



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



STS-132 Delta Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-07-10**

Program Freeze Point

PRCB Presentation

S115132C



STS-132 Delta Launch Site Flow Review

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Baseline the STS-132 Mission Specific Requirements and Flow Plans.

The STS-132 Integrated Launch Site Requirements were established by PRCBD S115132AR1 dated 10-22-09. This CR and the Associated Data Package were reviewed at the 01-04-10 FRWG.

Flight Operation & Integration*

Orbiter Engineering*

EVA

Payload/Cargo Engineering*

SSME

Launch Vehicle Processing*

Requesting Approval

Requesting Approval

Status in BackUp

KSC Integration*

Flight Software

Orbiter GFE

KSC ISS and Payload Processing

MO3/USA-PI

USA-OE

XA

USA-PI

MP21

PH/USA-GO

MK-SIO

USA-FSW

MV5

UB-R3

*Backup material included



STS-132 DELTA LAUNCH SITE FLOW REVIEW

Presenter
Phyllis Grounds

Date
Jan. 7, 2010

STS-132/ISS ULF4

Delta Launch Site Flow Review (LSFR)

Flight Requirements Status

FRWG Jan 4, 2010

PRCB Jan 7, 2010

Phyllis Grounds, MO3 MIM

Robert Reynolds, USA Flight Mgr.

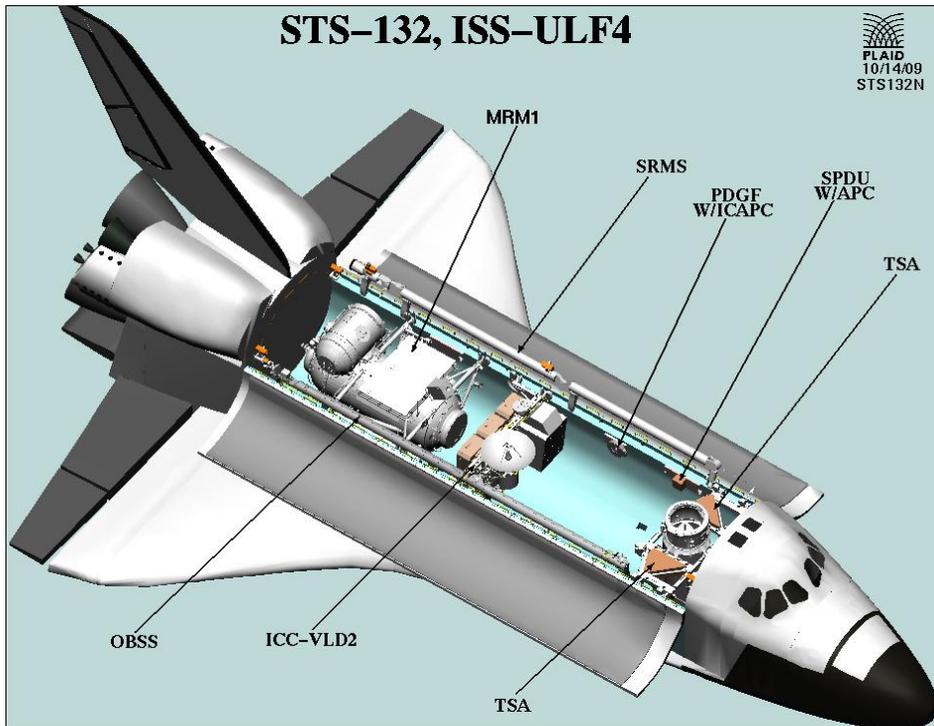


STS-132 DELTA LAUNCH SITE FLOW REVIEW

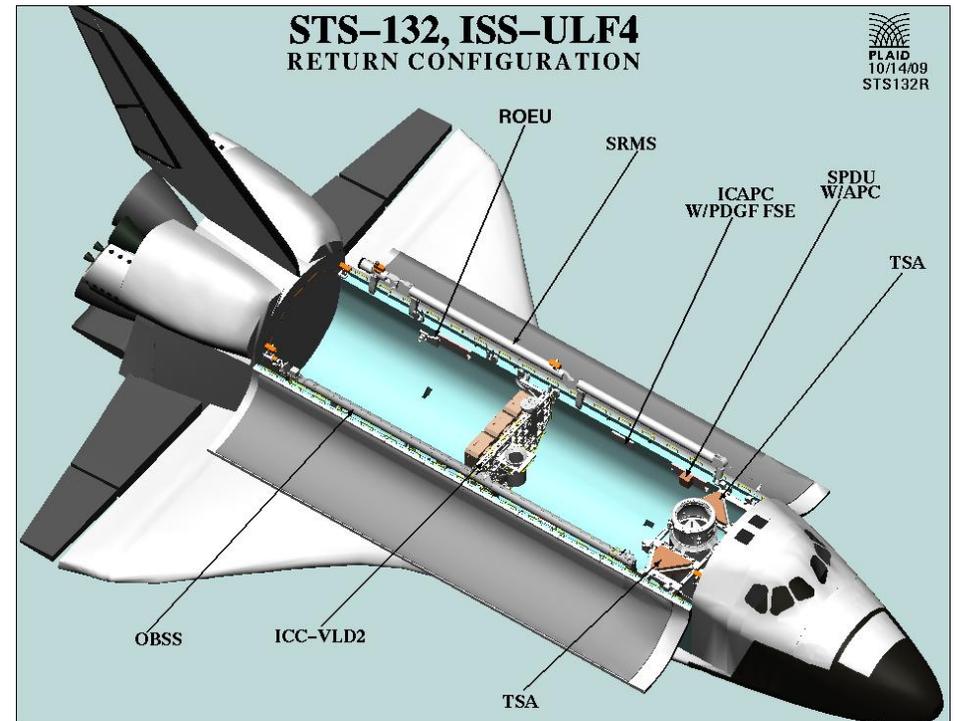
Presenter
Phyllis Grounds

Date
Jan. 7, 2010

Ascent Configuration



Return Configuration

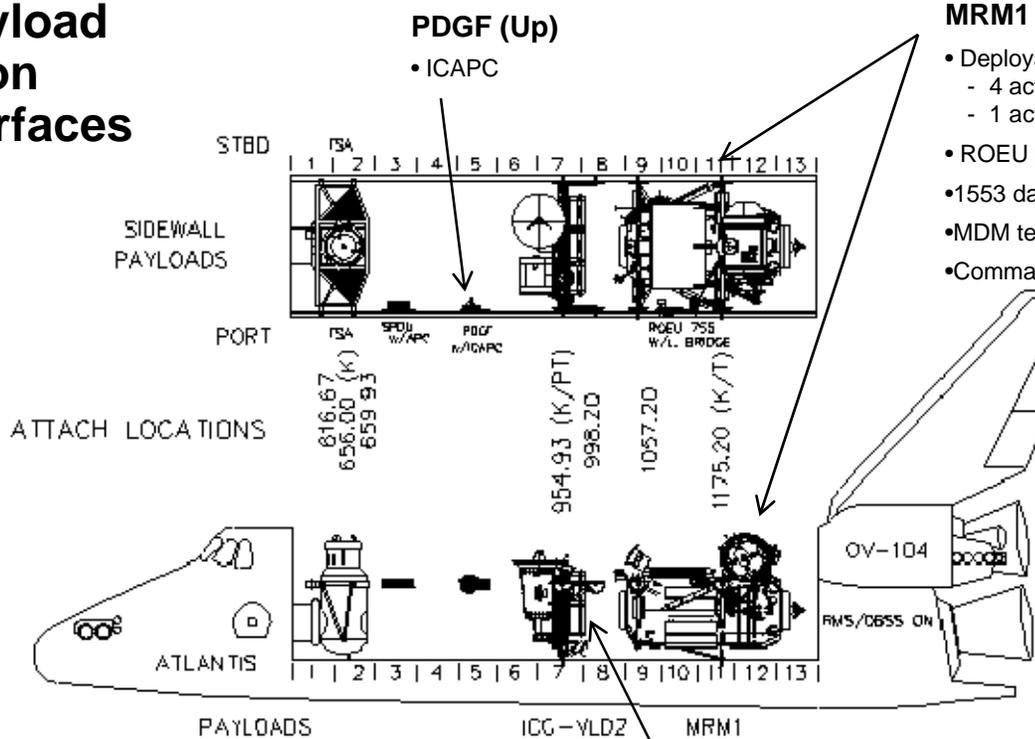




STS-132 DELTA LAUNCH SITE FLOW REVIEW

Presenter Phyllis Grounds
Date Jan. 7, 2010

STS-132 Payload Integration Services/Interfaces



MRM1 1st Flight

- Deployable
 - 4 active longeron latches (aft primary)
 - 1 active keel latch
- ROEU provides 28 VDC heater power
- 1553 data
- MDM telemetry
- Commanding from Standard Switch Panel

Middeck Powered Payloads

- CGBA-2 (Up/Dn) for Micro2
- CGBA-2 (Up/Dn) for NLP-Cells
- GLACIER - rear breather (36 CFM) (Up/Swap/Dn)

ICC-VLD 2nd Flight

- Deployable
 - 4 active longeron latches (fwd primary)
 - 1 active keel latch

• Note – SPDU supports OBSS



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



STS-132 DELTA LAUNCH SITE FLOW REVIEW

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LAUNCH

05/14/10
39A/ MLP 2
CREW SIZE: 6UP/6DN

ORBIT

51.6 DEG
122 NM
DIRECT INSERTION
DURATION: 11 + 1 + 2 DAYS

CONFIGURATION

OV-104(32)
LP04;RP01
ET-136
BI-143
RSRM-111
PROPOSED: (1) 2052 (2) 2051 (3) 2047
OI-34
SRMS, ODS, OBSS, APCU'S
ROEU, SPDU

CONSUMABLES

CRYO TANK SETS 5 (FULL)
GN2 TANKS 5 (FULL)
PAD Hold ~86 HRS (H2 Limited)
FWD RCS 2175# (MIDPOINT)
AFT RCS 4970# (FULL)
OMS 22760# (FULL)

PAYLOAD

ISS-ULF4 (MRM1, ICC-VLD. ICAPC/PDGF)	ISS-ULF4 MAUI SIMPLEX SEITE RAMBO-2
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LANDING

SITE TAL ALT. TAL SCA	KSC ZARAGOZA MORON & ISTRES 911
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STS-132 DELTA LAUNCH SITE FLOW REVIEW

Presenter Phyllis Grounds
Date Jan. 7, 2010

PERFORMANCE MARGIN

- SIMULATION MARGIN (OCFAF132) +3170

- WEIGHT CHANGES SINCE SIMULATION
 - PAYLOAD - 778
 - OPERATOR - 48
 - ORBITER +24
 - TOTAL WEIGHT CHANGES - 802 +802

- OTHER PERFORMANCE PROJECTIONS
 - PROTECTION FOR DOL DISPERSIONS - 700
 - SRB – M.P. UPDATES - 164
 - SRB – BR / 2.20 MIL HIGHER THAN 0.3705 AVG +440
 - PROJ TO 5 MIN WINDOW FROM INPLANE - 600
 - PERFORMANCE CHANGES ADJUSTMENT - 56

- CURRENT BASELINED APM (12/15/09) +2892

- PROJECTIONS
 - ISP/THRUST FOR SSME 2052, 2051, 2047 +25

- PROJECTED APM +2917

VOLUME III: ASCENT PERFORMANCE MANAGER'S RESERVE GUIDELINE AT LSFR/LSRR IS 400 LBS



STS-132 DELTA LAUNCH SITE FLOW REVIEW

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Date
Jan. 7, 2010

FLIGHT MASS PROPERTIES WEIGHTS AND CG'S ARE WITHIN ACCEPTABLE LIMITS

<u>CASE</u>	<u>TOUCHDOWN</u>	<u>MACH 3.5</u>
	<u>WEIGHT pounds (LIMIT)</u>	<u>X C.G. inches (LIMIT)</u>
NOMINAL	209581 (233000)	1078.4 (1075.2)
RTL5	235747 (245000)	1081.8 (1076.7)
TAL	234380 (244000)	1081.9 (1076.7)
AOA	230389 (242000)	1080.3 (1075.2)
CONT RTRN*	211183 (233000)	1078.2 (1075.2)

**NOTE: RTL5 INCLUDES 185 SEC ARCS & 25 SEC FRCS DUMPS
TAL INCLUDES 120 SEC ARCS & 65 SEC FRCS DUMPS
1109 LBS AFT BALLAST**

*** MRM1 deployed; ICC-VLD2 in ascent config, PDGF still in PLB**

ESTIMATES BASED ON OCFAF132 AND MODIFIED FOR WEIGHT CHANGES THRU 12/15/09.

STS-132 Delta LSFR

OV-104 FLIGHT 32

CONFIGURATION UPDATES

PRCB

January 7, 2010

Alvin Jenkins USA Orbiter Element
Elena Seastrom Boeing VPE

STS-132 OV-104 Flight 32 – Delta LSFR Updates

Program Authorization Is Requested For The Following:

- Three (3) Orbiter Modifications
- One (1) Mission Equipment Modification
- MECSLSI Updates

Information Only:

- Chits
- Pending RCNs
- Wing Leading Edge (WLE) Spar Inspection
- Auxiliary Power Unit (APU) Wetted Time Extension
- Previously Approved Modification

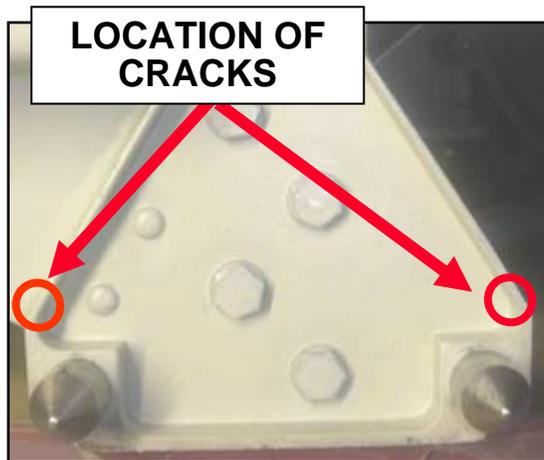
Back-up:

- Modification Records and MECSLSI Updates Summary
- Engineering, Hardware and Certification Status
- TPS Risk Reduction Priorities List and Allocation Breakdown
- Modification Details

STS-132 OV-104 Flight 32 – Modification To Be Baselined

TAD 30282 – Waste Collector System (WCS) Ring Fitting Redesign

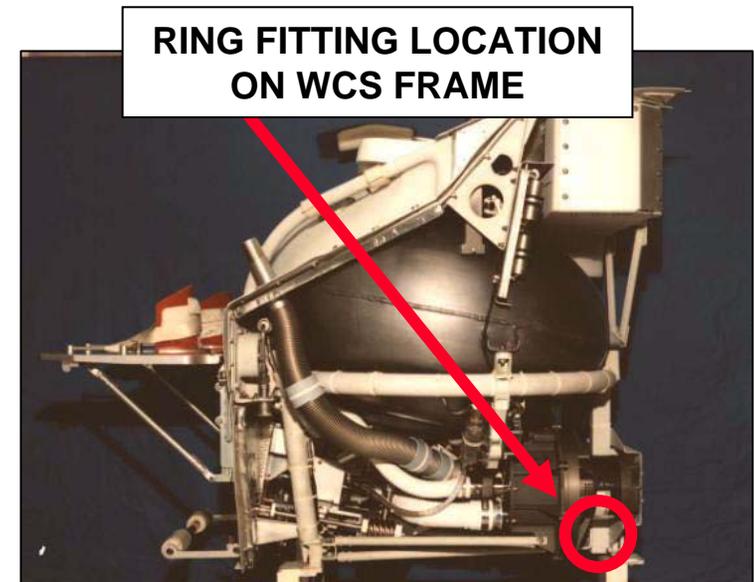
- Replaces the existing WCS aft attach point ring fitting with a modified titanium ring fitting
 - Cracks were discovered on the attach point ring fitting for WCS units in all vehicles
 - Initially cracks were discovered on the aft attach point ring fitting during inspection of WCS S/N 123 for OV-105 / STS-130
 - Linear strength analysis performed using NASTRAN model indicated a negative margin for the previous design
 - New design bracket material was changed from aluminum to titanium and material thickness was increased in areas where cracks had previously occurred
 - New design bracket shows positive margin with 20g crash loads
 - First flight of modification will be STS-130



