

STS-122 Integrated Launch Site Requirements Review

Presenter

Stephen Reilly

Date

11-02-06

Program Freeze Point

PRCB Presentation

S115122

STS-122 Integrated Launch Site Requirements Review

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Baseline the STS-122 Mission Specific Requirements and Flow Plans.

This CR and the associated Data Package were reviewed at the 10-30-06 FRWG.

KSC Integration*

MK-SIO

Orbiter Engineering*

Requesting Approval

USA-OE

SSME*

MP21

Status in BackUp

Flight Integration*

MO3/USA-PI

Flight Software*

USA-FSW

GFE EVA*

XA

Payload/Cargo Engineering*

USA-PI

*Backup Material



STS-122 Integrated Launch Site Requirements Review

Presenter	Amy Houts-Gilfriche	
Date	11-02-06	

Overview

- | | |
|--|-----------------|
| • Mission Description | To Be Presented |
| • Performance Margin | To Be Presented |
| • Flight Mass Properties | To Be Presented |
| • Ferry Flight Mass Properties | TBD |
| • SSP System Drawings | No Issues* |
| • SSP Authorized Modifications/Non-Standard Work | No Issues |
| • SSP ICD Changes (IRNs) | No Issues |
| • SSP LCC Changes (LCNs) | No Issues |
| • SSP OMRS Changes (RCNs) | No Issues |



STS-122 LAUNCH SITE REQUIREMENTS REVIEW

Presenter Amy Houts Gilfriche
Date NOVEMBER 2, 2006

LAUNCH

10/17/07 NET
 39A/ MLP1
 CREW SIZE: 7 UP/7 DN

ORBIT

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

CONFIGURATION

OV-103 (34)
 LP01;RP03
 ET-125
 BI-132
 RSRM-99
 (1) TBD (2) TBD (3) TBD
 OI-32
 RMS,ODS,MBA,SSPTS

CONSUMABLES

CRYO TANK SETS	5 (OFFLOADED)
GN2 TANKS	6 (FULL)
FWD RCS	1912# (2446# FULL)
AFT RCS	4970# (FULL)
OMS	24931#

PAYLOAD

ISS 1E
 COLUMBUS
 ICC-LITE
 ECSP

LANDING

SITE	KSC
TAL	ZARAGOZA
ALT. TAL	MORON & ISTRES
SCA	905



Presenter Amy Houts Gilfriche
Date NOVEMBER 2, 2006

STS-122 LAUNCH SITE REQUIREMENTS REVIEW

PERFORMANCE MARGIN

• SIMULATION MARGIN (SPLBSAPM)		+213
• WEIGHT CHANGES SINCE SIMULATION		
• PAYLOAD	+1765	
• OPERATOR	-830	
• ORBITER	+1040	
• SSME	-141	
• NPC	-137	
• CREW COMPARTMENT	+1298	
• OMS	-3237	
• MPS PROP (NOT INERT)	-478	
• ET	+22	
• RECONSTR ASCENT PERF COLLECTOR	+214	
TOTAL WEIGHT CHANGES	-484	+484
• OTHER PERFORMANCE PROJECTIONS		
• PROTECTION FOR DOL DISPERSIONS		-700
• 10/17/07 LAUNCH DATE (PMBT&ATMOS)		+1070
• PARTIAL PROJ FOR MPS BGT GEN0602S		-20
• PARTIAL PROJ FOR MPS BGT GEN0603S		+36
• OMS ASSIST ADJ (BASED ON 6768 USAGE)		+388
• SRB – M/P UPDATES		-14
• SRB BR / 0.70 MIL HIGHER THAN 0.3705 AVG		+140
• ISP/THST FOR GEN BLOCK 2 @104.5%		+317
• PROJ TO 5 MIN WINDOW FROM INPLANE		-600
• PERFORMANCE CHANGES ADJUSTMENT		-34
• CURRENT BASELINED APM (10/31/06)		+1280

VOLUME III: ASCENT PERFORMANCE MANAGER'S RESERVE GUIDELINE (POST-FDRD BASELINE) IS 1200 LBS



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STS-122 LAUNCH SITE REQUIREMENTS REVIEW

FLIGHT MASS PROPERTIES

<u>CASE</u>	<u>TOUCHDOWN</u> <u>WEIGHT pounds (LIMIT)</u>		<u>MACH 3.5</u> <u>X C.G. inches (LIMIT)</u>
NOMINAL	205875	(233000)	data unavailable** (1075.7)
RTLS	242812	(245000)	data unavailable** (1077.2)
TAL	240740	(244000)	data unavailable** (1077.2)
AOA	234527	(242000)	data unavailable** (1075.7)
CONT RTRN	205036	(233000)	data unavailable** (1075.7)

** = data unavailable this early in the flow

NOTE: RTLS 25 SEC FRCS DUMP
TAL 65 SEC FRCS DUMP
407 LBS. AFT FUS BALLAST

ESTIMATES BASED ON SPICE AND MODIFIED FOR WEIGHT CHANGES THRU 10/31/06.

STS-122 LSRR OV-103 FLIGHT 34 CONFIGURATION UPDATES

**Alan Ling
USA Orbiter Element**

November 2, 2006

STS-122 OV-103 Flt 34 – LSRR Updates

Modifications To Be Baselined

- 4 Mandatory Mods to be baselined
- 6 Mods to be baselined as opportunity

Potential Modifications for OV-103 Flight 34 (For info only)

- Potential modifications

Request authorization for configuration change to swap RMS

Additional Requirements being tracked:

- Chits
- TPS / Structures
 - Lockbolts
- OMDP Requirements Scrub
- OMRS Requirements Reset Time & Life, 6 requirements

Authorization Requested for MECSLSI and CCCD Updates Due to STS-122 Orbiter Mods

- Incorporate updates to CCCD and V072-200202 (OV-103 Flight 34)

Backup

- Engineering, Hardware and Certification Status for Proposed Mods
- Mandatory and Opportunity Modification Details
- TPS / Structures Requirements



Mandatory Mods For STS-122

(4) Mandatory Mods To be Baselined:

- **19789 Station To Shuttle Power Transfer System (SSPTS)**

SSPTS will provide the capability to convert 120 Vdc International Space Station (ISS) secondary power to 28 Vdc Orbiter power to supplement the Orbiter fuel cells, thereby providing increased on-orbit docked mission duration with the ISS. The SSPTS also provides the capability for converting 28 Vdc Orbiter power to 120 Vdc to feed power to Shuttle payloads

Mandatory Mods For STS-122 (cont.)

- **23240 Elimination Of '0' Gauge Wire Damage In Lower Wire Trays**

Implements corrective actions to eliminate damage to 0-gauge harnesses from Milson fasteners on wire tray covers and tray clamp fasteners by rotating harness bundle clamps to provide additional clearance to tray cover fasteners and adding chafe protection as required. Works with MCR 19618 Wire Tray Riser Removal to eliminate wire tray risers at some locations to prevent wire harness crowding and associated tray cover bulging.

A partial implementation of this Mod will be performed in the areas where SSPTS work is being performed

- **19810 AMEC/EMEC Mounting Nut Mod**

Replaces five nuts, used to mount the serial multiplexer interface adapter (SMIA) sub-module to the multiplexer interface adapter (MIA) module or parent assembly, with smaller diameter nuts to properly fit into the SMIA cutout or counterbore.

OV-103 hardware modified during flt 31 flow by restricted MR. This will be a 'paper modification' closing the work performed by MRs (less replacement of the re-ID labels for the internal module and external LRU)

Mandatory Mods For STS-122 (cont.)

- **23488 ECO Sensor Instrumentation**

Implements voltage measurements for all four MPS ECO LO2 and LH2 Sensor Transducer Circuits to provide insight into ECO sensor system performance anomalies. The added measurements will help identify the source and type of the anomaly in the Point Sensor Transducer circuits if they occur. However, the added voltage measurements will not be able to differentiate between the ET and Orbiter wiring/transducer anomalies.

The Point Sensor Checkout System combined with the added voltage measurements provides tools to assist in allowing deviation of the Launch Commit Criteria which presently requires 4 of 4 ECO sensors to not be indicating dry. In addition, these measurements allow real time discernment of failed wet ECO sensors during ascent.

Opportunity Mods For STS-122

- **(6) Mods to be authorized for implementation on an opportunity basis**
 - Can be worked if the time and resources become available
- **19743 BRI-18 Tile MLGD (attrition, no authorization required)**

Implements TUF1-coated BRI-18 tile (which is a direct drop-in replacement for current RCG-coated LI-2200 and FRCI-12 tiles) in the remaining MLGD perimeter areas
- **19546 Hub Tile (attrition, no authorization required)**

Replaces 2 tiles in the inboard elevon area with a single more robust tile. Previous design could lead to installation errors which could result in loss of tile in flight
- **19874 BRI-18 Tile, Other Locations (attrition, no authorization required)**

Implements BRI-18 tile on remaining NLGD perimeter, LESS Carrier Panel and Window 1-6 Carrier Panel locations. Implementation on ET Door perimeter location is currently under review
- **19735 WLE Spar “Sneak Flow” Protection, Panels 1-4**

Increases RCC panel damage tolerance by adding a flow restrictor to limit allowable plume flow to 50% across the flow restrictor (panels 5-22 previously implemented during STS-114/121 flows)
- **19763 Lower WLE Carrier Panel Horse Collar Gap Filler Redesign, Panels 1-4**

Redesigns the lower WLE access carrier panel horse collar gap fillers with an enhanced design with additional sleeving (panels 5-22 previously implemented during STS-114/121 flows)

Opportunity Mods For STS-122 (cont.)

- **23227 Connector Saver (ME414-0630) Redesign (OMS Pod, Ku Band)**

Connector Saver mod provides proper interfacial seal and wavy washer engagement retention force to reduce risk of inadvertent demate during use.

T-0 and monoball locations previously implemented during STS-121 flow

- **23411 Aft Freon Coldplate Loop Filters (If Freon loops are to be deserviced)**

Adds filters to the Freon Aft Cold-plate (ACP) Network to minimize the risk of flow blockage due to contamination to this network of coldplates. The filters will be installed in both freon loops between the FES tee and the flow meters and will be supported by new structural brackets

- **MCR 23467 WCS Configuration Changes**

Latest WCS configuration incorporating several minor modifications and improvements.

Opportunity Mods For STS-122 (cont.)

19755 RMS MPM Over Center Stops (To be worked with RMS removal)

New design Boeing stops limit the over-center travel of the Boom/RMS due to vibration loads and deflection. New design stops currently installed on Starboard (OBSS) MPMs on OV-103. Flight-specific load profiles will determine whether new design stops will be required on the Port side (RMS) MPMs for STS-122, but will not be available until late in the flow

- **Analysis to date on previous missions has not made this a mandatory requirement**
- **Risks to not performing the mod:**
 - **Columbus, although a single keel payload is heavier than the STS-116 & 121 payload**
 - **Higher potential for negative margin**
 - **Shoulder location cannot be performed in the vertical**
 - **Final loads analysis may not be available until close to OPF rollout**
 - **If not worked during STS-122, and a future mission determines it to be mandatory, it would have to be accomplished in a potential short flow**
 - **STS115 (OV-104) as run implementation was 3 weeks**

Potential Mods (Info Only)

- **23440 Polycarbonate Protectors for Orbiter Window Panes**
- **23452 RCC Fiducial Markings**
- **23455 Mini Boom Installation**
- **LON Requirements, if necessary**
 - **19798 LON Crew Rescue Recumbent Pallet System**
 - **19760 Recumbent Seat Kit (Seat 8) Rail Assembly**

DETAILED MOD DESCRIPTIONS IN BACK-UP

Significant Cargo Configuration Changes

- Requesting authorization for configuration change to swap RMS, which requires MECSLSI update for STS-116:
 - RMS S/N 303 to be removed from OV-103 after STS-116 and replaced with S/N 202
 - S/N 303 will be shipped back to MDA for scheduled upgrade and strain gauge calibration following removal
 - On-orbit data obtained on DTO 849 is not usable until the strain gauges are calibrated
 - Delays in obtaining usable data will delay analysis and definition of EVA stabilization requirements
 - EVA stabilization hardware development needs to begin as soon as possible in order to meet schedule requirements
 - Update MECSLSI to incorporate new RMS configuration
 - STS-122 MECSLSI V072-200202, Model MV0082A
 - For -001, change M072-544502-035 to -033

STS-122 Chits

- During the STS-121 and STS-116 flows a large number (~50) of Chits were generated to perform turnaround type tests and checkout
 - These requirements were primarily driven from Post STS-107 fallouts
- The majority of these Chits have since been converted to RCN's
- The work content of the remaining Chits is clearly understood and in the plan to be worked

STS-122 (OV-103 Flt 34) – Current / Potential Chits and/or RCNs:

TPS / RCC

- **J6116** Gapfillers
- **Jxxxx** Gapfiller Pull Test & Inspections
- **J6117A** Putty Repair Inspections
- **J5881A** LESS Carrier Panel torque check
- **J6115** Micro Inspection of small AFRSI Blankets
- **J6117B** Tile Putty Repair Inspection
- **J6119** ET Door Screed Cavity Verification
- **J6120** Large Tile Damage Scanning
- **OV17061R2** LESS/RCC Thermography Inspection (or chit if not approved)
- **OV16832** Body Flap/Crew Hatch/FRCS Thermal Barrier Inspections , Hub and Drain Hole Tile Manual Deflection Test, and NSI Arrowhead tile Insp

Str / Mech

- **J5897** Lockbolts (Complete 94)
- **Jxxxx** Lockbolts – Option 3
- **J5930** Corrosion Sampling
- **J6141** OBSS Shoulder Electrical Contact Verification (Under review)
- **Jxxxx** Windows 1-6 R & R
- **OV17103** OBSS MPM Static Clearance Checks (or chit if not approved)
- **OV17032** OBSS IBA Testing (or chit if not approved)

STS-122 (OV-103 Flt 34) – Current / Potential Chits and/or RCNs:

Fluids

- **J6139** Vernier Thruster Pc Tube Flush
- **OV17139** **(RCN)** MPS/TVC Isolation Valve X-Ray (or chit if not approved)
- **OV17146** **(RCN)** Radiator retract flex hose Freon Sniff check (or CHIT if RCN not complete)
- **RCN TBD** Fuel Cell mass spec leak check (for FC w/ torch brazed flowmeter, if implemented for STS-122)

Avionics

- **J6132** MPCA removal for Fuse Holder solder joints (or another chit to repeat the Ku-Band DA Heater checks if not performed)
- **J6106A** ASA /ATVC/ RJDF removal for Tin whiskers
- **Jxxxx** ADTA Replacement (Potential - 2 / 4 units, or 4 / 4 if OEM schedule can accommodate)
- **Jxxxx** Install GPS MAGRS-3S Link -008 software to address software DR 110646 (Potential)
- **Jxxxx** Radar Altimeter R&R for Tin Whisker Insp (Potential)
- **J6165** AMEC/EMEC Tin Whisker Mitigation

GFE

- **J6109** Radiometer 9L R & R
- **Jxxxx** OBSS Sensor Checkout
- **Jxxxx** OBSS Integrated Checkout
- **Jxxxx** DTV cable error bit check

STR/TPS Priorities – STS-122 / OV-103

Mandatory (Flight damage, OMRS Rqmts/Chits, & deferred work)

- **Deferred work may be redeferred with acceptable inspection**
- **Gap Filler R&R – Use “GF only” technicians**
 - **Continue zones 2A, 2B and 2B’ working Fwd to Aft**
- **Lockbolts - Complete Chit J5897 (94) Lockbolt**
 - **Perform Option 3**

