



	Presenter	
	Date	Page 1

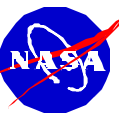
STS-114 Flight Readiness Review

MS/John F. Muratore
29 Jun 2005



<h1>Agenda</h1>	Presenter	
	Date	Page 2

- Exceptions and Open Work
- Integrated Hazards
- ECO Sensor UA
- Lox Geyser Analysis
- Flight Software
- Personal General Support Computer



Systems Engineering & Integration Exceptions

Presenter

Date

Page 3

- **Completion and closure of Integrated Hazards**
 - **Updates due to LO2 Feedline Bellows Heater implementation – ECD 7/7/05**
 - **IEPD-01: Inability to Power Critical Functions**
 - **IMPS-15: LO2 Geyser Event During Cryo Loading**
 - **ISPR-02: ET Vent Arm System Umbilical Malfunction**
 - **Modification to integrated system risk increase associated with ECO sensor UA – ECD 7/7/05**
 - **IMPS-03: Improper IMPS Configuration During Engine Operation**
 - **Adding new control for late checkout of sensor functionality**
 - **Development, review and approval of integrated debris hazard (IDBR-01) – ECD 7/7/05**
- **NSTS 08303, Ice/Debris Inspection Criteria, update for allowable ice as result of DVR – ECD 7/7/05**
- **CR S062528, Update 07700 Vol X to exempt specific element interfaces and ET instrumentation from the NSTS 08080-1 deadfacing requirements – ECD 7/7/05**

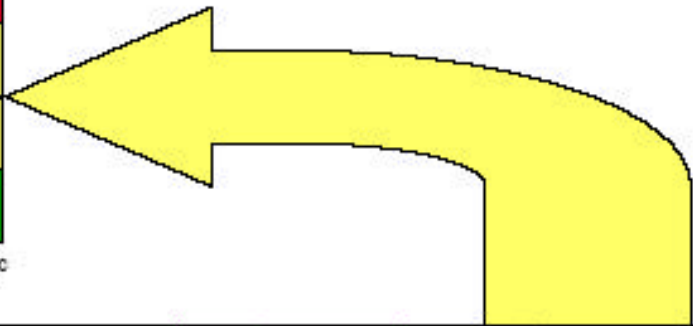
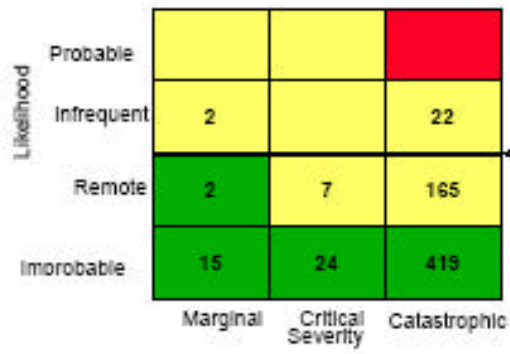


<h1>Systems Engineering & Integration Exceptions</h1>	Presenter	
	Date	Page 4

- **Complete integration, review and approval of open RCNs – ECD 7/1/05**
 - **MS16795R1 S00-ET BIPOD MANUAL HEATER CONTROL**
 - **KG16723R1 544.31- MSLBS AND TACAN, CLS-FRANCE P**
 - **KG16763 012.00 HYPERGOL VAPOR DETECTION, PADS R**
 - **KG16794 554.31 TACAN CIRCUIT BREAK., CLS-ISTRES R**



<h1>Integrated Hazard Report Risk Distribution</h1>	Presenter	
	Date June, 2005	Page 5



Hazard Report #	Accepted Risk Integrated Hazard Reports	Controlled					Accepted Risk							
		Controlled Risk	remote-marg	improb-marg	improb-critical	improb-cat	Accepted Risk	prob-marg	infreq-marg	remote-critical	remote-cat	prob-critical	infreq-critical	infreq-cat
IOBR-01	External Debris Impact to SSV	29				29	43				30			13
IEME-01	Adverse Electromagnetic Effects (EME)	1			1	22				22				
IEPD-01	Inability to Power Critical Functions	16		10	6	8			3	5				
IFSI-01	ET/SRB System Interface Failure	7			7	2				2				
IGNC-01	Ascent Trajectory Event Anomaly	15			15	1							1	
IMEO-01	Hazardous Environment in the Aft Compartment	7		2	5	7			1	3			3	
IMPS-01	Contamination in the Integrated MPS H2 System	1			1	3				3				
IMPS-02	Contamination in the Integrated MPS O2 System	1			1	3				3				
IMPS-03	Improper IMPS configuration during SSME Operation	18		1	17	3				3				
IMPS-04	Off-Nominal Purges	13			13	1				1				
IMPS-09	Hazardous Environment due to H2 External to SSV *	4			4	5				4			1	
INEV-01	Exposure to Natural Environment Exceeds Capability of the Space Shuttle SSV Elements	17	1	1	15	45		1	1	43				
ISPR-03	Tall Service Mast (TSM) T-0 Umbilical System Malfunction	57		9	7	51	1			1				
ISPR-04	SRB Hold Down Post (HDP) System Malfunction	2			2	2				2				
ISPR-05	SRB Umbilical System Malfunction	5			5	2				2				
ITHM-01	Exposure to Thermal Environment Exceed Capability of SSV	17	1	5	4	7	3		1	1	1			
IVLD-01	Exposure to Induced Environments Exceed Structural Capability of SSV	41			41	35			1	34				
ILIT-01	Failure to Avoid Lightning	0				10				6			4	
IH Risk Distribution Totals		261	2	15	24	220	196	0	2	7	165	0	0	22



