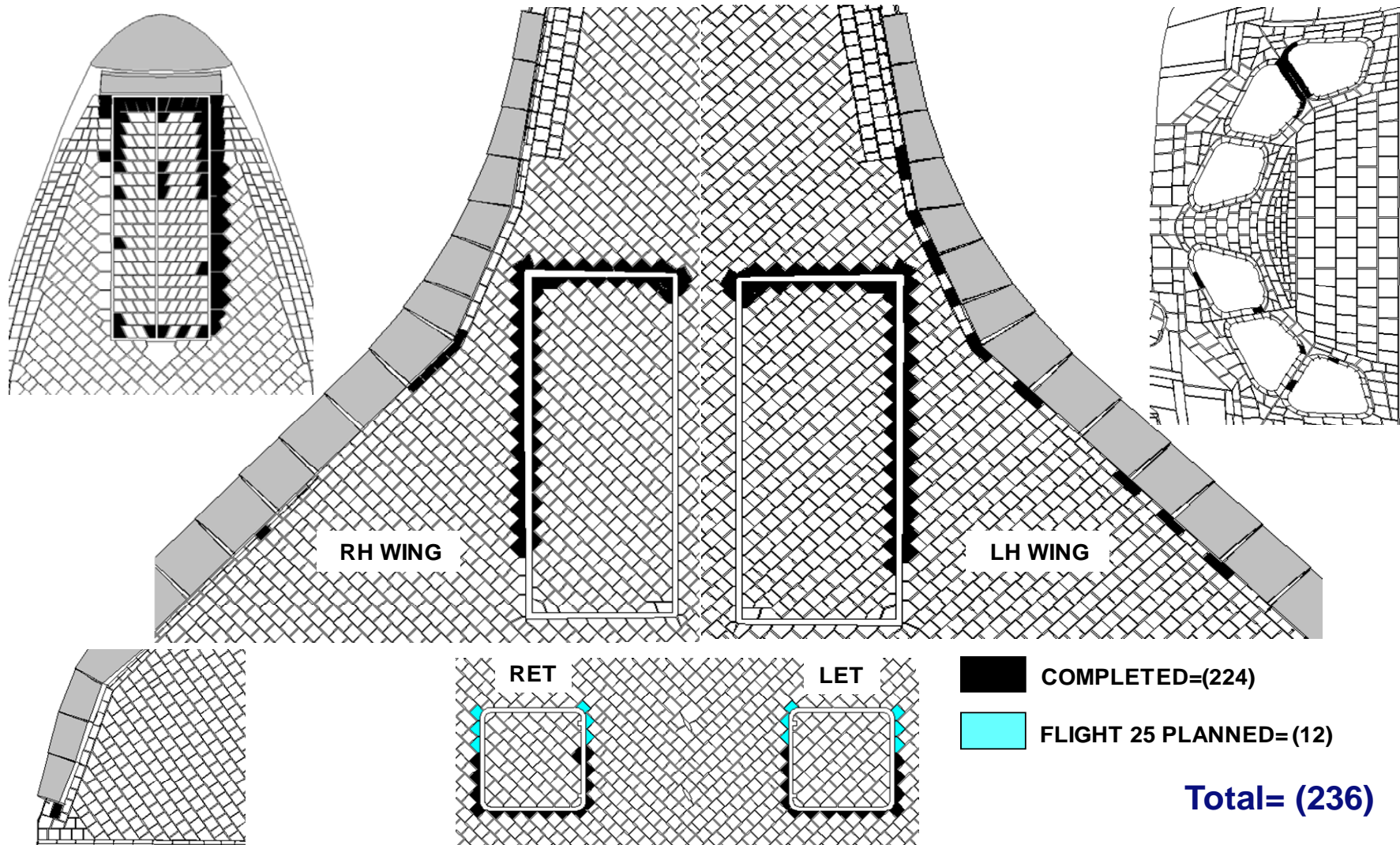


STS-134 Break Down		
	Allocation	Actual % of 34 Total
Corrosion	5	15
BRI-18	12	35
Putty	10	29
9lb/0.090 SIP/Body Flap Stub	7	21

- 98 Projected Removals for STS-134 – derived based on length of flow, resources, etc
- 79 Mandatory (Flight/Operations/Restricted/etc) removals account for most of the projected allotment
- 19 Removals allotted for TPS Risk Reduction Plan



# BRI Summary STS-134 (Flight 25)



STS-134 LSFR  
J. F. Kennedy Space Center



# CONFIGURATION / Facilities

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- **OV-105: Flight 25**
- **OMS Pods: LP03 / RP04**
- **ET: 137**
- **SRB: BI-144/RSRM 112**
- **SSME: TBD(#1), TBD (#2), TBD (#3) U/R**
- **Payload: ULF6, AMS, ELC3, MISSE8, STORRM**
- **Flight Software: OI-34**
- **Firing Room: 4**
- **OPF Bay: 2**
- **MLP: 3**
- **VAB High Bay: 3**
- **Pad: A**



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# **STS-134**

## **Launch Site Flow Review**

### **Flight Software Overview**

**Gail Sanders**

**USA FSW**

**FRWG 01/15/2010**

**PRCB 01/21/2010**



# STS-134 LSFR (FSW)

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- **STS-134/OV-105 Flight Software (FSW) Versions**
  - Sixth scheduled flight of Operational Increment (OI) 34 Flight Software (SASCB SCR 98107A documents PASS and BFS OI-34 content)
  - Fourth scheduled flight of MEDS IDP VI 07.01/Sixth scheduled flight of MDUF VI 06.00 (SASCB SCR 98113A documents content)
  - Seventh scheduled flight of MAGRS-3S Link 613-996-008 Software (Link-008) (SASCB SCR 98115 documents content)
- **STS-134/OV-105 Flight Software Payload Support:**
  - ISS ULF6
  - Orbiter Interface Unit (OIU)
  - Sequential Still Video (SSV)
  - Payload Power Switching Unit (PPSU)
  - Trajectory Control System (TCS)
  - ISS Caution and Warning (ISSCW)
  - Assembly Power Converter Units (APCUs) & Station to Shuttle Power Transfer System (SSPTS) (generic support for both configurations)
  - Alpha Magnetic Spectrometer-02 (AMS-02)
- **Major New Flight Software Support Items:**
  - None

