



SPACE SHUTTLE PROGRAM
Space Shuttle Systems Engineering & Integration Office
NASA Johnson Space Center, Houston, Texas



	Presenter	Kim Doering/MS	
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STS-121 FLIGHT READINESS REVIEW

June 16, 2006

Systems Engineering & Integration



<h1>AGENDA</h1>	Presenter	Kim Doering/MS	
	Date	06-16-06	Page 2

• System Engineering & Integration

- Flight Preparation Readiness
- Special Topics
 - PAL Ramp Removal Environments
 - ECO Sensor Anomaly
 - Ascent Debris
 - LH2 Pre-press Cycle Count
 - SRB Camera System
 - External Tank Instrumentation
- Integrated Hazard Report Summary
- Exception and Open Work Summary
- Flight Software Readiness
- Payload and General Support Computer (PGSC) Readiness
- CoFR Endorsement



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FLIGHT PREPARATION READINESS

Presenter	Kim Doering/MS	
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- **All standard Systems Engineering and Integration flight preparation activities have been completed or are planned. Non-standard open work and CoFR exceptions will be addressed**
 - System requirements verification
 - Design requirements and induced environment updates; verification of element incorporation
 - Integrated vehicle performance evaluation
 - Real-time mission support preparation and certification of personnel as applicable
 - Review and disposition of waivers, deviations, and exceptions
 - Updates to Integrated Hazard baseline
 - Flight Software verification/Payload and General Support Computer (PGSC) Readiness



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FLIGHT PREPARATION READINESS

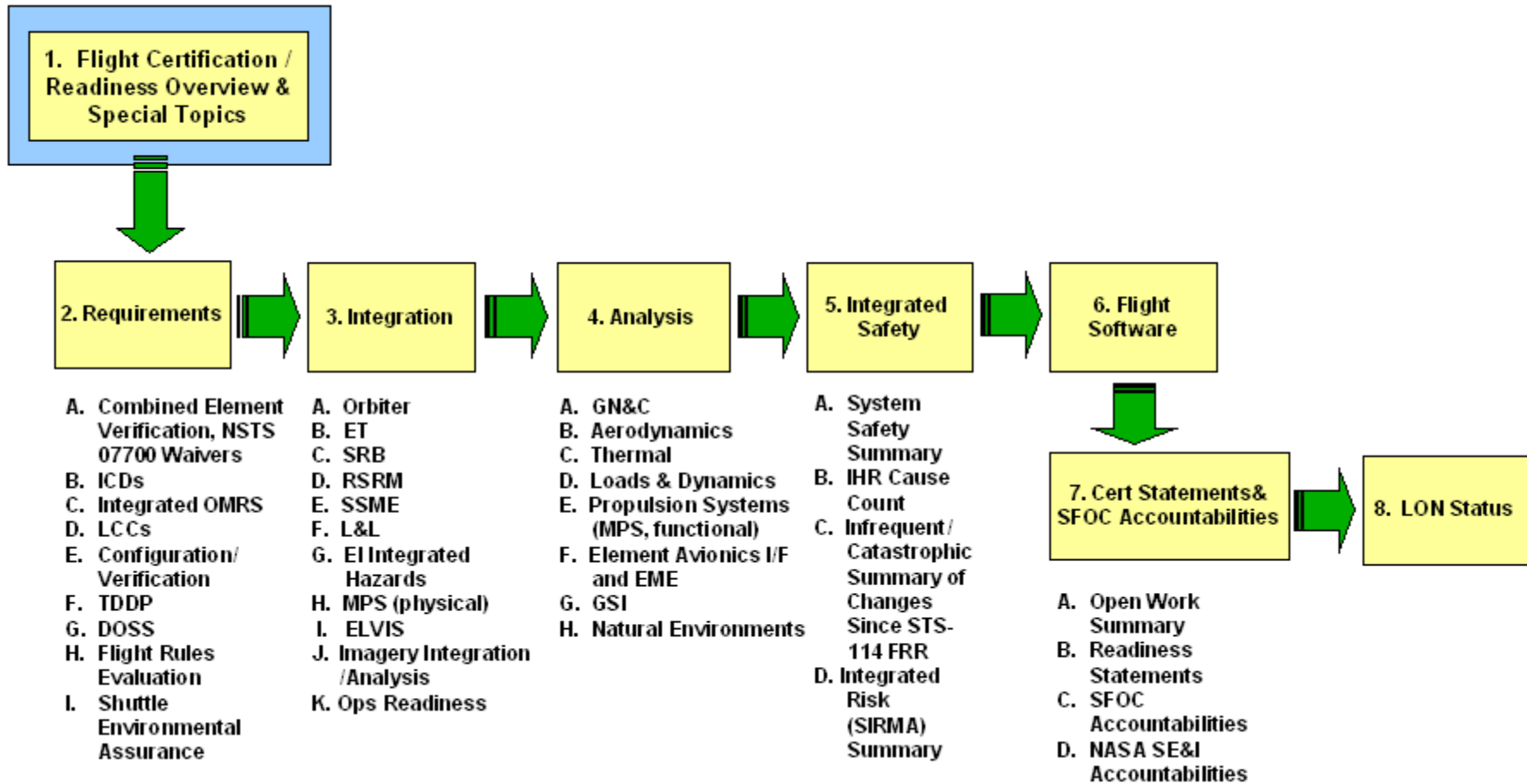
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- **Completed tasks include: (concluded)**
 - Disposition of IFAs from STS-114
 - 44 opened and all are dispositioned
 - 4 interim dispositions for two flights:
 - ECO Sensor failure
 - Tyvek Cover late release
 - LH2 Ice Frost Ramp (IFR) body debris
 - LH2 Ice Frost Ramp (IFR) adjacent acreage debris