Integrated Hazard Report Risk Distribution		Presenter	
		Date June, 2005	Page 6

Hazard Report #	Controlled Integrated Hazard Reports	Controlled				
		Controlled Risk	remote-marg	improb-marg	improb critical	improb-cat
IARO-01	Aerodynamics Environment not per Specified Design	1				1
ICOM-01	Adverse Effects due to Intentional RF Environment	3				3
IFSI-02	ET/Orbiter System Interface Failure	11				11
IFSI-03	SSME/Orbiter System Interface Failure	16				16
IFSI-04	Outer Mold Line Configuration Error	3				3
IFSW-01	Flight Software Generic Problems can cause loss of vehicle command and control	2				2
IMEO-02	Malfunction of Integrated Hydraulic System (Systems 1, 2 and 3)	5				5
IMEO-03	SSME Nozzle/OMS Pod/ Body Flap Interference	3				3
IMPS-05	Over pressurization of the Integrated MPS H2 System	20				20
IMPS-06	Under pressurization of the Integrated MPS H2 System	15				15
IMPS-07	Over pressurization of the Integrated MPS O2 System	17				17
IMPS-08	Under pressurization of the Integrated MPS O2 System	14				14
IMPS-12	Excessive O2 from ET/Orbiter/SSME External to SSV **	10				10
IMPS-15	LO2 Geyser Event during Cryo Loading	13				13
IMPS-16	Loss of MPS He System	4				4
IMPS-17	Inadvertent SSME Shutdown	5				5
IPYR-01	Pyrotechnic System Malfunction	21				21
ISPR-02	ET Vent Arm System (ETVAS) Umbilical System Malfunction	16				16
IVLD-02	System Instability Results In Structural Failure of SSV	20				20
IH Risk Distribution Totals		199	0	0	0	199



<h1>Integrated Hazard Open Work</h1>	Presenter	
	Date	Page 7

- **37 Integrated Hazard Reports Identified for STS-114.**
 - **36 dispositioned by PRCB.**
 - **The CR S050425BZ IDBR-01 “External Debris Impacts SSV” Integrated Hazard Report is released and in review. (SICB 07/05/05, PRCB 07/07/05)**
 - **All Open Work classified as RTF Constraints during the Integrated Hazard development process has been completed and the Integrated Hazard Reports are Closed.**
- **4 Additional Hazard Report Changes were identified following the Systems DCR.**
 - **CR S050425CL documents the 3 Integrated Hazard Report updates required as a result of the ET LO2 Feedline Bellows Heater modification. (SICB 07/05/05, PRCB 07/07/05)**
 - **IEPD-01, Inability to Power Critical Functions**
 - **ISPR-02, ET Vent Arm System (ETVAS) Umbilical Malfunction**
 - **IMPS-15, LO2 Geyser Event.**
 - **CR S050425CN documents the Integrated Hazard Report IMPS-03 “Improper IMPS Configuration during Engine Operation” changes identified as a result of the STS-114 Tanking Test LH2 ECO Sensor Anomaly. (SICB 07/05/05, PRCB 07/07/05)**
 - **Adding control for late checkout of sensor**



<h1>Infrequent/Catastrophic Causes</h1>	Presenter	
	Date	Page 8

Hazard Report	Hazard Report Title	Cause/Description	Post RTF Actions
IGNC-01	Ascent Trajectory Anomaly	Critical Math Models used for design/verification do not match flight conditions causing an ascent trajectory anomaly.	Develop an Integrated Hazard Report to better define the risk for Intact Aborts
IMEO-01	Hazardous Environment in the Aft Compartment	Hot Surface Temperatures (Ignition Sources) in the Aft Compartment from Improper Design/ Interface Characteristics.	Define the overall induced environment in the aft compartment. This includes identifying potential instrumentation changes to monitor and understand the aft compartment environment and warning systems to reduce the risk of current undetectable catastrophic failure modes such as SSME hot gas leaks.
		Leakage in the Aft Compartment from External Sources.	Determine if ingestion of Hazardous fluids in the Aft compartment is credible
		Ignition Sources in the Aft Compartment due to External Sources	Determine if ingestion of Hazardous fluids in the Aft compartment is credible