# STS-134 LSFR (FSW)

---

- **STS-134 Source Changes/Edits for Primary Flight Software (Base)**
  - SCR 92882 Allow Three String GPS for STS-116 and Subsequent OV-105 Flights
  - SCR 93211A Update of SSMEC Vehicle Data Table (VDT) for Enhanced Accelerometer Operations
  - SCR 93262A Film ET Camera
  - SCR 93267A Removal of the Set and Reset to False Cmds For the RCS Tank Iso Valves
  - SCR 93284 Update PASS HUD Body Flap Warning Limit K-Load
  - DR 126366 SM GPC Failure to Send GCIL Commands
- **STS-134 Patch Implementation for Primary Flight Software**
  - None.
- **STS-134 Patch/Edit Implementation for Backup Flight Software (Base) (included on delivered Mass Memory)**
  - SCR 93282 Update PASS/BFS HUD Body Flap Warning Limit K-Loads
- **STS-134 Patch Implementation for Backup Flight Software**
  - None

# STS-134 LSFR (FSW)

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- **Products**
  - **STS-134/OV-105 Base delivery schedule (available to field)**
    - FPSB**
    - **Shuttle Data Tape** **January 14, 2010**
    - **Mass Memory Unit** **January 28, 2010**
- **An STS-134/OV105 ADTL SDT/Mass Memory may be required**
  - **Decision to generate these products will be made in February, 2010**
    - FPSB**
  - **ADTL Shuttle Data Tape** **April 21, 2010**
  - **ADTL Mass Memory Unit** **April 29, 2010**
- **Open Items**
  - **None**
- **Concerns/Issues**
  - **No issues or concerns with STS-134 at this time**



<b>STS-134 LSFR FLIGHT CREW EQUIPMENT/GFE</b>	<b>Presenter</b> Kenneth Brown	
	<b>Date</b> Jan 21, 2010	<b>Page</b> 1

# STS-134 LSFR FCE/GFE Status

Kenneth Brown  
Manager, GFE & Flight Crew Equipment Office  
Johnson Space Center



**SPACE SHUTTLE PROGRAM**  
**Orbiter Project Office**  
NASA Johnson Space Center, Houston, Texas



<b>STS-130 LSFR FLIGHT CREW EQUIPMENT/GFE</b>	<b>Presenter</b> Kenneth Brown	
	<b>Date</b> Jan 21, 2010	<b>Page</b> <b>2</b>

- Delivery dates partnered at STS-134 Cargo Integration Review
  - Delivery dates shown are already delivered h/w or transferred from STS-131



# SPACE SHUTTLE PROGRAM

Orbiter Project Office

NASA Johnson Space Center, Houston, Texas



<b>STS-130 LSFR FLIGHT CREW EQUIPMENT/GFE</b>	Presenter Kenneth Brown	
	Date Jan 21, 2010	Page <b>3</b>

**BACKUP**



# SPACE SHUTTLE PROGRAM

Orbiter Project Office

NASA Johnson Space Center, Houston, Texas



<b>STS-134 LSFR FLIGHT CREW EQUIPMENT/GFE</b>		Presenter Kenneth Brown	
		Date Jan 21, 2010	Page <b>4</b>

Hardware	Tech Order	Ce rt O/ C	KSC Need	JSC Planned	JSC Remarks	JSC Contact
A (port forward)	M072-750025-080	O	5/3/10	5/3/10	H/W from STS-131.	Randall Moore
B (port aft)	M072-750025-081	O	5/3/10	5/3/10	H/W from STS-131.	Randall Moore
C (starboard aft)	M072-750025-082	O	5/3/10	5/3/10	H/W from STS-131.	Randall Moore
D (starboard forward)	M072-750025-083	O	5/3/10	5/3/10	H/W from STS-131.	Randall Moore
SRMS elbow camera	M072-544504-015	O	5/3/10	5/3/10	H/W from STS-131.	Randall Moore
SRMS wrist camera	M072-544504-010	O	5/3/10	5/3/10	H/W from STS-131.	Randall Moore
Centerline Airlock Camera (stowed)	M072-660828-002, CCCD	C			Installed h/w.	Randall Moore
Lefthand Umbilical Camera (aft)	M072-705001-016	C	6/11/10	6/11/10		Randall Moore



# SPACE SHUTTLE PROGRAM

Orbiter Project Office

NASA Johnson Space Center, Houston, Texas



<b>STS-134 LSFR FLIGHT CREW EQUIPMENT/GFE</b>		Presenter Kenneth Brown
Date	Jan 21, 2010	Page <b>5</b>

Hardware	Tech Order	Cert O/C	KSC Need	JSC Planned	JSC Remarks	JSC Contact
Righthand Umbilical Camera	M072-705001-028	O	6/11/10	6/11/10		Randall Moore
Digital Television (DTV)	M072-710570-007	C			Installed hardware.	Randall Moore
MCIU/RMS Situational Awareness Display (RSAD)	M072-710543-001	O			Installed hardware.	Larry Schmidt
Portable Foot Restraint (PFR)	M072-661568-029	C	4/26/10	4/26/10		Sandy Peterson
Tools for Rendezvous and Docking (TRAD)	M072-730021-020	O			Installed hardware.	Larry Schmidt
Tool Stowage Assembly (TSA)	M072-660853-002 M072-660850-005	C	4/26/10	4/26/10		Sandy Peterson
Video Processing Unit (VPU)	M072-710338-007	C			Installed hardware.	Larry Schmidt
Winches	V070-650007-085	C			Installed hardware.	Sandy Peterson
OBSS Boom	M072-544506	O	3/15/10	3/15/10	Enhanced IBA. To be left on ISS	Ken Ruta





# SPACE SHUTTLE PROGRAM

Orbiter Project Office

NASA Johnson Space Center, Houston, Texas

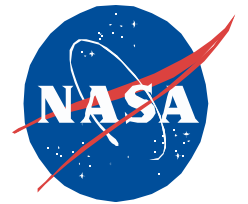


<b>STS-134 LSFR FLIGHT CREW EQUIPMENT/GFE</b>		Presenter Kenneth Brown
Date	Jan 21, 2010	Page <b>6</b>