PREVIOUS DESIGN



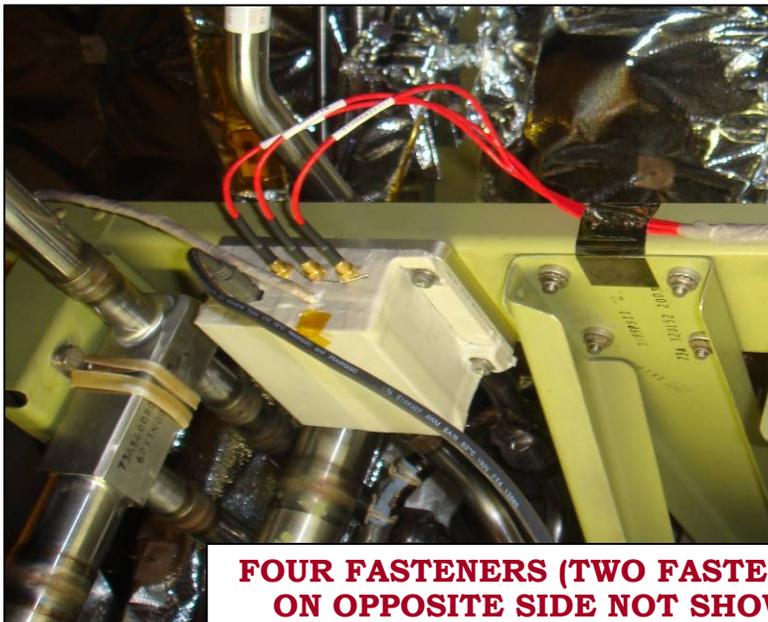
NEW DESIGN



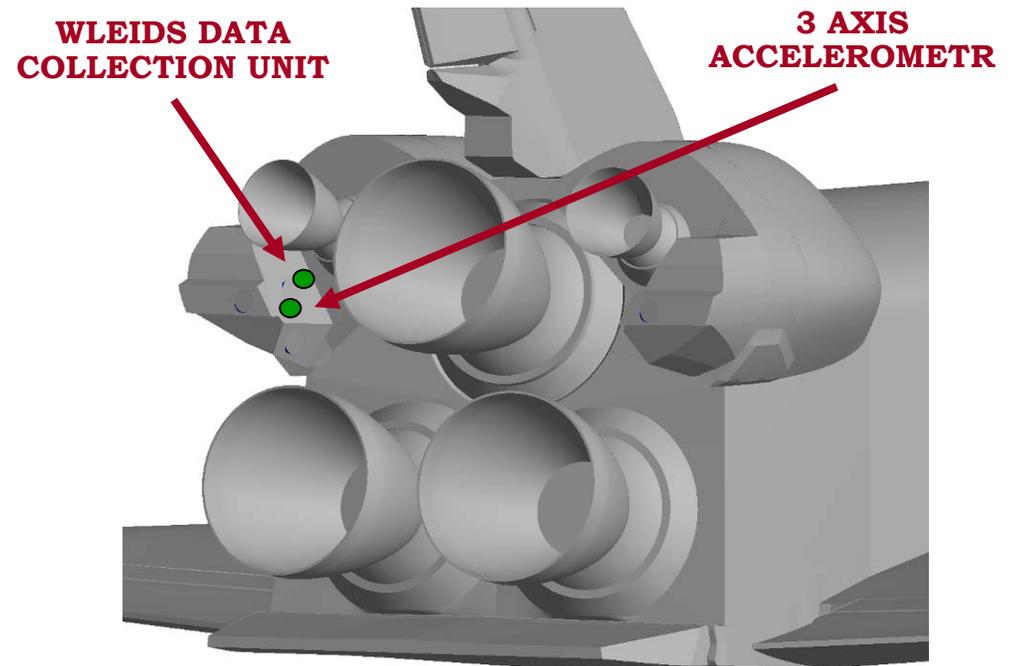
STS-132 OV-104 Flight 32 – Modifications To Be Baselined

TAD 30283 – Left OMS/RCS Stinger Accelerometer Installation Modification

- Adds safety wire to the fasteners that attach the micro-WIS box to the adapter plate for the stinger accelerometer
 - Authorization requested to add M072-755113-003 installation tech order to the STS-132 MECSLSI, and associated modification record 030283,0104,1 to the configuration baseline



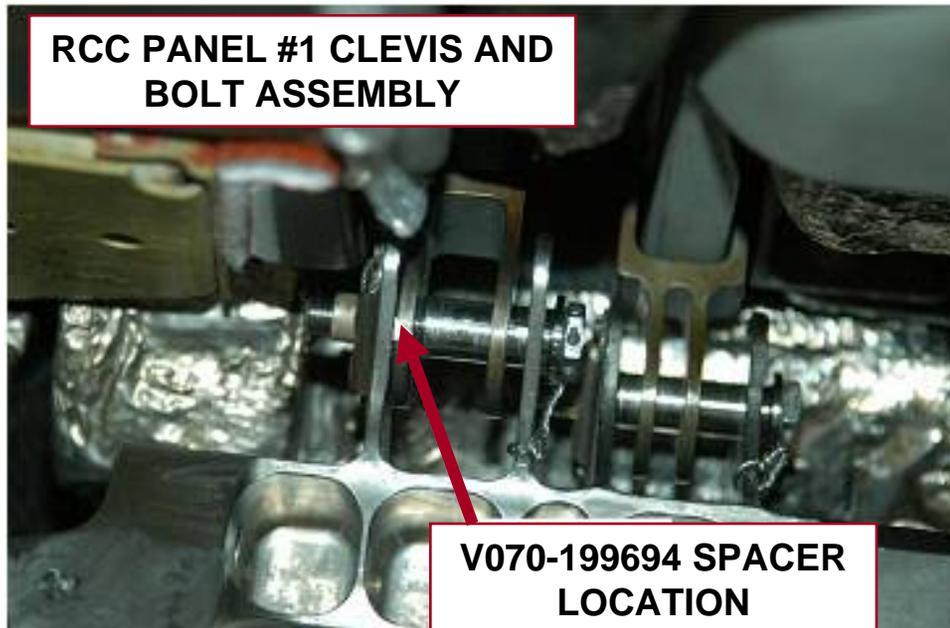
FOUR FASTENERS (TWO FASTENERS ON OPPOSITE SIDE NOT SHOWN) WILL BE SAFETY WIRED



STS-132 OV-104 Flight 32 – Modification To Be Baselined

MCR 11620 – WLE RCC Panel Spar Fitting Spacer Modification

- Adds two rivets to the spacer on the right hand rib splice #1 spar fitting to complete the deferred rivet installation per drawing
 - The PR EOTF TES-4-27-0839 action which corrected the rivets omission on the RCC installation drawing was not fully implemented during flight 27 flow and was deferred until next removal of the RCC spar fitting #1 (Ref. TES-4-A0040)
 - MR concurrence was obtained for the spacers installation without rivets until access becomes available because they are retained in place by the bolt and bushing

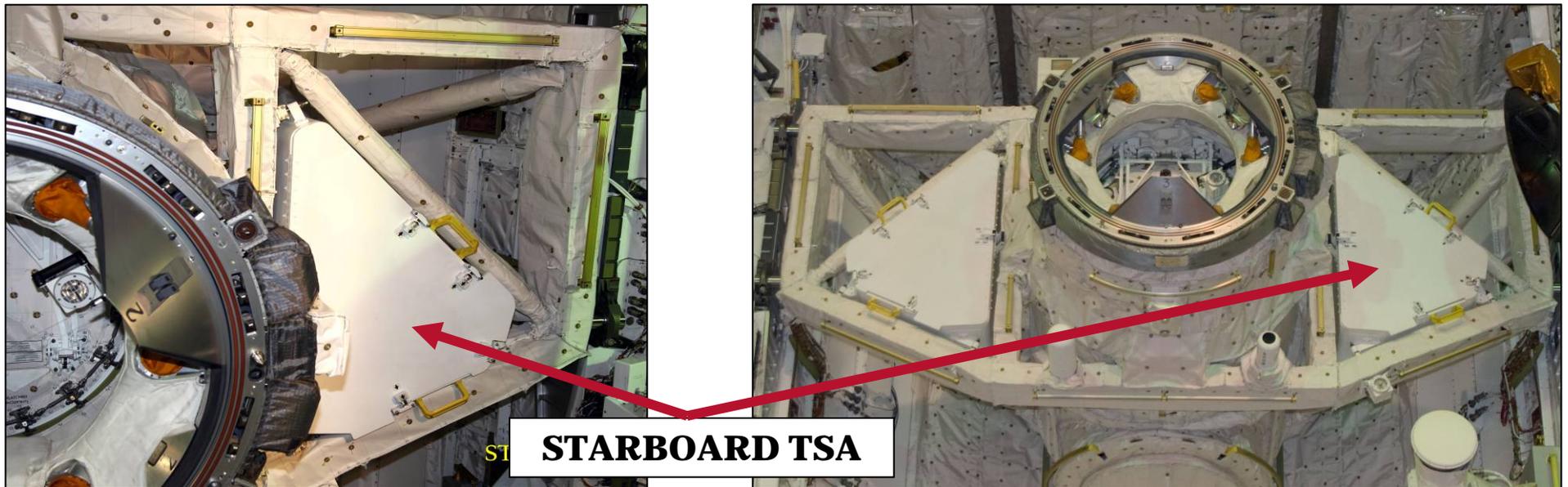


- The partial deferral of the modification was approved by PRCB on 5/26/06
- Authorization for the completion of the modification is requested since the removal of the RH RCC panel #1 is planned for corrosion inspection during flight 32 flow
 - The rivets retain the spacers to the spar fitting so they do not fall out or require a temporary securing measure when installing or removing the bolt

STS-132 OV-104 Flight 32 – Mission Equipment Modification

TAD 30010 – Starboard Lightweight Tool Stowage Assembly (LWTSA)

- Provides new cushion for the starboard Lightweight Tool Stowage Assembly (LWTSA) to accommodate STS-132 Official Flight Kit (OFK)
 - M072-660859-001 LW Starboard TSA installation tech order has been incorporated into the MECSLSI
 - Authorization requested to add associated modification record 030010,0104,8 to the configuration baseline



STS-132 OV-104 Flight 32 – MECSLSI Updates

- **Update the V072-200212 MECSLSI with the following tech order changes:**
 - **Left OMS/RCS Stinger Accelerometer Installation**
 - Add M072-755113-003 (Mission Kit MV0886A)
 - Originally -001 was installed for STS-129 to obtain direct measurement of RCS stinger loads; Configuration will be updated to add safety wire to the fasteners that attach the micro-WIS box to the adapter plate for the stinger accelerometer (Ref. OCR/D S165463A)
 - **PFR/UFR Longeron Bridge Installation**
 - Add M072-340074-036 (Mission Kit MV0072P)
 - Add M072-340074-037 (Mission Kit MV0072P)
 - High Strength Bridge Clamp (HSBC) is required for MRM1 contingency operation for the push button articulating socket in bay 8 Starboard, locations 1023.70 and 1035.50 (Ref. FRD 17462-132-0020 and OCR/D S165466)

Chits

CHIT	TITLE
J6275A	ORBITER STRUCTURE IML SURFACE CORROSION SAMPLING INSPECTION
J6399	0-GAUGE PROTECTION FOR OV-104, FLIGHTS 31-35
J6410	AFT STUB CRACKED TILE INSPECTION
J6501	STS-129 CIH CLOSE CLEARANCE MEASUREMENTS
J6527	FRCS THRUSTER CANISTER STUD INSPECTIONS - F5R AND F5L
J6528	PUTTY REPAIR TILE REPLACEMENT FOR RISK REDUCTION
J6559	UPPER AFT STUB TILE INSPECTION FOR IN-PLANE CRACKS
J6577	AMES GAP FILLER REMOVAL AND REPLACEMENT (In review)
J6579	CAPTURE OV-104 OUTPUT WAVEFORMS TO ADDRESS DIODE CONCERNS
J6582	RUDDER SPEED BRAKE THERMAL TAB INSPECTION (In review)

Potential Chits

- **W2 and W5 Windows Torque Increase**
 - OV-104 W2 and W5 (multi-flight) have been re-torqued to 70 in-lbs as directed by OPO
 - Post flight torque checks will be performed on OV-105 modified windows W1 and W6; Depending on these inspections the decision will be made if the post flight torque check will be required on OV-104 W2 and W5

Pending RCNs

- **OMS/RCS Requirements Update (non-standard ops)**
 - **OV18162 OMS HE Test PT Coupling Max Pressure**
 - **OV18161 RCS HE Test PT Coupling Max Pressure**
 - Defines max op pressure limits when using OMS High Pressure (Helium) test point couplings (not a factor unless He iso valves in the HMF are changed; Scheduled for the board review on 1-22-2010)
- **OV18100 TPS Requirements Update**
 - Establishes gap between ETD hinge tile and bell crank
 - MLGD periphery step and gap verification for structure work or re-rigging
 - Micro/Tactile inspection of upper aft stub tiles for cracks
 - Micro inspection of upper surface captive gap fillers
 - Inspection of LRSI tiles for cracks

STS-132 OV-104 Flight 32 – Information

Wing Leading Edge (WLE) Spar Inspection

- Structural inspections of the wing leading edge spars are due prior to the next flight of OV-104, STS-132 (due date January 22, 2010)
 - Performance of these inspections is intrusive and classified as a significant flow impact
 - Last WLE spar full inspection on OV-104 was performed in July 2003; prior OMDP inspections were performed in December 1997
 - PRT's position is full compliance with the requirement is required prior to 1/22/10
 - Coating system refurbishment and re-performance of structural inspections was to be accomplished at the next OV-104 OMDP which was to occur prior to flight 29
- 12 RCC panels and associated spar fittings were removed during the STS-129 flow to perform sampling inspection
 - Panels 12-16 LH and 10-16 RH
 - No active corrosion identified
- On 11/10/09 OCCB approved inspection of the panels 1-9 RH during the STS-132 flow
 - Inspection of the remaining panels 1-11 LH will be deferred to the next flow (STS-335)
 - Exception and Program accepted risk are required to defer inspection of the LH 1-11 panels to the STS-335 flow

STS-132 OV-104 Flight 32 – Information

Auxiliary Power Unit (APU) Wetted Time Extension

- APUs were due to be replaced prior to STS-132 based on the 5 year wetted time requirement
- Allowable APU wetted time TACCS File II OMRSD was recently increased from 4 years to 5 years based on historical inspection results
 - Further extension of the allowable time period beyond the 5 years required additional inspection and test data
- LOCCB 9/17/09 approved option to perform Disassembly and Inspection (D&I) on APU 401 post WSTF testing to provide for an extension from 5 to 6 years, pending successful D&I and test results
 - Final APU 401 ascent and entry mission duty cycle runs were completed at WSTF
- Based on D&I results on APU 401 and all other data, Boeing and Hamilton Sundstrand engineering have agreed to extend maximum limit for APU wetted time from 5 years to 6 years and 6 months
 - The RCN for new wetted time will be processed in January 2010
 - The QSA for STS-132 was signed on 12/14/09
- The APU removals will not be required during the STS-132 and following flow of OV-104 since the APU wetted time limit has been extended
 - New wetted time limit will allow use of installed units to the end of 2011

Previously Approved Modification

TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation

- Provides dedicated power sources for the Fuel Cell Flowmeter and Cell Performance Monitor (CPM) to protect against power loss to the CPM
 - Existing Shuttle design has the Fuel Cell H2 Flowmeter and the Fuel Cell CPM receiving power from the same 1-amp fused circuit
 - Original design used a 3-amp fuse which was changed in 2004 to 1-amp to preclude the potential for overheated electrical components on Flowmeter circuit boards
 - Part of this change was acceptance of risk for blowing 1-amp fuse for CPM
 - Recent flight anomalies with Fuel Cell H2 Flowmeter have resulted in need to re-evaluate power circuit design
 - During STS-124 MPCA#3 Fuse F6 blew, resulting in loss of both H2 Flowmeter #3 and CPM #3
 - During STS-126 no fuse was blown, however erratic behavior was observed on H2 Flowmeter #1
 - Since STS-126 H2 Flowmeter has been unpowered per MR
 - PRT recommends separation of the Flowmeter/CPM circuits by using the MPCA #1 and #3 fuse spares for Flowmeters #1 and #3, and one of the remaining existing spare MPCA #3 fuses for Flowmeter #2
 - Modification is scheduled to begin on 1-6-2010



EVA Status STS-132/ULF-4 Delta Launch Site Flow Review

**Bridget Ziegelaar
EVA Office
Johnson Space Center
January 7, 2010**

- **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 repair
- **Lightweight Port TSA – contains standard EVA contingency tools**
 - Port LWTSA installation – Tech Order: M072-660850-005
 - Port LWTSA Tools installation – Tech Order: M072-660853-002
- **Lightweight Starboard TSA – contains OFK (not EVA hardware)**
 - Starboard LWTSA installation – Tech Order: M072-660850-006
 - Starboard LWTSA Cushion installation – Tech Order: M072-660859-001
- **Winches**
 - Winch P/N SED33101570-327 on Forward Bulkhead
 - Winch P/N SED33101570-325 on Aft Bulkhead

- **Sill Stack hardware installed for launch per FRD17462-132-0020**
 - Provides worksite stabilization for MRM-1 contingency task
 - High Strength Bridge Clamp launching in Bay 8 starboard (Xo = 1035.5)
 - High Strength Bridge Clamp and Push Button Articulating Socket launching in Bay 8 starboard (Xo = 1023.7)
 - Unreleased T.O. M072-340074-036 and -037
- **Three Aft-bulkhead handrails removed for launch**
 - Provides additional clearance for contingency re-berth and return of MRM-1 in the event of a docking mechanism failure
 - Specified handrails are not required for Orbiter contingency EVA tasks
 - CR M9306 has been processed through the DMICB to affect this change
- **Handhold addition to PDGF Increased Capacity Adaptive Payload Carrier (ICAPC)**
 - Provides worksite stabilization for PDGF Retrieval Task
 - ICAPC with Handhold is a certified configuration
 - Requires MECSLSI and PDGF installation Tech Order updates following MIP/FRD revisions

STS-132
ISS-ULF4 – MRM1 / ICC-VLD
Delta Launch Site Flow Review

Payload Cargo Engineering Status

Yvette Carmona

281.212.6492

FRWG: 01/04/10

PRCB: 01/07/10

STS-132 Delta LSFR

Engineering Flight Product Status

<u>Drawing</u>	<u>Title</u>	<u>Rev</u>	<u>EO</u>	<u>Released</u>
V072-200212	MECSLSI	A	A01	10/19/09
VA72-200212	Cargo Arrangement	A	A01	10/15/09
VD72-200212	Avionics Diagram	A	A01	10/16/09
VS72-200212	Integrated Schematic	A	A01	10/16/09
VS70-540424	Retention Schematic	Basic	-	07/06/09

Open Engineering Updates

ECD

- **Add EVA High-Strength Bridge Clamps and Socket** (approved FRD)
 - MECSLSI 01/22/10
 - Cargo Arrangement Drawing 02/23/10
- **Remove Handrails from aft bulkhead** (approved DMICB)
 - MRM1 installation tech order 02/12/10
 - Cargo Arrangement Drawing 02/23/10
- **Add Handhold to PDGF ICAPC** (pending FRD, MIP updates)
 - MECSLSI 01/22/10
 - PDGF installation tech order 02/12/10