<h1>Infrequent/Catastrophic Causes</h1>	Presenter	
	Date	Page 9

Hazard Report	Hazard Report Title	Cause/Description	Post RTF Actions
ILIT-01	Failure to Avoid Lightning	Failure to Avoid Lightning During Prelaunch Operations Between the VAB and the Launch Pad	Perform a fleet assessment of the Program capabilities for vulnerability and protection
		Failure to Avoid Lightning During Prelaunch Operations at the Launch Pad	Review existing OMRSDs considering the risk throughout the entire period of ET Propellant Operations.
		Failure to Avoid Lightning During Entry/Descent/Landing	Review existing flight rules and OMRSDs considering the risk throughout the entire period of post-landing ground operations.
		Failure to Avoid Lightning During Post-Landing Through OPF Roll-In	
IMPS-09	Hazardous Environment due to H2 External to SSV	H2 Concentrations above LFL External to the SSME due to Failure to Disperse Lag H2 during Pad Shutdown	<p>Determine if imagery analysis and CFD analysis can conclude lag H2 is consumed and not trapped in a pad shutdown.</p> <p>Evaluate mechanisms for closing the gap between engine shutdowns and the initiation of Firex to reduce the risk of lag H2.</p>



<h1>Infrequent/Catastrophic Causes</h1>		Presenter	
		Date	Page 10

Hazard Report	Hazard Report Title	Cause/Description	Post RTF Actions
IDBR-01	External Debris Impacts SSV	ET Foam - PDL-1034 Located at the LO2 Ice/Frost Ramps Impact to Orbiter Tile During Ascent	ET project to continue the ice liberation testing to better define the size and amount of ice liberated from the feedline brackets.
		ET Foam - PDL-1034 Located at the LO2 Ice/Frost Ramps Impact to Orbiter Special Tile During Ascent	SE&I, KSC L&L and ET, IPWG to use flight imagery to help better define the size and amount of ice liberated during liftoff from bellows, brackets and umbilicals.
		ET Foam - PDL-1034 located on the Intertank Ice/Frost Ramps Impact to Orbiter Tile During Ascent	SE&I to update probabilistic analyses if/when additional data on ice is available. This would include ice density, ice quantity, shape and size.
		ET Foam - PDL-1034 located on the Intertank Ice/Frost Ramps Impact to Orbiter Special Tile During Ascent	SE&I to improve aerodynamic prediction capability of ice release during transonic Mach numbers with emphasis on ice debris crossrange capability.



<h1>Infrequent/Catastrophic Causes</h1>	Presenter	
	Date	Page 11

Hazard Report	Hazard Report Title	Cause/Description	Post RTF Actions
IDBR-01	External Debris Impacts SSV	ET Ice Located on the LO2 Feedline Brackets Impact to Orbiter Tile During Ascent	SSP to gather additional flight data on umbilical ice build up, baggie release and track ice damage on adjacent tile area. Orbiter to develop and provide updated special tile, door seal capability to SE&I SE&I to update analysis for special tile impacts with updated capability
		ET Ice Located on the LO2 Feedline Brackets Impact to Orbiter Special Tile During Ascent	
		ET Foam - PDL-1034 located on the Intertank Ice/Frost Ramps Impact to Orbiter Special Tile During Ascent	
		LO2 Feedline Bellows Ice Impact to Orbiter Tile During Ascent	
		LO2 Feedline Bellows Ice Impact to Orbiter Special Tile During Ascent	
		Orbiter/ET Umbilical Ice Impact to Orbiter Tile During Ascent	
		Orbiter/ET Umbilical Ice Impact to Orbiter Special Tile During Ascent	



<h1>Infrequent/Catastrophic Causes</h1>	Presenter	
	Date June, 2005	Page 12

Hazard Report	Hazard Report Title	Cause/Description	Post RTF Actions
IDBR-01	External Debris Impacts SSV	ET Foam - BX 265 Located on the LO2 to I/T Flange Closeout Impact to Orbiter Special Tile During Ascent	
		Miscellaneous Ice from ET Defects and ET/SRB Interfaces Impact to Orbiter Tile During Ascent	



	Presenter	
	Date	Page 13

SR 2911 – ECO Sensor UA



ECO Sensor UA on ET-120

Presenter

Date

Page 14

- **LH2 low-level cut-off sensors 3 & 4 failed wet during Tanking Test 1 (OV-103/ET-120)**
- **OV-103 wiring and point-sensor box removed and replaced**
- **Special instrumentation was added for Tanking Test 2**
- **Sensors performed nominally during Tanking Test 2**
- **Orbiter wiring/PSB test/inspection revealed no direct cause of anomaly**
- **UA to be discussed at STS-114 FRR (OV-103) and STS-121 FRR (ET-120)**
- **SICB (10 June) recommends use-as-is/no defect for ET-120**
- **Rationale**
 - **Tanking Test 2 – nominal performance with special instrumentation**
 - **Unusual findings in Orbiter investigation (not proven to be cause of anomaly)**
 - **Tank manufacturing/test process (simple components, QA)**
 - **ET-120 has been subjected to (and passed) more thorough checkout than other tanks**
 - **Fault tolerance/PRA**
 - **Additional checkout of sensors will be added to pre-launch sequence**



LOX Geyser Analysis

Presenter

Date

Page 15

- Concern raised regarding the effects of bellows heater on LOX geyser
- Analysis performed by USA showed that all conditions showed margin except for revert condition with bleed valve failed close
- USA analysis modified to add positive effects of GHe bubbling in LOX system
- System does not reach saturation temperature and avoids possibility of geyser with effects of GHe bubbling added