Hardware	Tech Order	C er t O/ C	KSC Need	JSC Planned	JSC Remarks	JSC Contact
Wireless Video System (WVS)	M072-744007-001 UHF M072-344828-001 mount M072-744004-012 S-BAND M072-744004-013 S-BAND M072-744004-014 S-BAND M072-744004-015 S-BAND M072-744004-016 S-BAND M072-744004-017 S-BAND M072-744004-018 S-BAND	C			Installed hardware.	Randall Moore
Space to Space Orbiter Radio (SSOR)	M072-344828-002 M072-740828-002 antenna	C			Installed hardware.	Larry Schmidt
RMS Sideview Camera (RSC)	M072-710281-002 M072-000416-006 camera	C	6/30/10	6/30/10		Randall Moore
Wing Leading Edge Instrumentation - Left Wing**	M072-756111-007	O			Installed hardware.	Michael Wright
Wing Leading Edge Instrumentation - Right Wing**	M072-756111-008	O			Installed hardware.	Michael Wright
SCU	M072-661606-012	C			Installed hardware.	Sandy Peterson
OBSS Sensor Package 1	M072-710282-009		4/26/10	4/26/10		
OBSS Sensor Package 2	M072-710282-009	O	4/26/10	4/26/10		Larry Schmidt
Airlock Adapter Plate	SJD32101440-302	O			Installed hardware.	Sandy Peterson



*Extravehicular  
Activity  
Office*

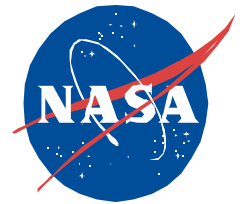


# **STS-134/ULF-6 Launch Site Flow Review**

**Maria Tullar  
EVA Office  
Johnson Space Center  
January 21, 2010**



# STS-134 LSFR EVA Hardware



- **Forward Bulkhead PFR**
  - Portable Foot Restraint, SED33105308-307 installed on forward bulkhead.
    - Released T.O. M072-661568-029
    - Required to protect for contingency EVA TPS inspection
  
- **Lightweight Port TSA**
  - Port LWTSA installation – Tech Order: M072-660850-005
  - Port LWTSA Tools installation – Tech Order: M072-660853-002
    - EVA contingency tools
    - EFGF planned for return in the mission specific area
  
- **Lightweight Starboard TSA (CR in review)**
  - Starboard LWTSA CR for manifest of OFK
  
- **Winches**
  - Winch P/N SED33101570-327 on Forward Bulkhead
  - Winch P/N SED33101570-325 on Aft Bulkhead



## STS-134 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-21-10**

### Backup Material

- **SSP Systems Drawings** **Attachment 1**
- **SSP Authorized Modifications/Non-Standard Work** **Attachment 2**
- **SSP OMRS Waivers and Exceptions** **Attachment 3**
- **Launch Window** **Attachment 4**
- **Open Configuration Waivers** **Attachment 5**



## STS-134 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-21-10**

### Overview

- **SSP System Drawings** **No Issues\***
- **SSP Authorized Modifications/Non Standard Work** **No Issues\***
- **SSP OMRS Changes (RCNs)** **No Issues\***

\* Backup material included



<b>STS-134 Launch Site Flow Review</b>	<b>Presenter</b> <b>MK-SIO / A. Swift</b>	
	<b>Date</b> <b>1-14-10</b>	<b>Page</b> <b>1</b>

**Mandatory RCNs:**

**NONE**

**Non-Mandatory Value Added RCNs:**

**NONE**

# STS-134 Launch Site Flow Review

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J.F. KENNEDY SPACE CENTER

**ULF-6**  
**STS-134**  
**AMS/ELC-3**

**KSC ISS & Spacecraft Processing**  
**Joseph T. Delai, NASA, KSC Mission Manager**

01/12/2010

# Planned Processing Milestones



J.F. KENNEDY SPACE CENTER

## PRE-SHUTTLE INTEGRATION ACTIVITIES

### Space Station Processing Facility

- AMS
  - AMS on dock, KSC 3/29/10
  - AMS SSPF Processing 3/30/10-5/28/10
    - OPF testing 5/19/10-5/24/10
  - AMS Fluids Servicing, as required 5/28/10-7/2/10
  - AMS Closeouts 7/6/10
  - Payload to Pad 7/10/10 U/R
- ELC-3
  - ELC#3 on dock, KSC 12/5/09
  - ELC#3 SSPF Processing 12/7/09-6/8/10
  - ELC 3 Closeouts 6/8/10-7/6/10
  - Payload to Pad 7/10/10 U/R

01/12/2010



# Planned Processing Milestones



J.F. KENNEDY SPACE CENTER

## SHUTTLE INTEGRATION ACTIVITIES

### PAD (U/R)

- Installation Activities 07/9/10 - 07/11/10
- Payload Installed into Orbiter 07/11/10
- AMS IVT 07/13/10
- AMS ETE 07/17/10
- AMS SFHe Topoff 07/25/10
- ELC 3 IVT 07/16/10
- Close Payload Bay Doors for Flight 07/26//10
- Launch 07/29/10

01/12/2010

# KSC/ISS Processing Summary

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J.F. KENNEDY SPACE CENTER

## **Watch Items:**

- None at this time

**The KSC STS-134/ULF6 - ISS Mission Processing Team is ready to proceed with processing the STS-134 Mission payload complement.**

01/12/2010



## STS-134 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-21-10**

### SSP System Drawings

The Drawings Baseline Was Released By PRCB S115134 on 12-09-09

- V072-000001-292 (Rev. WG) Space Shuttle System (Rel. 12-11-09)
  - V072-200214-001 (Rev. A) Mission Equipment Cargo Support (Rel. 01-04-10)
  - SGD32104457-501 (Rev. NEW) Crew Compartment Configuration (Rel. 12-18-09)
    - 502 Descent
  - V070-000001-005 Orbiter General Assembly
    - V070-410100-018 SSME Installation
  - 10100-0061-181 Integrated SRB General Assembly (BI-144)
  - 80901000000-530 External Tank Assembly (ET-137)
- STS-134 LSRR + 18 days Mission Configuration Product Plan (MCP) was last published on 12-21-09 and will be republished at ORR -14 days on TBD.