Rescue-Flight Status

- **STS-132 Reconfiguration Engineering Products will be developed by the standard Flight To Follow (FTF) process**

STS-132 Delta LSFR

Annex 1: ISS-ULF4-NSTS 21541-A01

<u>Activity</u>	<u>ECD</u>
• Baseline	07/31/09A
• <u>L-4MUpdate</u>	
– Customer Submittal	12/23/09
– CR Approval	01/13/10
• <u>L-1M Update</u>	
– Customer Submittal	03/29/10
– CR Approval	04/13/10
– Final Weight Log	04/13/10

Time-Critical Ground Handling Requirements

<u>Activity</u>	<u>ECD</u>
•Customer Submittal	01/13/10
•Release for Review	02/12/10
•Baseline	03/14/10

Issues / Concerns: None

STS-132 Delta LSFR

Cargo Close-Clearance Process

The following Close-Clearance area has been identified:

- MRM-1 Aft Port Scuff Plate to SRMS MPM
 - Currently just over one-inch (1”) of dynamic clearance
 - This will be monitored during the VLA to see if a close-clearance measurement will be required

Atlantis STS-132

Delta Launch Site Flow Review

Space Shuttle Main Engine

SSME - KSC
Paul Brzeski
(321) 861-4064

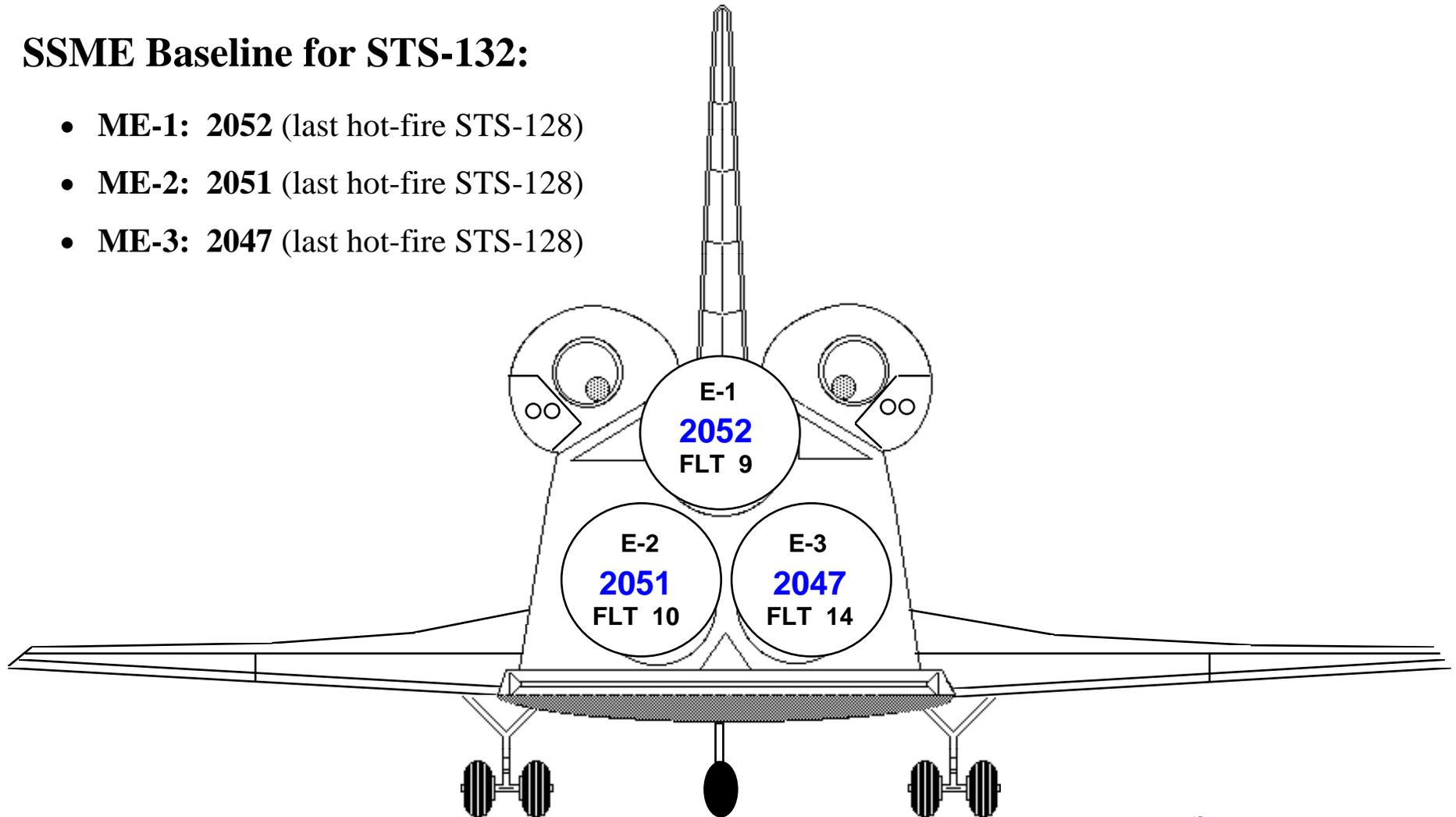


STS-132 Delta Launch Site Flow Review

SSME Allocations / Locations

SSME Baseline for STS-132:

- **ME-1: 2052** (last hot-fire STS-128)
- **ME-2: 2051** (last hot-fire STS-128)
- **ME-3: 2047** (last hot-fire STS-128)





STS-132 Delta Launch Site Flow Review

SSME Planned Modifications

Mods authorized by Shuttle Project Action Request (SPAR) or Level II Change Request (CR)

ECP	Title	Engine(s)	Kit Drawing	Weight Impact	SPARs / CRs	Status
1537	Joint F2 (LPFTP-to-LPF Duct) Liquid Air Insulation Redesign, with Helium supply.	2052 2051 2047	2R112833-010	+3.13 lbs	ME-0257 R01 ME-0258 R01 ME-0259 R01	Complete Complete In-Work
1543	Joint F3 (LPF Duct-to-HPFTP) Liquid Air Insulation Redesign.	2052 2047	2R112834-010	+0.37 lbs	ME-0257 R02 ME-0259 R02	In-Work In-Work
1544	Joint F5 (HPF Duct-to-MFV) Liquid Air Insulation Redesign.	2052 2051 2047	2R112835-010	-0.15 lbs	ME-0257 R01 ME-0258 R01 ME-0259 R01	In-Work In-Work In-Work
1556	Relocate G6 Accelerometer to Gimbal Bearing.	2052 2051 2047	2R112836-010	0 lbs	ME-0257 B ME-0258 B ME-0259 B	Complete Complete In-Work



STS-132 Delta Launch Site Flow Review

Rocketdyne Action Requests (RAR)

RAR	Title	Engine(s)	SPARs / CRs	Status
NONE				

STS-132 Delta Launch Site Flow Review

January 7, 2010

Agenda

- **Assessment/Multi Flow** **A. Brewer/NASA**
- **Milestone Interface Chart** **A. Brewer/NASA**
- **Flight Element Processing** **R. Propst/USA**

Multi Flow A. Brewer

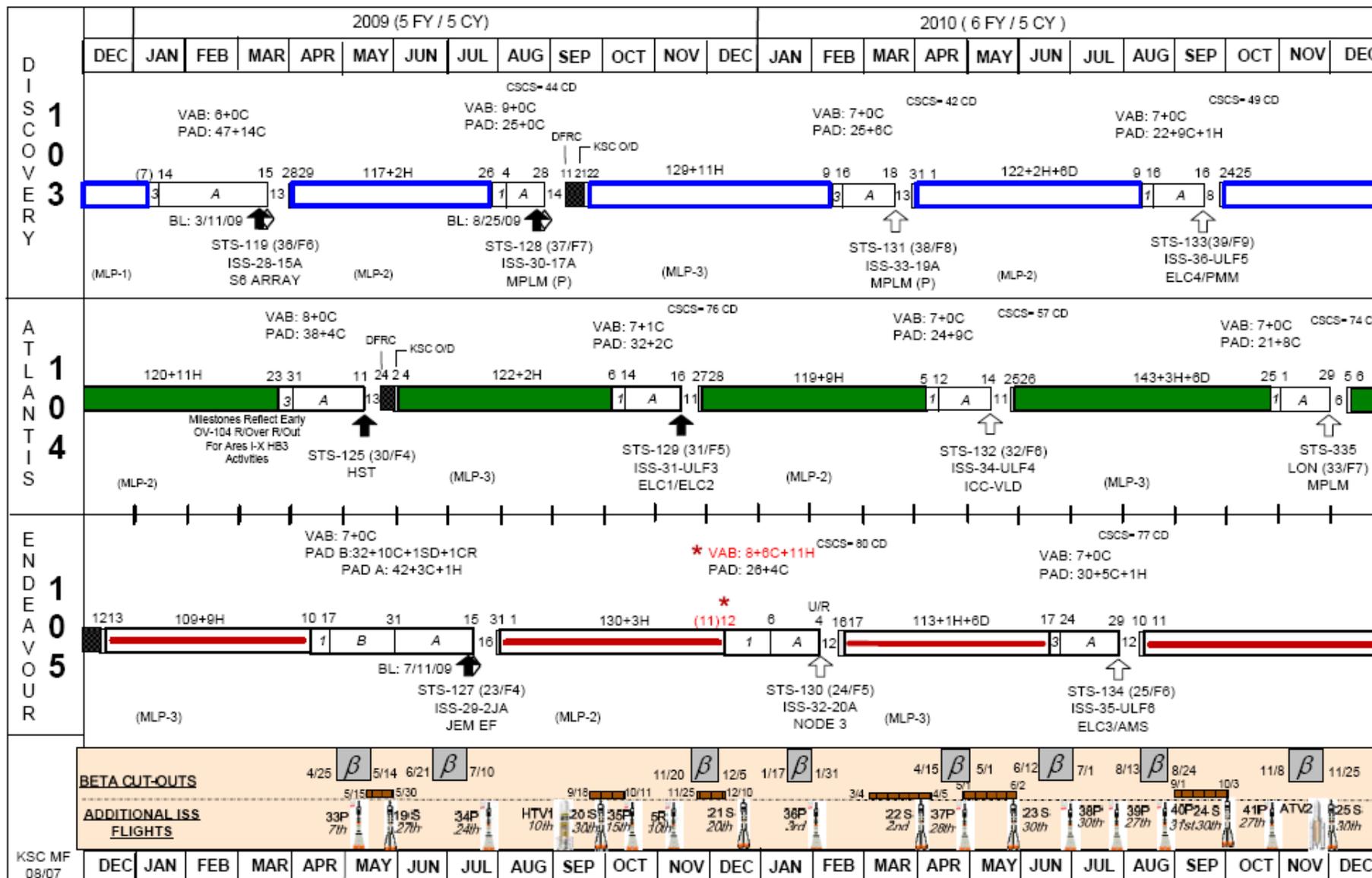
STS-132 DLSFR
J. F. KENNEDY SPACE CENTER

KSC ASSESSMENT / ORB MULTI-FLOW

SSP APPROVED MANIFEST
MANIFEST REF. 09B-9

- ◇ KSC ASSESSMENT (SLIP or OPTION)
- * DENOTES CHANGES TO BASELINE MANIFEST

1100 EDT, 11 DEC 2009



LEGEND
 H - HOLIDAY D - DRYDEN RESERVE C - PAD CONTINGENCY Wx - WEATHER OUTAGE [Green Box] - OPF-1 [Red Box] - OPF-2 [Blue Box] - OPF-3 [Hatched Box] - Vehicle out of service S - SOYUZ P - PROGRESS
 CR - CREW REST DAY [Black Box] - DFRCS OPS [1/3] - VAB OPS [A/B] - PAD OPS △ - MILESTONE ↑ - LAUNCH [Downward Arrow] - SOYUZ Outout

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

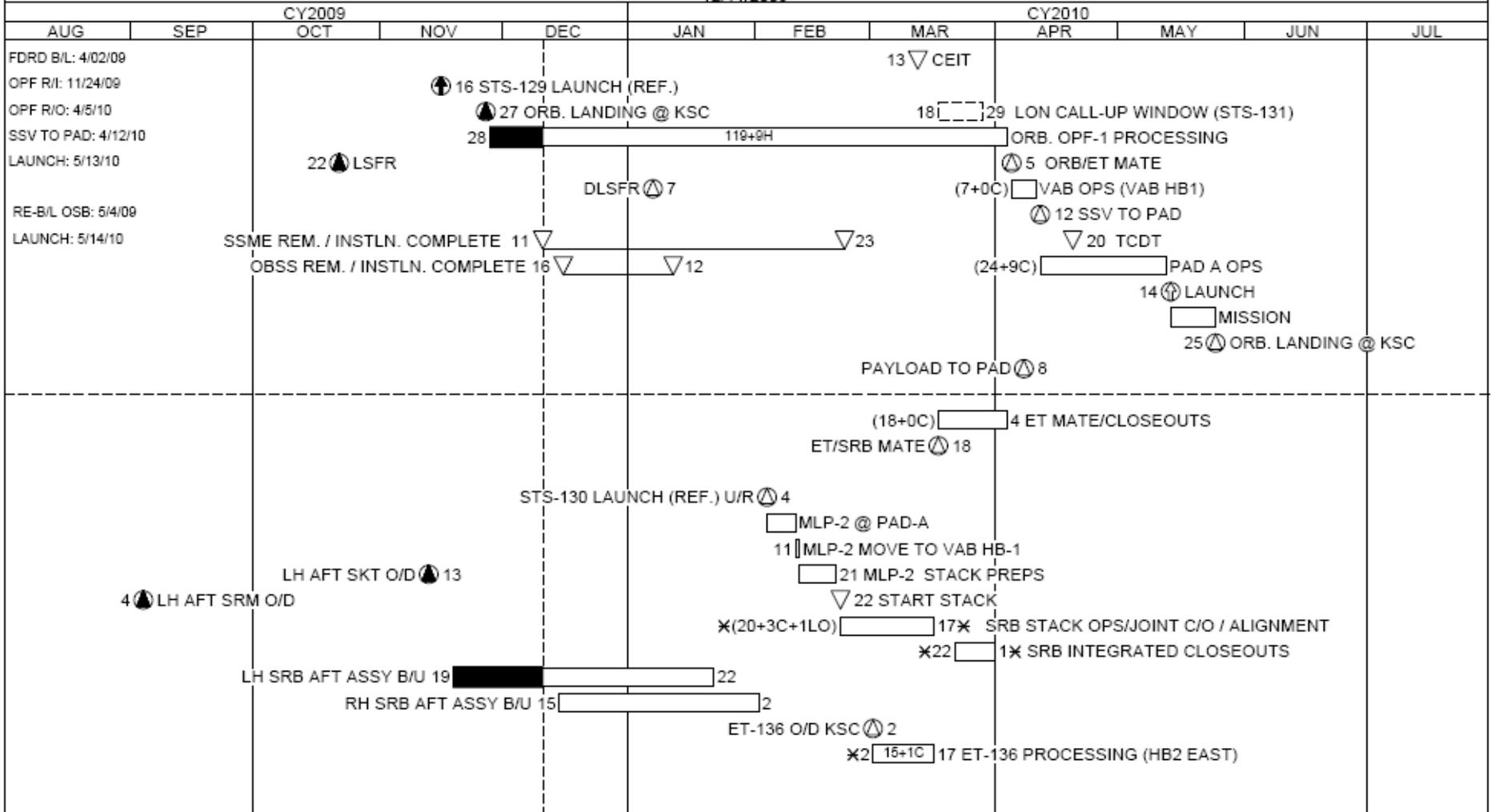
MLP TO VAB / START STACK / ET - SRB MATE / ET - MATE CLOSEOUTS COMPLETE

STS-132 KSC Milestone Interface Chart

OPR: USA - R. GILLETTE, INTEG. OPS.
NASA - A. BREWER, PH-A

OV-104 / 32 / ISS-34-ULF4 / ICC - VLD
CREW / DURATION: 6 UP - 6 DOWN / 11
ET-136 / BI-143 / RSRM 111 / MLP-2 / PAD-A / VAB HB1

SSP APPROVED OSB 5-4-09 (REF. CR #S072132A)
Status as of:
12/11/2009



THREATS:
 1. ET PROCESSING
 2. OPF FLOW DURATION (RCC)
 *3. MLP-2 TURNAROUND FROM STS-130

NOTES: 1. THIRTY-FOURTH ISS/SSP FLIGHT

Flight Element Processing

Ray Propst

Flight Element Processing Overview

- **Milestone Summary** **To Be Presented**
- **Significant Processing Deltas** **To Be Presented**
- **TPS Status** **To Be Presented**
- **Issues and Concerns** **To Be Presented**
- **Integrated Assessment** **To Be Presented**