Prioritized Opportunity

1. **BRI-18 Tile - MLGD**
1st subset – fwd & o/b corner – 12/door (24)
2. **BRI-18 Tile - MLGD**
2nd subset – fwd & o/b sides – 29/door - 9 fwd edge/20 outboard side (58)
3. **BRI-18 Tile - STR side of ET Doors (damage seen on STS-114/121/115) (26)**
 1. **26 tile total/13 per Door – Contingency (May be removed from list)**
 2. **Pending ice testing results – Engineering ECD Nov/Dec '06 (approx)**



STR/TPS Priorities – STS-122 / OV-103

4. **BRI-18 Tile - Windows 2, 3, 4, & 5 Upper Carrier Panels**
 1. **W3 & W4 1st - (9 per window) (18)**
 2. **W2 & W5 2nd - (11 per window) (22)**

5. **BRI-18 Tile – Remaining LESS carrier panels/window tiles/NLGD/MLGD**
 1. **NLGD (attrition – do leading edge first)**
 2. **MLGD – Outboard (1/3 left) – Inboard - Aft (in that order)**
 3. **Windows – 1 & 6 upper – 3 & 4 lower – 2 & 5 lower (in that order)**
 4. **LESS - panels 7, 6, 5, 11, 12, 13, 4, 3, 2, 1 (in that order)**

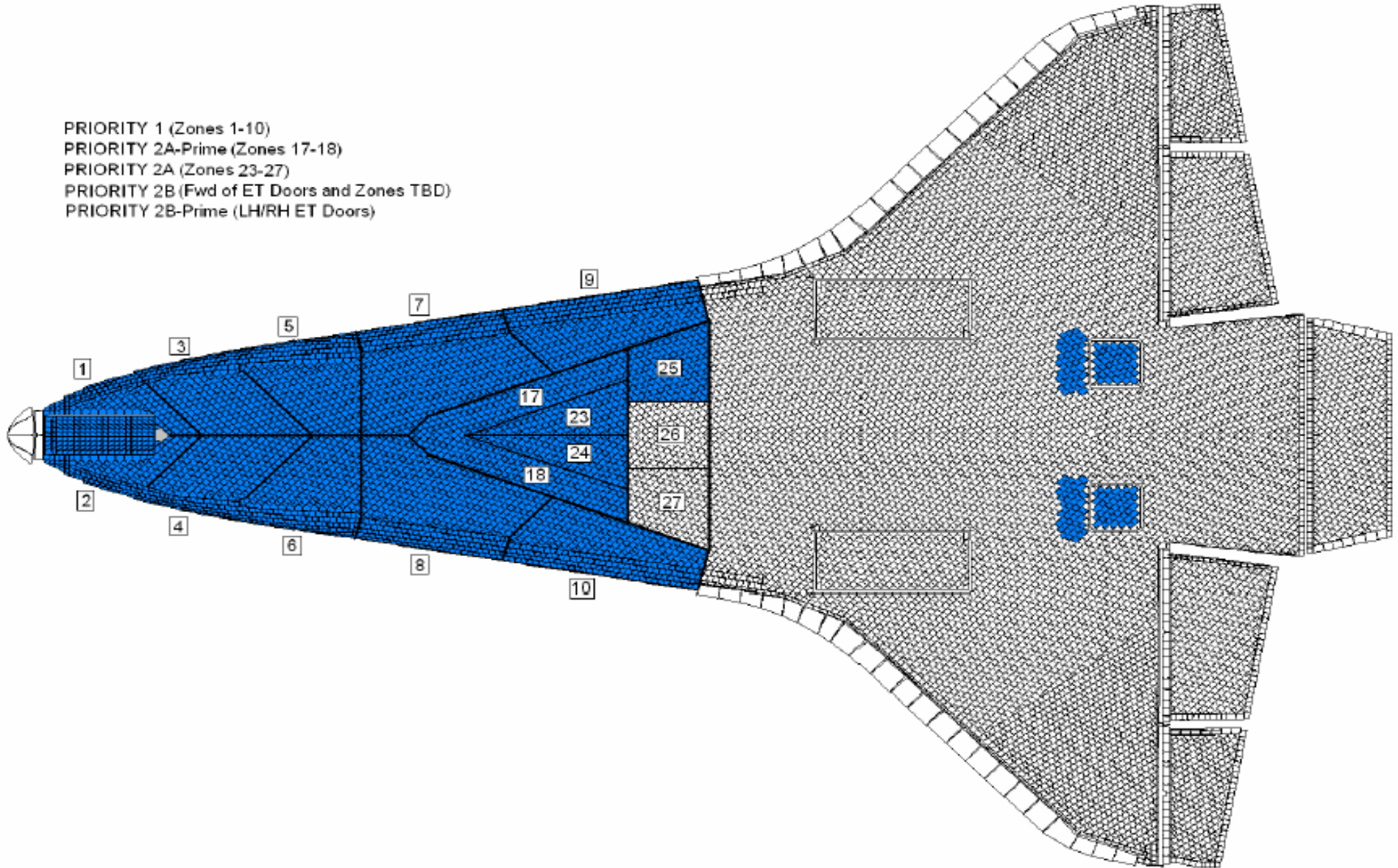
6. **Corrosion sampling (CHIT J5930C)**
 1. **Note - some sampling will be accomplished during lockbolt inspection**

7. **Mod work (Hub Tile, WLE sneak flow, Horsecollar Gap Fillers, MLGD sneak flow)**

8. **Gap Fillers – Zone 3**

Current 103 Gapfiller Replacement Status

PRIORITY 1 (Zones 1-10)
PRIORITY 2A-Prime (Zones 17-18)
PRIORITY 2A (Zones 23-27)
PRIORITY 2B (Fwd of ET Doors and Zones TBD)
PRIORITY 2B-Prime (LH/RH ET Doors)

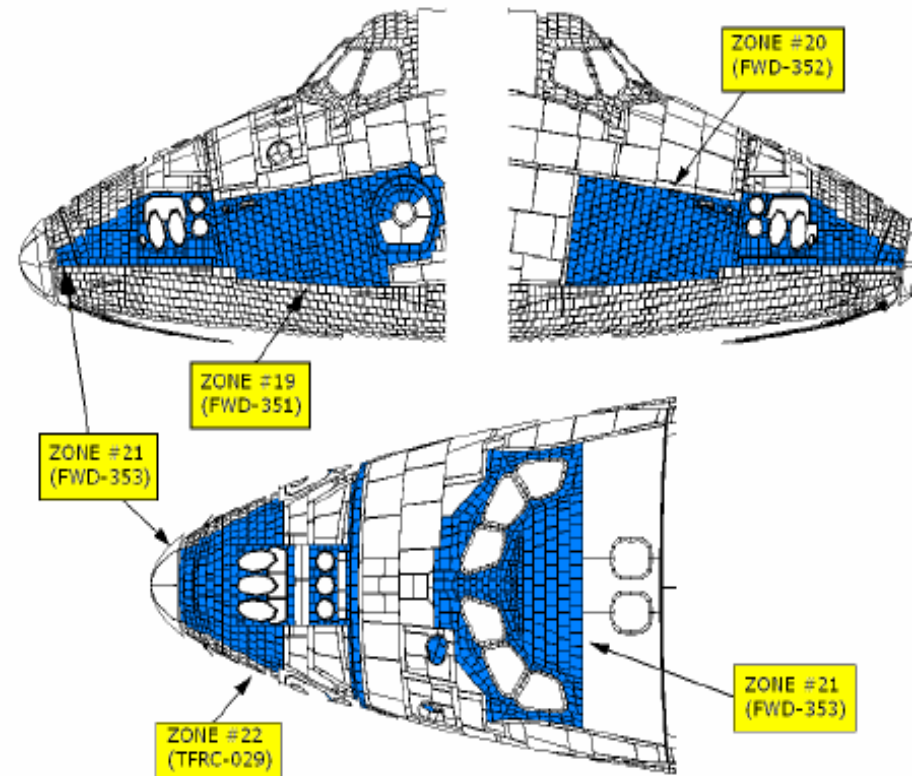
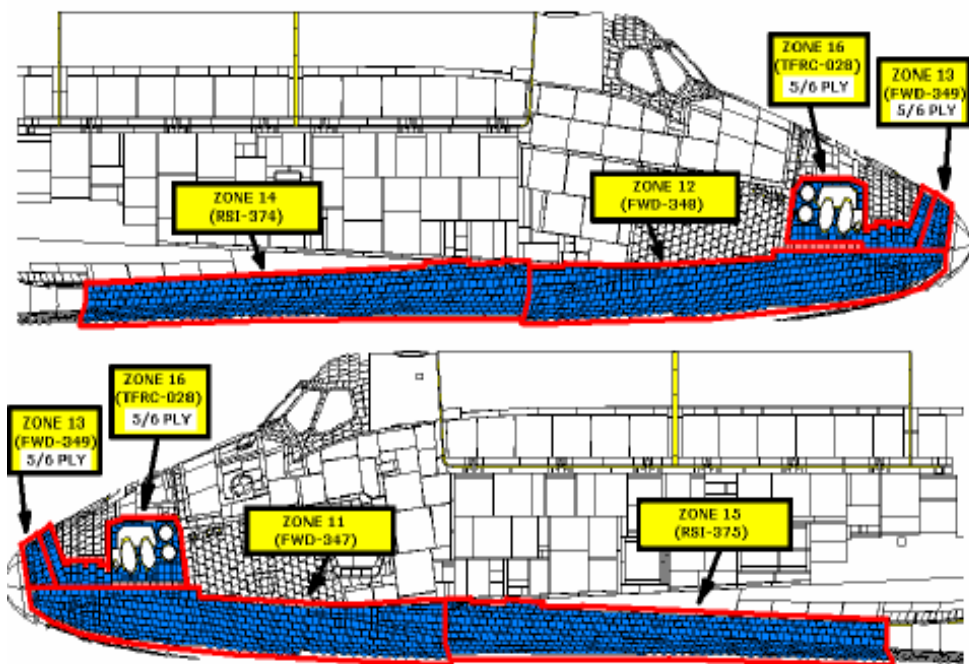


Current 103 Gapfiller Replacement Status

“WORK COMPLETE”

1A LOWER

1A UPPER



Lockbolts

Issue / Background:

- Results of sampled lockbolt collars have indicated that the concern for susceptibility to stress corrosion is not limited to OV-105
- Performance of a limited sample (94) is not sufficient to achieve the desired confidence level required to obtain sound flight rationale
 - Standard corrosion practices require validation of unknown corrosion rates at a 18 month interval and 36 months for better understood corrosion rates
 - OV-103 last inspected at the end of 2003. Due date early 2007
- Mitigation
 - Visual inspection of all lock bolt collars in 2003 with no cracks detected
 - Replaced tension and shear critical lock bolts
 - Partial sampling (~50 collars) completed
- Current sampling level of lock bolts will not allow extending lock bolt inspections to 3 years.
- Therefore sampling required during 122 flow

Concern:

- Performance of a large probabilistic distributed sample (376) has a significant impact on TPS resources
 - Approximately 90 total cavities
 - Reduces opportunity for other TPS enhancements

Lockbolts

Options presented at the October 25th OPO Technical Tagup were:

- Option 1:
- Perform only the 94 collar sample

Option 2:

- Perform the probabilistic 376 sampling
 - Requires access to all bays and impacts ~90 TPS cavities

Option 3:

- Complete option 1 and,
- Perform alternate sampling in each bay where lockbolt does not penetrate the IML, to minimize TPS impacts
- No impact to LRUs or tanks
- This alternate sample requires access to all portions of all midbody bays and minimizes impacts to TPS resources

Lockbolts

- **Option 3 was selected**
 - **Minimizes impact to TPS cavities**
 - **No impact to LRU removals**
 - **Achieves an acceptable sample size**
 - **Team formed at KSC to perform bay sampling**
 - **Team members include Boeing LSS, NASA KSC Structures and GO**
 - **Draft Chit in review cycle**

- **Chit is being processed, and expected to be ready to bring forward by LSFR**

Interval Reset Requirements

- GO requested an OPO assessment of 6 OMRS interval and Time/Cycle requirements that will time-out before program completion and may not fit within current flow planning schedules
 - V30AB0.100 - 4.5Y - FWD RCS SURVAL INSP - FRCS Removal
 - V30GA0.030 - 4.5Y - BODY FLAP DTL INSP – Cove Area
 - V30KG0.060 - 4.5Y - RCC PNL DET INTL INSP - Full WLE Struc Inspection
 - V30LG0.060 - 4.5Y - RCC PNL DET INTL INSP - Full WLE Struc Inspection
 - V30KG0.065 - 3Y - LH WLE DETAILED EXT INSP – SAMPLING - 6 RCC Panel Struc Insp.
 - V30LG0.065 - 3Y - RH WLE DETAILED EXT INSP – SAMPLING - 6 RCC Panel Struc Insp.
- Preliminary OPO assessment
 - Actions put in place to Evaluate Extending the full WLE Inspection to 6 years, and perform sampling at less than 6 RCC Panels
 - Extensive Rework of the WLE across the fleet during RTF effort
 - Inspection, corrosion prevention, recoat of WLE Structure
 - Determine Inspection Capability per Standard flow If RCC must be removed for PRACA
 - FRCS Inspection performed at the time of FRCS Removal for Component Failure
 - Inspection Capability during a Standard Flow in work
 - Body Flap Structural Inspection – Determine sampling plan
 - Expect Actions complete and OPO Recommendations pending

OMDP Reset Requirements

- **Current 3 year/8 flight OMDP interval requirement does not support remaining flight manifest without test reset or interval increase**
 - **OV-103 - OMDP due in March 2008 (March 2005 OPF rollout after OMDP)**
 - 8 flights planned (including STS-114/121) with 38 flights total accumulated
 - **Other vehicles also will time out on the 3 yr requirement prior to completing their manifest**
- **SSM/PRT review initiated in 2006 to evaluate all 756 OMDP-coded OMRS requirements for potential interval extension**
 - **Included both subsystem and V31 (zonal insp) requirements**
 - **OPO directed team to evaluate 5.5 year/8 flight interval (based on current manifest plan to fly through 2010)**
- **Ground Ops requested the evaluation be completed prior to STS-122 (OV-103 SSPTS long flow) LSRR in October 2006**
 - **Best opportunity to complete requirements that are non-extendable prior to the March 2008 due date (based on 3 year time-out)**

OMDP Reset Requirements (cont.)