<h1>Late Open Issues</h1>	Presenter	
	Date	Page 1

- **Review of SE&I induced environments on 28 June 2005 revealed the following issues:**
 - **STS-300 RTLS thermal environment bipod fitting has been run but thermal panel review scheduled for 30 Jun 2005**
 - **Lockwires on orbiter/ET attach fittings thermal capability for RTLS is open work**
 - **Roll Maneuver loads environment was not formally released to cargo but informal review at the loads panel has occurred**
 - **Roll Maneuver window loads and wing leading edge loads have been informally coordinated with orbiter at the loads panel but not released formally**
 - **Three STS-114 thermal environments and 7 protuberance airloads environments identified as open work at Systems DCR have not been issued. Informal coordination has occurred at the tech panels with the elements**
- **SE&I management reviewed at SICB on 6/28 and evaluated as low risk**
- **SE&I management believes that late release of these environments (although covering SE&I's responsibilities) would cause "paper thrash" without additional engineering value**
- **Revamping induced environment release system to prevent late release environments on future flights**



<h1>Late Open Issues</h1>	Presenter	
	Date	Page 2

- **Orbiter proposed waiver to EMI requirements for pyrotechnics in Orbiter Docking System**
 - Past testing of this system did not provide sufficient data to determine if requirements for margin were met
 - Low cost test option has been developed and should be performed
 - Request for waiver walked into ICB yesterday. Given criticality of system failure mode (loss of orbiter and ISS due to inadvertent docking system release) additional review is warranted
 - Program should assign action out of FRR
 - Risk rationale requires additional review
- **RCS Tyvek cover risk to ET and SRB was identified late**
 - Transport mechanism to ET/SRB identified late
 - Risk is assessed as low (200 fps impact)
 - Open work being carried in integrated hazard and risk assessment placed in the integrated hazard



	Presenter	
	Date	Page 16

FLIGHT SOFTWARE



<h1>AGENDA</h1>		Presenter	
		Date	Page 17

- **STS-114 Flight Software (FSW) Summary**
 - **Primary Avionics Software System (PASS)**
 - **Backup Flight System (BFS)**
 - **Multifunction Electronic Display Subsystem (MEDS)**
 - **Miniature Airborne Global Positioning System (GPS) Receiver Shuttle – 3 String (MAGRS-3S)**
- **FSW Roadmap to Flight**
- **Return-to-Flight (RTF) Related FSW Changes**
- **Initialization Load (I-Load) Patches**
- **Verification Summary**
- **STS-300 Status**
- **Flight Readiness Summary**