FLIGHT PREPARATION READINESS		Presenter Kim Doering/MS
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• **SE&I Process Roadmap**





SPECIAL TOPIC PAL RAMP REMOVAL ENVIRONMENTS	Presenter Kim Doering/MS
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• **Issue:**

- PAL ramp removal changed the outer mold line requiring that updated induced environments be provided to the ET Project for assessment

• **Discussion:**

- SSP approved removal of the PAL ramps in response to foam loss on STS-114
 - Original purpose of the PAL ramps was to protect for a flutter stability concern of the original cable tray design
- Review determined that induced environment updates were required for the entire cable tray/pressline and LO2 feedline assemblies because:
 - Baseline static airloads did not adequately capture the flow field physics
 - Baseline did not include unsteady (buffet) loads
 - Geometry change affected aero-heating
 - Aerodynamic changes affected cable tray venting analysis
- Induced environments delivered: static & buffet airloads, thermal, venting static pressures



SPECIAL TOPIC PAL RAMP REMOVAL ENVIRONMENTS	Presenter Kim Doering/MS	
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• **Flight Rationale:**

- Updated environments have been provided and element acceptability has been verified:
 - PAL ramp removal had negligible effects on other elements and Integrated Vehicle aerodynamics.
 - Static airloads changes and thermal effects were determined to be acceptable
 - ET testing and analysis has verified that the LO2 and LH2 cable trays do not exhibit flutter instabilities without PAL ramp
 - PAL Ramp removal effects on aero-acoustics were found to be within current Data Book environment
 - Predicted buffet loading increases on the LO2 cable tray in the location of the PAL ramp as a result of the PAL ramp removal
 - Predicted buffet loading does not increase significantly on the LH2 cable tray in the location of the PAL ramp when it is removed because the cross flow is generally outboard at this location so that the ramp was not providing shielding

• **Forward work—No constraint to STS-121:**

- Limited flight validation of dynamic responses will be performed using ET cable tray instrumentation following STS-121 and STS-115



SPECIAL TOPIC ECO SENSOR ANOMALY	Presenter Kim Doering/MS
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• **Issue:**

- LH2 ECO Sensor failure during tanking tests and launch attempt for STS-114 led to Integrated IFA as well as significant analysis and testing

• **Discussion:**

- Root cause of failure not definitively established after extensive fault tree analysis
- STS-114 ECO IFA dispositioned as a UA with a 2 flight effectivity

• **Flight Rationale:**

- Orbiter and ET hardware checkouts and testing are complete
 - STS-114 Point Sensor Box (PSB), s/n 112, passed an extended Acceptance Test (ATP) at NSLD.
 - Extensive Orbiter LH2 ECO system test and inspection of wiring and connectors complete
 - Original ET-119 LH2 ECO sensors replaced with sensors screened using nano-focus X-ray to ensure swage assemble integrity



SPECIAL TOPIC

ECO SENSOR ANOMALY

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• Flight Rationale: (concluded)

- System is designed such that WET indication is a benign sensor system failure
- Three failed WET sensors would still require an additional failure or systems dispersions beyond certification limits to require LH2 low-level cutoff
 - Propellant reserve + Fuel bias + APM at liftoff provides protection
- System design is for LO2 low-level cutoff
- MPS-22 LCC requires 4 of 4 functional sensors
 - LCC allows 3 of 4 with specific FA MDM failure affecting one sensor only