- **PRT reviews of the 756 OMDP coded requirements completed in mid-September based on groundrules established by OPO management**
 - Consistent documentation for each requirement applied across subsystems by developing detailed spreadsheet format
- **A series of Special OPO Tag-Ups were held to review PRT recommendations and detailed rationale in late September**
 - 693 subsystem requirements “ACCEPTABLE to extend” to 5.5 year interval
 - 34 zonal insp. (V31) requirements “ACCEPTABLE to extend” to 5.5 year interval
 - 29 subsystem requirements “NOT ACCEPTABLE to extend” past 3 year interval
 - 9 RCN’s associated with assigning a 8 flt / 3 yr effectivity to these requirements
- **List of 29 non-extendable requirements provided at October 5 PRCB**
 - Ground Ops preliminary agreement to work these requirements into OV-103 Flight 34 and/or Flight 35 flows
- **Implementation paperwork has been released for review**
 - CR to update NSTS 07700 Volume 3 to define new OMDP new interval of 8 flights and 5.5 years, for extendable requirements
 - OMRSD RCNs / Chits to change non-extendable requirements to specific flight/time intervals is in work

OMDP Reset Non-Extendable Requirements

SUBSYSTEM	OMRS REQMT	TITLE	DESCRIPTION
MECH Sep/Hatch	V59BA0.050	Y STAR TRACKER DOOR/PNL SEAL SURFACE INSP	Visual inspection of seal surface. Assures no evidence of damage to the star tracker door sealing surface.
MECH Sep/Hatch	V59BB0.050	Z STAR TRK DOOR/PNL SEAL SURFACE INSP	Same as V59BA0.050
PV&D	V05AN0.060-B	PURGE DUCT CHECK VALVE INSPECTION - AFT	Verifies purge circuit # 1 aft check valve open and close freely. Note: this partial has 3 valves - 2 valves for the OMS Pod 1 for the vertical stabilizer
PV&D	V05AN0.070	1307 BKHD CHECK VALVE INSPECTION	Verifies the 1307 bulkhead check valves open and close when required to ensure proper purging of the aft fuselage and vehicle compartmentation. Prevents possible transfer of hazardous fluids from one compartment to another, which may result in a flammable condition.
PV&D	V05AR0.015	ORB COMPARTMENT STRUCT LEAKAGE TEST (OV-103)	Ensures structural loads between compartment stay within acceptable limits. Prevents possible loss of crew and vehicle due to excessive structural loads resulting from an improper distribution of structural leakage area.
TPS	V09AW0.050	TPS SUBSTRATE CORROSION INSPECTION	Identifies integrity of structure under TPS <u>Consequence of non-performance:</u> Reduced structures margins with potential loss of TPS
ATCS	V63AF0.010	FCL 1 RAD FLOW CONTROL C/O (CONTR A)	FCL 1 Radiator controllers A/B auto and manual functional checkout.
ATCS	V63AF0.021	FCL 1 RAD FLOW CNTRL A FAULT DETECT C/O	Radiator flow controller automatic shutdown verification test.
ATCS	V63AF0.031	FCL 1 RAD FLOW CNTRL B FAULT DETECT C/O	Radiator flow controller automatic shutdown verification test.
ATCS	V63AF0.040	FCL 2 RAD FLOW CONTROL C/O (CONTR A)	FCL 2 Radiator controllers A/B auto and manual functional checkout.
ATCS	V63AF0.051	FCL 2 RAD FLOW CNTRL A FAULT DETECT C/O	Radiator flow controller automatic shutdown verification test.
ATCS	V63AF0.061	FCL 2 RAD FLOW CNTRL B FAULT DETECT C/O	Radiator flow controller automatic shutdown verification test.
ATCS	V63AH0.060	FES PRI A CONTROLLER FUNC TEST	Flash Evap Primary A controller functional verification test.

OMDP Reset Non-Extendable Requirements

SUBSYSTEM	OMRS REQMT	TITLE	DESCRIPTION
ATCS	V63AH0.063	FES PRI B CONTROLLER FUNC TEST	Flash Evap Primary B controller functional verification test.
ATCS	V63AN0.010	NH3 BOILER FLUSH	Flushes the NH3 heat exchanger with IPA to remove built up corrosive oil residue
HYD/WSB	V58AI0.005	LDG GR EXTEND ISO VLV INTERNAL LK CK	Verifies no excessive internal leakage of the Isolation Valve. Excessive leakage could cause loss of redundancy within the Landing Gear and NWS systems.
HYD/WSB	V58AI0.008	BRAKE ISOLATION VLV INTERNAL LK CK	Verifies no excessive internal leakage of the Isolation Valve. Excessive leakage could cause loss of redundancy within the Brake system.
Life Support	V61AQ0.020	CBN POS PRESS RELIEF VLVS (ITEM 1.1)	LRU test. Functional and leakage verification of vlv assembly
Life Support	V61AQ0.030	CBN NEG PRESS RELIEF VLV (ITEM 1.86)	LRU test. Functional and leakage verification of vlv assembly
Life Support	V61AT0.063	O2 REG RELIEF VALVE TEST (1.7)	Crack and reseal test for relief valve assembly.
Life Support	V61AT0.089	EMERG BREATH CK VLV LEAKAGE TEST	Check valve crack and reseal leakage verification
Life Support	V61AT0.091	EMERGENCY BREATHING SYSTEM REG C/O	Regulator assembly flow, lockup and leak check verification
Life Support	V61AW0.035	GN2 REG/REL VLV (1.25) (SYS 1 & 2)	Crack and reseal test for relief valve assembly.
Life Support	V64AC0.012	HATCH VERIFICATION	Test performs Hatch equalization valves function and leak check. Test also verifies the Hatch pressure gauge functions properly.
Life Support	V64AC0.026	CREW CABIN PURGE VALVE ASSY C/O	Test performs Crew Cabin Purge and Isolation valve internal leak and flow checks.
Life Support	V64AC0.050	EXT AIRLOCK NEG PRESS RELIEF VLVS C/O	LRU test. Functional and leakage verification of vlv assembly
Life Support (File II)	C00AB0.230004	HYDROGEN/WATER SEPARATOR	Clean the hydrogen separator at NSLD
MPS	V41AK0.050	750 HELIUM REGULATOR PRESSURE TRANSDUCER PERIODIC CALIBRATION	Records data to update actual calibration curves
OMS/RCS	V42BE0.130	VERNIER THRUSTER PC TUBE FLUSH	Water flush of thruster Pc tube to remove Fuel/Ox Reaction Products (FORP) to prevent Pc tube burnthrough.



Discovery STS-122

Launch Site Requirements Review

Space Shuttle Main Engine

02 November 2006

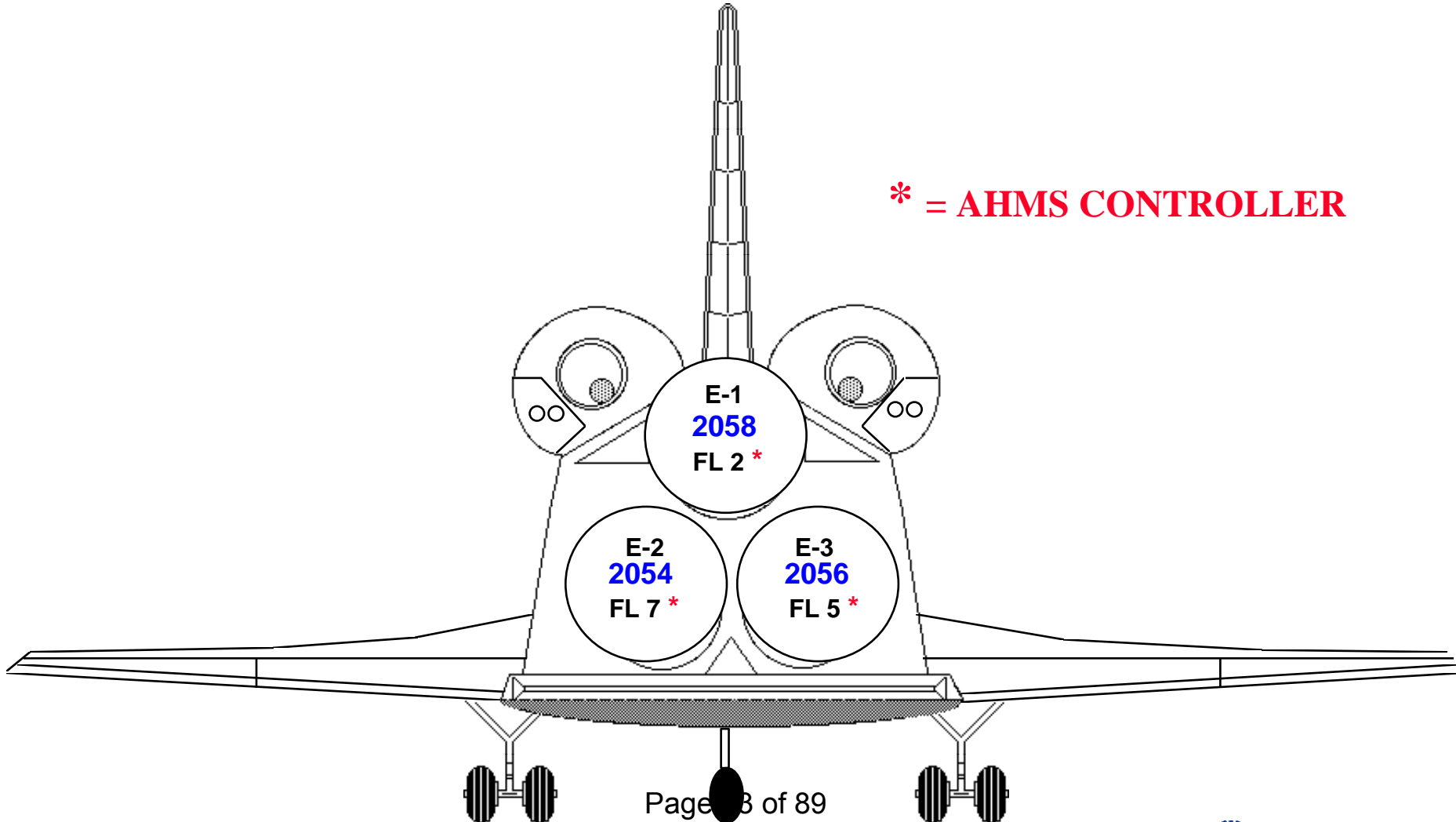
SSME- KSC
Greg Hite
(321) 861-4060



STS-122 Launch Site Requirements Review

Engine Allocation/Location

*** = AHMS CONTROLLER**



STS-122 Integrated Launch Site Requirements Review

Presenter
Stephen Reilly

Date
11-02-06

Backup Material

FRWG Presentation (With Minor Changes)



STS-122 Launch Site Requirements Review	Presenter MK-SIO / A. Swift	
	Date 11-02-06	Page 1

Mandatory RCNs:

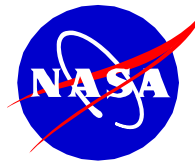
None

Non-Mandatory Value Added RCNs:

OV17212

V05 - OMDP INTERVAL EXTENSION

Preliminary

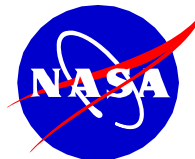


STS-122 (1E) LSRR

Flight Requirements Status

October 30, 2006

Ann M. Patterson, Lead MIM
James Flores, USA Flight Mgr.



STS-122 Documentation Status

Presenter **MO3/Ann M. Patterson**

Date **October 2006**

Page **2**

DOCUMENTATION

- MIP

- MIP - NSTS 21396 Baselined January 2004
 - CR # MIP21396-0002 Update MIP to Revision A Approved 27 Sept 2006

- eFRD

- Latest Revision: eFRD Basic, September 28, 2006
- Open CRs
 - No Open CRs



STS-122 Potential Changes/Threats

Presenter **MO3/Ann M. Patterson**

Date **October 2006**

Page **3**

Potential Changes/Threats

- **Cargo engineering assessing location/installation of EVA Cable Stowage Platform (ECSP)**
 - Interference when ICC-Lite moved aft to increase APM not discovered until week of 16 Oct 06
- **OBSS instead of Mini-boom**
 - Columbus PDGF will need to be removed from the Columbus Module for ascent
 - Impact to APM
 - Several options under assessment
 - PDGF on sidewall or in middeck or flown on prior flight and temp stowed on ISS
- **Potential ISS tasks could drive a 4th EVA**
 - NTA plans TBD
 - CMG plan TBD
- **Middeck**
 - 1 ESA rear breather powered middeck payload expected (MERLIN)
- **Mission duration extension**
 - 4th EVA
 - SSPTS capability vs power requirements

STS-122/322 Launch Site Requirements Review Flight Software Overview

Tom Stansel

PRCB 11/02/2006

STS-122 LSRR (FSW)

- **STS-122/OV-103 is the Second Scheduled Flight of Operational Increment (OI) 32 Flight Software (FSW)**
 - SASCBC SCR 98085D documents PASS and BFS OI 32 content
- **STS-122/OV-103 Flight Software Payload Support:**
 - ISS-1E
 - Orbiter Interface Unit (OIU)
 - Sequential Still Video (SSV)
 - Orbiter Docking System (ODS)
 - Trajectory Control System (TCS)
 - Assembly Power Converter Units (APCUs)
 - Station to Shuttle Power Transfer System (SSPTS)
- **Major New Flight Software Support Items:**
 - None

STS-122 LSRR (FSW)

- **STS-122 Source Changes/Edits for Primary Flight Software (Base)**
 - None
- **STS-122 Patch Implementation for Primary Flight Software (Base)**
 - None
- **STS-122 Patch Implementation for Backup Flight Software (Base)**
 - None

STS-122 LSRR (FSW)

- **Products**

- **STS-122/OV-103 Base software production schedule (available to field)**
 - **Shuttle Data Tape** April 3, 2007
 - **Mass Memory Unit Contents** April 17, 2007
- **STS-122/OV-103 Ascent/Entry flight specific I-Load DCRs are scheduled for SASCB approval on** June 28, 2007

- **STS-322/OV-103 deliveries will consist of the STS-122 Base SDT/Mass Memory, STS-322 Flight Specific I-Loads and post call-up changes if required**
 - **STS-322 Flight Specific I-Load patches**
 - **Other mandatory changes**

- **Concerns/Issues**

- **There are no known issues or concerns with Flight Software in supporting STS-122 or STS-322**

BACKUP

- **Mod Record and MECSLSI Updates**
- **Engineering, Hardware and Certification Status**
- **Mandatory Mod - details**
- **Opportunity Mods - details**
- **Potential Mods – details**
- **TPS /Structures Requirements**

Mod Record and MECSLSI Updates

MCR NO.	MCR TITLE	KIT/ MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
Mandatory Mods				
19789	<p>Shuttle-Station Power Transfer System (SSPTS) Station-Shuttle Power Transfer System (SSPTS) modifications and mission kits will provide the capability to convert 120 Vdc International Space Station (ISS) secondary power to 28 Vdc Orbiter power to supplement Orbiter fuel cell power to provide increased ISS docked mission duration. The SSPTS also provides the capability for converting 28 Vdc Orbiter power to 120 Vdc in support of Shuttle payloads.</p>	<p>VK70-347413-001,0103,0 - Mid fuselage structure and wiring supports for SSPTS VK70-360312-001,0103,0 - TCS modifications to accommodate SSPTS VK70-360312-002,0103,0 - Additional TCS modification kit parts VK70-704022-001,0103,0 - Mid fuselage & crew module avionics & panels modifications VK70-730481-001,0103,0 - Crew module D&C panels A12 & A15 modifications VK70-773363-001,0103,0 - Crew module harness intl VK70-774353-001,0103,0 - Crew moduel, mid, aft wiring instl VK70-775373-001,0103,0 - Aft fuselage harness instl K828-341013-001,0002,0 - Kit parts for payload bay support longeron K828-774353-001,0002,0 - ODS/airlock wiring mission kit mod TCTIM3419789REF.0001,0 - Transfers fluid longeron from MV0766A mission kit to orbiter to support SSPTS K845-346631-001,0001,1 - Kit contains hardware for M072-340087 for all vehicles - seq 1 will cover usage for OV-103</p>	<p>M072-340175-001 Adds additional support fittings to existing bay 2 port side fluid longeron supports (MV0828A) M072-340084-007 Adds support brackets to Xo807 & X0863 frames to support added SSPTS wiring (MV0845A) M072-341828-028 External airlock config with SSPTS mods (MV0828A) M072-367000-032 TCS partial liner config with SPTS mods to Xo576 bulkhead (MV0532A) M072-784633-015 Adds config/Views for SSPTS cross-ship wiring at Xo863 frame (MV0426A MADS) M072-794011-048 Adds config / views for SSPTS cross-ship wiring at Xo863 & Xo807 frames (MV0525A Tank Set 4) M072-794031-026 Adds config / views for SSPTS cross-ship wiring at Xo576 bulkhead, Xo863 & Xo807 frames (MV0544A Tank Set 3) M072-794051-051 SSPTS wiring at Xo863 frame and bay 5 shelf 6 (MV0566A Tank Set 5) M072-794090-001 PTU interconnect harness bay 5 LH shelf 6 (MV0712A) M072-794746-004 Orbiter sidewall & sill to external airlock harness instl (MV0828A)</p>	MECSLSI update required