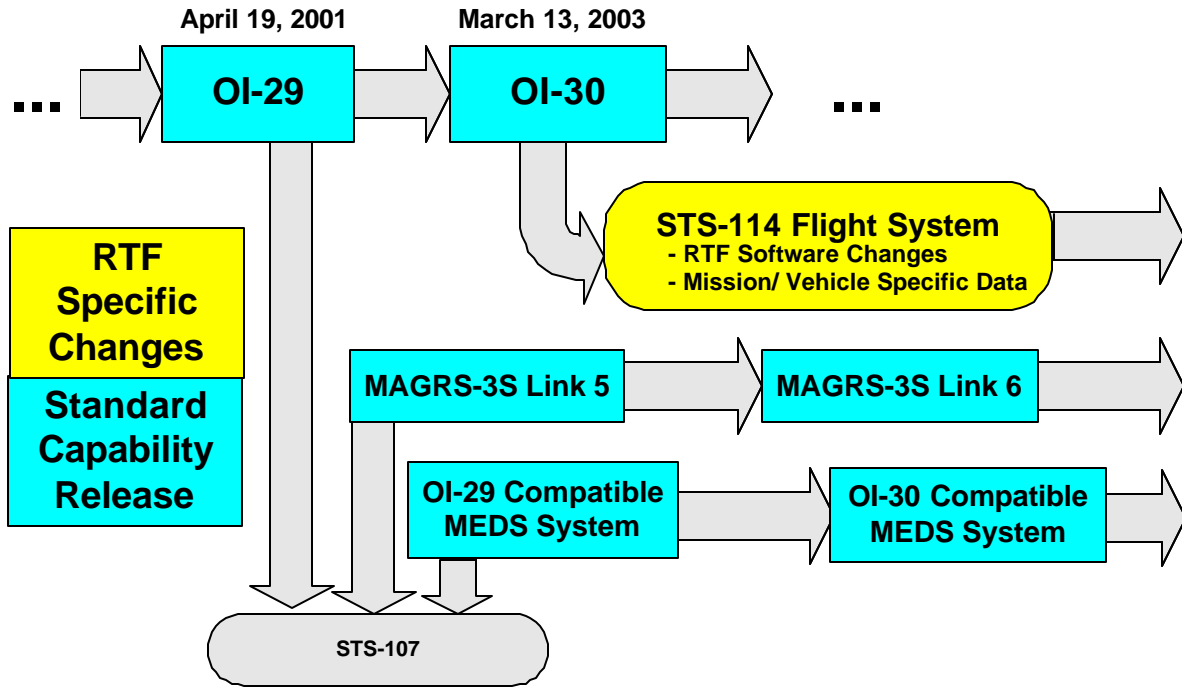


STS-114 FLIGHT SOFTWARE SUMMARY	Presenter	
	Date	Page 18

- **First flight of PASS and BFS Operational Increment 30 (OI-30)**
 - OI-30 includes changes for enhanced crew situational awareness; improved abort control and expanded abort options; and other enhancements for ground and flight operations and safety
 - Additional new capabilities in support of RTF initiatives for STS-114
 - Standard flight specific I-Load patches for STS-114
 - One additional BFS I-Load patch for STS-114
- **First flight of updated MEDS Version Increments (VIs)**
 - Integrated Display Processor (IDP) VI 4.01 and Multifunction Display Unit Function (MDUF) VI 5.00
 - In conjunction with OI-30, provides for enhanced crew situational awareness
- **First flight of MAGRS-3S Link 613-9966-006 FSW**
 - Link-006 includes corrections for known problems
 - For STS-114, GPS will only be used to provide for additional redundancy in the event of complete loss of TACAN capability



<h1>FSW ROADMAP TO FLIGHT</h1>		Presenter
Date	Page 19	



- Changes since STS-107 are of overall size, complexity and quality levels comparable to previous releases
- Additional data on changes is provided in backup



<h1>RTF RELATED FSW CHANGES</h1>	Presenter	
	Date	Page 20

- **FSW changes addressing RTF safety issues and supporting RTF enhancements include:**
 - **Automatic detection and isolation of a failed-on Reaction Control System (RCS) Thruster to help mitigate the risk of ISS structural failure**
 - **An additional control option during Remote Manipulator System (RMS) automatic mode operations to minimize trajectory tracking errors and automatically command braking if error thresholds are exceeded**
 - **Supports auto-sequences for the Orbiter Boom Sensor System (OBSS) survey**
 - **Crew visibility into Starboard Manipulator Positioning Mechanisms (MPMs) and Manipulator Retention Latches (MRLs) which will cradle the OBSS**
 - **Facilitation of power to the Orbiter Digital External Tank (ET) Camera during appropriate mission segments**
 - **Includes delayed ET Sep scenarios and on-orbit downlink operations**



<h1>I-LOAD PATCHES</h1>		Presenter	
		Date	Page 21

- **Standard flight specific I-Load patches were approved by the SASCB on 11/18/04**
 - **Includes incorporation of data for the new Istres (Le Tube) Trans-Atlantic Landing (TAL) site**
- **One additional I-Load patch approved for STS-114**
 - **Changes BFS Fault Detection and Annunciation (FDA) limits for Avionics Bay Fan delta pressures to reflect Avionics Bay hardware upgrades**
 - **PRCB authorization for flight occurred on 4/11/05 (S062530)**
 - **PASS limits will be changed in flight via Table Maintenance Block Update (TMBU) uplink capability**
- **All I-Load patches were generated using standard automated processes and released to the field for use in crew training and SAIL verification**



<h1>VERIFICATION SUMMARY</h1>		Presenter	
		Date	Page 22

- **Integrated Avionics Verification (IAV) complete**
 - **A total of 170 test cases were performed in the Shuttle Avionics Integration Laboratory (SAIL) and analyzed in support of STS-114**
 - **Included testing of full flight system (PASS/BFS OI-30 and STS-114 changes; MEDS VI 4.01/5.00; MAGRS-3S Links 5-6; and SSME AC42 software)**
 - **Included Payload Telemetry testing previously performed in the KSC Cargo Integration Test Environment (CITE)**
- **Design Certification Review (DCR)**
 - **FSW RTF Design Certification Review (DCR) activities completed with no open actions**
 - **Covered all FSW changes since STS-107 (including standard capability releases flying for the first time on STS-114)**
 - **Formal Certification Statement signed by Systems DCR Part 1 Board**



<h1>STS-300 STATUS</h1>		Presenter	
		Date	Page 23

- **Development and verification of FSW flight-specific products for STS-300 is complete**
 - **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 is complete (13 test cases)**
 - **MEDS and MAGRS-3S FSW**
 - **STS-114 products require no changes for use on STS-300**
- **Formal Software Readiness Review (SRR) to be conducted upon call-up**



<h1>FSW READINESS SUMMARY</h1>	Presenter	
	Date	Page 24

- **SAIL facility will be in a condition of readiness for mission support**

- **Formal Software Readiness Review (SRR) conducted on 04/14/05**
 - **Delta SRR conducted on 06/16/05**
 - **No FSW non-standard open work**

- **With the completion of standard open work, FSW is in a condition of readiness for flight**



	Presenter	
	Date	Page 25

Payload and General Support Computer (PGSC) Readiness for STS114

FRR

June 29, 2005



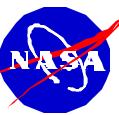
<h1>Agenda</h1>	Presenter	
	Date	Page 26