STATUS

USA	NASA
C	C

C	C
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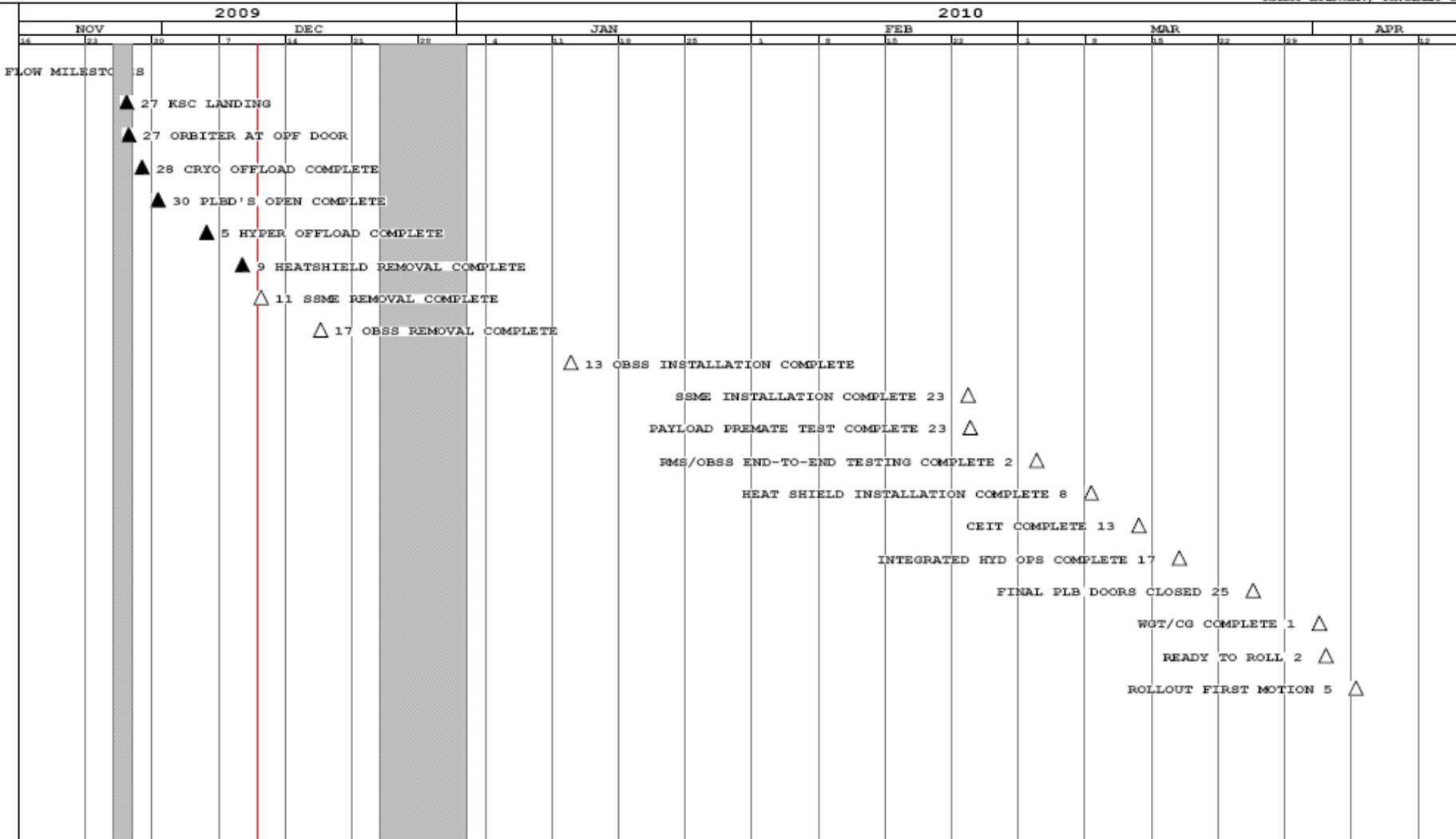
C/C/STATUS SCHEDULE-STATUS

STS-132/OV-104 OPF FLOW MILESTONES

DOWN PAYLOAD:ISS-31-ULF3 ELC1/2 \ UP PAYLOAD:ISS-34-ULF-4

Creation Date:13-OCT-2009
 Revision Date:10-DEC-2009
 Revision :G

OPR:USA-PROPST, RAYMOND D
 NASA-BREWER, ANGELA J



△ PLAN/BASLINE ◊ DEVIATION FROM BASELINE ▲ ◆ ACTIVITY COMPLETED △ ACTIVITY CANCELED △ ACTIVITY DURATION **** SCHEDULE CHANGE

STATUS DATE: 11-DEC-2009:1 PLOT DATE: 14-DEC-2009, 10.31 am NETWORK: OPF132.701 CONTACT: B.A. COREY ,1-8334 OPF BAY-1 EXE:CUSOPFSU.27

Significant Processing Deltas

Major Components Removal / Replacements

- Windows 1, 6 & 8
- T-Seal 6L Repair/RCC Adjustment
- Chin Panel /441 Gap Filler Replacement
- WLE Corrosion Inspection – RCC 1 – 9 RH
- 10 of 22 Non-Extendable OMDP Requirements to be Satisfied This Flow

MODS

- Fuel Cell CPM Dedicated Power Feed (TAD 30274)
- RH RCC SPAR Fitting Rivet Installation (MCR 11620)
- MEI Instrumentation – Safety Wire To Fasteners (TAD 30283)

Chits

- All approved Chits have been partnered and integrated into flow

STS-132 TPS Work Content

TPS Removals

<u>Priority</u>	<u>Description</u>	<u>LSFR</u>	<u>DLSFR</u>
Mand	Deferred Tile/ Fib For 1 Flight (Minimum)	7	7
Mand	In-flight Tile/Blanket Damage (Estimate)	25	25
15	Piano Key Tile (Upper Body Flap)	6	6
Mand	Estimated Putty Removals (Grindouts)	14	14
Mand	Operational Damage (Estimate)	10	10
Mand	Putty Repairs (Chit Driven)	10	10
Mand	Corrosion Sampling	5	5
 BRI Replacement:			
10	MLGD-Outboard Middle 1/3	24	24
 Projected TPS Removals TOTAL (Estimate)		101	101

TPS Work Content (Additional Work)

LSFR Planned Work:

- I-4 Reqmt: Remove (6) chin carrier panels- Additional NLG T/B Work (6 T/B)
- Remove 9 RCC = (20) LESS Carrier Panel removals

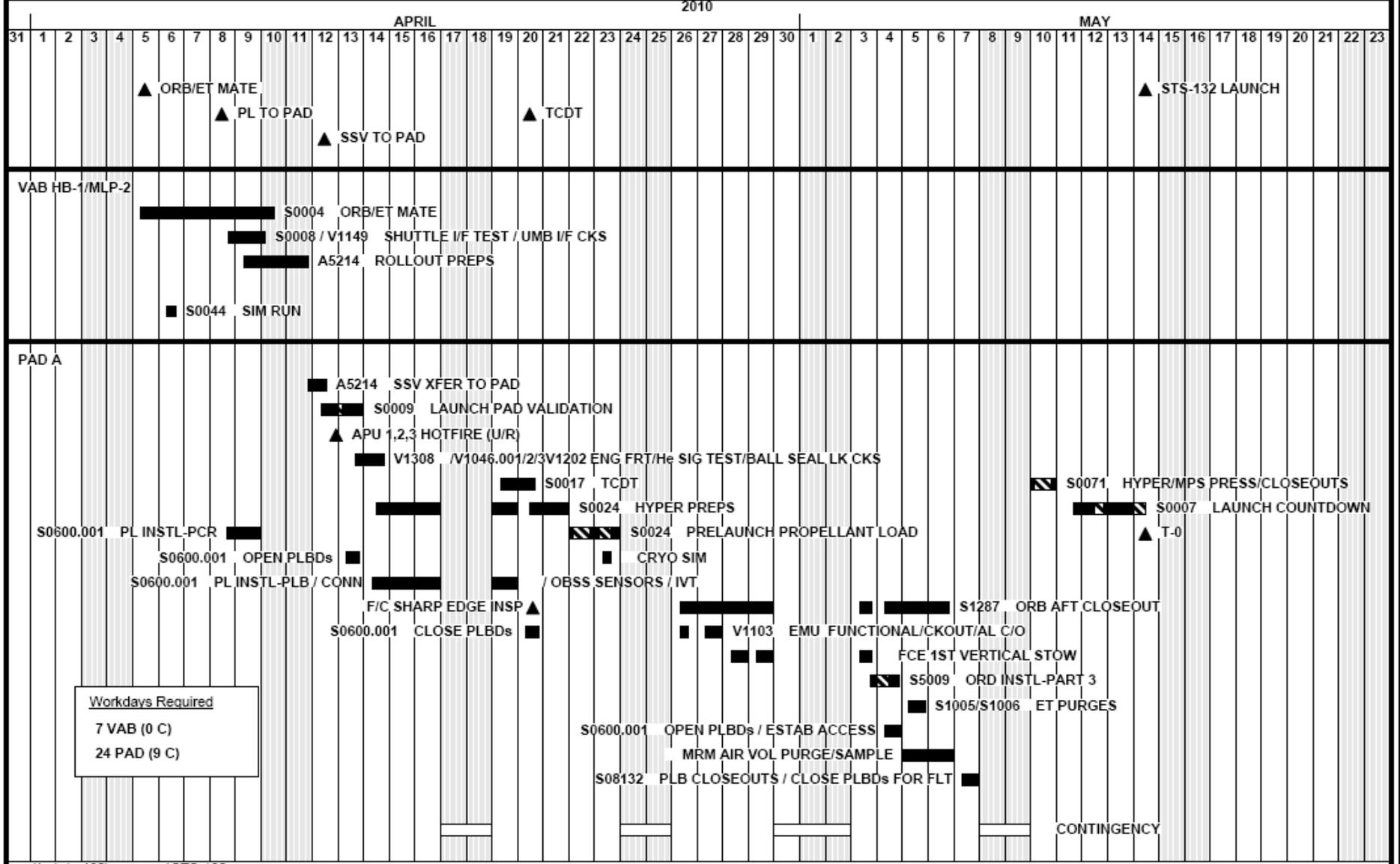
Get Ahead Work

- OMDP Requirement: Re-waterproof all upper surface blankets on Flt-33
 - Complete Vertical Tail during Flt-32

DLSFR Additional (Unplanned Work):

- Chin Panel R&R to support '441 Gap Filler replacement and Nose Cap Repair
 - Requires additional (7) NLG Thermal Barrier R&R's
- ET Door (2) Tile replacements / (5) Thermal Barriers
- Windows 1/6/ 8 = (12) Carrier Panels, Potting, Gap Fillers
- LH RCC #6 Tee Seal = (6) LESS Carrier Panels
- Additional (7) LESS carrier panels (Torque, Flowpath) –Total LESS R&R=(33)

STATUS		OPR: USA - J. Taylor, INTEG FM (1-7420) NASA - A. Brewer, PH-A (1-9104)		STS-132 / OV-104	
USA	NASA	CONCUR			
C	C			Integrated Operations Assessment Summary	
C=Concur NC=Non-Concur				Payloads: ISS-34-ULF4 ICD-VLD / MRM (VERT)	



Issues and Concerns

- **TPS Work Volume**
- **Chin Panel/Nose Cap Repair/NLG Thermal Barrier Replacement**



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



STS-132 Delta Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-07-10**

Backup Material

FRWG Presentation (With Minor Changes)



STS-132 DELTA LAUNCH SITE FLOW REVIEW

Presenter
Phyllis Grounds

Date
Jan. 7, 2010

**Backup Charts-Requirements Documentation Status:
Flight Requirements Document (FRD)
ULF 4 MIP (NSTS 21541)
07700 Vol III, FDRD**



STS-132 DELTA LAUNCH SITE FLOW REVIEW

Presenter
Phyllis Grounds

Date
Jan. 7, 2010

STS-132 Flight Requirements Document (FRD) DLSFR Status

Robert J. Reynolds
FRWG 1/4/10
PRCB 1/7/10



STS-132 DELTA LAUNCH SITE FLOW REVIEW

Presenter Phyllis Grounds
Date Jan. 7, 2010

STS-132 FRD Status

STS-132 FRD Revision 009, dated December 15, 2009:

<https://sspweb.jsc.nasa.gov/efrd/>

Open CRs

FRD17462-132-0024 – Add Additional 5 MLE Bag (Evaluations due 1/8/10)

FRD17462-132-0025 – Add Bracket Assembly (Evaluations due 1/12/10)

(Recommend putting in backup for PRCB)



STS-132/ULF4 Requirements Status
STS-132 DELTA LAUNCH SITE FLOW REVIEW

Presenter
Phyllis Grounds

Date
Jan. 7, 2010

1. ULF 4 MIP (NSTS 21541)

- **Current version available on PILS: Basic + Change 8, dated 12/1/09**
- **Open CR's --None**
- **Pending CR's:**
 - **Update to Appendix E, pending FPSR assessment**
 - **Updates to Mission Priorities and launch package control weight**
 - **TBD closures**
 - **Add reference to DTO 703 Integration Plan and the Annex 5 (POCC) reqmts for ICC-VLD in section 8.4 and 14.0**
 - **Dual Docked Operations (if required)**
 - **Updated ICC-VLD Figures**

2. Payloads Of Opportunity status:

SEITE – NSTS 21542, Basic + Change 2 dated 10/19/09

SIMPLEX – NSTS 21327, Revision A, dated 6/16/08

RAMBO-2 – NSTS 21556, Basic + Change 1 dated 10/10/09

MAUI, NSTS 21530, Basic + Change 2, dated 5/5/08

Back-up

- **Modification Record and MECSLSI Updates Summary**
- **Engineering, Hardware and Certification Status**
- **TPS Risk Reduction Priorities List and Allocation Breakdown**
- **Modification Details**

Modification Records and MECSLSI Update Summary

MCR/ TAD NO.	TITLE	KIT / MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
<u>Orbiter Modifications To Be Baselined</u>				
30282	Waste Collector System (WCS) Ring Fitting Redesign Replaces the existing WCS aft attach point ring fitting with a modified titanium ring fitting.	TCTIV6230282REF_0104_0 - Changed the existing bracket material from aluminum to titanium and increased material thickness.	No Tech Order Impact	No MECSLSI Impact
30283	Left OMS/RCS Stinger Accelerometer Installation Modification Adds safety wire to the fasteners that attach the micro-WIS box to the adapter plate for the stinger accelerometer.	030283_0104_1 - Changes out 4 screws and adds lockwire.	Add M072-755113-003 MV0886A	MECSLSI Impact
11620	WLE RCC Panel Spar Fitting Spacer Modification Adds two rivets to the spacer on the installed rib splice #1 spar fitting on the right hand side to complete the deferred rivet installation per drawing.	TCTIV1911620REF_0104_11 - Completes PR EOTF TES-4-27-0839 action which corrected the rivets omission on the RCC installation drawing .	No Tech Order Impact	No MECSLSI Impact
<u>Mission Equipment Modification To Be Baselined</u>				
30010	Starboard Lightweight Tool Stowage Assembly (LWTSA) Provides new cushion for the starboard Lightweight Tool Stowage Assembly (LWTSA) to accommodate STS-132 flight memorabilia.	030010_0104_8 - Designs and installs a new cushion for STBD TSA.	No Tech Order Impact*	No MECSLSI Impact *Tech Order M072-660859-001 has been incorporated into MECSLSI
<u>Previously Baselined Orbiter Modification</u>				
30274	Fuel Cell H2 Flowmeter and CPM Power Source Separation Provides dedicated power sources for the Fuel Cell Flowmeter and Cell Performance Monitor (CPM) to protect against power loss to the CPM.	TCTIV7030274REF_0104_0 and TCTIV7930274REF_0104_0 - Modify MPCAs 1 & 3 to utilize existing spare 1 amp fuses to power the circuits for the Fuel Cell Hydrogen Flowmeters 1, 2, and 3. Provide separate power sources for Fuel Cell H2 Flowmeter and CPMs.	No Tech Order Impact	No MECSLSI Impact

Engineering, Hardware and Certification Status

MCR/ TAD NO.	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	CERTIFICATION CR / CAR (BOEING)	REMARKS
<u>Orbiter Modifications To Be Baselined</u>										
30282	<u>Waste Collector System (WCS) Ring Fitting Redesign</u> Replaces the existing WCS aft attach point ring fitting with a modified titanium ring fitting.	Released	N/A	N/A*	N/A*	GO	Submitted	1/7/10	23-623200-001E 08-23-623200-001E	* CFE hardware (WCS with a new bracket) will be delivered from the vendor, HS, on 2/19/10; the GO need date is 2/19/10
30283	<u>Left OMS/RCS Stinger Accelerometer Installation Modification</u> Adds safety wire to the fasteners that attach the micro-WIS box to the adapter plate for the stinger accelerometer.	2/12/10	2/12/10	N/A*	N/A*	GO	1/13/10	1/27/10	03-73A000015-1001G 131-03-73A000015-1001G	* Hardware available on site OCR/D S165463A approved 12/11/09
11620	<u>WLE RCC Panel Spar Fitting Spacer Modification</u> Adds two rivets to the spacer on the installed rib splice #1 spar fitting on the right hand side to complete the deferred rivet installation per drawing.	Released	N/A	N/A*	N/A*	GO	N/A	N/A	N/A	* Hardware available on site
<u>Mission Equipment Modification To Be Baselined</u>										
30010	<u>Starboard Lightweight Tool Stowage Assembly (LWTSA)</u> Provides new cushion for the starboard Lightweight Tool Stowage Assembly (LWTSA) to accommodate STS-132 flight memorabilia.	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	* Requirements for the cushion have not been defined
<u>Previously Baselined Orbiter Modification</u>										
30274	<u>Fuel Cell H2 Flowmeter and CPM Power Source Separation</u> Provides dedicated power sources for the Fuel Cell Flowmeter and Cell Performance Monitor (CPM) to protect against power loss to the CPM.	Released	N/A	N/A*	N/A*	GO	1/22/10	2/20/10	21-764430-001K 08-21-764430-001K	* Hardware available on site OCR/D S165454 approved 10/20/09

TPS Risk Reduction Priorities List

Mandatory (everyflow expectation)

- **Flight damage, OMRS Rqmts/Chits, LRU access, & deferred work**

Multi-flow
Chits

- Corrosion Sampling (10% of total tile allocation) *Chit J6275A*
- Putty repairs in RCC & Window DTA Zones (23% with 10 tile min.)(Chit J6514,J6497,J6504)
- Continue G/F R & R on a best effort basis - zones 2B subset
- *Deferred work may be redeferred with acceptable inspection*

Prioritized Opportunity

1 - 9 1 thru 9 complete on all vehicles (with one exception #7 on OV-104)