Mod Record and MECSLSI Updates

MCR NO.	MCR TITLE	KIT/ MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
Mandatory Mods				
19810	AMEC/EMEC SMIA Mounting Nut Mod Replaces five nuts, used to mount the serial multiplexer interface adapter (SMIA) sub-module to the multiplexer interface adapter (MIA) module or parent assembly, with smaller diameter nuts to properly fit into their respective SMIA cutout or counterbore. OV-103 hardware modified during fit 31 flow by restricted MR will be replaced by released engineering - 'paper modification' less replacement of the re-ID labels for the internal module and external LRU. (ref PR EPD-3-31-1588 & PR EPD-3-31-1590)	TCTIV7019810REF.0103.0 - MEC SMIA mounting nut mod	No Tech Order Impact	No MECSLSI Impact
23420	0-Gauge Wire Protection for Lower Midbody Wire Tray Implements corrective actions to eliminate damage to 0-gauge harnesses from milson fasteners on wire tray covers and tray clamp fasteners in the Orbiter lower midbody wire trays.	TCTIV3423420REF.0103.0 - Wire tray structure related mod VK70-794137-001, 0103.0 - Wire harness routing and clamping mod VK70-794137-002, 0103.0 - Additional misc bolt & nut kit hardware	No Tech Order Impact	No MECSLSI Impact
23448	ECO Sensor System Instrumentation Implements voltage measurements for all four MPS ECO LO2 and LH2 Sensor Transducer Circuits to provide insight into ECO sensor system performance anomalies.	TCTIV3523448REF.0103.0 - ECO Sensor Av Bay 5 & 6 instrumentation rewire (structures tree-up drawings) TCTIV7023448REF.0103.0 - ECO Sensor DSC mod TCTIV7723448REF.0103.0 - ECO Sensor Av Bay 5 & 6 instrumentation rewire	No Tech Order Impact	No MECSLSI Impact

Mod Record and MECSLSI Updates

MCR NO.	MCR TITLE	KIT/ MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
Opportunity Mods				
19546	Inboard Elevon Drain Hole Relocation Elevon structural drain hole will be relocated from the side of the elevon to the top of the elevon. The old drain hole tile will be replaced with a "normal" tile	TCTIV1919546.0103.0 - Modification of inboard elevon tile for relocated drain hole VK70-100048-001.0103.0 - Structural mod to relocate elevon drain hole	No Tech Order Impact	No MECSLSI Impact
19735	WLE Spar "Sneak Flow" Protection Implements partial deferral of remaining Non-RTF mandatory panels (1-4)	TCTIV1019735REF.0103.2 - Front Spar protect for sneak flow - Structures (Panels 1-4) TCTIV1919735REF.0103.2 - Front Spar protect for sneak flow - TPS/RCC (Panels 1-4)	No Tech Order Impact	No MECSLSI Impact
19743	BRI-18 TPS Hardening - MLG Door Implements TUFI-coated BRI tile on an attrition basis for the MLGD periphery tile locations.	SUB-EO-19743.0103.0 - MLGD TPS Hardening Substitution	No Tech Order Impact	No MECSLSI Impact Note: Mod record is authorized attrition mod and require no additional program authorization.
19755	RMS MPM Pedestal Over-Center Stops New Boeing stops to replace GFE stops on RMS MPMs (Shoulder, FWD, MID and AFT locations) due to potential that mission unique loads will exceed MPM over-center mechanism capability.	VK82-544010-003.0005.1 - RMS MPM Pedestal Over-Center Stops	M072-544501-087 (Ref) Mod config established at -045 Config waiver taken at fit 33 for unworked dash numbers prior to -087 (MV0082A)	No MECSLSI update required from STS-116 configuration
19763	Lower WLE Carrier Panel Horse Collar Gap Filler Redesign Implements partial deferral of remaining Non-RTF mandatory panels (1-4).	TCTIV1919763REF.0103.2 - WLE Horse Collar Redesign (Panels 1-4)	No Tech Order Impact	No MECSLSI Impact
19874	BRI-18 TPS Hardening - Other Vehicle Areas Implements TUFI-coated BRI tile which is tougher than the current RCG-coated LI-2200 and FRCL-12 tiles. This MCR authorizes implementation on an attrition basis for the NLGD periphery, ET Door periphery, Window (1-6) carrier panels and lower LESS Carrier Panel locations.	SUB-EO-19874.0103.0 - NLG Door BRI-18 Hardening (SUBST) SUB-EO-19874.0103.1 - LESS Carrier Panel BRI-18 Hardening (SUBST) SUB-EO-19874.0103.2 - W1-6 Carrier Panel BRI-18 Hardening (SUBST) 019874.0103.3 - Placeholder for ET Door Perimeter BRI-18 Hardening (SUBST) - Not authorized for implementation at this time	No Tech Order Impact	No MECSLSI Impact Note: Mod record sequences 0, 1 & 2 are authorized attrition mods and require no additional program authorization. Mod record sequence 3 requires OPO and program attrition authorization

Mod Record and MECSLSI Updates

MCR NO.	MCR TITLE	KIT/ MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
Opportunity Mods				
23227	Connector Saver Redesign Redesigned connector savers (ME414-0630) to reduce risk of inadvertent demate during use. Implementation at remaining unworked locations (OMS Pod and Ku-Band) as Opportunity.	VK70-795153-001,0103,1 - Vehicle Conn. Saver Redesign (Ku-Band) K598-430013-001,0011,1 & K598-430013-002,0011,1 - LP01 OMS Pod Conn. Saver Kits K598-430014-001,0023,1 & K598-430014-002,0023,1 - RP03 OMS Pod Conn. Saver Kits	No Tech Order Impact	No MECSLSI Impact
23411	Aft Freon Coldplate Loop Filters Adds filters to the Freon Aft Cold-plate (ACP) Network to minimize the risk of flow blockage due to contamination to this network of coldplates.	VK70-635308-001,0103,0 - ECLSS filter & line modification VK70-854103-001,0103,0 - Structures supports for filter	No Tech Order Impact	No MECSLSI Impact
23467	WCS Configuration Change (CFE) Revises WCS dash number to the latest Hamilton Sundstrand WCS1000-25 configuration installed by Boeing installation drawing, V070-623002 to reflect WCS part number change.	023467,0103,0 - WCS-25 configuration installation placeholder	No Tech Order Impact	No MECSLSI Impact
Authorized Non-Flight Specific / Attrition Mods for Implementation				
19618	Wire Tray Riser Removal (Partial) Removes the risers in the bottom of the wire trays. Adds protective Teflon sheeting at inter-tray gaps. Opens up EMI barrier Cutouts and adds grommets on sharp edge. Replaces torque set screws with hi-Loks. Adds protective coating on payload wire tray cover Milson fastener receptacles.	VK70-340023-001, 0103,1 - Wire tray structures mod engineering & hardware TCTIV7919618REF,0103,0 - Wiring installation changes	No Tech Order Impact	No MECSLSI Impact Authorized as non-flight specific by PRCBD S115114AC.
19546	Inboard Elevon Tile Enhancement (Hub Tile Mod) Replaces 2 hub tiles on the inboard elevon area with a single, more robust tile / tile design (Attrition).	SUB-EO-19546,0103,0 - New Inbd Elevon Hub Tile (Substitution)	No Tech Order Impact	No MECSLSI Impact Authorized as attrition by PRCBD S086425DB

Mod Record and MECSLSI Updates

MCR NO.	MCR TITLE	KIT/ MOD RECORD & DESCRIPTION	TECH ORDER IMPACT	REMARKS
Potential Mods				
23440	MCR 23440 Lexan Covers for Pressure Panes Implements polycarbonate window shields on aft and overhead Orbiter pressure pane interior surface to reduce risk of window breakage.	<u>VK70-331593-001,0103,0</u> - Lexan protective covers for aft & overhead windows	No Tech Order Impact	No MECSLSI Impact
23452	Fiducial Markings on WLE RCC T-Seals Implements fiducial markings on wing leading edge T-seals 6-11 and nose cap reinforced carbon-carbon (RCC) to facilitate on-orbit imagery X-Y-Z coordinate location identification on RCC inspection areas of interest.	<u>023452.0103.0</u> - Placeholder for RCC T-seal and nose cap engineering for application of Sharpie marking	No Tech Order Impact	No MECSLSI Impact
23455	Mini-Boom System The MiniBoom is a follow-on inspection system to the Orbiter Boom Sensor System (OBSS). It is a boom-based inspection system with the same mechanical and electrical interfaces as the OBSS, except the MiniBoom is about half the length of the OBSS and it spans two Manipulator Positioning Mechanisms (MPMs) rather than three.	<u>023455.0103.0</u> - Mini-Boom system placeholder	Tech Order Impact to be defined - New mini-boom T/O - MPM Instl T/O - MPM Wire Harness T/O - Camera suite T/O - Grapple fixture/hand rail T/O	MECSLSI updates required - TBD

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Mandatory Mods										
19789 Lee	<p>Shuttle-Station Power Transfer System (SSPTS)</p> <p>Station-Shuttle Power Transfer System (SSPTS) will provide the capability to convert 120 Vdc International Space Station (ISS) secondary power to 28 Vdc Orbiter power to supplement power from the Orbiter fuel cells for Orbiter electrical loads, thereby providing increased on-orbit docked mission duration with the ISS. The SSPTS also provides the capability for converting 28 Vdc Orbiter power to 120 Vdc to feed power to Shuttle payloads. Includes development, delivery and integration of the following: ISS Jumpers provided by Space Station; Routes 120 Vdc SSPTS input power from the ISS Remote Power Controller Modules to the existing APAS 'X' connectors; Power Transfer Units (PTUs) for Shuttle provided by Pratt & Whitney Rocketdyne to converts 120 Vdc power from the ISS to 28 Vdc power for use by the Orbiter and converts 28 Vdc Orbiter power to 120 Vdc for use by the Shuttle payloads;</p> <p>Orbiter Mod Kits (wiring, structures, switches, contacts & misc hardware) provided by Boeing used to route the 120 Vdc input power from the APAS 'X' connectors thru the Orbiter to the PTUs, route 28 Vdc output power from the PTU to the Orbiter Main Distribution Control Assembly (MDCA), route 120 Vdc output power from the PTU to the Shuttle payloads, and enables modification to Orbiter A15 Panels and MDCAs.</p>	Released	N/A	Delivered (4a) March'07 (4b) 12/1/06 (4c)	N/A	(4)	7/6/06 A 7/6/06 A 9/26/05 A 5/11/06 A 1/15/07 P	TBD TBD TBD TBD 2/26/07 P	CR 09-367000-001Y CAR 15-09-367000-001Y (TCS cert) CR 21-409-0547-0010 CR 21-409-0547-0010 errata CAR 01-21-409-0547-0010 (Power Transfer Unit)	(4a) Boeing mod kit hardware delivered (4b) PTU units 3 & 4 delivery (4c) GSE Output Over-voltage Tester (OOVT) delivery 12/1/06 (4) Go for scar / wiring installation. Currently No Go for PTU pending completion of qual testing (11/21/06) and DCR (mid-Jan 2007) Note: checkout for initial implementation flows will be by Chit - ERD Dec 2006

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Mandatory Mods										
19810 Rodriguez	AMEC/EMEC SMIA Mounting Nut Mod Replaces five nuts, used to mount the serial multiplexer interface adapter (SMIA) sub-module to the multiplexer interface adapter (MIA) module or parent assembly, with smaller diameter nuts to properly fit into their respective SMIA cutout or counterbore. Corrective action for condition found during final inspection following repair of AMEC S/N 4. MC450-0016-0009 revised to MC450-0016-0029 for AMEC and MC450-0016-0007 revised to MC450-0016-0027 for EMEC (interchangeability for OV-103). OV-103 hardware modified during flt 31 flow by restricted MR due to lead time required to implement design change via vendor engineering. This will be a 'paper modification' closing the work performed by MRs (less replacement of the re-ID labels for the internal module and external LRU - ref PR EPD-3-31-1588 & PR EPD-3-31-1590) to the design engineering.	Released	N/A	N/A (27)	N/A (27)	Go	6/17/05 A	2/13/06 A	CR 21-450-0016-0009C CAR 02-21-450-0016-0009C	(27) Modified nuts already installed - MR documentation to be replaced by mod engineering ('paper modification') only less application of SRU / LRU, ID labels provided by vendor to Logistics. Note: Plan is to combine implementation of this mod with LRU recycle to NSLD for tin whisker mitigation by chit J6165. SRU tin eyelets will be embedded with RTV.
23420 Antonios	0-Gauge Wire Protection for Lower Midbody Wire Tray Implements corrective actions to eliminate damage to 0-gauge harnesses from milson fasteners on wire tray covers and tray clamp fasteners by primarily rotating harness bundle clamps to provide additional clearance to tray cover fasteners and adding chafe protection as required. Works with MCR 19618 Wire Tray Riser Removal to eliminate wire tray risers at some locations to prevent wire harness crowding and associated tray cover bulging.	Released	N/A	Delivered	N/A	Go	N/A	N/A	N/A	Partial implementation likely as dictated by specific wire tray condition and impacts of implementing Wire Tray Riser Removal and SSPTS.
23448 Antonios	ECO Sensor System Instrumentation Implements voltage measurements for all four MPS ECO LO2 and LH2 Sensor Transducer Circuits to provide insight into ECO sensor system performance anomalies. In the event of recurrence, the added measurements will help identify the source and type of the anomaly in the Point Sensor Transducer circuits. However, the added voltage measurements will not be able to differentiate between the ET and Orbiter wiring/transducer anomalies. The Point Sensor Checkout System combined with the added voltage measurements provides tools to assist in allowing deviation of the Launch Commit Criteria which presently requires 4 of 4 ECO sensors to not be indicating dry. In addition, these measurements allow real time discernment of failed wet ECO sensors during ascent.	Released (6) 12/14/06 (7)	10/20/06 (6)	N/A (8) N/A	N/A (8) N/A	Go	1/19/07 P 1/19/07 P 12/15/06 P 12/15/06 P	3/2/07 P 3/2/07 P 2/2/07 P 2/2/07 P	CR 21-770000L CAR 10-21-770000L (Avionics cert) CR 03-350013-001 CAR 168-350013-001 (Structures cert)	Ref OCRD S165037 (6) Avionics/electrical implementation released all released (7) Upper level avionics and structures accum / tree-up drawings release (8) Parts (wiring / splices) available on site

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Authorized Non-Flight Specific / Attrition Mods for Opportunity Implementation										
19618 Antonios	Wire Tray Riser Removal (Partial) To be worked as a partial mod with MCR 19789 SSPTS and MCR 23420 0-Gauge Wire Protection implementation. Removes the risers in the bottom of the wire trays; adds protective Teflon sheeting at inter-tray gaps; opens up EMI barrier cutouts and adds grommets on cutout edges; replaces torque set screws with hi-Loks; adds protective coating on payload wire tray cover Milson fastener receptacles.	Released	N/A	Delivered	N/A	Go	N/A	N/A	N/A	Authorized as non-flight specific by PRCBD S115114AC
19546 Barnum	Inboard Elevon Tile Enhancement (Hub Tile Mod) Replaces 2 hub tiles on the inboard elevon area with a single, more robust tile / tile design.	Released	N/A	N/A (16)	N/A	Go	7/18/01 A	9/26/01 A	CAR 25-07-190001-001U	(16) Parts to be fabricated at KSC Attrition authorized PRCBD S086425DB
Opportunity Mods										
19546 Barnum	Inboard Elevon Drain Hole Relocation Elevon structural drain hole will be relocated from the side of the elevon to the top of the elevon. The old drain hole tile will be replaced with a "normal" tile. Provides a new RTV drain plug which will allow drainage and prevent rain water intrusion into the drain hole and elevon cavity (new RTV drain plug authorized under MCR 23422 with engineering released under MCR 19546 mod codes).	Released	N/A	Delivered (1)	N/A	Go	7/18/01 A	9/26/01 A	CAR 25-07-190001-001U	(1) Design center provided kits delivered. Drain hole plug to be fabricated on-site at KSC
19735 Barnum	WLE Spar "Sneak Flow" Protection Implements partial deferral of remaining Non-RTF mandatory panels (1-4)	Released	N/A	N/A (2)	N/A	Go	10/6/04 A 10/6/04 A 10/6/04 A	6/16/05 A 6/16/05 A 6/23/05 A	CR 08-199200-003T CAR 39-08-199200-003T CAR 146-05-100004-002J	(2) Hardware provided by KSC Back-Shop.