- PGSC (Payload and General Support Computer) Configuration Summary
- Integrated Testing
- Open Issues
- Readiness for Flight



<h1>PGSC Hardware and Software Configuration Summary</h1>	Presenter	
	Date	Page 27

- **STS-114 Will Be the First Space Shuttle Flight of the IBM ThinkPad A31p (1.8 Ghz P4) PGSC and associated 28V DC Power Supply**
 - **Hardware Has Successfully Flown on the International Space Station**
 - **First deployed in July 2003**
 - **Shuttle Hardware Provided by ISS Program**
 - **Shuttle and Station Share Common Laptop Hardware (Same Purchase Lot)**
 - **Shuttle and Station Hardware Certification is Combined**
 - **Hardware is Criticality 1R/3 (OBSS/LCS, EVA Camera), Criticality 3/3 (PGSC Applications)**
- **All Software on the PGSC/A31p is New to the Space Shuttle Program**
 - **Windows 2000 Operating System Replaces ThinkPad 760XD's Windows 98**
 - **Dual Hard Disk Drive (HDDs) Configuration**
 - **First Contains QNX Operating System-Based OBSS/Laser Camera System (LCS) Software**
 - **Second Contains Windows 2000 O/S Based Software Including Return to Flight (RTF) Software**
 - **Both HDDs Are Bootable and Selectable At Start-Up**
- **Six 760XD Thinkpads (166 Mhz P1) will fly with existing PGSC software in basically same configuration (with minor upgrades) as flown on STS-107.**
- **Three Thinkpad A31p's are added to the shuttle network for a total of 9 laptops.**
- **One Thinkpad A31p is flown as backup.**



Integrated Testing

Presenter

Date

Page 28

- **A31p RTF Integrated Testing was completed with no anomalies on 4/11/05**
 - ET umbilical camera
 - Laser Camera System (LCS) QNX Operating System compatibility with Windows Network
 - Wing Leading Edge (WLE)
 - Dynamic Onboard Ubiquitous Graphics (DOUG)
 - Netmeeting
- **PGSC team supported Integrated Verification Test (IVT) test with LCS on the PAD on 4/20/05.**
 - Test successful.
- **A31p RTF Integrated Testing repeated 06/21/05 with new LCS load delivered 6/17/05 and May late update disk applied and new load built.**
 - Tile database and WLE command files
 - No Anomalies
- **STS-300 plan is to use STS-114 load with the exception of WLE which supports firmware installed on OV104 (STS-121).**
 - Requires a subset of the integrated test the week of July 10.



<h1>Open Work</h1>	Presenter	
	Date	Page 29

- **RS-422 cable extension GCAR has not been signed.**
 - **Expected 06/28/05**



<h1>PGSC Readiness for Flight</h1>	Presenter	
	Date	Page 30

The Payload and General Support Computer (PGSC) Configurations are in a condition of readiness to support the STS-114 flight.