7 Inboard Elevon “Hub” Tile Modification – *104 only remaining* (2 Tiles Port Side)

10 MLGD BRI-18 – Outboard Middle 1/3 -24 Tiles (6 Door/6 STR)

11 ET Door - Remaining STR side of Door & leading edge on Door - 40 tiles (24 STR/ 16 door)

12 MLGD BRI-18 – Outboard AFT 1/3 - 24 Tiles (6 door/6 STR)

13 Nose Area 9lb/90 SIP Upgrade to FRCI-12 – 14* Tiles (7/side) (*103 16 tiles,thruster)

14 Base Heat Shield 9lb/90 SIP Upgrade to AETB-8 – 42 Tiles (32/stinger, 10/Box Attach point)

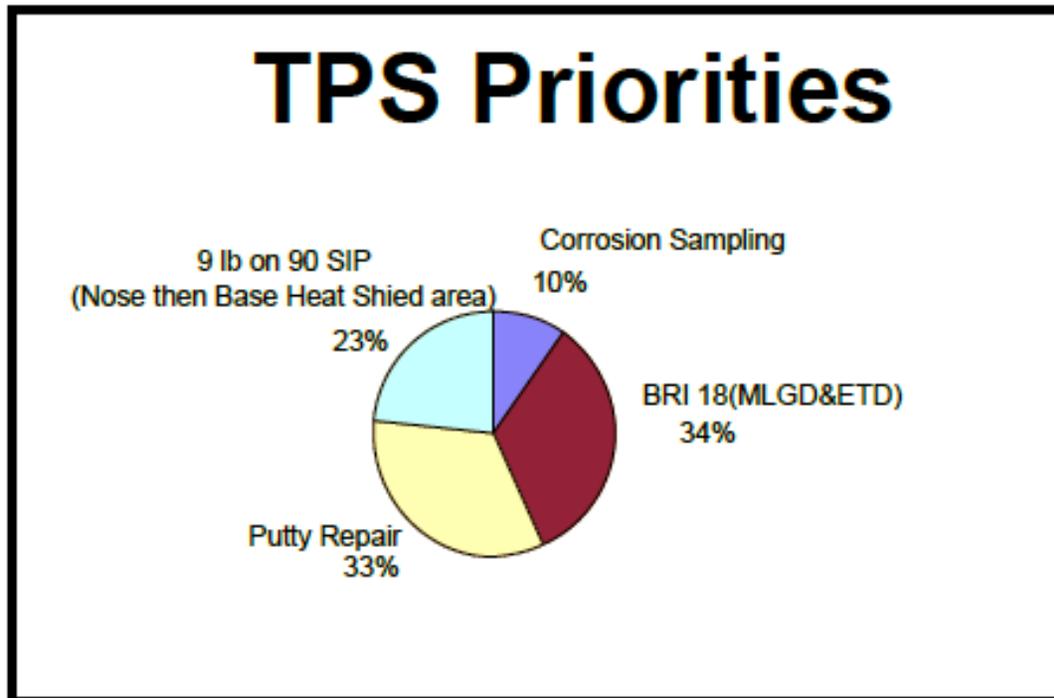
TPS Risk Reduction Priorities List (Cont.)

- 15 **Body Flap Stub "Piano Key" Upgrade to AETB-8 -40 Tiles** (Order as defined in PRT map)
- 16 **Gap fillers in Subset 2B - 5 Zones** (Defined as a line across MLGD edge)
- 17 **Remaining BRI-18 Tile – Remaining MLGD (top priority) / ET Door / LESS carrier panels/NLGD**
 - MLGD (Inboard, forward edge working to AFT door edge)
 - ET Door
 - LESS - panels 8, 9, 10, 7, 6, 5, 4, 3, 2, 1, 11, 12, 13 (in that order)
 - NLGD (attrition – do leading edge first)
- 18 **Mod work** (WLE sneak flow, WLE Horsecollar Gap Fillers,)
- 19 **MADS Instrumentation Failures** (104 & 105 L/H OMS Pod)(place holder)
- 20 **Remaining Gap Fillers & Window BRI-18**
 - Windows 2, 3, 4, & 5 Upper Carrier Panels (top priority)

Current Fleet Status

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	0	complete
11. ET Door remaining STR side	40	1	10	0
12. MLGD - Outboard AFT 1/3	24	0	0	9
13. Nose Area 9lb/90 SIP	14 (16 ^{OV103})	3	complete	7
14. Base Heat Shield 9lb/90 SIP	42	10	complete	complete
15. Body Flap Stub "Piano Key" tiles	40	18	14	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 15	NLGD 19	NLGD 52
	LESS 68 (92 ^{OV-105})	LESS 7	LESS 5	LESS 22
	ET Door 28	ET Door 5	ET Door 2	ET Door 1
18. Mod work LESS internal	44 locations	40	complete	complete
20. Remaining Gap Fillers & Window BRI-18	124	3	2	19

Allocation Breakdown



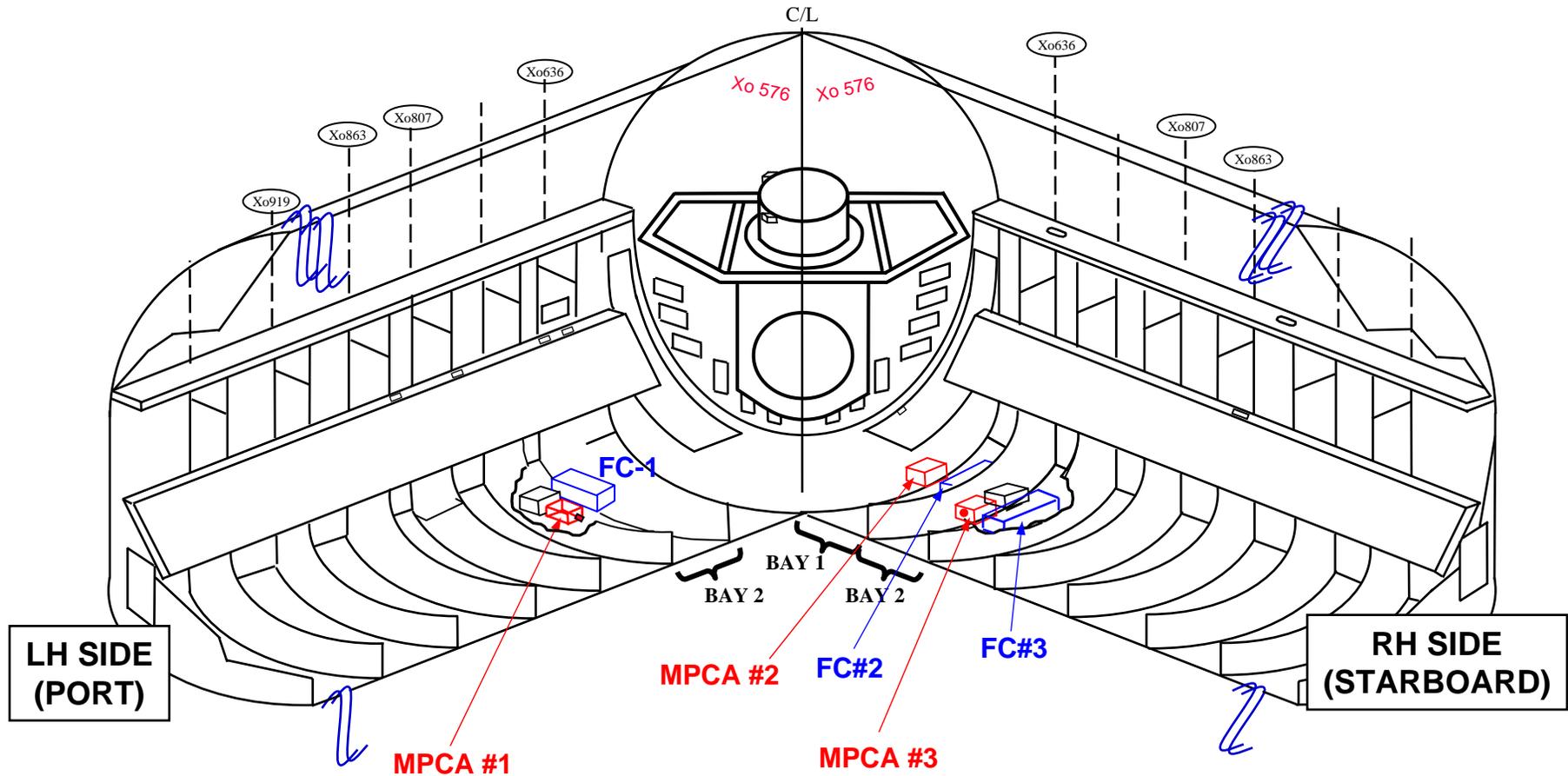
Example	60 tile Allocation at DLSF
Corrosion Sampling	6
BRI-18 MLGD&ETD	20
Putty Repair	20
9lb on 90 SIP	14

- Orbiter's expectations for the work areas are shown on the pie chart
 - The above table is for reference only – exact #'s are determined by the KSC Team
 - Access/configuration/length of flow
 - Distribution provides data/risk reduction in all areas of the list
 - Does not allocate all the resources in one area

Previously Approved Modification

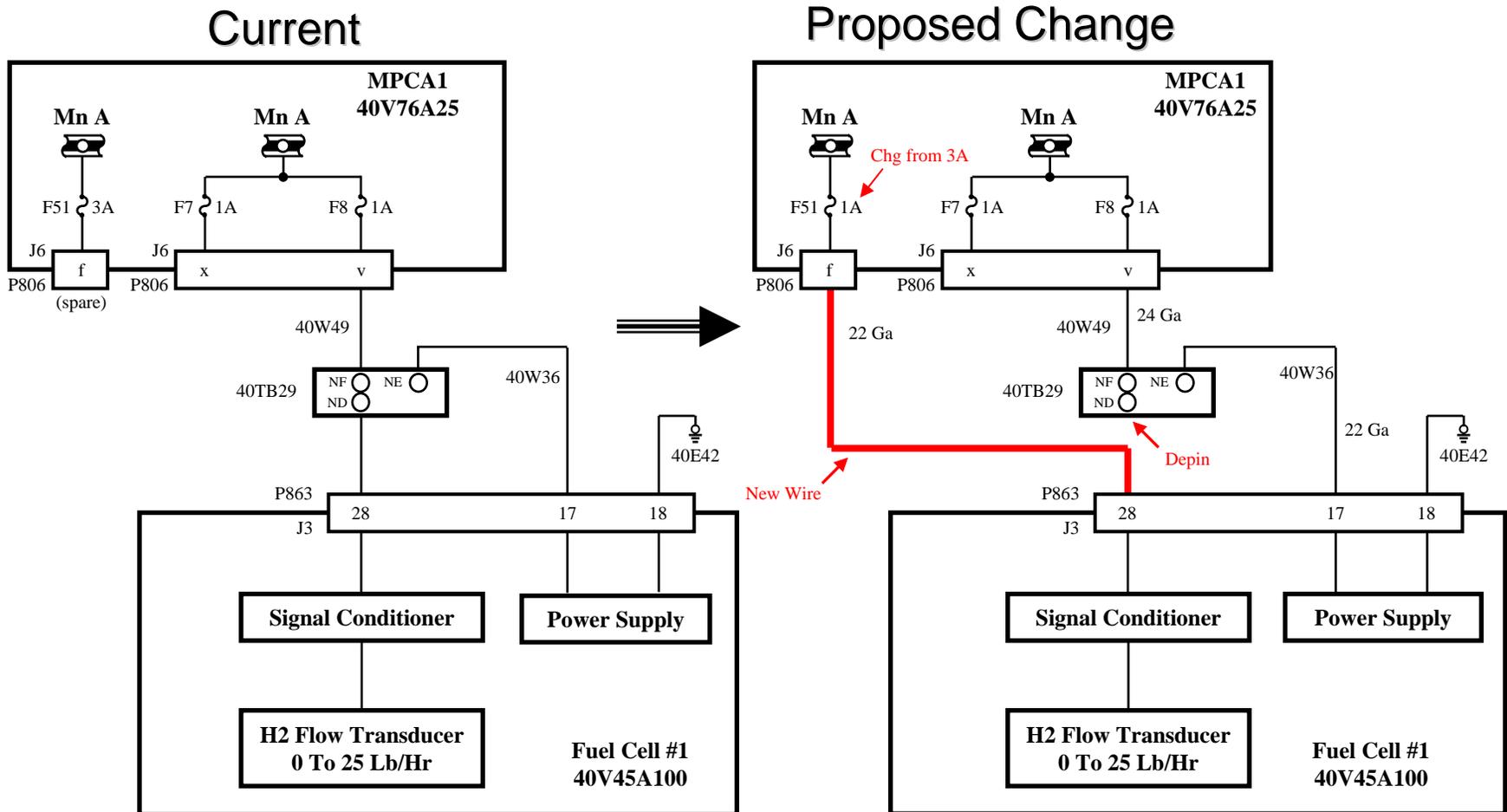
TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation (Cont.)

Fuel Cell / MPCA Locations In Mid-Body



Previously Approved Modification

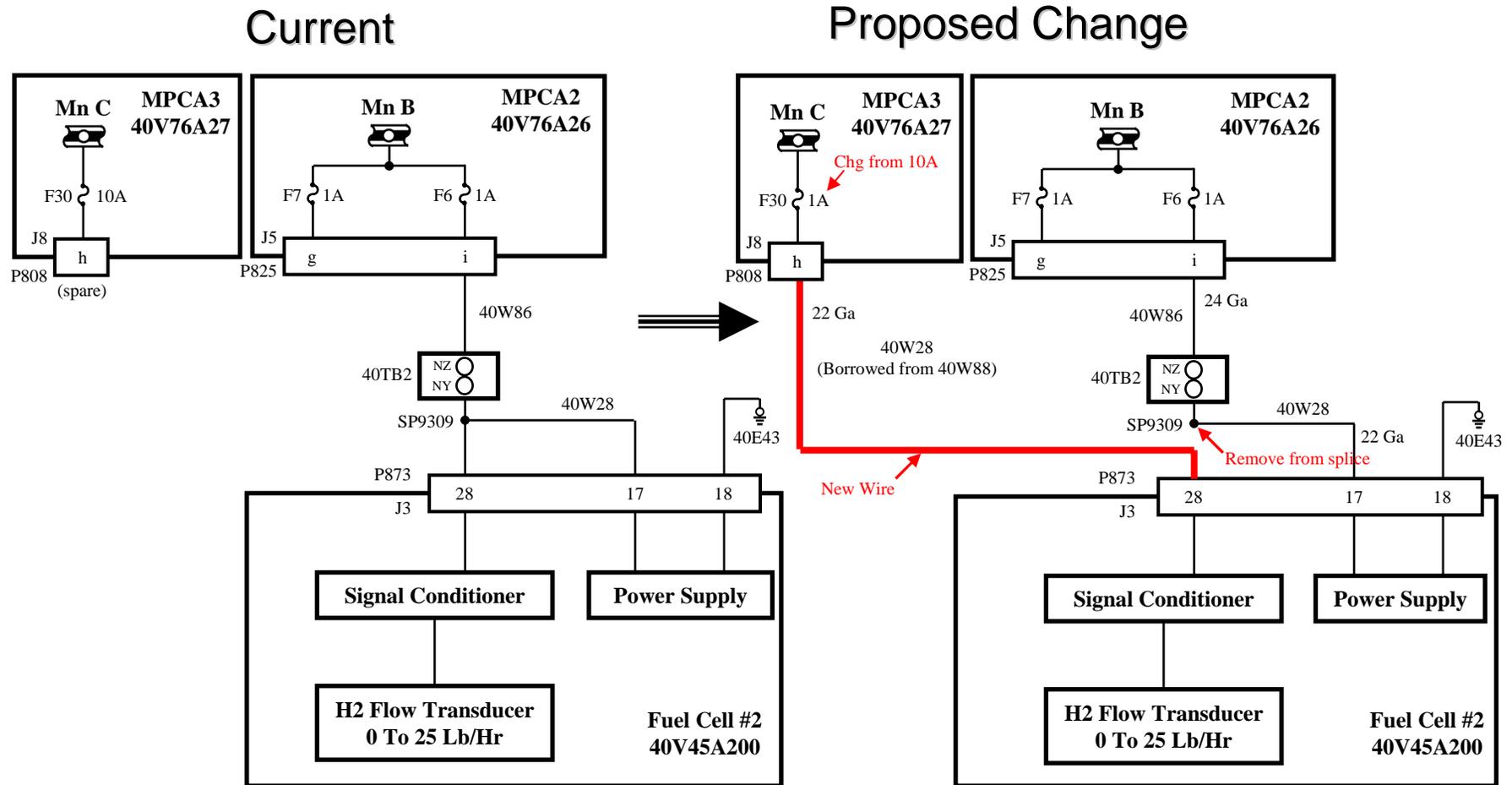
TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation (Cont.)