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Opportunity Mods										
19743 Barnum	<u>BRI-18 TPS Hardening - MLG Door</u> Implements TUF1-coated BRI tile which is tougher than the current RCG-coated LI-2200 and FRCL-12 tiles. This MCR authorizes implementation on an attrition basis for the MLGD periphery tile locations.	Released	N/A	See Remarks (17)	See Remarks (17)	Go	10/13/05 A 10/24/05 A 01/25/06 A 9/1/06 A	5/03/06 A 5/03/06 A 5/03/06 A 12/1/06 P	CR 07-190001-001X CAR 28-07-190001-001X CAR 29-07-190001-001X CAR 30-07-190001-001X	(17) Current authorization provides 160 billets of BRI-18 material per vehicle & 50 containers of TUF1/Slurry under MCR 19743, which also will be used to cover attrition implementation under MCR 19874. As of 10/6/06, 440 of the 480 total billets and all 50 containers of slurry have been delivered with remaining 40 billets to be delivered by end of October 2006. Will require billet allocation and final KSC backshop fabrication prioritization based on vehicle attrition needs. Full 17 mission cert submitted by CAR 30 September 2006
19755 Riley / Bacon	<u>RMS MPM Pedestal Over-Center Stops</u> New Boeing stops to replace GFE stops on RMS MPMs (Shoulder, FWD, MID and AFT locations) due to potential that mission unique loads will exceed MPM over-center mechanism capability	Released	N/A	Delivered	N/A	Go	6/9/06 A	6/13/06 A	CAR 08-44-000002-001K	Requirement for new stops dependent upon flight specific loads analysis, completed late in the flow per loads analysis template.
19763 Barnum	<u>Lower WLE Carrier Panel Horse Collar Gap Filler Redesign</u> Implements partial deferral of remaining Non-RTF mandatory panels (1-4)	Released	N/A	N/A (3)	N/A	Go	10/6/04 A 10/6/04 A	6/16/05 A 6/16/05 A	CR 08-199200-003T CAR 39-08-199200-003T	(3) Hardware provided by KSC Back-Shop.

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Opportunity Mods										
19874 Barnum	BRI-18 TPS Hardening - Other Vehicle Areas Implements TUF-coated BRI tile which is tougher than the current RCG-coated LI-2200 and FRCL-12 tiles. This MCR authorizes implementation on an attrition basis for the NLGD periphery, ET Door periphery, Window (1-6) carrier panels and lower LESS Carrier Panel locations.	Released	N/A	See Remarks (17)	See Remarks (17)	Go	3/06/06 A 3/06/06 A 9/1/06 A	5/21/06 A 5/21/06 A 12/1/06 P	CR 07-391001-001AB CAR 33-07-391001-001AB CAR 34-07-391001-001AB	NLG Door Portion of Mod (17) - Applies to all MCR 19874 material deliverables. Current authorization provides 160 billets of BRI-18 material per vehicle & 50 containers of Tufi/Slurry under MCR 19743, which also will be used to cover attrition implementation under MCR 19874. As of 10/6/06, 440 of the 480 total billets and all 50 containers of slurry have been delivered with remaining 40 billets to be delivered by end of October 2006. Will require billet allocation and final KSC backshop fabrication prioritization based on vehicle attrition needs. Full 17 mission cert submitted by CAR 34 September 2006
		Released (18)	N/A	See Remarks (17)	See Remarks (17)	Go	8/25/06 A 10/30/06 P	11/2/06 P 11/15/06 P	CR 08-199200-003U CAR 40-08-199200-003U CAR 41-08-199200-003U	Lower WLE Carrier Panel Portion of Mod (18) All 14 drawings including tree-up released. Cert submittal covers full 17 flight certification - 'Go' implementation based on completed sequence of environment cycle testing (report released 8/18/06) and additional vehicle area specific analysis. CAR revision to be submitted to document updated environments in the aero thermal analysis.
		Released (19)	N/A	See Remarks (17)	See Remarks (17)	Go	11/3/06 P 11/3/06 P	12/15/06 P 12/15/06 P	CR 07-391001-001AC CAR 35-07-391001-001AC	Window Carrier Panel Portion of Mod (19) All engineering released 7/28/06 due to ground ops request for re-prioritization. Cert submittal covers full 17 flight certification - 'Go' implementation based on completed sequence of environment cycle testing (report released 8/18/06) and additional vehicle area specific thermal analysis.
		11/28/06 (20)	TBD	See Remarks (17)	See Remarks (17)	No Go (8)	~12/21/06 P	~1/12/07 P	CR 07-395001-001X CAR 28-07-395001-001X	ET Door Perimeter Portion of Mod (20) 4 test arrays completed 10/6/06 in support of ice impact testing at SWRI in late October - ECD for preliminary evaluation of test results early November, 2006. Engineering release consists of 2 working level drawings and 1 tree-up and will commence dependent upon testing results.

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Opportunity Mods										
23227 Antonios	Connector Saver Redesign Redesigned connector savers (ME414-0630) provide proper interfacial seal and wavy washer engagement retention force to reduce risk of inadvertent demate during use. Implementation at remaining unworked locations (OMS Pods and Ku-Band) as Opportunity.	Released	N/A	N/A	N/A	Go	10/11/05 A 10/11/05 A	3/17/06 A 3/17/06 A	CR 21-770000K CAR 08-21-770000K	Non-implementation will require inspection of existing connector savers and tape
23411 Antonios	Aft Freon Coldplate Loop Filters Adds filters to the Freon Aft Cold-plate (ACP) Network to minimize the risk of flow blockage due to contamination to this network of coldplates. The filters will be installed in both freon loops between the FES tee and the flow meters and will be supported by new structural brackets. The filter has a greater capacity than other 25 micron filters and hence will not add additional periodic maintenance. The filters are off-the-shelf filters from Wintec LLC. Flow restriction due to contamination has occurred twice, both times resulting in significant impacts: STS-109 with near early mission termination & OV-103 post J3 OMM with 9 months of extensive, invasive vehicle inspection and hardware replacement. An off-the-shelf 25 micron filter will be used, built by the current supplier for many Shuttle filters.	Released	TBD	11/15/2006 (23)	11/15/2006 (23)	No- Go (24)	11/10/06 P 11/10/06 P	1/5/07 P 1/5/07 P	CR 24-635100-001H CAR 06-24-635100-001H	(23) Structures kit delivered, 11/15/06 for ECLSS kit. (24) Hardware certification to be by analysis & test - delta qualification for Shuttle vibration environment is required and due to be complete by vendor 10/25/06. Waiver for OVEI requirement of 30 mission cycles will be required as qual test / cert will be for 10 mission cycles (end of program cost & schedule considerations) Mod has no effect on Software, LCC, OMRSD, Flight Rules
23467 Bacon	WCS Configuration Change (CFE) Revises WCS dash number to WCS1000-25 with the following changes: a. Change vendor on dual vane compactor material webbing (new vendor qualification). b. Change WCS commode stave heat shrink material. c. Revise Check Valve gasket and o-ring seat material, check valve lubricant, revise poppet material specification. d. Add back shells to all Fan separators. e. Provides heel cups and inner & outer straps for the WCS foot restraint. Requires update to Boeing installation drawing, V070-623002 to reflect WCS part number change.	11/17/06 (14)	TBD	TBD (15)	TBD	TBD (15)	TBD (15) 11/29/06 (14)	TBD (15) 1/24/07 (14)	TBD (15) USA Cert CR 23-623000-001G CAR 06-23-623000-001G (14) Boeing Cert	(14) Installation drawing & certification is Boeing responsibility - Instl EO by 11/3/06, tree-up 11/17/06 (15) WCS hardware delivery and certification is USA CFE responsibility

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Potential Mods										
23440 Munoz	MCR 23440 Lexan Covers for Pressure Panes Implements polycarbonate window shields on aft and overhead Orbiter pressure pane interior surface to reduce risk of window breakage. Hazard Report ORBI-009 indicates that failure of the Orbiter Crew Module pressure panes, due to on-orbit impact, may lead to failure of redundant panes that may cause loss of crew & vehicle. Installation training to occur at JSC mockup trainer.	10/30/06 (25)	TBD	12/8/06	TBD	No Go (26)	12/1/06 P 12/1/06 P 12/1/06 P 12/11/06 P	1/19/07 P 1/19/07 P 1/19/07 P 1/19/07 P	CR 04-331701-001F CAR 103-04-331701-001F (rear windows) CR 04-331551-001F CAR 103-04-331551-001F (aft windows)	OCRD S165021A targets flight 33 target implementation - will require revision. (25) MAO spec released - window assy drawings ECD 10/30/06 - final instl drawing 11/2/06 (top accum dwgs 11/15/06) (26) Development testing is required to be completed prior to proceeding with vehicle implementation (window optical & thermal properties, process to join covers to the window pressure panes). Completion of development testing and OPO approval of implementation is mid October. Certification will be based on optical, thermal, pressure, and compatibility testing. OMRS & Hazard Report updates required
23452 Azama	Fiducial Markings on WLE RCC T-Seals Implements fiducial markings on wing leading edge T-seals 6-11 and nose cap reinforced carbon-carbon (RCC) to facilitate on-orbit imagery X-Y-Z coordinate location identification on RCC inspection areas of interest. Will enable more accurate and expeditious coordinate location identification for inspection and damage assessment activities. Implementation requires successful completion of RCC coupon material compatibility testing and chemical analysis of Sharpie ink marking, radiant heating (ascent) testing and X-Ray diffraction & electron microscopy of marked RCC area cross sections.	1/31/2007 (9a)	TBD	N/A	N/A	No Go (9)	2/20/07 P (9a) 2/20/07 P (9a)	4/3/07 P 4/3/07 P	CAR 41-08-199200-003T (WLE T-Seal cert) CAR 37-08-399200-001R (Nosecap cert)	OCRD S165045A approved 9/18/06 authorizes flight 34 implementation. Effort includes material testing, certification, specification change, drawing changes. (9) Remaining qual testing involves performing multi-mission arc jet effects testing (ECD early Dec 2006) and cross sectional analysis of the Sharpie marked RCC subjected to multi-mission arc jet test (ECD mid Jan 2007). Summary of test results will be evaluated for a Go/No Go decision. (9a) Product delivery dates have moved out due to slip in availability of JSC Arc Jet facility to run multi-mission marking test. Dates noted are estimates only based on assumed start of arc jet testing.
23455 Lee / Ferrera	MiniBoom System The MiniBoom is a follow-on inspection system to the Orbiter Boom Sensor System (OBSS). It is a boom-based inspection system with the same mechanical and electrical interfaces as the OBSS, except the MiniBoom is about half the length of the OBSS and it spans two Manipulator Positioning Mechanisms (MPMs) rather than three. Additionally, the MiniBoom has a fixed array of digital cameras rather than video and laser sensors. MiniBoom is being developed as a work-around for STS-122/1E (and STS-123/1J/A & STS-124/1J) since the OBSS can not be manifested due to interferences or unacceptable clearances between the boom and the ISS cargo elements.	3/01/07 (10) 5/01/07 (11)	3/01/07 (10) 5/01/07 (11)	3/1/07 (12a) 6/25/07 (12b)	TBD	No Go (13a)	2/16/06 P 8/16/07 P (13b)	3/28/06 P 8/28/07 P (13b)	CR 44-000002-001L QSA 04-44-000002-001L	All dates reflect preliminary schedule information. (10) MPM instl tech order / rigging spec (No wiring mods) (11) All other tech orders (12a) Boeing MPM kit delivery (12b) First mini-boom end item delivery to KSC (13a) PRCB for approval to proceed with MiniBoom project 10/26/06 - JPRCB 10/30/06. (13b) Tentative QSA date (supporting engineering test & analysis thru 8/15/07) OMRS, OVEI, SODB Updates 5/1/07

Engineering, Hardware and Certification Status

MCR NO.	MCR 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
Potential Mods - Required for STS-322 LON										
19760	Recumbent Seat Kit Seat 8 Rail Assembly Modifies Recumbent Seat Kit (RSK) Seat 8 rail assemblies to adapt to vehicle-to-vehicle variations during crew on-orbit installation. Modified the design of the recumbent seat 8 rail assembly installation to provide better alignment with the middeck floor attach provisions and easier installation of the rail assembly Eliminates installation difficulties due to vehicle-to-vehicle variations during crew on-orbit installation STS-322 LON ONLY FOR FLIGHT 34	Released	N/A	N/A	N/A	Go	6/29/04 A	5/4/05 A	03-25-39129802-301C	Required for ISS crew return mission with 8th crew member or LON. CCCD Mission Equipment item: M072-660865-009 replaces -010 (MV0865A) M072-660865 C03 rel'd 5/27/04
19798	LON Crew Rescue Recumbent Pallet System No vehicle mods - pallet is manifested due to LON mission requirement. STS-322 LON ONLY FOR FLIGHT 34	Released	N/A	Delivered	N/A	Go	10/5/05 A	4/11/06 A	25-932-660100-001A	Hardware ready to support OV-104 STS-300 or STS-301 LONs CCCD Mission Equipment Item M072-660932-002 (ADD for OV-103) (MV0932A)

19743 TPS Hardening (BRI-18 tile) – MLGD Perimeter Location

Implements TUF-1-coated BRI-18 tile which is a direct drop-in replacement for current RCG-coated LI-2200 and FRCI-12 tiles. Tile has been under development for the past several years and is tougher (~78% more impact tolerant) than the current tiles.

This MCR covers MLGD perimeter location (structure and door side) and is engineered with Attrition effectivity (install only as required for tile replacement).

19874 TPS Hardening (BRI-18 tile) – Other Locations

Implements BRI-18 tile on NLGD perimeter, LESS Carrier Panel and Window 1-6 Carrier Panel locations. Implementation on ET Door perimeter location is currently under review.

This MCR will also be engineered with Attrition effectivity (install only as required for tile replacement).

19735 WLE Spar “Sneak Flow” Protection

Increases RCC panel damage tolerance by adding a flow restrictor to limit allowable plume flow to 50% across the flow restrictor. Also adds protection to the exposed lower 2” of the WLE spar to protect against hot gas sneak flow convective heating conditions in the event of a 0.25” hole in the lower RCC surface.

Panels 5-22 are complete, 1-4 left to be worked

19763 Lower WLE Carrier Panel Horse Collar Gap Filler Redesign

Redesigns the lower WLE access carrier panel horse collar gap fillers with an enhanced design with additional sleeving

Damage to the lower access carrier panel tile could allow hot gases into the WLE cavity - redesign is expected to increase heating contingency margins in the event of a partial carrier panel tile loss.

Panels 5-22 are complete, 1-4 left to be worked

23227 Connector Saver (ME414-0630) Redesign

Connector savers have been found in the fleet with incorrect interfacial seal and retention force too low to insure proper locking following installation. Remaining implementation locations for this mod include OMS Pod interface and Ku-Band (T-0 and ET Umbilical Monoball locations implemented during STS-114 flow).