## STS-134 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-21-10**

### SSP System Drawings – (Continued)

#### Ferry Configuration

- V072-000001-293 (Rev. WG) Space Shuttle System Drawing (Rel. 12-11-09)
  - V072-200214-002 (Rev. A) Mission Equipment Cargo Support (Rel. 01-04-10)
  - SGD321004457-001 (Rev. NEW) Crew Compartment Configuration (Rel. 12-18-09)
  - V072-300055-030 (Rev. BU) Ferry Flight Configuration (Rel. 05-11-09)

**SCA 911**



## STS-134 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-21-10**

### Modification Impact Report

- **Mission Equipment Modifications and Orbiter Modifications analyzed for impacts to OMRSD, LCC, ICD, EMI, Software, and GSE.**
- **A total of 4 MCRs have been approved and/or pending mods**
- **Current MCR impact status:**
- **No impacts for all six disciplines** **1**
- **One or more disciplines with impacts, documentation approved and/or pending approval** **0**



## STS-134 Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-21-10**

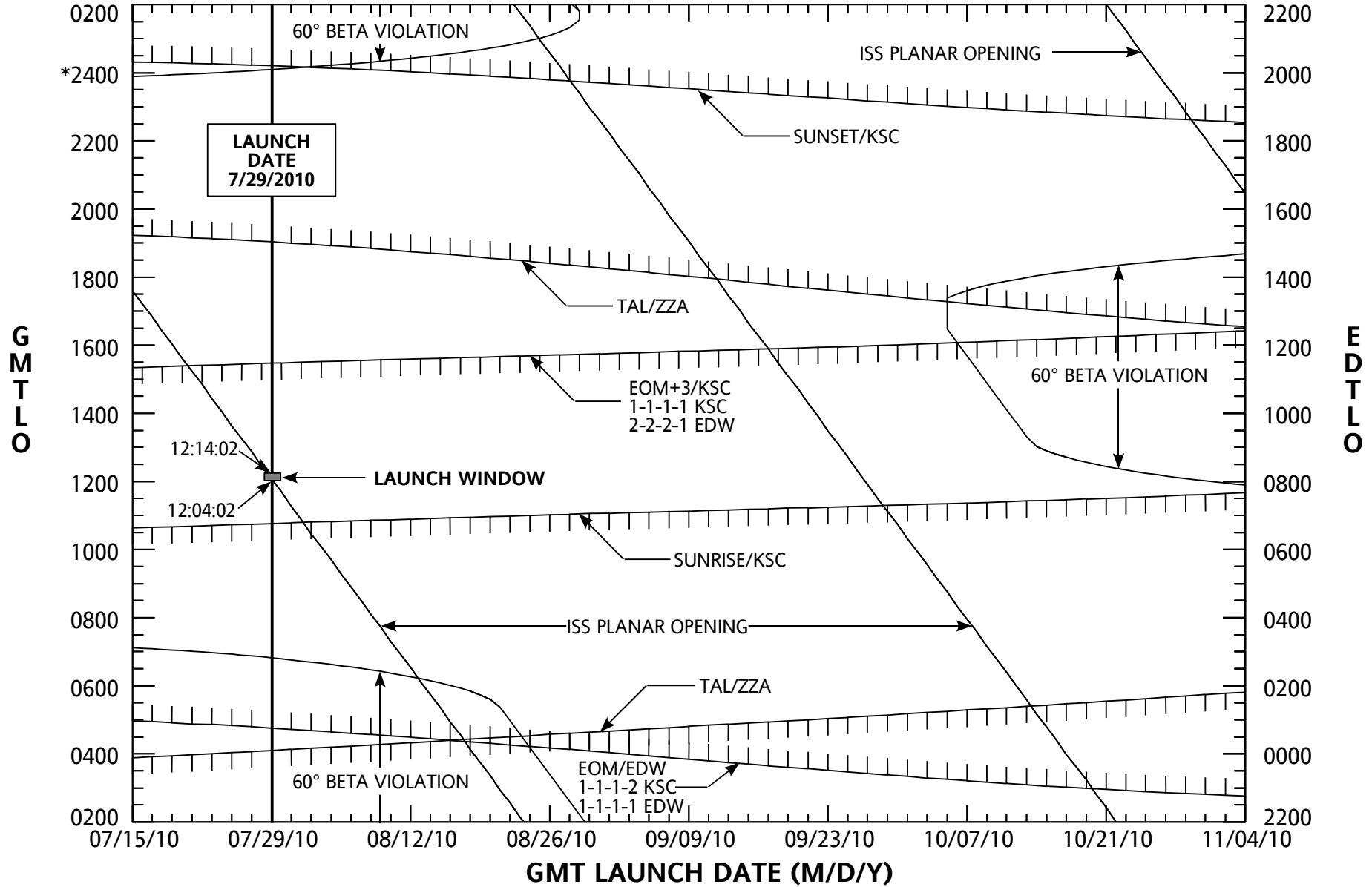
### Modification Impact Report – (Continued)

- Possible impacts still under review 3
  - MCR 30274, 30180, and 30191 are being reviewed for OMRSD, LCC, ICD, EMI, S/W, GSE impacts

Mission Duration = 12+1+2  
 Inclination = 51.6°  
 OMS2 ha/hp = 124 x 85 nmi.  
 Target ha/hp = 208 x 203 nmi.

### STS-134 OCF LAUNCH WINDOW

N. Wortham/USH-483L  
 P. Gentry/USH-483L  
 September 9, 2009



Note: EOM lighting lines, based on an OMS2 phase angle of 251 deg, are representative only.  
 The ISS beta angle ( $|\beta| < 60^\circ$ ) for mated operation is beginning ~ 1/20:49:21 MET (FD3 Rendezvous) and ending ~ 10/15:01:00 MET.  
 \* Indicates the dateline. Launch times above this point are on subsequent days from the date indicated on the corresponding date axis

# MODULAR LOCKER LAYOUT ASCENT

ML60B6013  
-310  
PRIME C/L CAM  
GFE TV CONTROL

---

ML60E 0646  
-TBD

STS1=OCA  
STS2=WINDECOM  
STS3=KFX  
STS4=WLDMAP  
STS5=RPOP  
STS6=WLES  
PGSC ACCESS  
ACCESS PT  
☒ PCS LAPTOP  
PCS ACCESS.