Fuel Cell #1 H2 Flowmeter/CPM Wiring

Previously Approved Modification

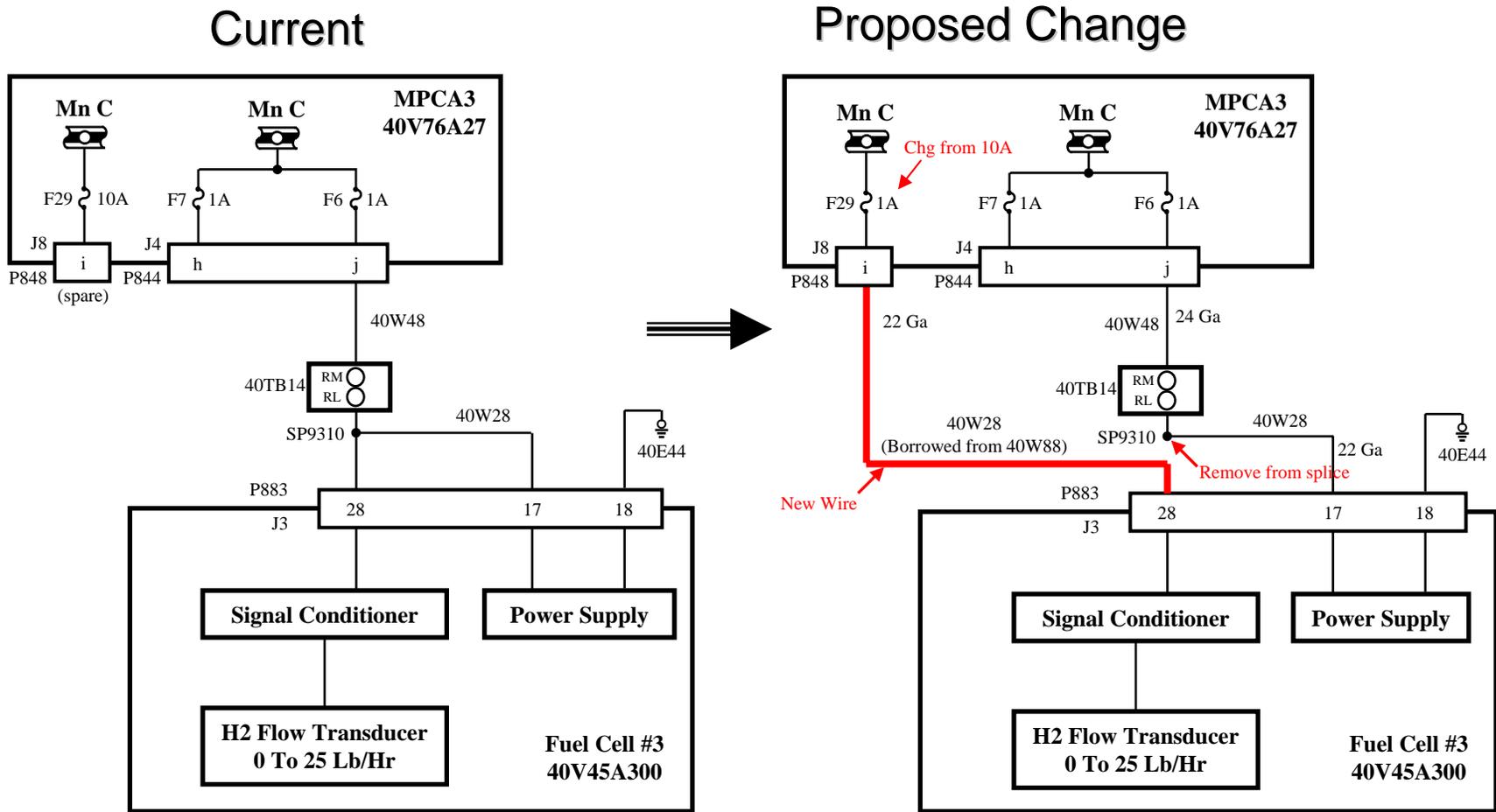
TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation (Cont.)



Fuel Cell #2 H2 Flowmeter/CPM Wiring

Previously Approved Modification

TAD 30274 – Fuel Cell H2 Flowmeter and CPM Power Source Separation (Cont.)



Fuel Cell #3 H2 Flowmeter/CPM Wiring

STS-132 Delta LSFR

Payload Cargo Engineering Backup Charts

STS-132 Delta LSFR

OMRSD

- **FII V2 Payload (Post-Mate)**

- Baselined File

- 541 - ULF4 Integrated OMRS

- RCNs

- PP18155 R1 P541 – ULF4 Integrated OMRS Update
(PSU Switching & Clean Up)

- Board Date

- 01/12/10

- **FII V4 (Pre-Mate)**

- Baselined Files

- S07 STS-132 Mission-Unique List (MUL) - Early Release
 - PS18157R1 FIII MUL
 - PS18156R1 Adjacent Pin Test

- RCNs

- PS18158R2 S07 STS-132 MUL Update

- Board Date

- 01/12/10

- **FII V6 (Shuttle Experiments)**

- None

- **Issues / Concerns**

- None

STS-132 Delta LSFR

Payload ICDs/PIRNs

- All Payload-Unique ICDs are baselined
- PIRNS that impact Flight Products
 - None
- Issues / Concerns
 - None

STS-132 Delta LSFR

Cargo Integration Hardware Status

- **Open Work**
 - None

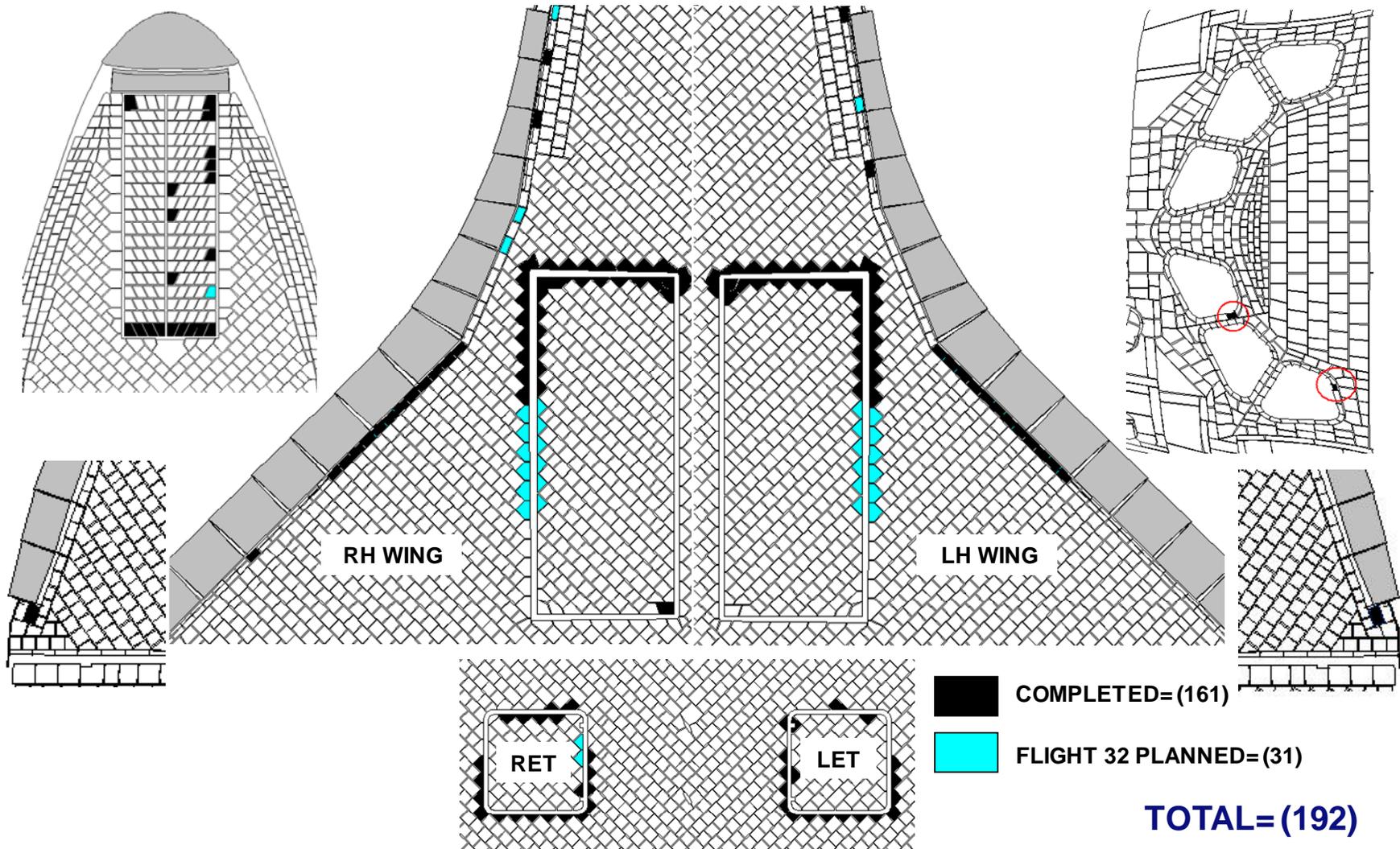
- **New Build Hardware - All Delivered to KSC**
 - Camera Bracket – V787-340035-003 (Mod)
 - AFD Harness – V845-773990-001 (New)
 - PLB Harness – V845-774984-001 (New)
 - PLB Harness – V845-774985-001 (New)
 - PLB Harness – V845-774784-005 (Mod)
 - New Build Harness Leg – V845-774787-001

- **Issues/Concerns**
 - None

BACKUP

STS-132 DLSFR
J. F. KENNEDY SPACE CENTER

BRI Planning STS-132 (Flight 32)



STS-132 DLSFR
J. F. KENNEDY SPACE CENTER



STS-132 Delta Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-07-10**

Overview

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

* Backup material included



STS-132 Delta Launch Site Flow Review	Presenter MK-SIO / A. Swift	
	Date 1-7-10	Page 1

Mandatory RCNs:

NONE

Non-Mandatory Value Added RCNs:

OV18004 V09 – RCC THERMOGRAPHY LINE SCAN ECD 1/8/10

STS-132

Delta Launch Site Flow Review

Flight Software Overview

Tom Stansel

USA FSW

PRCB 01/07/10

STS-132 DLSFR (FSW)

- **STS-132/OV-104 Flight Software (FSW) Versions**
 - Fifth scheduled flight of Operational Increment (OI) 34 Flight Software (SASCB SCR 98107A documents PASS and BFS OI-34 content)
 - Third scheduled flight of MEDS IDP VI 07.01 and fifth scheduled flight of MDUF VI 06.00 (SASCB SCR 98113A documents content for both)
 - Sixth scheduled flight of MAGRS-3S Link 613-996-008 Software (Link-008) (SASCB SCR 98115 documents content)
- **STS-132/OV-104 Flight Software Payload Support:**
 - ISS ULF4
 - 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)
 - Mini Research Module 1 (MRM1)
- **Major New Flight Software Support Items:**
 - None

STS-132 DLSFR (FSW)

- **STS-132 Source Changes/Edits for Primary Flight Software (Base)**
 - 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-132 Patch Implementation for Primary Flight Software**
 - None.
- **STS-132 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-132 Patch Implementation for Backup Flight Software**
 - None

STS-132 DLSFR (FSW)

- **Products**

- **STS-132/OV-104 Base delivery schedule (available to field)**

FPSB

- **Shuttle Data Tape**
 - **Mass Memory Unit**

October 16, 2009 A

October 23, 2009 A

- **An STS-132/OV104 ADTL Cycle is not required**

- **Open Items**

- **None**

- **Concerns/Issues**

- **No issues or concerns with STS-132 at this time**



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



STS-132 LSFR Flight Crew Equipment/GFE	Presenter MV6/Bill Lane	
	Date Jan 7, 2010	Page 1

STS-132 Delta LSFR

FCE/GFE Status

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



STS-132 LSFR
Flight Crew Equipment/GFE

Presenter MV6/Bill Lane	
Date Jan 7, 2010	Page 2

- **All GFE hardware delivery dates were partnered at CIR**
- **Tech orders and hardware list noted in backup charts, reference only**
- **No modifications planned for STS-132**
- **Starboard TSA manifested to contain OFK items but exact configuration TBD (likely will fill to max capacity, possibly add to port TSA)**
- **Based on DSR-25 clock reset issues experienced in flight (FIAR JSCEV1676F), the VTR may be replaced – delivery TBD**
- **Planned PTU swap for cameras A, C, Elbow and SP1 in order to manage 5 flight cert limit – no affect on planned delivery date**



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



STS-132 LSFR
Flight Crew Equipment/GFE

Presenter MV6/Bill Lane	
Date Jan 7, 2010	Page 3

BACKUP



STS-132/ISS-ULF-4 Delta Launch Site Flow Review

KSC ISS/Payload Processing

January 7 , 2010

**Robert Ashley
Mission Management Office (UB-R)
321-867-6037**





ISS/PAYLOAD PROCESSING AGENDA

Presenter: Robert Ashley	
Date: 1/07/10	Page 2

- Remaining Milestones In backup
- Issues & Concerns None
- Master Milestone Schedule (MMS) In backup
- MRM 1 Components In backup
- ICC-VLD Components In backup





ISS/PAYLOAD PROCESSING

SIGNIFICANT MILESTONES

Presenter:

Robert Ashley

Date:

1/07/10

Page

3

SSPF

- **SGANT Boom O/D at KSC** 13 November 2009 (A)
- **SGANT O/D at KSC** 2 December 2009 (A)
- **SAPA-to-FSE Integration (ready for Antenna installation)** 15 December 2009 (A)
- **SGANT-to-FSE Integration** 7 January 2009
- **PDGF O/D at KSC** 10 February 2010
- **ICC-VLD O/D at KSC & Install into Canister** 29 March 2010
- **MRM1 O/D at KSC & Install into Canister** 5 April 2010

Astrotech Facility @ Port Canaveral (SPPF)

- **SGANT Boom T/O to Astrium** 7 December 2009 (A)
- **MRM1 O/D at SLF, Offload & Transfer to SPPF** 17 December 2009 (A)
- **EOTP O/D at SPPF** 8 January 2010
- **EOTP T/O to Astrium** 29 January 2010
- **SGANT IA T/O to Astrium** 9 February 2010
- **ISS Batteries (QTY 6) T/O to Astrium** 19 February 2010
- **Payload Crew Equipment Interface Test (CEIT)** 12-13 March 2010 U/R
- **ICD Walkdown** 15 March 2010 U/R
- **MRM1 Processing Complete** 4 April 2010

(A) –

U/R –

Bold

Actual
Under Review





ISS/PAYLOAD PROCESSING SIGNIFICANT MILESTONES

Presenter: Robert Ashley	
Date: 1/07/10	Page 4

OPF

- PDGF Installation on Sidewall **23 February 2010**

Integrated Operations

- MRM1/ICC-VLD Transfer to Pad A **8 April 2010**
- MRM1 IVT **16 April 2010**
- **MRM1 Internal Air Volume Check and Final Pressure Set** **6 May 2010**
- Close Payload Bay Doors for Flight **7 May 2010**
- Launch **14 May 2010**