• Non-Constraining Forward Work

- Address post-failure trouble-shooting plan at 6/22/06 PRCB
- ECO System Level Test
- PSB s/n 111 teardown & inspection
- ET-94, ET-119, ET-120 Sensor Destructive Physical Analysis (DPA)



SPECIAL TOPIC ASCENT DEBRIS	Presenter Kim Doering/MS
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• **Issue:**

- Multiple unexpected debris-related events observed during the STS-114 ascent resulted in 28 IFAs opened which have subsequently been dispositioned
 - 3 interim dispositions for two flights:
 - Tyvek Cover late release
 - LH2 Ice Frost Ramp (IFR) body debris
 - LH2 Ice Frost Ramp (IFR) adjacent acreage debris
 - Re-opened Integrated debris hazard report, IDBR-01

• **Discussion:**

- IFA closure and additional element evaluations led to System design and process changes:
 - ET PAL ramp
 - Bipod wiring close-out
 - Orbiter shim stock and gap filler
 - Tile putty repairs
 - Tyvek cover



SPECIAL TOPIC ASCENT DEBRIS	Presenter Kim Doering/MS
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• **Discussion: (concluded)**

- Identified new Ice/Frost Ramps failure mode risk from dissections of ET-120
 - Risk is captured in IDBR-01 which will be approved at PRCB

ECD: 6/15/06

- NASA senior management decided to accept risk for Ice/Frost Ramps for a limited number of flights while a redesign is underway
- Multiple design and verification reviews held
 - Debris TIMS, Debris Verification Review (DVR), ET DCR
- Debris environment definition and operational control updates are in work
 - NSTS 07700, Volume X – Book 1, Section 3.2.1.2.14 - Debris Prevention
 - Exception Modification
 - NSTS 60559, “Expected Debris Generation and Impact Tolerance Requirements, Guidelines, and Assumptions”
 - NSTS 60555, “Verification Limitations for External Tank Thermal Protection System”
 - NSTS 08303 – Ice/Debris Inspection Criteria
 - IDBR-01 – Integrated Debris Hazard Report



SPECIAL TOPIC ASCENT DEBRIS	Presenter Kim Doering/MS	
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• **Flight Rationale:**

- Debris risk mitigation provided by design and process modifications
- Program acceptance of residual risk

• **Open Work (CoFR Exceptions):**

- PRCB presentations (PRCB directive approvals ECD: NLT L-2 days)
 - NSTS 07700, Volume X – Book 1, Section 3.2.1.2.14 - Debris Prevention
 Exception Modification ECD: 6/15/06
 - NSTS 60559, “Expected Debris Generation and Impact Tolerance Requirements, Guidelines, and Assumptions” ECD: 6/15/06
 - NSTS 08303 – Ice/Debris Inspection Criteria ECD: 6/22/06
 - IDBR-01 – Integrated Debris Hazard Report ECD: 6/15/06
- PRCB directive approval
 - NSTS 60555, “Verification Limitations for External Tank Thermal Protection System” ECD: NLT L-2 days



SPECIAL TOPIC LH2 PRE-PRESS CYCLE COUNT	Presenter Kim Doering/MS	
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• Issue

- STS-114 pre-press cycle count above prediction and was within 1 cycle of causing an LCC violation and launch scrub
- Nominal valve performance on STS-121 (10.5 cycles) is expected to be higher than the nominal performance prediction used to derive the 13 cycle LCC (9 cycles)
 - Accounting for dispersions, higher pre-press control band, and valve cycle timing results in reduced margin against inadvertent launch scrub.

• Discussion

- Cycle count LCC for STS-114 was set to 11 in order to protect against potential unquantified effects of ET system changes.
- Cycle count LCC for STS-121 and subsequent flights is 13 (scrub on 14), which is consistent with historical limit.
 - Increased understanding of the analysis behind the 13 pre-press cycle limit led to realization of increase variation in actual system performance
- OMRSD was implemented to perform checkout testing prior to tanking and launch in order to quantify pre-press valve performance and determine if any corrective action was required.