---

ML60M 6014  
-312  
B/U C/L CAM  
ULTRA SONIC  
LEAK DETECTOR

VOL B 7436  
(MA4D/J) -TBD

VOL 3B 7425  
(MA75J) -328  
QUICK DON MASK(2)  
OCAC  
SPOTLT/D2XS CAM  
12-24MM  
G1 CMCDR  
400MM LENS/OBF

A16 7490  
(MA4D/J) -310  
PGSC DESK(2)  
CORE CAMR BAG  
PILOT HC  
BRACKETS(2)

CDR MARK KELLY  
PLT GREG JOHNSON  
M/S #1 MIKE FINCKE  
M/S #2 ROBERTO VITTORI  
M/S #3 ANDREW FEUSTEL  
M/S #4 GREG CHAMITOFF

PANTRY FOOD (SNACKS) 1622 -308	MF57A PANTRY FOOD (UTENSILS) 1622 -308	PANTRY FOOD (BEVERAGES) 1622 -302
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MIDDECK FORWARD

MF14E 2760 -306 FRESH FOOD  FRESH FOOD	MF28E/G 7493 -302 GLACIER
MF14G 2788 -303 MENU FOOD  MENU FOOD	MF28H 6684 -TBD MED KITS ALTIMETER
MF14H 2763 -304 MENU FOOD  MENU FOOD	MF28K 1904 -307 M/S #3  CLOTHING
MF14K 2764 -306 MENU FOOD  MENU FOOD	MF28M TBD AMS PGSC STORRM PGSC
MF14M 2765 -304 MENU FOOD  MENU FOOD	MF28O 2769 -309 MENU FOOD  MENU FOOD

MF43C TBD -TBD SODF   CHECS (HCTB) (HCTB)	MF57C TBD -TBD ISS PHOTO/TV KIT (HCTB)	MF71C 1432 -301 PLUS 1 FOOD   CREW CARE PKG (HCTB) (HCTB) ☒
MF43E TBD ISS RESERVE (HCTB)	MF57E 1903 -305 M/S #2  CLOTHING	MF71E 7497 -305 NLP-CELLS (CGBA)
MF43G 1902 -308 M/S #1  CLOTHING	MF57G TBD TDRS TRANSPONDER (CTB)	MF71G 6240 -311 ORBITER FDF SODF(ZIPLOCK)
MF43H 0305 -TBD POST INSERTION	MF57H 8047 -304 DC VAC (CTB 6015-326)	MF71H 5473 -305 ORBITER FDF
MF43K TBD -301 POST INSERTION #2  EMPTY	MF57K TBD -TBD CHECS	MF71K 6299 -325 COAS/WORK LIGHT SHIELDS/D2XS AUDIO DOSIMETER BTA
MF43M 1900 -308 CDR  CLOTHING	MF57M 8965 -318 YELLOW HOSE CONDENSATE CWC(2) ORINGS/BRAYCOTE DOCK MECH KIT SUPA(13)/CSA-CP	MF71M 3005 -304 M/S #4  CLOTHING
MF43O 5432 -330 IFM BREAKOUT BOX TURNBUCKLES AIR SAMPLERS WWD FILTER RMS KIT	MF57O TBD IPT RESERVE	MF71O 6697 -340 HH LIDAR W/NIGHTSCOPE 2ND HHL (TRAD)/SSV/BPSMU

VOLUME D 7498  
(MD52C) -303  
RCC REPAIR HDWR  
B/U DTV HDWR

VOLUME F 1403  
(MD76M) -306  
WET TRASH

VOLUME G 1800  
(MD80R) -347  
CONT UCDS  
WASTE MGMT  
CWC(2)

VOLUME H 8068  
(MD23R) -325  
☒ EMU SERVICE KIT (INBD)  
  
EVA ACCESS 8065  
(OBD) -315

WMC 0914  
(MAB2H) -332  
TOWELS AND RESUPPLY ITEMS  
WMC DISPENSER  
1st DAY CLOTH SUPA(1)  
1641-332

EXT AIRLOCK 5557  
-TBD (STBD) 2-EMUS 5555  
-TBD (PORT)  
EXT A/L FLOOR 5555  
-TBD (PORT)  
ESEL HARDWARE

LEADER: KEITH CAMPBELL  
DATE: 12-07-09  
LAUNCH: 07-29-10  
FLIGHT: STS-134/ULF6  
VEHICLE: OV-105  
CREW: 6 MAN 12 + 1 + 2 DAYS  
RQMTS: TEPC, ERGOMETER,  
GALLEY  
SLEEPING BAGS

MIDDECK AFT

MA9D/F 9882 -310 TRAD/OBF/MAK SOMS RESUS AMMONIA DETEC KIT MINERAL SYRINGE KIT HEART RATE MON(2)	MA16D 6250 -358 IFM TOOLS 2163-302 2161-305 2162-307 ☒ MULTIMETER
MA9G 8737 -311 RCC COLD BAG ASSY	MA16F/G 1135 -TBD *GLACIER
MA9J 8719 -309 COLOR PRINTER & PAPER (CTB 6066-334)	MA16J 8723 -302 PHOTO/TV STOW&GO (CTB)
MA9L 6269 -309 PRINTER TRAYS  GIRA 6256-306	MA16L 1901 -305 PLT  CLOTHING
MA9N 7432-341 4980-315 SOFT STWG BAGS PHK'S(6) CCK/LIGHT STICKS 8071-326 ZIPLOCKS/COMM PHK RSTRNTS/FLUID LD 8070-303 FIBERSCOPE	MA16N 1908 -309 CREW SUPPORT

MD CEIL (PORT 1) TBD -301 ESEL HARDWARE
MD CEIL (PORT 2) TBD -TBD ☒ RFTA TOWELS/WASHCLOTHES ENTRY GARMENTS HYGIENE
MD CEIL (STBD 1) TBD -301 ECOK(3)
MD CEIL (STBD 2) TBD -301 ☒ RFTA ☒ CWC(4) ☒ CQMK
MD FLOOR (PORT 2) TBD -301 ISS RESERVE
MD FLOOR (PORT 1) TBD -301 ☒ TCTB: AMIA(2)
MD FLOOR (STBD 2) TBD -301 LIOH(8)
MD FLOOR (STBD 1) 1707 -TBD ☒ TOCA