	Presenter	
	Date	Page 31

- ECO Sensor Backup



SPACE SHUTTLE PROGRAM

Space Shuttle Systems Engineering and Integration Office

NASA Johnson Space Center, Houston, Texas

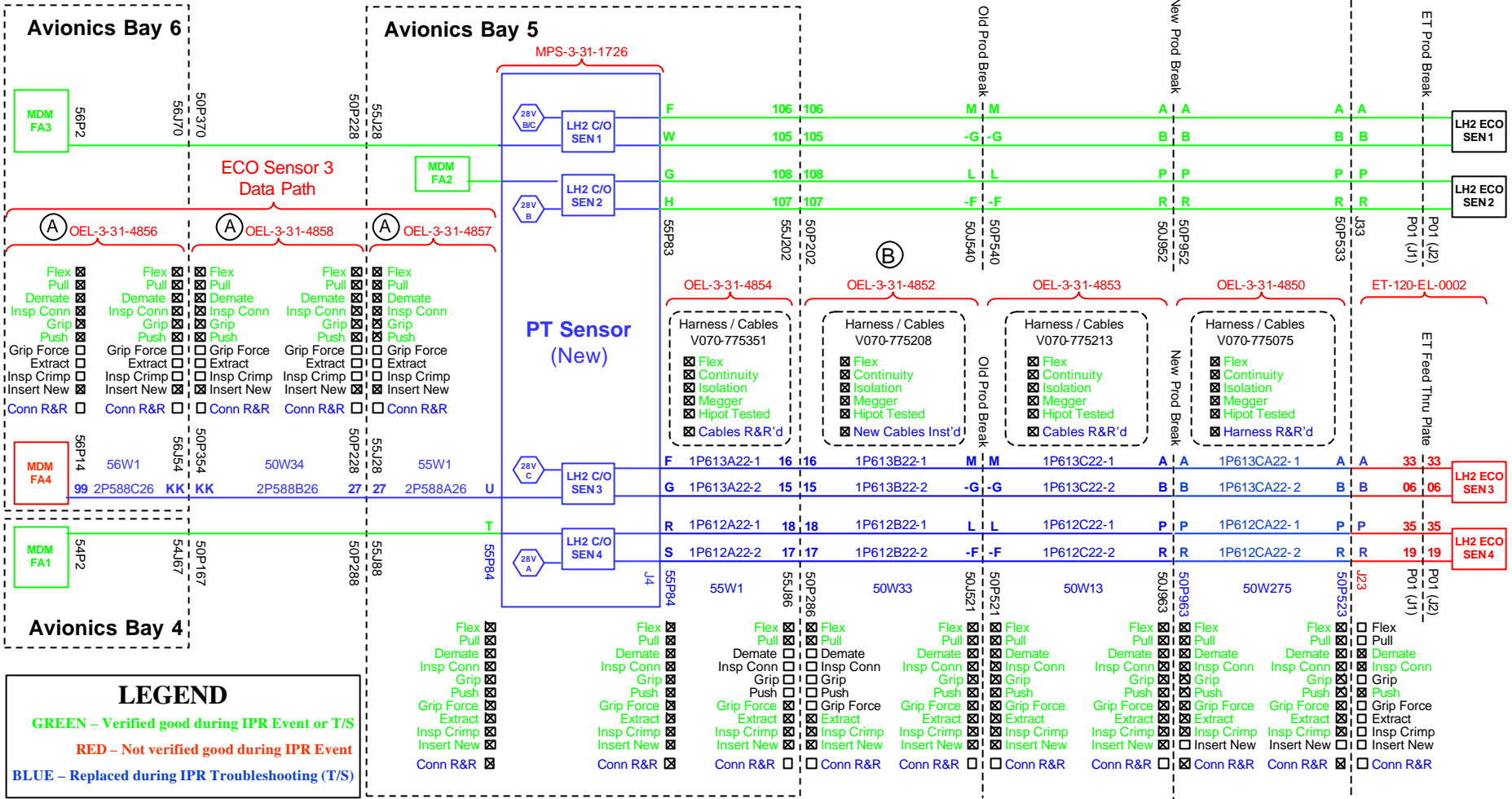


Presenter	
Date	Page 32

- (A)**
- New Cables have been installed – routed outside of clamps (MR)
 - Old Cables have been abandoned in place (MR)
 - Old Cable contacts have been removed and routed to NSLD Mal Lab
 - Grip Force tests will be performed
 - Old Cables have been Capped & Stowed

- (B)**
- New Cables have been installed – routed outside of clamps (MR)
 - Old Cables have been abandoned in place (MR)
 - Old Cable contacts have been removed and routed to NSLD Mal Lab
 - Old Cables have been Capped & Stowed

Orbiter ET





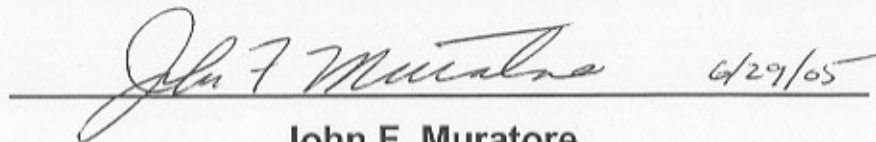
NSLD Contact Troubleshooting & Analysis	Presenter	
	Date	Page 33

CONNECTOR REF DES	CONTACT TYPE	INSPECTION	OPTICAL MICROSCOPY	PHOTOGRAPH	X-RAY	EXTRACTION FORCE
55J4	PINS	X	X	X	X	X
55P84	SOCKETS	X	X	X	X	X
55J86	PINS	X	X	X	X	X
50P286	SOCKETS	X	X	X	X	X
50J521	PINS	X	X	X	X	X
50P521	SOCKETS	X	X	X	X	X
50J963	SOCKETS	X	X	X	X	X
50P963	PINS	X	X	X	X	X
50P523	SOCKETS	X	X	X	X	X

Systems Engineering and Integration Office STS114 - 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, have been or will be completed. 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-114.

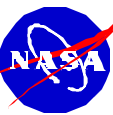
A handwritten signature in black ink, reading "John F. Muratore", followed by the date "6/29/05" written in a smaller, cursive script.

John F. Muratore
Manager Systems Engineering and Integration Office



	Presenter	
	Date	Page 34

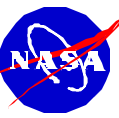
FLIGHT SOFTWARE BACK-UP MATERIAL



<h1>FSW CHANGES SINCE STS-107</h1>	Presenter	
	Date	Page 35

	PASS	BFS	MEDS	MAGRS-3S
Thousands of Lines of Code Added/Deleted/Modified	15.1 (3.3%)	3.2 (2.9%)	9.6 (11.3%)	4.0 (3.8%)
Software Change Requests (SCRs) implemented	122	30	13	2
Introduced DRs with FSW waivers	1	1	0	0

- **All changes were developed and verified through full standard processes**
 - **FSW process compliance with Program Master Verification Plan requirements was documented during RTF Design Certification Review activities**
- **Quality indicators are evaluated throughout the FSW lifecycle**
 - **No adverse trends**
 - **Newly introduced DRs with waivers have minor display-only impact**
- **Remaining risk is consistent with approved Integrated Hazard Report IFSW-01 (classified as “Controlled”)**
- **New capabilities, described on the following pages, were designed to increase overall system robustness including:**
 - **Enhanced crew situational awareness**
 - **Improved abort control and expanded abort options**
 - **Other enhancements for ground and flight operations and safety**