SPECIAL TOPIC LH2 PRE-PRESS CYCLE COUNT	Presenter Kim Doering/MS
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• **Flight Rationale:**

- ET-119 valve tested at 0.476 average cycle time
 - Variations could result in maximum of 0.499 cycle time for flight
 - Lockheed Martin analysis indicates valve timing limit of 0.5 seconds or less with 13 cycle count LCC protects against a 0.065 lb/s leak
- 10.5 cycles is expected for nominal performance
- 13.3 cycles is possible based on variation stack-up
- No LCC violation is expected; however, effect of firing room signal processing is unknown
- SICB recommended to accept risk and proceed to launch in existing configuration

• **Open Work:**

- Present analysis and proposal results to PRCB (ECD 6/15/06)



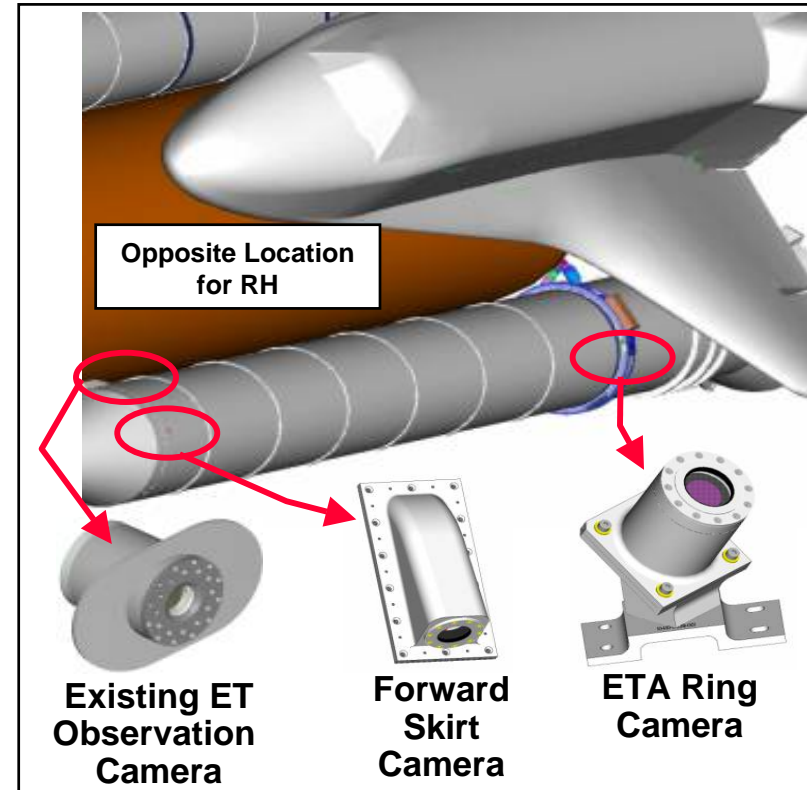
SPECIAL TOPIC		Presenter Kim Doering/MS	
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SRB CAMERA SYSTEM			

Topic

- New LH and RH SRB Camera System (SCS) supplements existing ET observation camera
 - Forward Skirt Aft Pointing Camera (FSAP)
 - External Tank Attach Ring (ETAR) Camera

Background

- Columbia Accident Investigation Board (CAIB) recommendation for onboard ascent imaging
- ET Observation camera implemented on STS-114



SRB Camera Locations (LH)



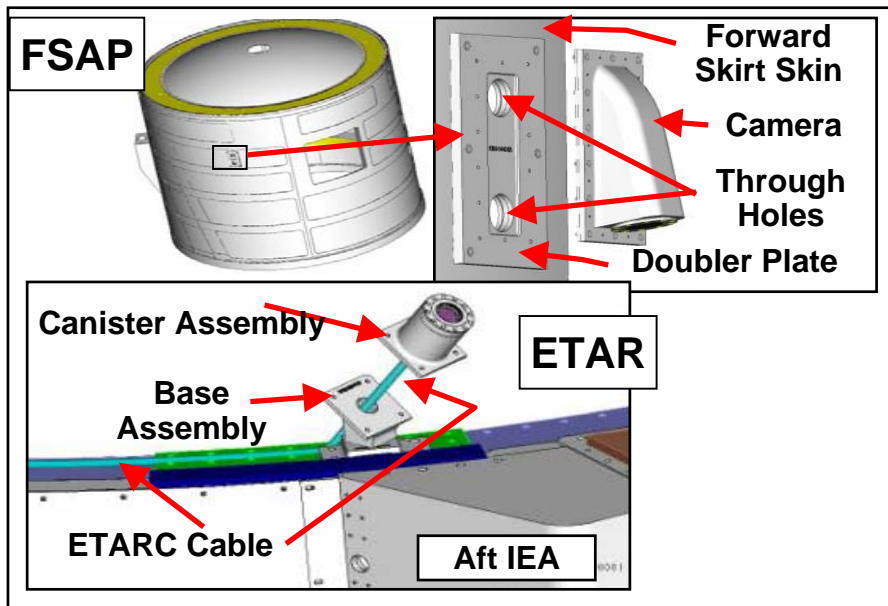
SPECIAL TOPIC		Presenter Kim Doering/MS	
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SRB CAMERA SYSTEM			