Connector Saver mod approved to provide proper interfacial seal and wavy washer engagement retention force to reduce risk of inadvertent demate during use

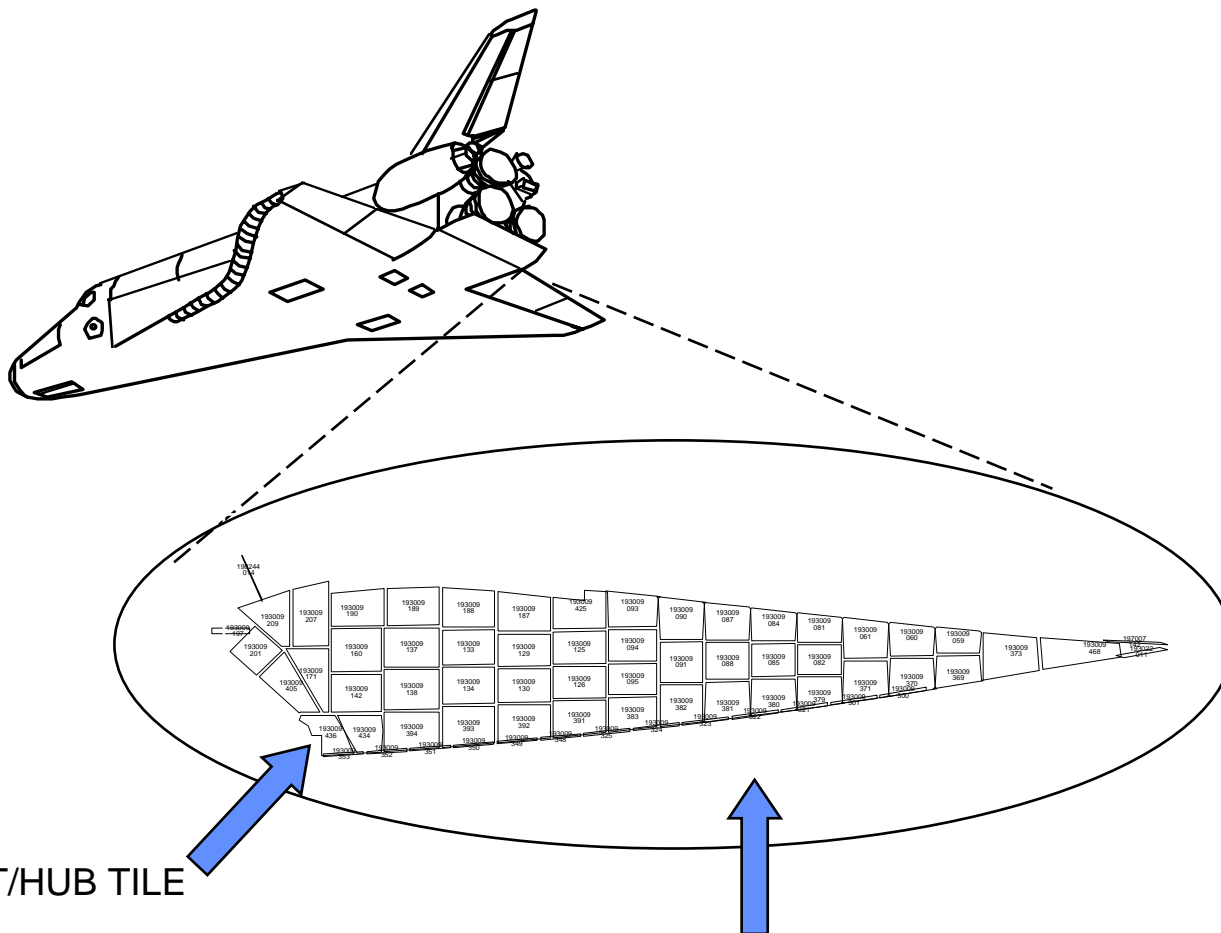
19546 Hub Tile Modification

Replaces 2 tiles in the inboard elevon area with a single more robust tile. Previous design could lead to installation errors which could result in loss of tile in flight.

Tile is difficult to bond due to complex design. New tile allows a Bond Verification (BV) check to be done on the newly installed tile (BV could not be done on previous design) This is the only Crit 1 Tile on lower surface that cannot be BV'd

STS-122 OV-103 Flt 34– Opportunity Mods

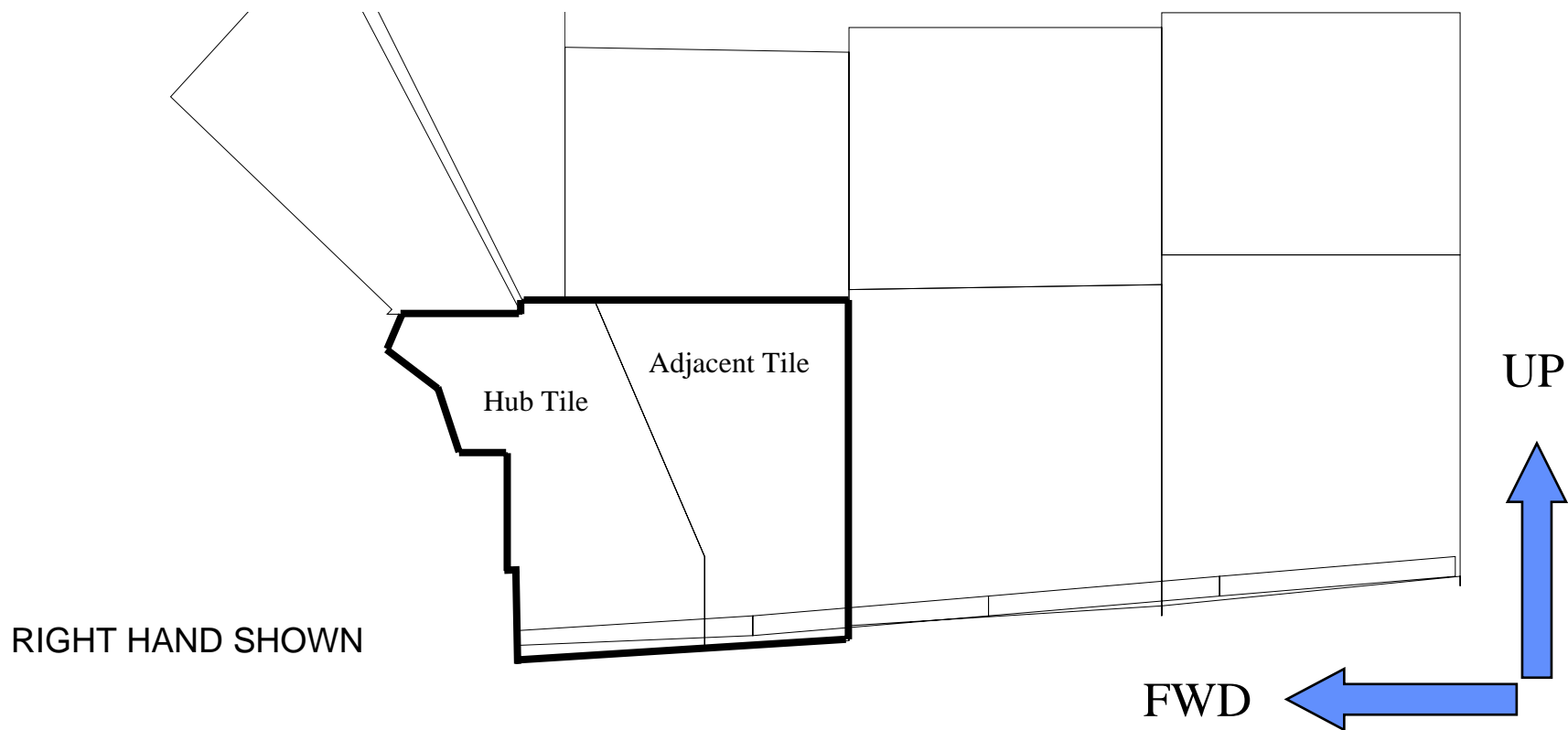
Hub Tile (Cont.)



HINGE POINT/HUB TILE

APPROXIMATELY 50 TILE ARE LOCATED ON ELEVON SIDEWALL

Hub Tile (Cont.)



Potential Mods (Back-up)

- **23440 Polycarbonate Protectors for Orbiter Window Panes**

Implements polycarbonate window shields on aft and overhead Orbiter pressure pane interior surface to reduce risk of window breakage.

Hazard Report ORBI-009 indicates that failure of the Orbiter Crew Module pressure panes, due to on-orbit impact, may lead to failure of redundant panes that may cause loss of crew & vehicle. Installation training to occur at JSC mockup trainer.

- **23411 Aft Freon Coldplate Loop Filters (If Freon loops are to be deserviced)**

Adds filters to the Freon Aft Cold-plate (ACP) Network to minimize the risk of flow blockage due to contamination to this network of coldplates. The filters will be installed in both freon loops between the FES tee and the flow meters and will be supported by new structural brackets.

The filter has a greater capacity than other 25 micron filters and hence will not add additional periodic maintenance. The filters are off-the-shelf filters from Wintec LLC.

Flow restriction due to contamination has occurred twice, both times resulting in significant impacts: STS-109 with near early mission termination & OV-103 post J3 OMM with 9 months of extensive, invasive vehicle inspection and hardware replacement. An off-the-shelf 25 micron filter will be used, built by the current supplier for many Shuttle filters.

Potential Mods (Back-up)

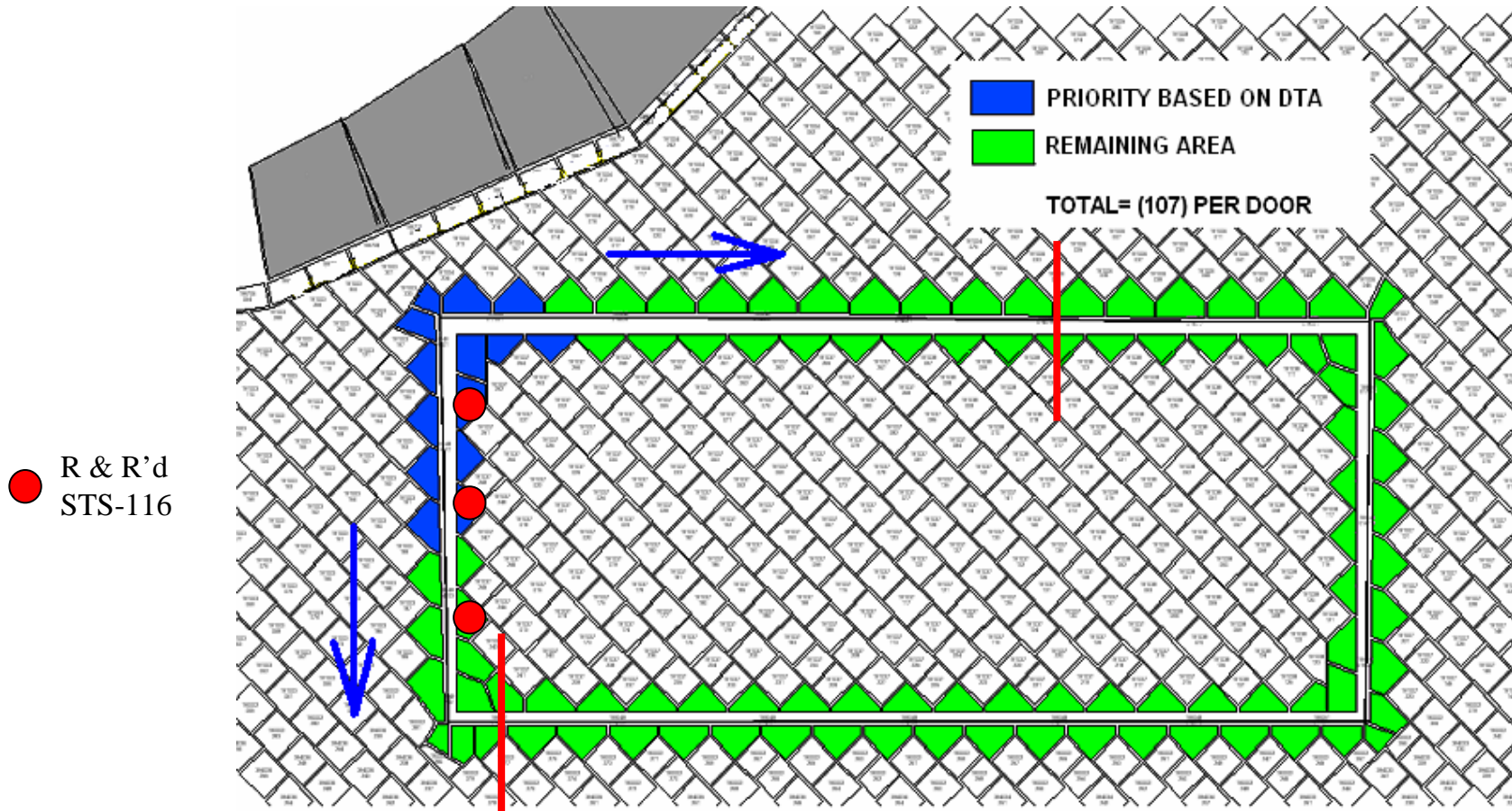
- **23452 RCC Fiducial Markings**

Implements fiducial markings on wing leading edge T-seals 6-11 and nosecap reinforced carbon-carbon (RCC) to facilitate on-orbit imagery X-Y-Z coordinate location identification on RCC inspection areas of interest.

Will enable more accurate and expeditious coordinate location identification for inspection and damage assessment activities.

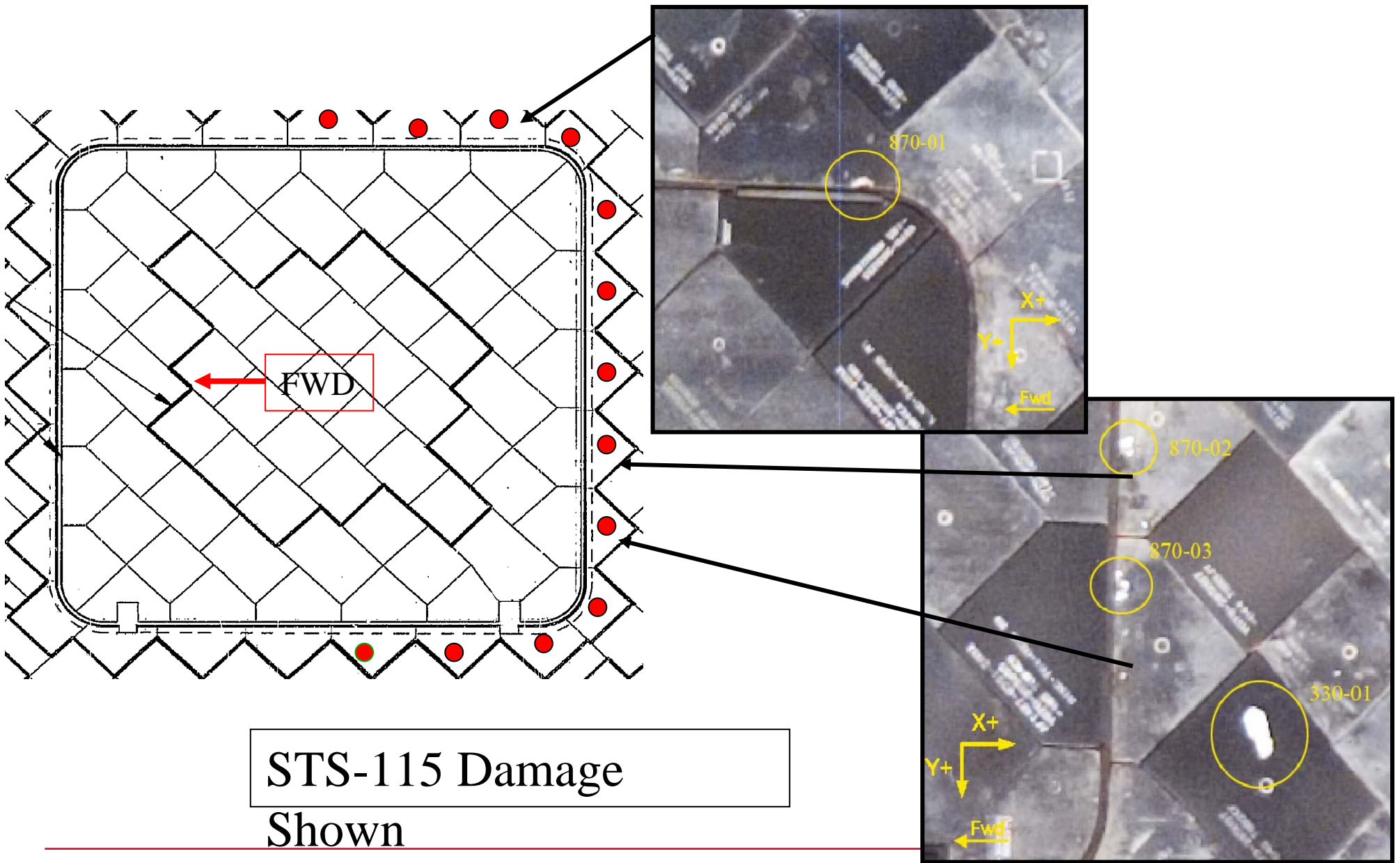
Implementation requires successful completion of RCC coupon material compatibility testing and chemical analysis of Sharpie ink marking, radiant heating (ascent) testing and X-Ray diffraction & electron microscopy of marked RCC area cross sections.