39 LIOH: 29 + 1 ATCO IN LIOH BOX, 2 INSTLD,  
8 IN BAG D  
G-SUITS(6)  
(7435-TBD)

WINDOW SHADE BAG - WINDOW SHADES  
(5548-381)  
IFM CABLES & HOSES (4259-344)  
MONITOR SHIELDS/OCA CABLE

L10A1: AVIU/MPC (6686-338)  
L10A2: DTV MUX  
L10A3: DTV VTR/MP  
L11: PDIP 2 OIU 1/2  
L12A1: SSP 1  
L12A2: SSP 2  
L12A3: PDIP 1  
R12A1: VPU  
R12A2: OBSS/OPP

\* NOT APPROVED  
● LATE LOAD  
☒ SWAP  
☒ TRANSFER TO ISS  
CTB-CARGO TRANSFER BAG  
HCTB-HALF CARGO TRANSFER BAG

C/D JSC TBD  
P/D JSC TBD  
C/D KSC TBD  
P/D KSC TBD  
CEIT KIT 2122-315  
MDK LBL TBD  
DWG NO. SGD32104453  
/USR/DWGS/LOCKER/STS130  
CCMM: M. MCDONALD 483-1384



1MRCS REPT. 4650-1  
PAGE NO. 1

SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0134

MEQ

ECP-MCR/KIT SEQUENCE

RUN TIME

11:24 DATE 01/12/2010

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRIO	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
-----	----	-----	----	-----
030180	AUTH	TCTIM0030180REF	0003 000	IBA BOOM CONFIGURATION CHANGE FOR STS-134
S115134				
	KSC			ADDED PER V092-000002 A15
2009-12-09	025			
TOTAL MODS =		1		

1MRC5 REPT. 4650-1  
PAGE NO. 2

SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0134

ORB

ECP-MCR/KIT SEQUENCE

RUN TIME

11:24 DATE 01/12/2010

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRIO	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
ORB-0088B	AUTH	J6116	0105 004	AMES GAP FILLER REMOVAL AND REPLACEMENT
2006-08-16	MAND			
	KSC		SPAR	
	025			
S-J6275A	AUTH	J6275A	0105 003	ORBITER STRUCTURE IML SURFACE CORROSION SAMPLING INSPECTION
2008-02-26	MAND			
	KSC		SPAR	CORROSION SAMPLING CAPABILITIES WILL BE PROJECTED AT LSFR,
	025			AND FINALIZED AT DLSFR FOR EACH FLOW.
S-J6514A	AUTH	J6514A	0105 001	PUTTY REPAIR TILE REPLACEMENT FOR RISK REDUCTION
2009-05-22	MAND			
	KSC		SPAR	PUTTY REPAIR TPS REPLACEMENTS HAVE BEEN FACTORED INTO OPF
	025			PROCESSING PLANS FOR STS-130 & STS-131.
S-J6522	AUTH	J6522	0105 001	NODE 3 CLOSE CLEARANCE MEASUREMENTS OF ORBITER HARDWARE
2009-06-11	MAND			
	KSC		SPAR	
	025			
S-J6527	AUTH	J6527	0105 001	FRC5 THRUSTER CANISTER STUD INSPECTIONS - F5R AND F5L
2009-07-02	MAND			
	KSC		SPAR	OV-105 (FRC5) FLT 25
	025			
S-J6543	AUTH	J6543	0105 001	ET FERRY FLIGHT DOOR ATTACH FITTING INSPECTION
2009-09-17	MAND			
	KSC		SPAR	NDE OF FERRY FLT DOOR ATTACH FITTINGS WILL ONLY BE REQ'D
	025			

FOLLOWING A F/FLT BACK TO KSC. F/FLT ONLY.

S-J6559	AUTH J6559	0105 000	UPPER AFT STUB TILE INSPECTION FOR IN-PLANE CRACKS
	MAND		
	KSC	SPAR	
2009-10-01	025		
S-J6580	AUTH J6580	0105 000	CAPTURE OV-105 OUTPUT WAVEFORMS TO ADDRESS 1N3600 DIODE CONC
	MAND		
	KSC	SPAR	ERNS
2009-12-08	025		
S052924CZ	AUTH K6561A	0105 001	GROUND LIGHTNING MONITORING SYSTEM (GLMS) INSTALLATION
	SCHD		
	KSC	NSW	
2009-10-13	025		
S052924DA	AUTH K6566	0105 001	SSME NOZZLE PURGE HOT WALL CORROSION PREVENTION
	SCHD		
	KSC	NSW	
2009-10-13	025		
030191	AUTH 030191	0105 000	SENSOR TEST FOR ORION RELNAV RISK MITIGATION (STORM) MOD
S115134			
	KSC	CONTR	ADDED PER D. CLINE REQUEST
2009-12-09	025		
030274	AUTH TCTIV7030274REF	0105 000	FUEL CELL CPM DEDICATED POWER FEED CIRCUIT FUSE MOD
S115134			
	KSC	NOT REQUIRED	ADDED BY EDS I/F & V070-764400 H01, -764450 F07
2009-12-09	025		

TOTAL MODS = 12

1MRCS REPT. 4650-1  
PAGE NO. 3

SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0134

PIH

ECP-MCR/KIT SEQUENCE

RUN TIME

11:24 DATE 01/12/2010

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRIOR	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
008852	APPD	K782-710004-001	0001 000	KIT - INTEG H/W, STS-133 & STS-134
NOT REQD	JSC			ADDED PER KIT EO NEW
025				
	APPD	K796-774002-001	0001 000	STS-134, CARGO INTEGRATION HARDWARE KIT
NOT REQD	KSC	NOT REQUIRED		ADDED BY EDS I/F & KIT EO NEW
025				
	APPD	K845-773015-001	0001 000	HARDWARE PROVISIONS FOR STS-134
NOT REQD	KSC			ADDED PER V845-773985 NEW
025				
	APPD	TCTIM0008852REF	0001 001	WIRE HARNESS ASSY AREA 38 MOD FOR STS-134
NOT REQD	KSC			ADDED PER V845-773796 B03
025				
TOTAL MODS =		4		