Discussion

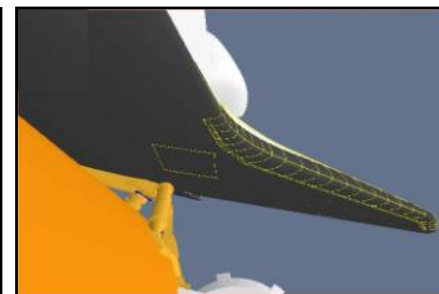
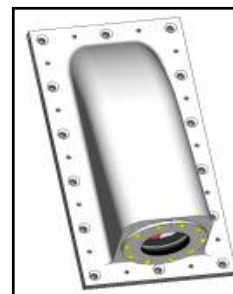
- **SCS designated Criticality 3**
 - Not for launch or real time ascent contingency decisions
- **Imagery available at KSC after SRB arrival at Hanger AF**



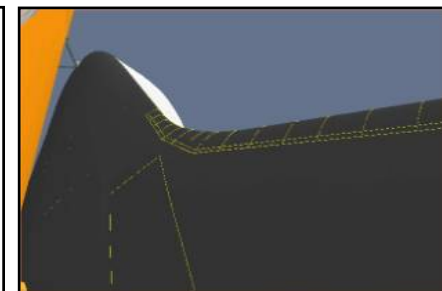
ET Observation Camera LH View



New Camera Installations



FSAP Camera LH View



ETAR Camera LH View



SPECIAL TOPIC		Presenter Kim Doering/MS
SRB CAMERA SYSTEM		Date 06-16-06 Page 17

Discussion (cont.)

- **Solid State Video Recorders (SSVR) supply power and obtain video from ETAR and FSAP Cameras**
 - Located in forward skirts
- **Baselined SCS specification 10SPC-0249 establishes requirements**
 - Flow down from NSTS 37389, System Requirements Document for Enhanced Launch Vehicle Imaging System (ELVIS)
- **Updated Level II Interface Control Documents (ICD) to include SRB camera system**
- **NSTS 08171, Operations and Maintenance Requirements and Specifications Document (OMRSD), File V, Volume 1 updated to perform SRB camera system checkout test during S0008**



SSVR Box

Basis for Certification

- **Test, Analysis and Similarity**
- **Loads and thermal environments provided to SRB**
- **SCS DCR conducted January – April, 2005**
- **Certificate of Qualifications (COQs) signed May 1, 2006**
- **ELVIS Delta DCR held April 7, 2006 to confirm ELVIS Requirements satisfied (NSTS 37389)**
 - **No issues identified and all open work closed**



SPECIAL TOPIC External Tank Instrumentation	Presenter Kim Doering/MS
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• Issue

- Instrumentation has been installed in the External Tank cable trays to validate that there is no aero-elastic instability due to the removal of the PAL ramp

• Discussion

- Accelerometers were installed to measure the cable tray response to the integrated dynamic environment acting on the cable trays after PAL ramp removal on ET-119
 - LO2 Cable Tray Accelerometers
 - 5 acceleration measurements installed in the last section of the LO2 cable tray (same locations as STS-114)
 - LH2 Cable Tray Accelerometers
 - 9 acceleration measurements installed in the first three sections of the LH2 cable tray
- ET accelerometer data will be recorded on the SRB element's Enhanced Data Acquisition System (EDAS)
 - Accelerometer data will be transferred through the SRB/ET range safety crossover and modified SRB cables (same concept as STS-114)
 - Two EDAS units are installed in each booster for BI126

• Flight Rationale

- ET instrumentation design was certified at the STS-121 ET DCR



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INTEGRATED HAZARD REPORT SUMMARY	Presenter	
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EXCEPTION AND OPEN WORK SUMMARY	Presenter Kim Doering/MS
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- **SSP CoFR Exceptions**
 - NSTS 08117, Appendix M:

M	SPACE SHUTTLE SYSTEMS ENGINEERING AND INTEGRATION	
	2.3.2 Requirement Changes, Waivers, Deviations, and Exceptions	
	Approval of Change Requests for:	ECD
	NSTS 07700, Volume X – Book 1, Section 3.2.1.2.14 - Debris Prevention	6/15/06 PRCB PRCB directive approval ECD: NLT L-2 days
	NSTS 07700, Volume X – Book 2, Table 10.11.1, Include update induced environments	PRCB directive approval ECD: NLT L-2 days
	NSTS 08303, "Ice/Debris Inspection Criteria"	6/22/06 PRCB PRCB directive approval ECD: NLT L-2 days
	NSTS 60555, "Verification Limitations for External Tank Thermal Protection System"	PRCB directive approval ECD: NLT L-2 days
	NSTS 60559, "Expected Debris Generation and Impact Tolerance Requirements, Guidelines, and Assumptions"	6/15/06 PRCB PRCB directive approval ECD: NLT L-2 days
	2.7 Integrated Hazard Reports	
	Approval of Change Request for:	ECD
	IDBR-01, "Ascent Debris Impact to SSV"	6/15/06 PRCB PRCB directive approval ECD: NLT L-2 days
	INEV-01, "Exposure to Natural Environment Exceeds Capability of the Space Shuttle Vehicle (SSV)/Elements"	PRCB directive approval ECD: NLT L-2 days
	IMPS-02, "Contamination in the Integrated MPS 02 System"	PRCB directive approval ECD: NLT L-2 days
	IMPS-03, "Improper IMPS configuration during SSME Operation"	PRCB directive approval ECD: NLT L-2 days
	IMPS-09, "Hazardous Environment due to H2 external to the Space Shuttle Vehicle"	PRCB directive approval ECD: NLT L-2 days
	IMPS-17, "Inadvertent SSME Shutdown"	PRCB directive approval ECD: NLT L-2 days
	IFSI-02, "ET/Orbiter System Interface Failure"	PRCB directive approval ECD: NLT L-2 days
	IFSI-03, "SSME/Orbiter System Interface Failure"	PRCB directive approval ECD: NLT L-2 days



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EXCEPTION AND OPEN WORK SUMMARY

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• Non-standard Open Work (not CoFR Exceptions)

- Flight Test Plan

- SICB approval
- PRCB approval
- PRCB directive approval

ECD 6/13/06

ECD: 6/15/06

ECD: NLT L-2 days



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STS-121 FLIGHT SOFTWARE SUMMARY

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- **Second flight of Primary Avionics Software System (PASS) and Back-up Flight System (BFS) Operational Increment 30 (OI-30)**
 - Two new code changes implemented prior to release
 - One new code patch authorized by PRCB for use on STS-121
 - One Initialization Load (I-Load) data patch for STS-121
- **Second flight of OI-30 compatible Multi-function Electronic Display Subsystem (MEDS) Version Increments (VIs)**
 - Integrated Display Processor (IDP) VI 4.01 and Multifunction Display Unit Function (MDUF) VI 5.00
 - No software changes for STS-121
- **Second flight of Miniature Airborne Global Positioning System (GPS) Receiver Shuttle – 3 String (MAGRS-3S) Link 613-9966-006 FSW**
 - No software changes for STS-121



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STS-121 FLIGHT SOFTWARE SUMMARY OVERVIEW OF STS-121 CHANGES

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- **Two new PASS code changes implemented in source prior to release as planned follow-on to STS-114 RTF changes**
 - Reorganized Reaction Control System (RCS) SPEC 23 for improved readability
 - Improved system robustness for second stage contingency RTLS scenarios (eliminates user note)
- **One new PASS code patch authorized for use on STS-121**
 - Corrected latent SM requirements error for improved antenna pointing (PRCBD S063366)
- **One PASS and BFS I-Load data patch for STS-121**
 - Reduced LO2 Low Level Sensor Timer Delay value to ensure propellant mass required for safe engine operation is maintained (PRCBD S063344)
- **All changes were generated using standard processes and released to the field for use in crew training and SAIL verification**



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STS-121 FLIGHT SOFTWARE SUMMARY FSW READINESS SUMMARY

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- **Integrated Avionics Verification (IAV) is complete**
 - A total of 31 test cases were performed in the Shuttle Avionics Integration Laboratory (SAIL) and successfully analyzed in support of STS-121
- **SAIL facility will be in a condition of readiness for mission support**
- **Formal Software Readiness Review (SRR) conducted on 06/01/06**
 - No known constraints
- **With the completion of standard open work, FSW is in a condition of readiness for flight**



STS-121 FLIGHT SOFTWARE SUMMARY STS-300 STATUS	Presenter Patti Thornton/USA
	Date 06-16-06 Page 25

- **Development and verification of FSW flight-specific products for STS-300 completed prior to STS-114**
 - PASS and BFS FSW
 - STS-121 (OV-104) FSW products plus flight specific I-Load patches
 - Products were generated using standard processes and released to the field for use in crew training and SAIL verification
 - SAIL IAV testing and analysis completed (13 test cases)
 - MEDS and MAGRS-3S FSW
 - STS-121 products require no changes for use on STS-300
- **Additional FSW patches to be generated and verified after call-up**
 - LO2 Low Level Timer Delay I-Load patch
 - Improved Main Landing Gear tire pressure calibration data patch
- **Formal SRR to be conducted after call-up**