MLGD BRI-18 Priority Plan



- MLGD area to be worked from the FWD Outboard corner working Inboard and AFT (area most susceptible to debris impact)
 - 1st subset is in blue
 - 2nd subset is marked by red lines – approximate locations

External Tank Door Tiles – STR Side



STS-115 Damage
Shown

Window BRI-18 Priority Plan

- Forward Window area (1 – 6)
 - Windows 2-5 upper portion as priority (debris potential)



PRIORITY BASED ON POTENTIAL DEBRIS

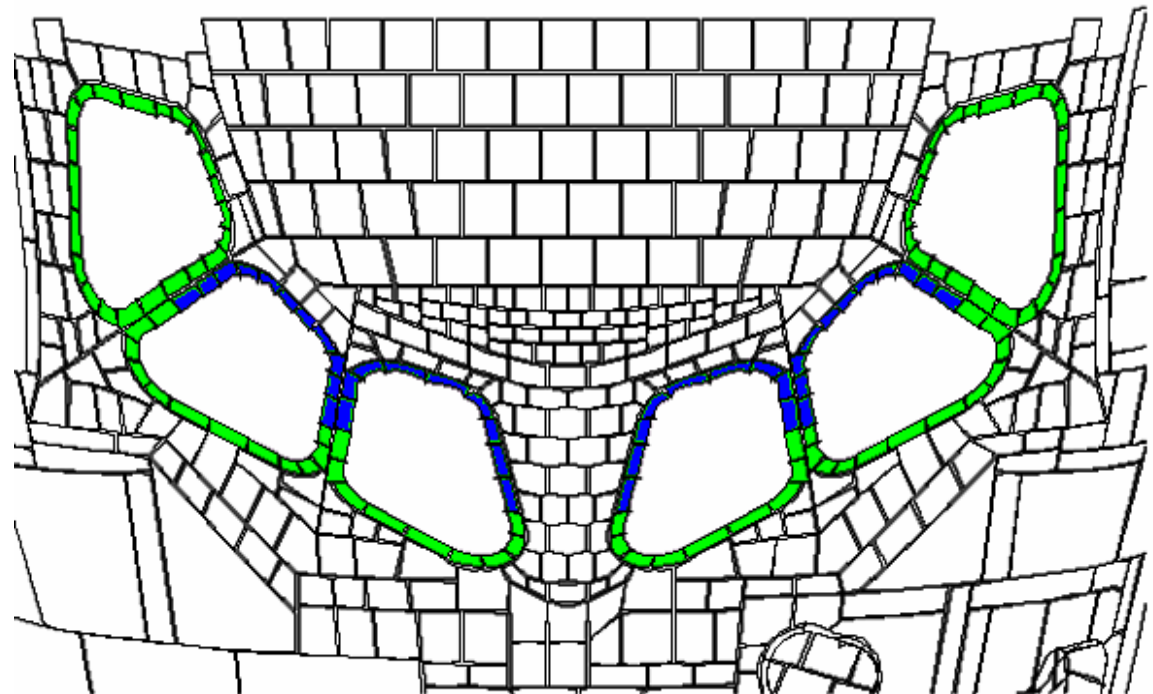


W1/W6= (22) W2/W5= (23) W3/W4= (18)

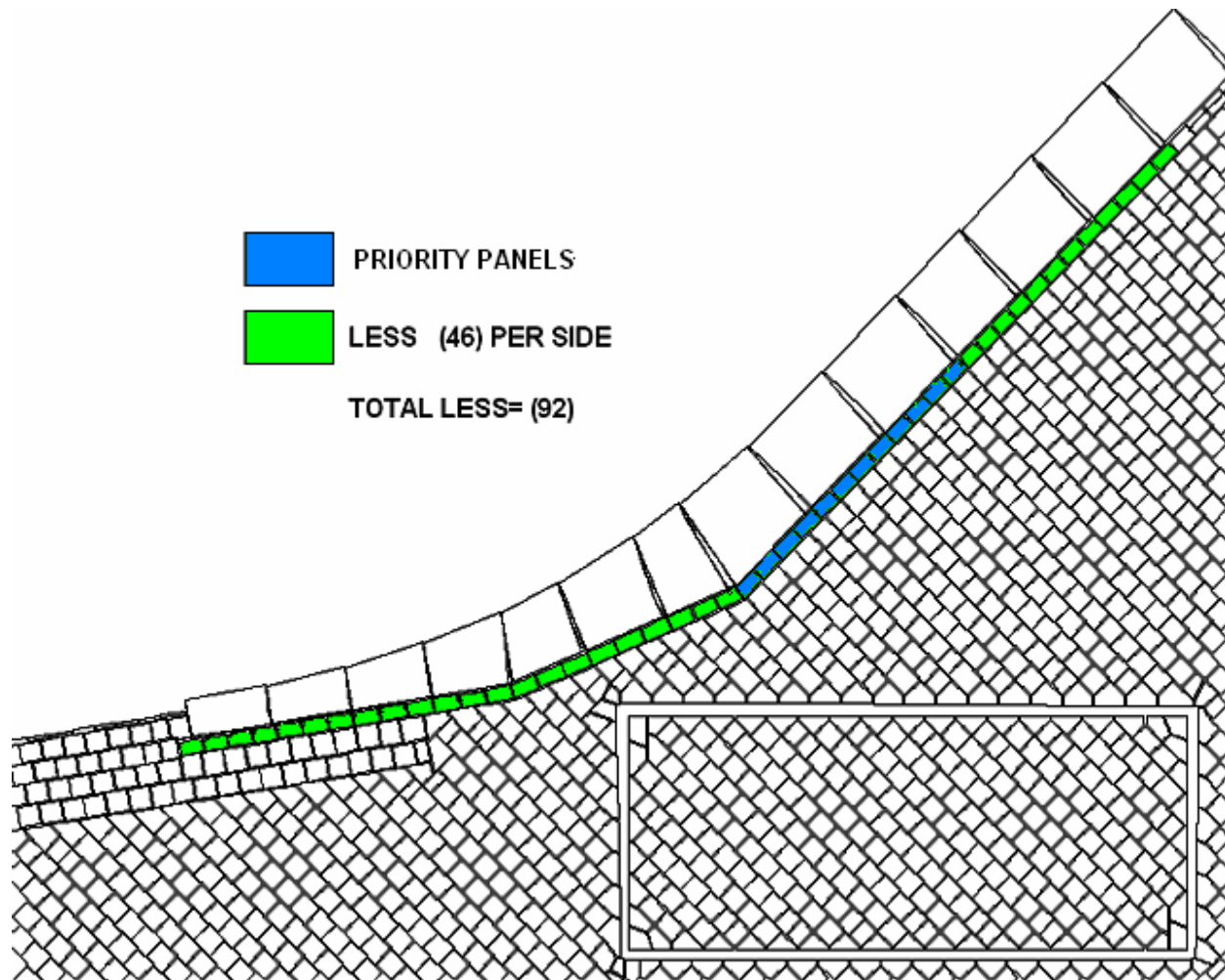
TOTAL WINDOWS= (126)

Current Status

- OV-103 none planned for STS-116
- OV-104 begin next flow
- OV-105 has 11 tile in-work



BRI Hardening Priority Plan (LESS)



- **Lower Wing LESS Carrier Panels (1 – 13)**
 - Panels 8-10 as priority (hottest panels)

Current Status

- OV-103 has replaced 8 – 10 both sides (STS-116 flow)
- OV-104 begin next flow
- OV-105 has 11 tile in-work

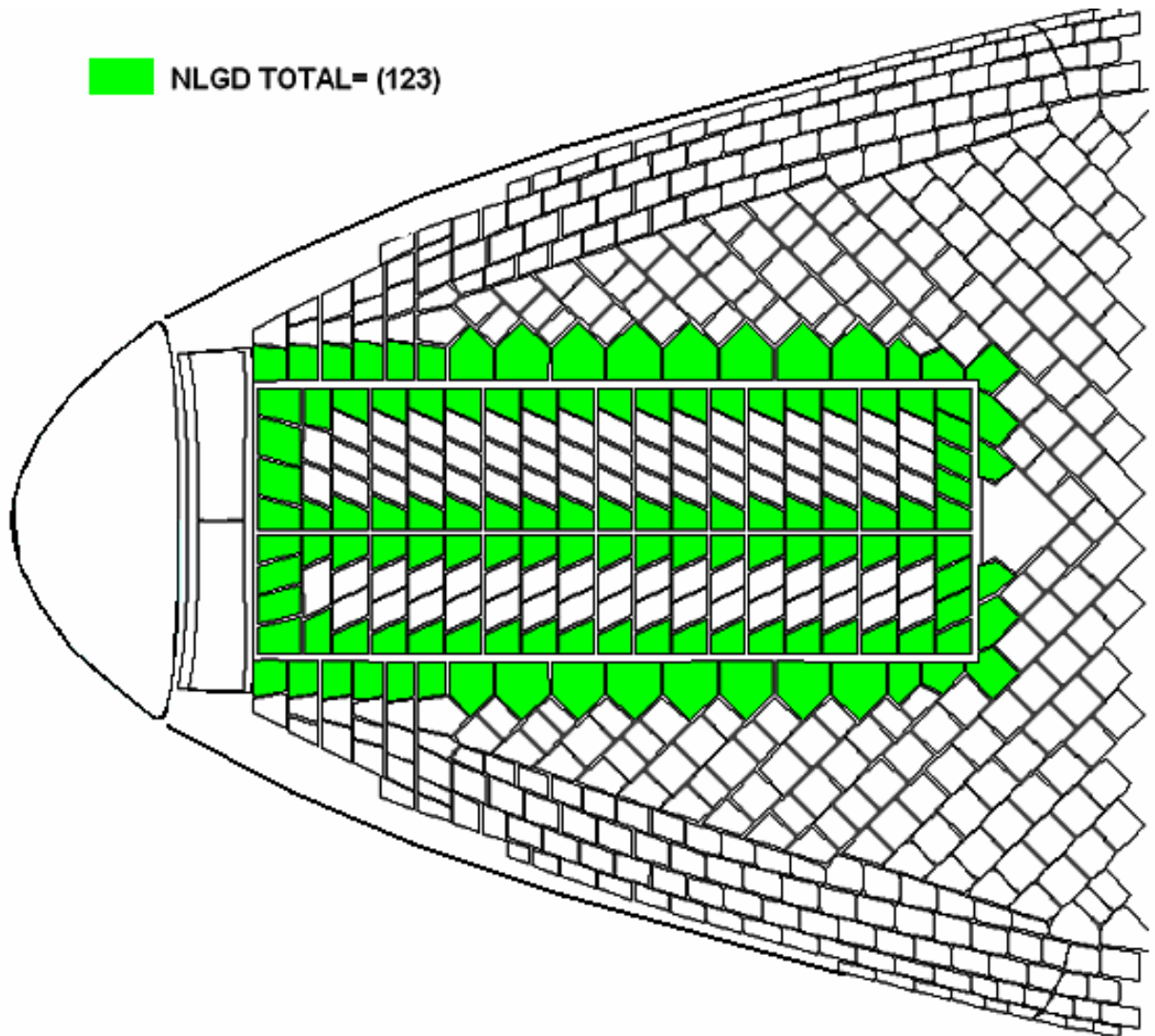
BRI Hardening Priority Plan (NLGD)

 NLGD TOTAL= (123)

- NLGD Area to be worked as flight / processing damage dictates removal

Current Status

- OV-103 currently has 10 installed (2 r & r'd for STS116)
- OV-104 currently has 14 installed
- OV-105 has 16 in-work





EVA Status

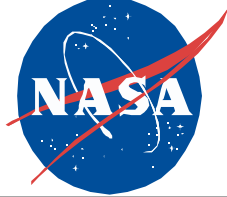
STS-122/1E

Launch Site Readiness Review

XA/Linda Thomas

Johnson Space Center

October 30, 2006



- **Bulkhead PFR, SED33105308-307**
 - Bulkhead PFR installation – Tech Order: M072-661568-029
- **Winches**
 - Forward Winch, SED33101570-327
 - Aft Winch, SED33101570-325
- **Port TSA (Lightweight)**
 - Port LWTSA installation – Tech Order: M072-660850-003
 - Port LWTSA Tools installation – Tech Order: M072-660853-002
- **No Starboard TSA**
- **No Safety Tethers Routed in PLB**
- **No Slidewires**

STS-122
ISS – 1E COLUMBUS, ICC-LITE
LAUNCH SITE REQUIREMENTS REVIEW
PAYLOAD CARGO ENGINEERING STATUS

MICHAEL BARIDO
281.212.6072
NOVEMBER 02, 2006

STS-122 LSRR

ENGINEERING FLIGHT PRODUCT STATUS

<u>DRAWING NO</u>	<u>TITLE</u>	<u>REV</u>	<u>EO</u>	<u>RELEASED</u>
V072-200202	MECSLSI	NC	-	XX-XX-XX
VA72-200202	CARGO ARRANGEMENT	NC	-	XX-XX-XX
VD72-200202	AVIONICS DIAGRAM	NC	-	XX-XX-XX
VS72-200202	INTEGRATED SCHEMATIC	NC	-	XX-XX-XX
VS70-540XXX	RETENTION SCHEMATIC	NC	-	XX-XX-XX

RESCUE FLIGHT STATUS

- STS-322 RECONFIGURATION ENGINEERING PRODUCTS WILL BE DEVELOPED BY THE ENGINEERING ORDER TO FOLLOW (EOTF) PROCESS.