Approved STS-134 OMRS Waivers and Exceptions

WVR EXC	ELEMENT PROJECT	PRCBD NUMBER WAIVER# (STAT) (INITIAL STS)	ABSTRACT RAS REQUIREMENTS	EISN PAYLOAD	STS BEG END
E	ORB	S053299TQ EK10696 (A)	OMRSD EXCEPTION REQUEST - FUEL CELLPOWERPLANT 1 H2 FLOWMETER LOWE RLIMIT (EK10696)	105	023 027
		S053300V EK10749 (A)	OMRSD EXCEPTION REQUEST - VERTICAL TAIL FWD ATTACHMENT BOLT INSPE CTIONEXCEPTION (EK10749)	103 105	038 038 025 025
W	ET	S053293FZ WK03850R1 (A) (STS-093)	L02/LH2 TANK PRESSURE MONITOR FOR MOVE	ET	099 999
	OMS	S053299HG WK10648R2 (A)	OMRSD WAIVER REQUEST - LEFT OMS PODHELIUM ISOLATION VALVE INTERNA L LEAK(WK10648R2)	0013	033 036
		S053300W WK10752R1 (A)	OMRSD WAIVER REQUEST - RIGHT OMS GHE ISOLATION VALVE LEAKAGE(WK1 0752R1)	0024	031 032
	ORB	S053296LJ WK10240 (A)	OMRSD WAIVER REQUEST - WSB 2 GN2 REG PRESS BELOW OMRSD (WK10240)	105	018 026
		S053298TA WK10538 (A)	OMRSD WAIVER REQUEST - MODULAR AUXILIARY DATA SYSTEM FREQUENCY DI VISIONMULTIPLEXER 1 FREQUENCY CALIBRATIONOV- 105 (WK10538)	105	020 026

S053298TB		OMRSD WAIVER REQUEST -	105	020 026
WK10540	(A)	MODULAR AUXILIARY DATA SYSTEM FREQUENCY DI VISIONMULTIPLEXER 2 MUX CH. 1 DATA SHIFT OV-105 (WK10540)		
S053299DQ		OMRSD WAIVER REQUEST -	105	021 026
WK10614	(A)	MODULAR AUXILIARY DATA SYSTEM FREQUENCY DI VISIONMULTIPLEXER-M1A, NOISE RATIO/NOISE LEVEL (WK10614)		

## Approved STS-134 OMRS Waivers and Exceptions

WVR EXC	ELEMENT PROJECT	PRCBD NUMBER WAIVER# (STAT) (INITIAL STS)	ABSTRACT RAS REQUIREMENTS	EISN PAYLOAD	STS BEG END	
+	W	ORB	S053299HE WK10639R1 (A)	OMRSD WAIVER REQUEST - AUXILIARY POWER UNIT 1 GAS GENERATOR CHAMB ERPRESSURE BIAS (WK10639R1)	105	022 025
			S053299LM WK10655 (A)	OMRSD WAIVER REQUEST - FUEL CELL POWER PLANT CELL PERFORMANCE MON ITORSTACK DELTA VOLTAGE 1 AT 510 MILLIVOLTS (WK10655)	105	022 025
			S053299QE WK10684R1 (A)	OMRSD WAIVER REQUEST - FRCS FUEL CELL CHECK VALVE 101 ELEMENT #3 FAILEDLEAK CHECK (WK10684R1)	105	023 025
			S053299TT WK10697 (A)	OMRSD WAIVER REQUEST - AIRLOCK FWD HATCH PORT EQUALIZATION VALVE LOWTORQUE (WK10697)	105	023 025
			S053299ZD WK10733 (A)	OMRSD WAIVER REQUEST - FRCS CV101 ELEMENT 4 FAILED LEAK CHECK (WK 10733)	105	024 025
	RCS		S053296PV WK10275 (A)	OMRSD WAIVER REQUEST - RRCS FUEL A& B LEG REG LOCKUP PRESSURE(WK 10275)	0024	026 034
	SRB		S053293WA WK03886 (A) (STS-103)	LH FWD AND RH MID SRB JOINT TEMP SENSORS	BI	099 999

	Waivers	Except	Deviat	Cannib	Total
Total Extracted	14	2	0	0	16



ACTIVE WAIVERS FOR  
OV-105

Item #	Authority	Date	Waiver Description	Effectivity	Wad
53	S052428A	03/27/91	Allows specified flights to fly with interim TPS repair after each mission to minimize damage to surrounding tile during ferry flight	STS-37, STS-39, STS-40, STS-42 thru STS-999	<b>STAYS OPEN</b>
101	S076972	11/19/91	Permit the modified GPCs (AP101-S) Battery Back-up Unit to fly with annotated fastener improvements without rolling the LRU Part Number	STS-42, STS-44, STS-47 and STS-49 thru STS-999	<b>STAYS OPEN</b>
341	S063701	08/07/07	<p>The following requirement is waived to allow OV-105 to fly with the following out-of-configuration condition:</p> <p>Partial installation of Tech Order M072-660010-004, Middeck Air Flow Re-routing Duct Tech Order, not to include bolt (NAS1003-8A) and washer (NAS620C10) in the lower aft corner of the vent housing cover assembly.</p> <p>During vertical stowage the nut plate (not under USA Tech Order configuration controlled) was noted missing from behind the starboard closeout panel. Without the nut plate, the bolt and washer cannot be installed. The area cannot be currently accessed to re-install the missing hardware. (NOTE: MRB in work on PR FCS-5-20-0476 to approve use of tape on the open hole. Lost and found PR LAF-5-20-0440 written to document lost nut plate.</p>	OV-105, Flight 20	