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PGSC Hardware and Software Summary	Presenter Alan Currie/MS4
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- **STS-121 Will Be the Second Space Shuttle Flight of the IBM ThinkPad A31p PGSC and Associated 28V DC Power Supply (Emerald brick)**
- **All software on the PGSC/A31p has been moved from the PGSC/760XD**
 - **With the exception of**
 - **OCA and WinDecom which require docking station for PCI cards (expected June 2007)**
 - **RSAD lacks MCIU Windows 2000 driver (expected July 2006)**
 - **PILOT and Centerline camera controller require port to Windows OS or DOS emulation**
- **Single Disk Drive Configuration for STS-121**
 - **QNX O/S-Based OBSS/LCS Software and Utilities moved to Windows 2000**
 - **OBSS/IDC software new for STS-121**
- **ISS -307 Epson printer flown to support swap with ISS printer (cyan not printing)**
- **No batteries installed in PGSC/760XD's to support ePCS**
 - **Only 3 batteries remain, all past expiration dates**
- **RMS Work Area Stability DTOs supported with wireless strain gauge data collection**



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PGSC Integrated Testing/Hardware Status	Presenter Alan Currie/MS4
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- **A31p Integrated Testing was completed with no anomalies on 5/12/05**
 - Major applications (WorldMap, ET camera, IDC camera, LCS, DOUG, Netmeeting)
 - Other A31p applications tested by OPR if applicable and presented a validation package and statement.
- **Crew training**
 - Integrated sims supported with STS-121 loads
 - Several STS-121 crew sessions with WorldMap and other PGSC applications
- **Late Update Disk L-10 days for FDF**
 - POCCB 5/24/06
 - SW due 6/19/06
 - Changes evaluated for impacts
 - All affected applications tested in PGSC lab with late update disk
- **STS-114 IFA's are closed**
- **Open FIARs have or will have ISOD's to cover applicable hardware for STS-121**
 - Interim Selected Operation Disposition (ISOD) states review and concurrence by Engineering, SRQA, SSP, and ISS laptop board chairs and documents detection, impacts, hazard controls, and operational workarounds for limited duration.



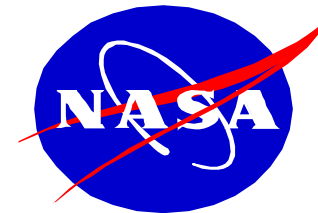
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COFR ENDORSEMENT

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Systems Engineering and Integration Office STS121 - Flight Readiness Statement



The Space Shuttle Program, Systems Engineering and Integration Office's Flight Preparation Process Plan, documented in NSTS 08117, Requirements and Procedures for Certification of Flight Readiness have been satisfied. Required products and other responsibilities identified in NSTS 08117, paragraph 8.5.12 and Appendix M, with noted exceptions, have been or will be scheduled for completion. All technical functions and responsibilities are ready and the Systems Engineering and Integration Office is prepared to sign the Certificate of Flight Readiness for STS-121.