(A) –

U/R –

Bold

changes since LSFR

Actual

Under Review

– **Items in bold are**



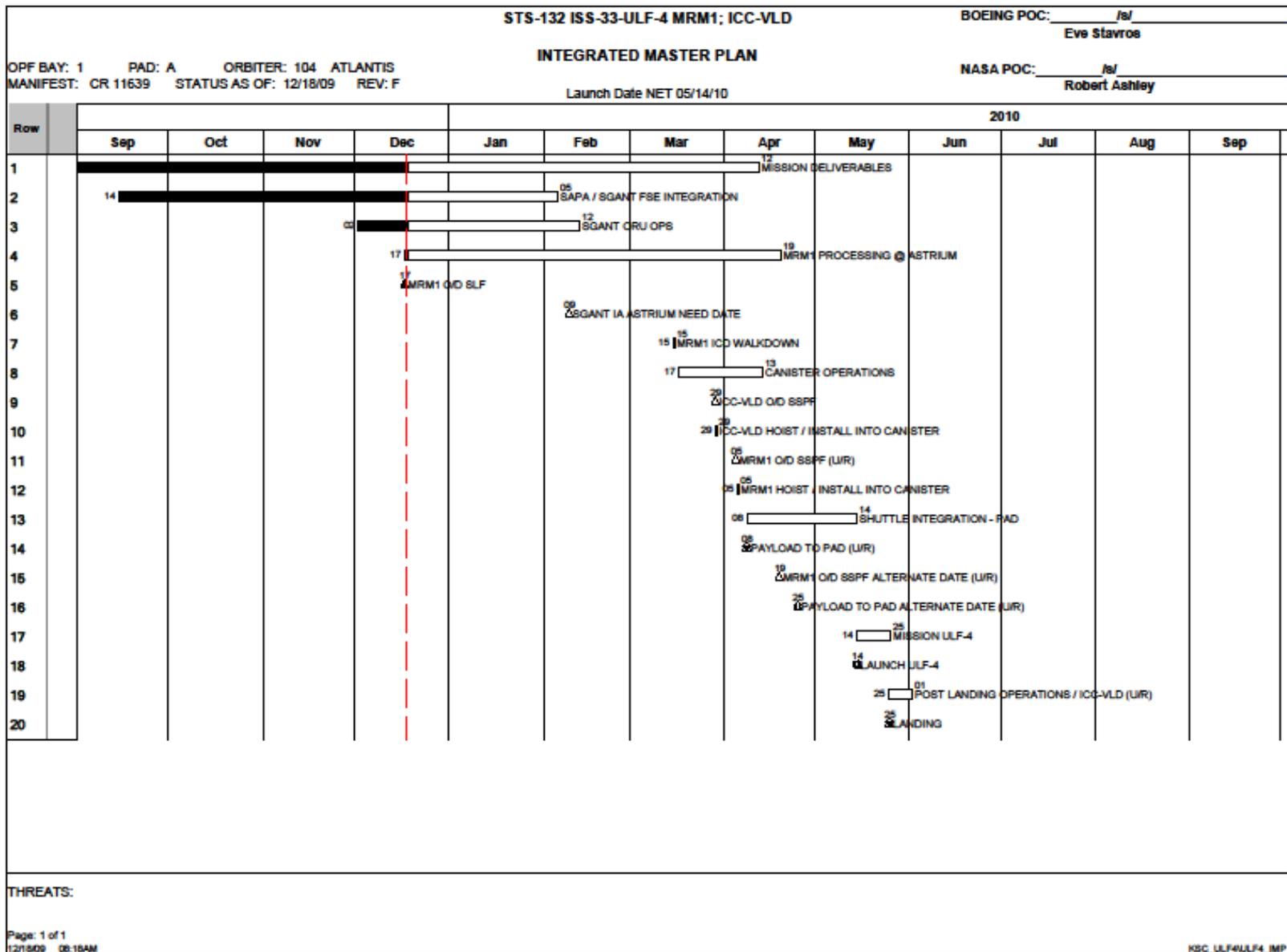


ISS/PAYLOAD PROCESSING

STS-132 / ISS-ULF-4 MASTER SCHEDULE

Presenter:
Robert Ashley

Date: **1/07/10** Page **5**

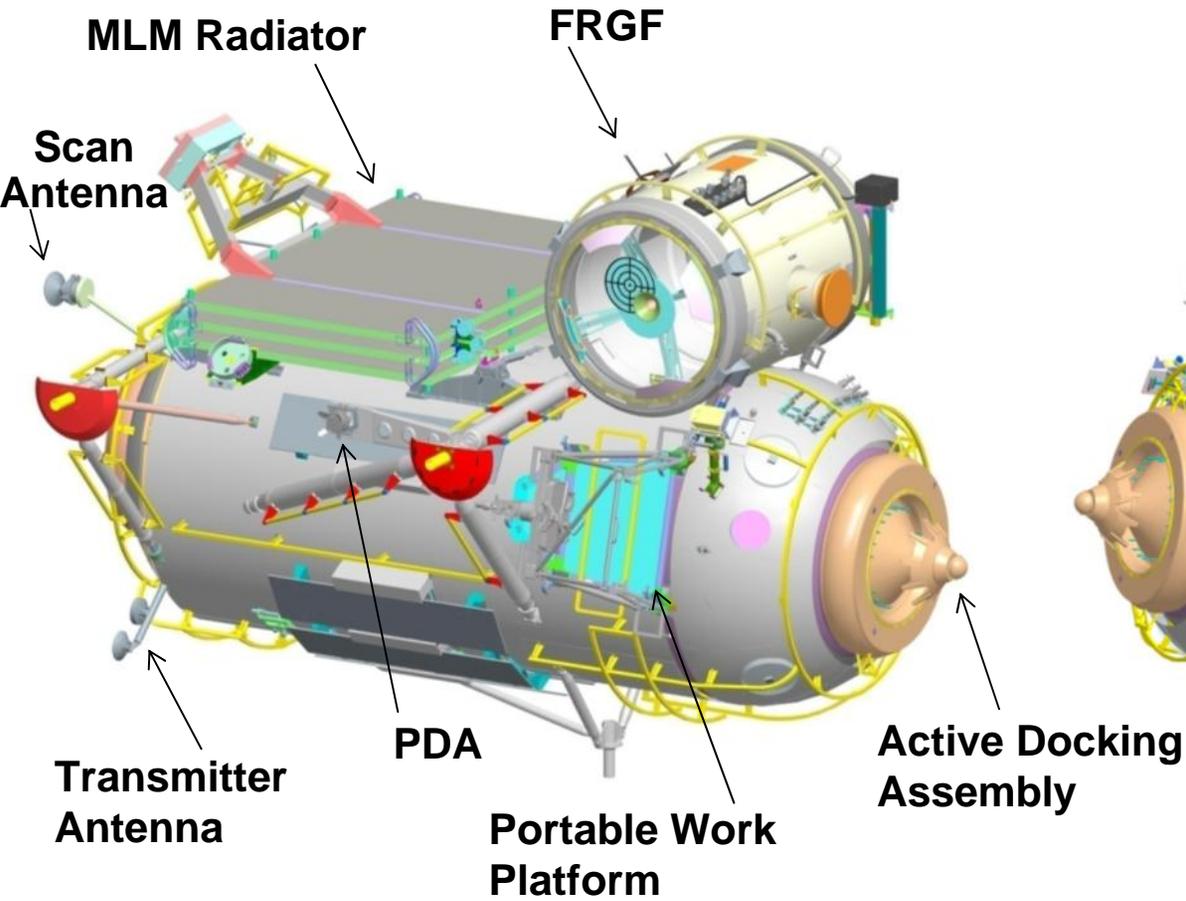




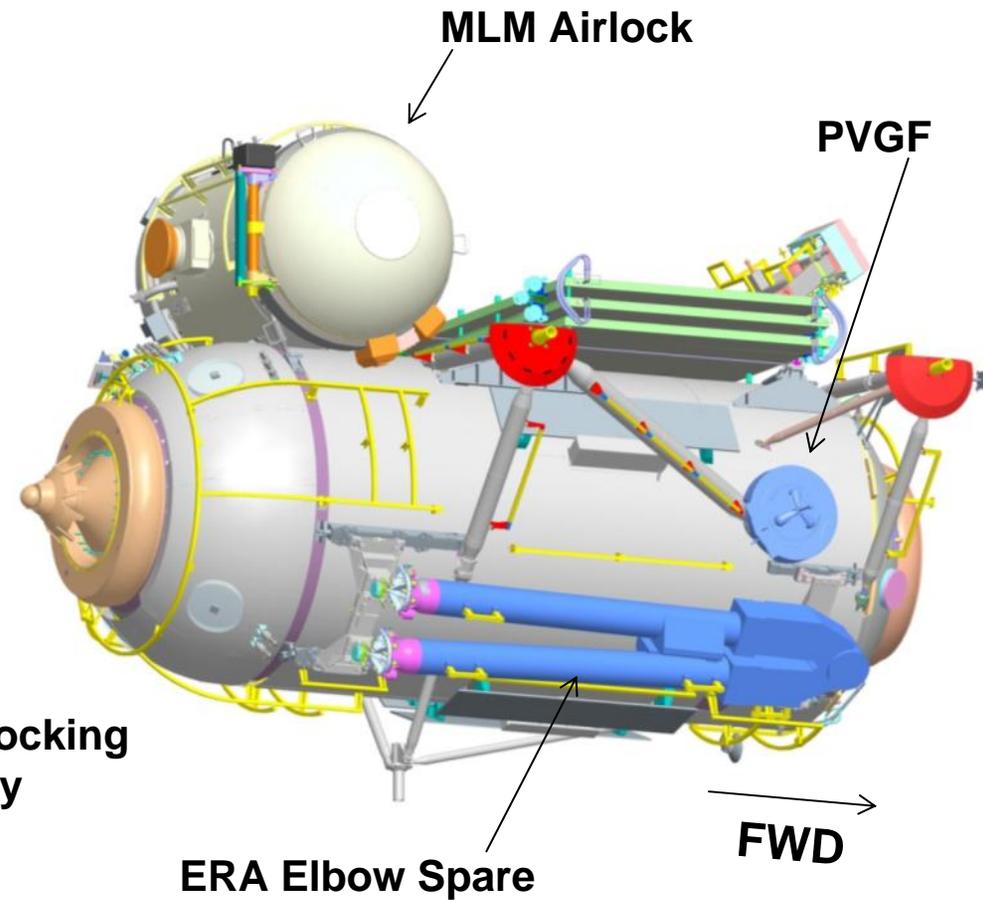
ISS/PAYLOAD PROCESSING

MINI RESEARCH MODULE-1 (MRM1)

Presenter: Robert Ashley	
Date: 1/07/10	Page 6



Port Side



Starboard Side

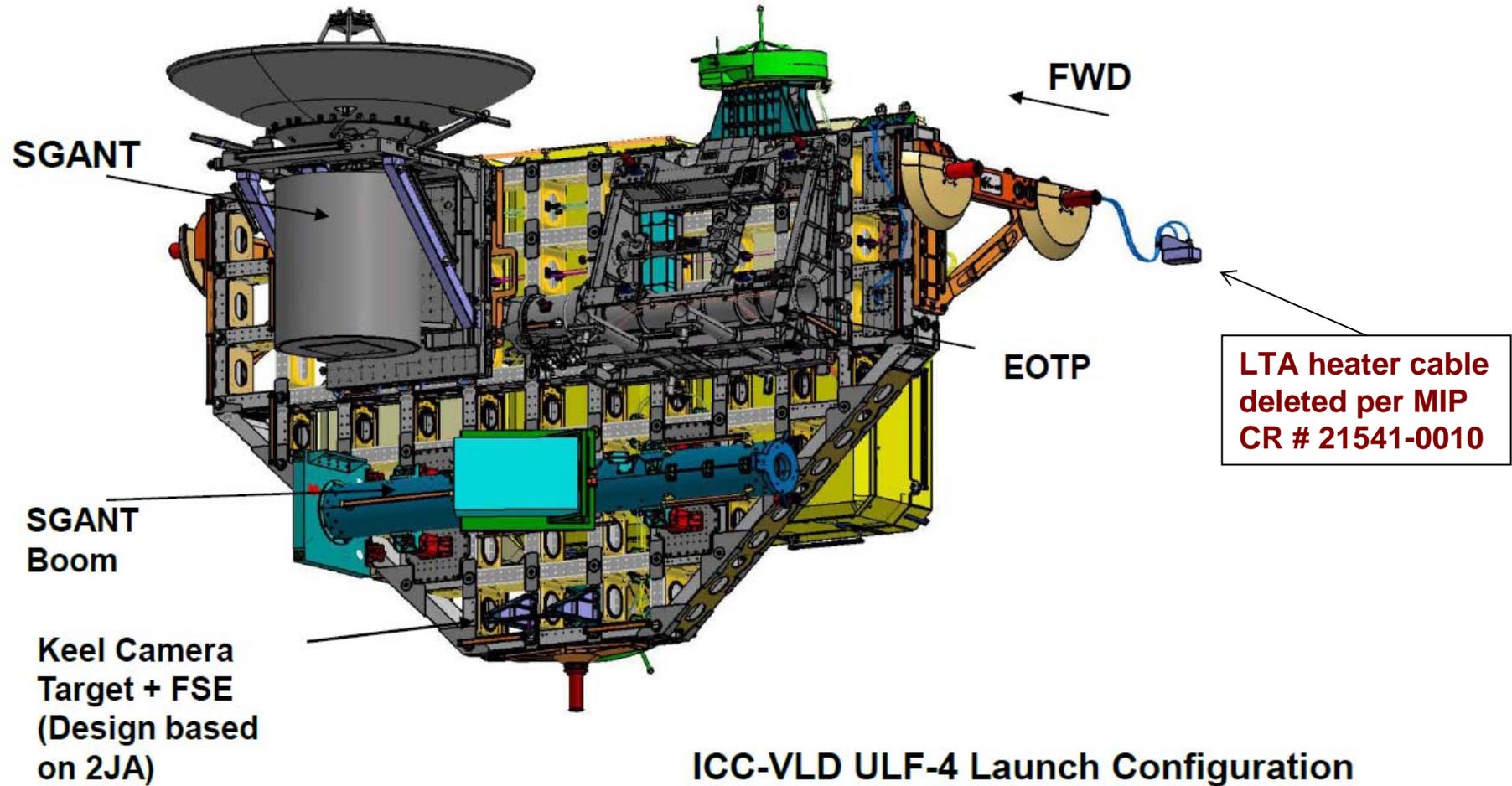




ISS/PAYLOAD PROCESSING

ICC-VLD COMPONENTS

Presenter:	
Robert Ashley	
Date:	Page
1/07/10	7

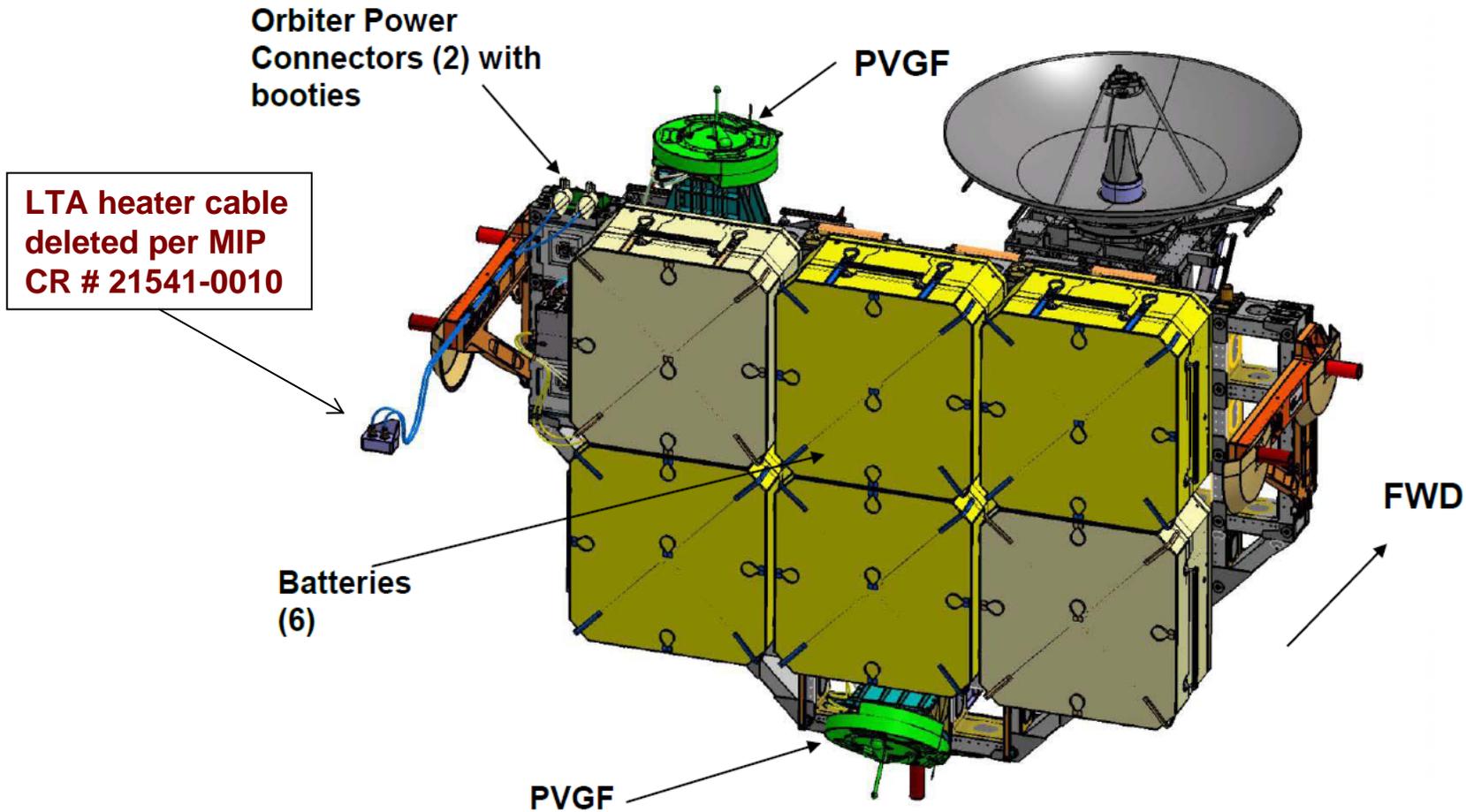




ISS/PAYLOAD PROCESSING

ICC-VLD COMPONENTS

Presenter:	
Robert Ashley	
Date:	Page
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ICC-VLD ULF-4 Launch Configuration





STS-132 Delta Launch Site Flow Review

Presenter	Kenneth Nowak	
Date	01-07-10	

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-132 Delta Launch Site Flow Review

Presenter **Stephen Reilly**

Date **01-07-2010** Page **1**

- **STS-132 Orbiter/Ferry Mass Properties Have Been Reviewed by Space Shuttle Program Integration and Are Within Specified Limits**

<u>Case</u>	<u>Ferry Weight (LB)</u>	<u>Center of Gravity (inch)</u>		
		<u>X</u>	<u>Y</u>	<u>Z</u>
<u>Nominal - Orbiter c.g.</u> (SCA c.g.) (No CM Ballast, No Fluids Off-Loaded, No Payload Bay Opening)	208348	1117.2 (1412.9)	0.0 (N/A)	371.5 (513.9)
<u>AOA - Orbiter c.g.</u> (SCA c.g.) (1650 lbs CM Ballast, No Fluids Off-Loaded, No Payload Bay Opening)	227862	1113.5 (1409.3)	0.2 (N/A)	372.5 (515.0)
<u>TAL - Orbiter c.g.</u> (SCA c.g.) (3 SSME's Removed, No Fluids Off-Loaded, No Payload Bay Opening, Max Weight 217000 LB)	205613	1076.6 (1372.4)	0.1 (N/A)	373.9 (518.3)

X c.g. Limits (Orbiter Coordinates)

Nominal = 1060.0 TO 1124.3
 AOA = 1060.0 TO 1116.0
 TAL = 1060.0 TO 1126.2

Z c.g. Limits (Orbiter Coordinates)

Nominal = 360.0 TO 380.0
 AOA = 360.0 TO 380.0
 TAL = 360.0 TO 380.0



STS-132 Delta Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-07-10**

SSP System Drawings

The Drawings Baseline Was Released By PRCB S115132 on 08-20-09

- **V072-000001-288** (Rev. WE01) Space Shuttle System (Rel. 11-02-09)
 - **V072-200212-001** (Rev. A01) Mission Equipment Cargo Support (Rel. 10-19-09)
 - **SGD32104455-401** (Rev. NC) Crew Compartment Configuration (Rel. 10-01-09)
 - 402** Descent
 - **V070-000001-004** Orbiter General Assembly
 - **V070-410100-018** SSME Installation
 - **10100-0061-180** Integrated SRB General Assembly (BI-143)
 - **80901000000-530** External Tank Assembly (ET-136)
- **STS-132 LSRR + 18 days Mission Configuration Product Plan (MCP) was last published on 10-12-09 and will be republished at ORR -14 days on TBD.**



STS-132 Delta Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-07-10**

SSP System Drawings – (Continued)