ACTIVE WAIVERS FOR  
OV-105

Item #	Authority	Date	Waiver Description	Effectivity	Wad
344	S071024MP	12/20/07	<p>During maintenance of an Advanced Master Events Controller (AMEC) it was discovered that the module cards are able to translate upward, away from connectors. The cards are retained by friction applied by wedge-locks. An assessment determined a 0.070 upward card translation, would result in card disengagement from connectors. The wedge-lock system can not assure the cards will not translate upwards. The AMEC vendor (Boeing Autonetics) is no longer on contract supporting SSP. A design proposal is to provide a secondary connector retention using the AMEC covers. The new design new lids will limit the upward translation to 0.055. The new design will reduce the milled section of the cover and add silicone pads to provide shock absorption. Due to the absence of the original vendor and no current alternate drawings available for the AMEC the modification is being requested via a program directed Material Review (MR).</p> <p>P/N MC450-0016-0029</p> <p>S/N U6F0002, U6F0003, U6F0004, U6F0006, U6F0007, U6F0009, U6F0010 and U6F0011</p> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 35 OV-104, Flight 30 OV-105, Flight 21	
345	S115123AR5	03/03/08	<p>The following requirement is waived to allow OV-105 to fly with the following out-of-configuration condition:</p> <p>Tech Order M072-544504-009, (CATIA) RMS elbow camera, fly with the RMS elbow camera/PTU assembly angle change from 10.6 degrees to 0 degrees for STS-123 launch.</p> <p>A dynamic clearance assessment for STS-123 identified an interference between the camera/PTU assembly and the Payload Bay Door radiators. A decision was made to change the tilt angle from 10.6 degrees to 0 degrees for launch.</p>	OV-105, Flight 21	

Prepared by: Jeff McRoberts  
USA RV/DR  
861-2505

01/13/2010

ACTIVE WAIVERS FOR  
OV-105

Item #	Authority	Date	Waiver Description	Effectivity	Wad												
347	S115126AR5	08/22/2008	<p>The following requirement is waived to allow OV-105 (STS-400/LON) to fly with the following out-of-configuration condition:</p> <p>Active latches without extended guides in Bays 8 and 12 will replace the respective STS-126 requirements:</p> <table border="0"> <tr> <td>Bay 8 STBD</td> <td>M072-544201-203</td> </tr> <tr> <td>Bay 8 Port</td> <td>M072-544201-204</td> </tr> <tr> <td>BAY 12 STBD</td> <td>M072-544101-028</td> </tr> <tr> <td>Bay 12 Port</td> <td>M072-544101-027</td> </tr> </table> <p>Latches changed from secondary to primary:</p> <table border="0"> <tr> <td>Bay 12 STBD</td> <td>M072-002112-043 Partial in Lieu of M072-002212-045</td> </tr> <tr> <td>Bay 12 Port</td> <td>M072-002112-044 Partial in Lieu of M072-002212-046</td> </tr> </table> <p>The following Tech Orders will not be installed:</p> <p>M072-000423-001 M072-710801-001 M072-544001-008</p> <p>The following Tech Orders will be partially installed:</p> <p>M072-544752-003 ROEU installed but not mated and grease application not accomplished.</p> <p>M072-000442-004 Orbiter aft bulkhead handrails removed, but LMC installation not accomplished.</p> <p>M072-002113-003 and M072-002113-004 latch cap bolt MD111-4026-1635 torque to 20 +/- 5 ft-lbs.</p>	Bay 8 STBD	M072-544201-203	Bay 8 Port	M072-544201-204	BAY 12 STBD	M072-544101-028	Bay 12 Port	M072-544101-027	Bay 12 STBD	M072-002112-043 Partial in Lieu of M072-002212-045	Bay 12 Port	M072-002112-044 Partial in Lieu of M072-002212-046	STS-400/LON (OV-105, Flight 22)	
Bay 8 STBD	M072-544201-203																
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861-2505

01/13/2010

ACTIVE WAIVERS FOR  
OV-105

Item #	Authority	Date	Waiver Description	Effectivity	Wad
348	S115126AR7	12/17/2008	<p>The following requirement, approved baseline return configuration, is waived to allow OV-105 to ferry from DFRC to KSC with out-of-configuration conditions for H2 and O2 supply line valves for fuel cell #2.</p> <p>During power operations, loss of power occurred on main B Bus. Fuel cell #2 coolant pump experienced a loss of power at this time due to the fact that Bus B provides AC2 power to fuel cell #2. Because of this loss of power, an overtemp condition may have occurred. During ferry, fuel cell #2 will be flown in a depressurized state. The addition of the jumper to the H2 and O2 lines is required to avoid potential damage to the fuel cell. This additional hardware is not part of the ferry flight configuration. Discharge water line from the fuel cell has been disconnected and secured in place. Reason being is this allows the removal of the water from the fuel cell and Orbiter line separately for freeze protection during ferry.</p> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-105, Flight 22 (Ferry Flight)	
349	S115126AR7	12/17/2008	<p>The following requirement, approved baseline return configuration, is waived to allow OV-105 to ferry from DFRC to KSC with the following out-of configuration conditions:</p> <p>Discharge water line disconnected from fuel cell.</p> <p>TCS insulation blanket V070-362917-001 not installed.</p> <p>TCS blanket covers a frame and GSE disconnects. During ferry flight, temperatures will not be high enough or low enough to damage Orbiter hardware. TCS blanket V070-362917-001 was inadvertently left out of the midbody before Door 44 was installed for ferry flight. Discharge water line from the fuel cell has been disconnected and secured in place. Reason being is this allows the removal of the water from the fuel cell and Orbiter line separately for freeze protection during ferry.</p>	OV-105, Flight 22 (Ferry Flight)	

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ACTIVE WAIVERS FOR  
OV-105

Item #	Authority	Date	Waiver Description	Effectivity	Wad
350	S115127AR7	05/04/2009	<p>The following requirements are waived to allow OV-105 (STS-400/LON) to fly with the following out-of-configuration conditions:</p> <p>Active latches installations are partial without extended guides:</p> <p>M072-544101-059    M072-544101-060    M072-544201-309 M072-544201-310    M072-544201-349    M072-544201-350 M072-544201-351    M072-544201-352</p> <p>Payloads installation Technical Orders will not be installed:</p> <p>M072-000475-001 (JEM-EF)    M072-000476-001 (JEM-ES) M072-000477-001 (ICC-VLD)</p> <p>The following Technical Orders will not be installed:</p> <p>EVA Cable Stowage Hardware (ECSH) Technical Order (Landing Configuration)</p> <p>M072-544001-008    Sill Wipers (Qty 3)</p> <p>The ROEU configuration will be changed:</p> <p>M072-544751-054    ROEU (stowed)    Partial (no grease per A16 flag &lt;15&gt; Note 2)</p> <p>The TSA contents will be different for landing:</p> <p>M072-660853</p> <p>Payload to Orbiter Installation (wiring) is partial - payload connector caps only.</p>	STS-400/LON (OV-105, Flight 23)	