ENGINEERING OPEN WORK

- EARLY DOWNLOAD MECSLSI 11-14-2006
- CIR DATAPACK 01-16-2007

STANDARDIZATION

- MISSION CONFIGURATION DOES COMPLY WITH ORBITER/PAYLOAD INTEGRATION STANDARDIZATION DOCUMENT NSTS 60523

STS-122 LSRR

PAYLOAD ICDs/PIRNs

PIRNs THAT IMPACT FLIGHT PRODUCTS

<u>PIRN #</u>	<u>ICD/PAYLOAD</u>	<u>TITLE</u>	<u>ECD</u>
A05221	ICD-A-21396 Columbus	Mech. Updates, Clearance Violations	11-30-06
A05268	ICD-A-21396-ICCL	ICD Baseline	12-22-06

ISSUES/CONCERNS

- NONE



STS-122 Launch Site Requirements Review

SSME Planned Modifications

- Work approved by shuttle project action request (SPAR) or Level II change request (CR)

ECP	Kit No	Description	Weight Impact	SPAR No./ CR No.	Engine	Status
1480	2R091575-10	AHMS Controller	-3 LB	ME-0191 R16	2056	In-Work
1511	2R091613-10	AHMS Weight Updates	+0 LB	ME-0216 R4	2056	In-Work



STS-122 Launch Site Requirements Review

Rocketdyne Action Requests (RAR)

- All work to be performed in the engine shop

RAR Number	ENGINE	SPAR	DESCRIPTION	STATUS
1566	2056	ME-0220R01	Dye Pen HPFTP Speed Sensors	CLOSED



STS-122 Integrated Launch Site Requirements Review

Presenter	Amy Houts-Gilfriche	
Date	11-02-06	

Backup Material

- SSP Systems Drawings Attachment 1
- Open Configuration Waivers Attachment 2
- Launch Window (Not Available)



STS-122 Integrated Launch Site Requirements Review

Presenter Amy Houts-Gilfriche

Date 11-02-06

SSP System Drawings

The Drawings Baseline Was Released By PRCB S0115122B on TBD

- V072-000001-268 (Rev. TBD) Space Shuttle System (Rel. TBD)
 - V072-200202-001 (Rev. TBD) Mission Equipment Cargo Support (Rel. TBD)
 - SGD32104445-301 (Rev. TBD) Crew Compartment Configuration (Rel. TBD)
 - 001 Descent
 - V070-000001-003 Orbiter General Assembly
 - V070-410100-017 SSME Installation
 - 10100-0001-168 Integrated SRB General Assembly (BI-132)
 - 80901000000-510 External Tank Assembly (ET-125)
- STS-122 CIR + 70 days Mission Configuration Product Plan (MCP) was published on TBD and will be republished at LSRR +18 days on 11-20-06.



STS-122 Integrated Launch Site Requirements Review

Presenter Amy Houts-Gilfriche

Date 11-02-06

SSP System Drawings – (Continued)

Ferry Configuration

- V072-000001-269 (Rev. TBD) Space Shuttle System Drawing (Rel. TBD)
 - V072-200202-002 (Rev. TBD) Mission Equipment Cargo Support (Rel. TBD)
 - SGD321004445-302 (Rev. TBD) Crew Compartment Configuration (Rel. TBD)
 - V072-30055-027 (Rev. BL01) Ferry Flight Configuration (Rel. 06-21-06)

SCA 905



STS-122 Integrated Launch Site Requirements Review

Presenter	Amy Houts-Gilfriche	
Date	11-02-06	

Modification Impact Report

Mission Equipment Modifications and Orbiter Modifications analyzed for impacts to OMRSD, LCC, ICD, EMI, Software, and GSE.

A total of 10 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-122 Integrated Launch Site Requirements Review

Presenter Amy Houts-Gilfriche

Date 11-02-06

Modification Impact Report – (Continued)

Possible impacts still under review

6

MCRs 23411 and 23440 are being reviewed for OMRSD impacts

MCR 23448 is being reviewed for EMI impacts

MCRs 19789, 23455, and 23467 are being reviewed for GSE impacts

underlined MCRs have impacts in other disciplines

ACTIVE WAIVERS FOR
OV-103 (STS-116)

Item #	Authority	Date	Waiver Description	Effectivity	Wad
47	S052310A	02/14/91	Fly with FRSI instead of tile	OV-103, Flight 12 & Subs (flight by flight evaluation)	OK TO RETIRE S061954B MV 4-2 RTF-130 Briefing
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
327	S115114VR5	03/17/05	Partial installation of M072-784633-014 (harness installation - interface panel - MADS #3). The M072-784663-014 Technical Order was established to incorporate the crossover bracket modification at locations X0863 and X0750. The dash number configuration for the Technical Order was not baselined until January 25, 2005 (PRCBD S115114VR2). This area was closed out before this time and would cause significant impact to verify configuration of this Technical Order dash number -014.	OV-103, Flight 31 OV-103, Flight 32 WAIVER for STS-121	INS-3-28-279 (installed Tech Order)
***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****					
328	S115114WR1	04/07/05	Partial installation of M072-794500-004, for Integrated Vehicle Health Monitoring (IVHM) harness installation, calls for the removal of the unused IVHM harness and routing hardware. This requirement was manifested after the Bay 13 Longerons Bridge installation was complete. With the installation of the bridge, the removal of the IVHM harness is no longer possible without the removal of the bridge.	OV-103, Flight 31 OV-103, Flight 32 WAIVER for STS-121	OEL-3-31-304 PTL OEL-3-31-4432 PTL
***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****					

ACTIVE WAIVERS FOR
OV-103 (STS-116)

Item #	Authority	Date	Waiver Description	Effectivity	Wad
329	S115114AM	08/15/05	<p>The following requirements are waived to allow OV-103, Flight 31 to fly (ferry) with the following out-of-configuration conditions:</p> <ol style="list-style-type: none">1) V070-391139-025 (blanket under window #1 removed for ferry flight)2) M072-421502-002 (did not perform acetone wipe prior to universal thruster plug assemblies - procedural omission)3) V070-753110-003 (camera mount will not be installed for ferry flight) <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 31	Ferry Flight from Dryden
330	S115114VR15	09/16/05	<p>The following requirement is waived to allow OV-103 to ferry from DFRC to KSC with the following out-of-configuration condition:</p> <p>TCS blanket V070-362917-001 located at Door #44 NOT installed.</p> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 31 Ferry Flight	Ferry Flight from Dryden

ACTIVE WAIVERS FOR
OV-103 (STS-116)

Item #	Authority	Date	Waiver Description	Effectivity	Wad
331	S115114VR15	09/16/05	<p>The following requirement is waived to allow OV-103 to ferry from DFRC to KSC with the following out-of-configuration condition:</p> <ol style="list-style-type: none">1) Two switches on Panel A15 will ferry without switch guards (P/N G070-700904-001). In lieu of switch guards at two locations, tape was installed.2) Eight GSE switch guards were left installed and not removed as required by Technical Order M072-710700-002 as called out in the ferry flight drawing.3) Three switch guards are not installed on Panel L4 for TACAN circuit breakers. The procedure does not include the switch guard installation. <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 31 Ferry Flight	Ferry Flight from Dryden
332	S115121TR8	05/04/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>M072-794500-004 IVHM harness installation Bay 13 called out by MECSLSI V072-200201 NOT removed from OV-103.</p> <p>During STS-114 processing this Tech Order configuration called for the removal of an un-used IVHM harness along with the routing hardware. At the time the Tech Order was made a requirement for Flight 31, the Bay 13 longeron had already been installed for flight. The harness was demated and stowed in place per MR and was deferred to a future flight at which time Bay 13 longeron will be removed since the Bay 13 longeron was not removed this flight, a configuration waiver is needed for STS-121.</p>	OV-103, Flight 32	

ACTIVE WAIVERS FOR
OV-103 (STS-116)

Item #	Authority	Date	Waiver Description	Effectivity	Wad
333	S115121TR8	05/04/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>Partial installation of M072-784633-014 (harness installation - interface panel - MADS#3). The M072-784633-014 Tech Order was established to incorporate the crossover bracket modification at locations X0863 and X0750. The dash number configuration for the Tech Order was not baselined until January 25, 2005 (PRCBD S115114VR2). This area was closed out before this time and would cause significant impact to verify configuration of this Tech Order dash number -014.</p> <p>***** SEE NSTS 07700 VOLUME IV BOOK 2 FOR COMPLETE DETAILS *****</p>	OV-103, Flight 32	
335	S115116NR2	08/18/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>M072-794500-004 IVHM harness installation Bay 13 called out by MECSLSI V072-200195 not removed from OV-103.</p> <p>During STS-114 processing, this Tech Order configuration called for the removal of an unused IVHM harness along with the routing hardware. At the time the Tech Order was made a requirement for Flight 31, the Bay 13 longeron had already been installed for flight. The harness was demated and stowed in place per MR and was deferred to a future flight at which time Bay 13 longeron will be removed since the Bay 13 longeron was not removed this flight, a configuration waiver is needed for STS-116.</p>	OV-103, Flight 33	

ACTIVE WAIVERS FOR
OV-103 (STS-116)

Item #	Authority	Date	Waiver Description	Effectivity	Wad
336	S115116NR2	08/18/06	<p>The following requirement is waived to allow OV-103 to fly with the following out-of-configuration condition:</p> <p>M072-794500-004 IVHM harness installation Bay 13 called out by MECSLSI V072-200201.</p> <p>During OMDP, the crossover bracket modification was successfully implemented at all four locations with no technical issues by engineering defined by Orbiter drawings as well as three Tech Orders (M072-794011, M072-794021 and M072-794051). The M072-784633-014 Tech Order was established to incorporate the crossover bracket modification at two locations (X0863 and X0750).</p> <p>At the X0863 location, M072-784633-014 called for the removal of a clamp and six screws to reflect the change harness mounting due to the new wire tray shape. TPS OEL-3-31-245 incorporated the electrical portion of this modification per the vehicle drawings as well as the three tank set harness Tech Orders. During STS-114 processing, the WAD was reviewed and it was determined that an error exists in the M072-784633 engineering. This Tech Order reflects harness routing at the X0863 that does not reflect the as-built configuration on the Orbiter. A one flight configuration waiver was processed and approved for STS-114 and STS-121. All hardware on this Tech Order supports MADS wire routing, there were no observed wire routing violations noted during Flight 31 midbody closeout and all MADS testing will be completed and verified. No technical issue with hardware, installation, or function of MADS. There was no access to this area this flow to perform wire routing as-designed condition. A configuration waiver is needed for STS-116 for this Tech Order.</p>	OV-103, Flight 33	

VEHICLE LIMITED LIFE STATUS REPORT

PRELIMINARY SUBMITTED 10/18/2006

LAUNCH DATE USED 10/17/2007

MISSION DURATION = 12 DAYS

NO.	SYS	REQT / PART DESC / PART NO	TOP / SEPAR	ANTICIPATED ACTION	CONSTR	ELE
1	PYRO	C00AA0.110.032 NASA STANDARD DET. SEB26100094-201	V5032.004 V5029.001	REMOVE/INSTALL	2	O
2	PYRO	C00AA0.110.033 CARTRIDGE SKD26100098-301	V5032.004 V5127	REMOVE/INSTALL	2	O
3	PYRO	C00AA0.110.034 AFT ATTACH BSTR CART. SKD26100099-401	V5032.004 V5029.001	REMOVE/INSTALL	4	O
4	PYRO	C00AA0.110.035 NLG THRUSTER CART. SKD26100100-301 LOT HCH	V5032.004 V5127 SEPAR-TBD	REMOVE/INSTALL/RECERT	2	O
5	PYRO	C00AA0.110.037 CARTRIDGE, MLG SKD26100102-301 LOT NAA	SEPAR TC06-075	REMOVE/REPLACE/RECERT	2	O
6	PYRO	C00AA0.110.043 GAS PRESS CTG. SEB26100001-25X	V5056	INSTALL	4	O
7	PYRO	C00AA0.115.001 GAS SAMPLER BATTERY SED33101116-321	V5012.001 V5029.004	REMOVE/INSTALL	4	O
8	INS	C00AA0.140.004 MADS TAPE RECORDER ME435-0055-0003 THRU 0005	S0007 V1200 V1248	TEST	4	O
9	COM	C00AA0.160.001 GPS RECEIVER MC478-0153-0001	SEPAR-TBD	REMOVE/REPLACE BATTERIES	4	O
10	MEQLG	C00AB0.010.003 NLG TIRE MC194-0007-0006 (2)	V1165.003 V1165.004	REMOVE/INSTALL	2	O
11	MEQLG	C00AB0.010.004 MLG TIE BOLTS & NUTS MC621-0051-0038 (4 WHEELS)	V1165.001 V1165.002	REMOVE/INSTALL	2	O

Constraints

1=ET/SRB MATE 3=VAB ROLL
2=OPF ROLL 4=LAUNCH

Elements

O=ORBITER
M=MISSION EQUIP.

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12	MEQLG	C00AB0.010.005 MAIN WHEEL ASSEMBLY MC621-0051-0038 (4)	V1165.001 V1165.002	REMOVE/INSTALL	2	O
13	MEQLG	C00AB0.010.006 NOSE WHEEL ASSEMBLY MC621-0050-0004 (2)	V1165.003 V1165.004	REMOVE/INSTALL	2	O
14	ODS	C00AB0.075.006-B DOCKING SYSTEM CONTROL UNIT MC621-0087-2002	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
15	ODS	C00AB0.075.007-B POWER SWITCHING UNIT MC621-0087-2003	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
16	ODS	C00AB0.075.008-B LATCH ACTUATOR CONTROL UNIT MC621-0087-2004	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
17	ODS	C00AB0.075.009-B DOCKING MECH. CONTROL UNIT MC621-0087-0005	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
18	ODS	C00AB0.075.010-B PYRO FIRING CONTROL UNIT MC621-0087-0006	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
19	ODS	C00AB0.075.011-B PRESS. ACTUATOR CONTROL UNIT MC621-0087-0007	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
20	ODS	C00AB0.075.012-A DOCKING CONTROL PANEL MC621-0087-0009	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
21	ODS	C00AB0.075.013 DATA COLLECTION UNIT MC621-0087-0008	RCN-OS17198	WAITING FOR 'APPROVAL' TO BE EXTENDED FROM 8 TO 15 YEARS	2	O
22	PLM	C00AB0.160.020A VIDEOSPECTION CAMERA ASSY SED39125120-310	TPS-TBD	REMOVE/REFURB/INSTALL	4	M

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23	TPS	C00AB0.170.001 RCC ARROWHEAD PLATE MC621-0007-7009	V5139.001 V5139.002	REMOVE/INSTALL	2	O
24	TPS	C00AB0.170.002 RCC ARROWHEAD PLATE MC621-0007-7010	V5139.001 V5139.002	REMOVE/INSTALL	2	O
25	PYRO	C00AD0.030.009 SPHERICAL BEARING ASSY V070-562036-002	V5032.004 V5127	REMOVE/INSTALL	2	O
26	PYRO	C00AD0.030.012 PYRO CENTERING MECHANISM SKD26100098-501	V5032.004 V5127	REMOVE/INSTALL	2	O
27	PLM	C00EB0.050.001 EVA CABLE STOWAGE UNIT V725-714056-001	TPS-TBD	INSTALL	4	M
28	PLM	JSC24937.30 PORTABLE FOOT RESTRAINT ASSY SED33105308-307	TPS-TBD	REMOVE/REFURBISH/INSTALL	2	M
29	FCS	JSC24937.56 EMER EGRESS SLIDE SYS MC623-0015-0023	TPS-TBD	REMOVE/INSTALL	4	M
30	ECLSS	V61AIL.010-C LIOH CANNISTER MC621-0008-0409	TPS-TBD	INSTALL AT PAD	4	O
31	ECLSS	V61AIL.015-C HYDRAZINE (CO RMVL CART.) MC621-0008-0060	TPS-TBD	INSTALL AT PAD	4	O
32	ECLSS	V61AIL.016-C ATCO CARTRIDGE MC250-0024-0001	TPS-TBD	INSTALL AT PAD	4	O
33	ECLSS	V61AJ0.141 PPO2 SENSOR MC250-0002-3165	V1053.010	RECALIBRATE SENSORS AT PAD	4	O

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34	FCS	V66AIL.060 POLE CREW ESCAPE SYS ASSY SED27101375-322	TPS-TBD	REMOVE/INSTALL	4	M
35	COM	V74AD0.130 MSBLS RF ASSY MC409-0017-0007	SEPAR-TBD	PERFORM 15 MINUTE TEST	4	O

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