Ferry Configuration

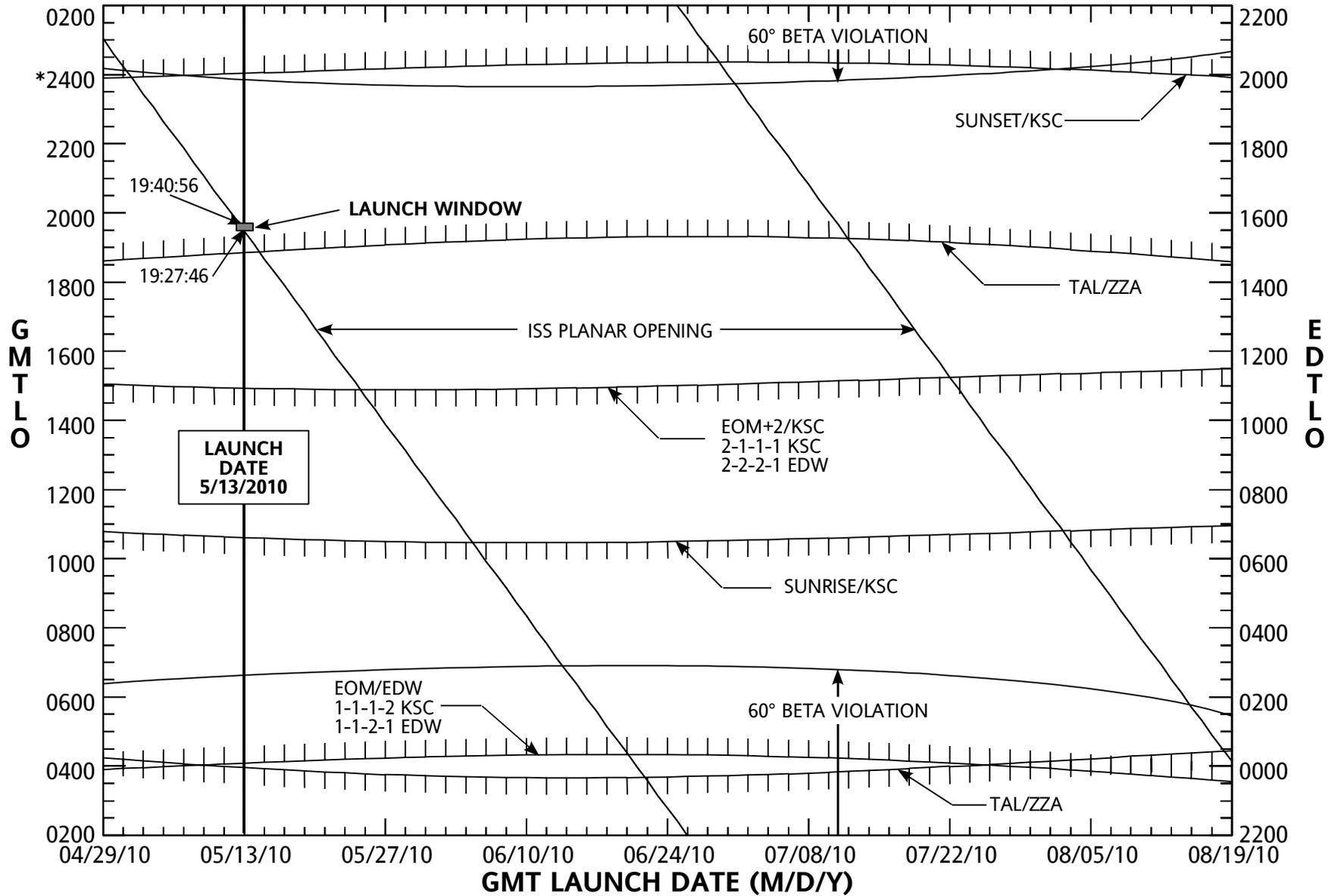
- **V072-000001-289** (Rev. WC01) Space Shuttle System Drawing (Rel. 09-02-09)
 - **V072-200212-002** (Rev. A01) Mission Equipment Cargo Support (Rel. 10-19-09)
 - **SGD32104455-001** (Rev. NC) Crew Compartment Configuration (Rel. 10-01-09)
 - **V072-300055-025** (Rev. BU) Ferry Flight Configuration (Rel. 05-11-09)

SCA 911

Mission Duration = 11+1+2
 Inclination = 51.6°
 OMS2 ha/hp = 124 x 85 nmi.
 Target ha/hp = 203 x 198 nmi.

STS-132 OCF LAUNCH WINDOW

N. Wortham/USH-483L
 P. Gentry/USH-483L
 May 14, 2009



Note: EOM lighting lines, based on an OMS2 phase angle of 178 deg. are representative only.
 The ISS beta angle ($|\beta| < 60^\circ$) for mated operation is beginning ~ 1/20:43:08 MET (FD3 Rendezvous) and ending ~ 9/15:22:00 MET.
 * Indicates the dateline. Launch times above this point are on subsequent days from the date indicated on the corresponding date axis



STS-132 Delta Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-07-10**

Modification Impact Report

- Mission Equipment Modifications and Orbiter Modifications analyzed for impacts to OMRSD, LCC, ICD, EMI, Software, and GSE.
- A total of 7 MCRs have been approved and/or pending mods
- Current MCR impact status:
 - No impacts for all six disciplines 4
 - One or more disciplines with impacts, documentation approved and/or pending approval 0



STS-132 Delta Launch Site Flow Review

Presenter **Kenneth Nowak**

Date **01-07-10**

Modification Impact Report – (Continued)

- Possible impacts still under review 3
- MCR 30283, 30282, and 30274 are being reviewed for all impacts

1MRC5 REPT. 4650-1
 PAGE NO. 1

SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0132

ORB

ECP-MCR/KIT SEQUENCE

RUN TIME

09:40 DATE 12/17/2009

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRIO	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
S-J6275A	AUTH MAND KSC 032	J6275A	0104 002	ORBITER STRUCTURE IML SURFACE CORROSION SAMPLING INSPECTION CORROSION SAMPLING CAPABILITIES WILL BE PROJECTED AT THE LSFR, AND FINALIZED AT DLSFR FOR EACH FLOW.
2008-02-26				
S-J6341A	COMP MAND KSC 032	J6341A	0104 001	EVALUATION OF OMS POD LI-900 TILE INSTALLED ON 0.090" SIP TILES REMOVED AND REPLACED DURING FLT 30 PROCESS.
2008-04-09				
S-J6399	AUTH MAND KSC 032	J6399	0104 001	0-GAUGE PROTECTION FOR OV-104, FLIGHTS 31-35
2008-10-03				
S-J6410	AUTH MAND KSC 032	J6410	0104 001	AFT STUB CRACKED TILE INSPECTION
2008-09-18				
S-J6501	PLND MAND KSC 032	J6501	0104 001	STS-129 CIH CLOSE CLEARANCE MEASUREMENTS POST FLIGHT WORK
2009-04-28				
S-J6516A	COMP MAND KSC 032	J6516A	0104 001	WLE JOGGLE REGION IR THERMOGRAPHY REQUEST FOR HIGH LINE SCAN WF PANELS WORK ACCOMPLISHED DURING FLIGHT 31
2009-06-16				

S-J6527	AUTH J6527 MAND KSC 032	0104 001	FRCS THRUSTER CANISTER STUD INSPECTIONS - F5R AND F5L
2009-07-02		SPAR	OV-104 (FRC4) FLT 32
S-J6528	PLND J6528 MAND KSC 032	0104 001	PUTTY REPAIR TILE REPLACEMENT FOR RISK REDUCTION
2009-07-06		SPAR	OV-104 FLT. 32
S-J6543	COMP J6543 MAND KSC 032	0104 001	ET FERRY FLIGHT DOOR ATTACH FITTING INSPECTION
2009-09-17		SPAR	NDE OF FERRY FLT DOOR ATTACH FITTINGS WILL ONLY BE REQ'D FOLLOWING F/FLT BACK TO KSC. FERRY FLT ONLY.
S-J6559	AUTH J6559 MAND KSC 032	0104 000	UPPER AFT STUB TILE INSPECTION FOR IN-PLANE CRACKS
2009-10-01		SPAR	
S-J6579	AUTH J6579 MAND KSC 032	0104 000	CAPTURE OV-104 OUTPUT WAVEFORMS TO ADDRESS 1N3600 DIODE CONC
2009-12-08		SPAR	ERNS
S052924CZ	AUTH K6561A SCHD KSC 032	0104 001	GROUND LIGHTNING MONITORING SYSTEM INSTALLATION
2009-10-13		NSW	
S052924DA	AUTH K6566 SCHD KSC 032	0104 001	SSME NOZZLE PURGE HOT WALL CORROSION PREVENTION
2009-10-13		NSW	
030274 S115132AR1	AUTH TCTIV7030274REF MAND KSC 032	0104 000	FUEL CELL CPM DEDICATED POWER FEED CIRCUIT FUSE MOD
2009-11-02			ADDED BY EDS I/F & V070-764400 H01 & -764450 F07. REPLACES 030274,0104,0 IN PART

S115132AR1 AUTH TCTIV7930274REF 0104 000 FUEL CELL FLOWMETER/CELL PERFORMANCE MONITORING WIRING MOD
2009-11-02 KSC NOT REQUIRED ADDED BY EDS I/F & V070-774428 A25 & V070-774436 A 15.
032 REPLACES 030274,0104,0 IN PART

TOTAL MODS = 15

1MRCS REPT. 4650-1
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SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0132

PIH

ECP-MCR/KIT SEQUENCE

RUN TIME

09:40 DATE 12/17/2009

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRIO	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
008851	APPD	TCTIM0008851REF	0001 000	ADD HARDWARE REQUIREMENTS IN SUPPORT OF STS-132
NOT REQD	MAND			ADDED PER THE RELEASE OF EO V787-340035 A02
	JSC			
032				
008852	APPD	K845-774025-001	0001 000	MRM1 HDWE INTEGRATION REQMT PROVISIONS
NOT REQD	KSC	NOT REQUIRED		ADDED BY EDS I/F & KIT EO NEW
032				

TOTAL MODS = 2

1MRCS REPT. 4650-1
PAGE NO. 3

SSP SUMMARY MOD ITEMS - PRCBD MOD BASE LINE STS-0132

SRB

ECP-MCR/KIT SEQUENCE

RUN TIME

09:40 DATE 12/17/2009

PRCB	STAT	ITEM/KIT NUMBER	SEQ	
MCR/ECP	PRIO	TCTI NUMBER	EISN NO.	DESCRIPTION / GENERAL REMARKS
AUTHDATE	SITE			
	FLT			
-----	----	-----	----	-----
S084539LR4	AUTH	FEC A-10358C	B143 000	EDAS SENSOR INSTALLATION SUPPLEMENT FOR BI141 THRU BI143
2009-10-30	KAS			
S084539LR5	AUTH	FEC A-10361C	B143 000	EDAS INSTALLATION FOR BI141 THRU BI143
2009-11-19	KAS			
TOTAL MODS =		2		

Approved STS-132 OMRS Waivers and Exceptions

WVR EXC	ELEMENT PROJECT	PRCBD NUMBER WAIVER# (STAT) (INITIAL STS)	ABSTRACT RAS REQUIREMENTS	EISN PAYLOAD	STS BEG END
E	ORB	S053298ZC EK10572R1 (A)	OMRSD EXCEPTION REQUEST - MISSION LIFE ASSESSMENT OF WING LEADING EDGEINSULATORS (EK10572R1)	104	029 033
		S053298ZD EK10574R1 (A)	OMRSD EXCEPTION REQUEST - WING LEADING EDGE INSULATORS (EK10574R1)	104	029 036
		S053299AQ EK10592 (A)	OMRSD EXCEPTION REQUEST - DRAG CHUTE DEPLOY SYSTEM 2 LIGHT FAILU RE(EK10592)	104	029 032
		S053299AT EK10593 (A)	OMRSD EXCEPTION REQUEST - DRAG CHUTE DEPLOY SYSTEM 2 LIGHT FAILU RE(EK10593)	104	029 032
W	ET	S053293FZ WK03850R1 (A) (STS-093)	L02/LH2 TANK PRESSURE MONITOR FOR MOVE	ET	099 999
		S053300AN WK10761 (A)	OMRSD WAIVER REQUEST - BIPOD OUTBOARD SLOT 3 HEATER READING LOW(W K10761)	ET	134 RCN
	OMS	S053298NV WK10522 (A)	OMRSD WAIVER REQUEST - RIGHT OMS SECONDARY REGULATOR CREEP RATE(W K10522)	0021	035 043
		S053299YG WK10723 (A)	OMRSD WAIVER REQUEST - RIGHT OMS FUEL CV501 ELEMENT 4 LEAK CHECK	0021	038 040

FAIL(WK10723)

ORB	S053299BLR1 WK10600R2 (A)	OMRSD WAIVER REQUEST - OXYGEN SYSTEM 1 RELIEF VALVE FAILED RESEA TLEAKAGE (WK10600R3)	104	029 032
RCS	S053296GY WK10188R1 (A)	OMRSD WAIVER REQUEST - LRCS OXIDIZER GHE ISOLATION VALVE LEAK(WK 10188R1)	0014	025 032
	S053296YG WK10318R1 (A)	OMRSD WAIVER REQUEST - RIGHT RCS OXIDIZER GHE SYSTEM INTERNAL LEA KAGE(WK10318R1)	0021	034 042

Approved STS-132 OMRS Waivers and Exceptions

WVR EXC	ELEMENT PROJECT	PRCBD NUMBER WAIVER# (STAT) (INITIAL STS)	ABSTRACT RAS REQUIREMENTS	EISN PAYLOAD	STS BEG END
W	RCS	S053298JF WK10503 (A)	OMRSD WAIVER REQUEST - RRCS OX TANKOUTLET TRANSDUCER ACCURACY (WK 10503)	0021	034 042
		S053299GW WK10634 (A)	OMRSD WAIVER REQUEST - LEFT REACTION CONTROL SYSTEM FUEL GHE ISO LATIONVALVE LEAKAGE (WK10634)	0014	030 032
SRB		S053293WA WK03886 (A) (STS-103)	LH FWD AND RH MID SRB JOINT TEMP SENSORS	BI	099 999

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+-----+
o               o Waivers o Except o Deviat o Cannib o Total o
+-----+-----+-----+-----+-----+-----+
o Total Extracted o      10 o      4 o      0 o      0 o      14 o
+-----+
    
```

ACTIVE WAIVERS FOR
OV-104

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	STAYS OPEN
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	STAYS OPEN
325	S061956	07/15/03	Blanket on the Control Moment Gyro (CMG) Orbital Replacement Unit (ORU) on the Lightweight MPESS Carrier (LMC) will NOT be re-installed on-orbit per configuration defined in ICD-A-21494. It will be secured around the FSE and attached to the aft bulkhead.	OV-104, Flight 27	
334	S115115JR1	07/19/06	The following requirement is waived to allow OV-104 to fly with the following out-of-configuration condition: Tech Order M072-544501-067 (RMS, MPM over-center stop and MPM pedestal insulation cover fasteners) will be implemented in total, less the requirement to perform bench rigging per updated specification requirements for for OV-104, Flight 27 and subsequent OV-104 flights until such time that all MPMs can be removed and bench rigging can be performed.	OV-104, Flight 27 thru OV-104, Flight 999	STAYS OPEN
339	S063652	07/09/07	The following requirement is waived to allow OV-104 to ferry from DFRC to KSC with the following out-of-configuration condition: Retain RH ET Camera installation for ferry flight MECSLSI V072-200197, reference flag note (3), removes (MV0456A) M072-705001-024 RH ET Sep Camera (Digital Camera with 35 mm lens) for ferry flight. The RH ET Camera needs to remain in flight configuration to support resolution of IFA STS-117-V07 Digital Umbilical Camera Image Corruption. Troubleshooting will be performed on the installed hardware after returning OV-104 to KSC.	OV-104, Flight 28	

Prepared by: Jeff McRoberts
USA CM/CVAS
861-2505

12/21/2009

ACTIVE WAIVERS FOR
OV-104

Item #	Authority	Date	Waiver Description	Effectivity	Wad
340	S063652	07/09/07	<p>The following requirement is waived to allow OV-104, Flight 28 to ferry with the following out-of-configuration conditions:</p> <p>Remove LH OMS Pod LP04 (FIB) blankets prior to ferry flight thermal blanket V070-396376-241 on LOMS Pod lifted at forward leading corner and edges reported on orbit, IFA STS-117-V-02. Two blankets (V070-396376-241 and adjacent V070-396376-051) are removed. RTV ramp applied in cavity up to adjacent blankets per TLP04-28-2520 MRB approval.</p>	OV-104, Flight 28	
343	S115122GR4	12/07/2007	<p>The following requirement is waived to allow OV-104 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 one each bolt (NAS1003-8A) and one each 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 control) was noted missing from behind the starboard closeout panel. Without the nutplate, the bolt and washer cannot be installed. The area cannot be currently accessed to reinstall the missing hardware.</p>	OV-104, Flight 29	ECL-4-A0118 (was ECL-4-29-1637)

ACTIVE WAIVERS FOR
OV-104

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>	<p>OV-103, Flight 35 OV-104, Flight 30 OV-105, Flight 21</p>	

ACTIVE WAIVERS FOR
OV-104

Item #	Authority	Date	Waiver Description	Effectivity	Wad
351	S115125BR9	06/03/2009	<p>Allow OV-104 to ferry from DFRC to KSC with out-of-configuration conditions for removal of Flow Control Valve (FCV) assemblies for ferry flight and install Main Propulsion System (MPS) cap and plug set GSE plugs:</p> <p>Three MPS GH2 FCV solenoid and poppet sleeve assemblies (P/N 80420-1301) for each engine.</p> <p>Engine 1 GH2 FCV LV56 Engine 2 GH2 FCV LV57 Engine 3 GH2 FCV LV58</p> <p>NOTE: The following MPS cap and plug set GSE plugs will be installed in place of the Flow Control Valve System (FCSV): 3 G070-602824-001.</p> <p>RATIONALE: There is adequate access and time to remove the requested parts. Removal of these parts is well within USA's experience base. These valves have been removed numerous times at KSC. Removal at DFRC will be no different than removal at KSC. There is no increase in risk performing this work at DFRC, and the early removal will better support the upcoming manifest. There is no GH2 FCV position specified for ferry flight, and no blanket pressure is required. The manifold is firmly mounted/restrained and requires no additional support due to removed FCV components.</p>	OV-104, Flight 30 (Ferry Flight)	