Kimberly B. Doering
Manager Systems Engineering and Integration Office



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BACK-UP CHARTS



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IFA DISPOSITIONS		Presenter Kim Doering/MS
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	Integrated IFA	Element IFA	Anomaly Description	IFA Disposition
1	STS-114-I-01	STS-114-T-05	Debris at 127.1 seconds -- External Tank (ET) Protuberance Air Load (PAL) ramp foam loss.	Closed
2	STS-114-I-02	STS-114-T-03	135.8 seconds -- LH2 acreage debris below -Y bipod (PDL repair)	Closed
3	STS-114-I-03	STS-114-T-02	148.1 seconds -- Debris coming from -Y bipod.	Closed
4	STS-114-I-04	STS-114-T-01	Debris from LH2 Intertank flange at -83 degree locations. Time unknown	Closed
5	STS-114-I-05	STS-114-T-01	Debris from LH2 Intertank flange at -90 degree locations. Time unknown	Closed
6	STS-114-I-06	STS-114-T-03	Debris from aft LH2 tank acreage between LO2 feedline and pressline. Time unknown.	Closed
7	STS-114-I-07	STS-114-T-04	154.8 seconds -- Debris from LH2 ice/frost ramp at XT -1262.	2 Flight Interrim
8	STS-114-I-08	STS-114-T-04	Debris from LH2 ice/frost ramp at XT -1525, unknown time.	2 Flight Interrim
9	STS-114-I-09	N/A	Vapor from ET LH2 Vent during ascent	Closed
10	STS-114-I-10	N/A	Free-flying debris observed 18 minutes after ET separation	Closed
11	STS-114-I-11	N/A	Payload General Support Computer (PGSC) STS-2 would not boot up on initial try	Closed
12	STS-114-I-12	STS-114-V-14	Lock-Up of STS3 PGSC/760XD when Viper PCMCIA Card Inserted	Closed
13	STS-114-I-13	N/A	Bird strike on ET during ascent	Closed
14	STS-114-I-14	STS-114-K-001	LN2 dripped from ET vent line ice suppression shroud	Closed
15	STS-114-I-15	STS-114-K-66 thru 90, -110, -113, -118	Debris walkdown identified several FOD/debris weighing more than a U.S. quarter (0.014 lb)	Closed
16	STS-114-I-16	STS-114-K-114	NSI firing lines pulled out of the HDP post prior to breaking loose	Closed
17	STS-114-I-17	STS-114-V-26	66 seconds -- Right nose landing gear door tile material loss. Across two tiles.	Closed
18	STS-114-I-18	STS-114-V-01	Liquid Hydrogen (LH2) Engine Cutoff (ECO) #2 Sensor Failed 'wet' During Test	2 Flight Interrim
19	STS-114-I-19	STS-114-V-11	Orbiter experienced several instances of TPS tile damage	Closed
20	STS-114-I-20	STS-114-V-02	Late release of Tyvek cover on jets F3D and F4D	2 Flight Interrim
21	STS-114-I-21	STS-114-V-08	TPS blanket damage near Window 1	Closed
22	STS-114-I-22	STS-114-V-12	Protruding gap fillers	Closed



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IFA DISPOSITIONS		Presenter Kim Doering/MS
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	Integrated IFA	Element IFA	Anomaly Description	IFA Disposition
23	STS-114-I-23	STS-114-V-06	APU 1 drain system pressure decay	Closed
24	STS-114-I-24	N/A	Both SRB aft skirt gaseous nitrogen (GN2) purge lines were intact and slightly bent. The protective tape layering was completely eroded. The two lines exhibited frayed braiding.	Closed
25	STS-114-I-25	STS-114-B-001	Potential ascent impact site to RH SRB ET attach ring foam.	Closed
26	STS-114-I-26	STS-114-B-002	RT455 missing aft of inboard RH Booster Separation Motor (BSM) triple motor housing.	Closed
27	STS-114-I-27	STS-114-B-003	Hypalon debris generated from BSM Aero Heat Shield impact	Closed
28	STS-114-I-28	STS-114-B-004	Potential ascent impact site to RH forward skirt on acreage along -Z axis Forward of Range Safety System (RSS) Antenna	Closed
29	STS-114-I-29	STS-114-V-29	Forward ET attach bolt pyro NASA Standard Initiator (NSI) ejection	Closed
30	STS-114-I-30	STS-114-K-109	Shim stock fell from Orbiter TPS during ascent	Closed
31	STS-114-I-31	STS-114-T-TBD	ET experienced several instances of impact damage	Closed
32	STS-114-I-32	N/A	A31P Laptop Timing Problems	Closed
33	STS-114-I-33	STS-114-V-31	Orbiter experienced several putty repair losses	Closed
34	STS-114-I-34	STS-114-B-06	Missing Aft Skirt Shoe Sidewall Material (Post Location 7)	Closed
35	STS-114-I-35	STS-114-E-02	SSME Nozzle Aft Manifold Ablative	Closed
36	STS-114-I-36	STS-114-M-01	Numerous Acrymax paint/RT455 pop-outs/pop-ups on GEI runs and filed Joint closeouts	Closed
37	STS-114-I-37	STS-114-M-02	Spalling of cork in the center aft and aft GEI cork runs and aft face of the inactive stiffener stub	Closed
38	STS-114-I-38	STS-114-T-06	+ Y Thrust Flange Foam Loss	Closed
39	STS-114-I-39	STS-114-V-32	GH2 PRESS System Leakage	Closed
40	STS-114-I-40	STS-114-K-57 STS-114-K-58	GH2 Umbilical-Quick Disconnect, STEM transition area on bottom of poppet assembly has raised metal, Transition area on the 7 inch QD body stem has raised metal	Closed
41	STS-114-I-41	N/A	High MPLM Pressure During Environment Check # 1	Closed
42	STS-114-I-42	STS-114-K-48	UPS-40/40A plug backed out of receptacle	Closed
43	STS-114-I-43	STS-114-E-01	SSME 1 Recirculation Isolation Valve (RIV) did not return to 100% open after propellant dump	Closed
44	STS-114-I-44	N/A	High O2 Concentration in aft compartment	Closed