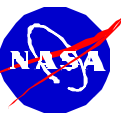
MAJOR NEW OI-30 CAPABILITIES PASS, BFS and MEDS

Presenter

Date

Page 36

- **Enhanced crew situational awareness and flight safety**
 - **Overhauled the MEDS composite flight instrument display**
 - **Provides tailoring of flight instrument display to major mode and optimizes location of needed data**
 - **Eliminates the requirement for split screen ADI and HSI displays**
 - **Added dynamic theta limit brackets on the composite flight instrument display when Mach <2.0 and air data not incorporated**
 - **Reduces CDR workload by reducing the number of displays that need to be monitored to stay within theta limits**
 - **Added display of SSME failure velocities on OMS/MPS and ASCENT TRAJ displays**
 - **Improves situational awareness during time critical events by providing data required to follow various tables in the ascent checklist**
 - **Added display of a maneuver time-to-go and current Digital Auto Pilot (DAP) selection on the Maneuver Execute Display**
 - **Provides crew improved insight into progress of an on-orbit maneuver and the need to select a different DAP or execute manual RHC inputs if required to complete the pre-burn maneuver**



MAJOR NEW OI-30 CAPABILITIES PASS, BFS and MEDS

Presenter

Date

Page 37

- **Improved abort control and expanded abort options**
 - **Expanded the Landing Site Table to improve the probability of a safe Orbiter landing in abort situations by increasing the possible landing areas from 25 to 45.**
 - **Reduces the need to uplink additional sites not found in the existing LST, thus reducing crew/ground operations and workload**
 - **Created a short field speedbrake (SB) option to support landings on runways less than 8500 ft**
 - **Makes shorter runway landings and rollout conditions acceptable by removing touchdown energy via the speedbrake**
 - **Automates a manual procedure for an ELS short field SB technique and adds 30 degrees to the nominal SB retract and adjust commands**
 - **Eliminated TAL droop for 2-SSME auto guidance (2-SSME TAL droop still available via item entry)**
 - **Provided a method for varying the angle of attack command via item entry while the MM304 Entry Guidance low energy logic is engaged to extend vehicle range**



MAJOR NEW OI-30 CAPABILITIES PASS, BFS and MEDS

Presenter

Date

Page 38

- **Improved abort control and expanded abort options (cont)**
 - **Provided a new contingency abort maneuver to reduce ET recontact potential for single engine RTLS trajectories near zero downrange relative velocities and to reduce ECAL crew workload**
 - **Uses OMS and RCS burns during mated coast to reduce large amplitude MPS propellant slosh dynamics**
 - **Performs closed-loop minus Z burn to increase clearance between the Orbiter and ET following separation**
 - **Provides Yaw drift timer to allow attitude control in the yaw axis earlier during the -Z burn, increasing optimization of separation trajectory**
 - **Added commanding of the forward up-firing RCS jets to increase control margins during single engine RTLS Powered Pitch Down**
 - **Alleviates the limitation in pitch gimbal authority when only a side SSME remains on high CG missions**
 - **Added thermal and stability constraints, during an ECAL, to the calculation of Alpha and target NZ to improve performance and improve energy control for S-Turns**
 - **Additional Abort Performance Enhancements added on OI-30 but not yet fully certified have been disabled for STS-114**



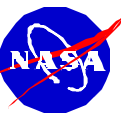
MAJOR NEW OI-30 CAPABILITIES PASS, BFS and MEDS	Presenter	
	Date	Page 39

- **Other enhancements for ground & flight operations and safety**
 - **Provided GPS capability enhancements**
 - **Allows for uplink of time compensation throughout OPS-1/6/3**
 - **Provides BFS capability to deselect GPS satellites and perform GPS receiver filter restarts**
 - **Improved flexibility to accommodate changes to SSME downlist**
 - **Deletes and modifies downlist measurements in preparation for future SSME AHMS and safety enhancements, adding more flexibility by allowing SSME systems/AHMS changes to be made outside the normal OI template**
 - **Upgraded the Automatic Reboost capability to provide an errors-within-deadbands check, increasing the efficiency of on-orbit flight control**
 - **Ensures attitude errors are acceptably low before allowing a transition from Rotation to Translation mode**



	Presenter	
	Date	Page 40

BACKUP



Recent Point Sensor Box Issues

Presenter

Date

Page 41

- Point sensors box S/N 108 was removed after Tanking Test 1, and passed all tests at NSLD
 - Several workmanship issues were identified within point sensor box
 - These were deemed unrelated to Tanking Test 1 ECO sensor UA
- S/N 110 installed on OV-103, passed tanking test 2
 - Subsequently, an anomaly occurred
 - S/N 110 removed – anomaly repeated at NSLD
- S/N 112 (harvested from OV-105) failed ATP prior to installation in OV-103
- S/N 111 (harvested from OV-104) will undergo full ATP and be installed on OV-103 for STS-114
- OV-104 PSB replacement TBD