

Space Transportation Vehicle Division



STS-130 MOD FRR

January 7, 2010

DS/Jim Azbell

Agenda Item 5

DS Shuttle CoFR Status Summary

REQUIREMENT	Training	Analysis	DPS	INCO	MMACS	EGIL	EECOM	GNC	PROP	BOOSTER
Critical Processors /Applications	N/A	N/A	N/A	G	G	G	N/A	G	G	G
Non-Crit Processors /Applications	N/A	G	G	G	G	G	G	G	G	G
EMCC	N/A	N/A	G	G	G	G	G	G	G	N/A
Training - MCC/POCC	G	G	G	G	G	G	G	G	G	G
Training - Crew	G	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Training - SMS	G	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LCC/MEL/MIL	N/A	N/A	G	G	G	G	G	G	G	G
FTP - New Ops	N/A	N/A	G	G	G	G	G	G	G	G
Flight Anomaly Resolution	G	N/A	G	G	G	G	G	G	G	G
Anomaly – Procedures	G	N/A	G	G	G	G	G	G	G	G
Exceptions/Action Items from prior reviews	G	G	G	G	G	G	G	G	G	G
CIL/Hazards	G	N/A	G	G	G	G	G	G	G	G
No Constraints	G	G	G	G	G	G	G	G	G	G
Level II Actions	G	G	G	G	G	G	G	G	G	G
Mission Requirements	G	G	G	G	G	G	G	G	G	G
Engineering Drawings	N/A	N/A	G	G	G	G	G	G	N/A	G
Command Procedures	N/A	N/A	G	G	G	G	G	G	G	G
Fit Prep Process Plan Requirements Met	G	G	G	G	G	G	G	G	G	G
Contractor Process Insight	N/A	G	G	G	G	G	G	N/A	G	G
MOD Work Guidelines	N/A	N/A	G	G	G	G	G	G	G	G

SSP Electrical Summary

Reactants	Tanks	Liftoff Load (lbm)	Min L/O (lbm)	Margin (lbm)	Padhold (hrs)
H2	5	455.5	331.2	124.3	311.5
O2	5	3394.2	2988.1	406.1	324.1

- NOTES:
- 1) Assumes 12+1+2 day mission with 3+1 ISS-based EVAs
 - 2) Assumes H2 target load obtained and loading completed at L- 45 hrs
 - 3) Assumes O2 target load obtained and loading completed at L- 40 hrs
 - 4) 490 lbm O2 offloaded evenly from Tanks 1, 2, 3, 4, and 5
 - 5) 23.8 lbm O2 protected for PMA/ODS Repress, 4 ISS-based EVAs, a Node 3 Vestibule Repress, and a Cupola Repress
 - 6) SSPTS output energy provided is 1351.5 kWh based on:
 - 4 converters at full power for 192.7 hrs (including additional day)
 - SSPTS deactivated for 1 Water Dump (4:05 hrs) and 1 unscheduled EVA (6.5 hrs)
 - 7) Analysis includes an Additional Day with an unscheduled EVA and 4 SSPTS converters activated except 6.5 hrs during the EVA. Average power for the 24.0 hr day is 8.94 kW, which equates to 18.2 lbm H2 and 161.4 lbm O2.
 - 8) For a 13+1+2 day mission, the offload may be increased to 645 lbm O2 while still maintaining 96 hours of launch hold.
 - 9) CSCS capability with 4 SSPTS converters allows for 24 days docked with 64 lbm O2 margin and unmanned undock on FD27. O2 margin includes metabolic for 5 ISS crew for the docked duration.

SSP Environmental Summary

Consumable	L/O Load	Min L/O	Margin
N2 (lb)	321.8^{1,2}	280.1³	41.6
Supply H2O (lb)	353⁴	353	0
LiOH (cans)	40^{5,6}	40⁶	0

NOTES: 1) Assumes 12+1+2 day mission

2) N2 L/O load protects/reflects KSC 6 lbm prelaunch usage requirement

3) N2 loading protects for 3 scheduled ISS based EVAs and 1 unscheduled ISS based EVA

4) Supply H2O loading reflects a 180 lbm offload

5) 46 LiOH canisters are required for a 12+1+3 day mission. 31 cans will be stowed in the Shuttle Middeck and 9 stowed in Node 3. The equivalent of 6 canisters will be provided by ISS CDRA (dual bed) and Vozduhk to support Shuttle docked operations.

6) For a 13+1+3 day mission, two additional LiOH canisters will be required.

Status of Standard Open Work Shuttle (Training – MCC)

- **MCC Team Certification Status:**

- All SMS training instructors have completed required training according to their Certification Guides. All operators have been certified and all certification records are complete.
- All Flight Controller certification requirements are complete except as follows:

Various Physicals, Proficiency and Final Certifications to be completed prior to flight with backup personnel available if required for all positions.

Status of Standard Open Work Shuttle (FTP- New Ops)

- **New Ops Work Status:** All significant differences from previous flights have been reviewed by FTP, POWG, or other appropriate operations forum and where required documented in either new procedures or new flight rules, except as follows:

DAP configurations and constraints - (Awaiting C. S. Draper Laboratory Memo): The current version of the flight rules and crew procedures contain preliminary data from C. S. Draper Laboratory. Upon receipt of the official memo, GNC will review the document, and update any DAP constraints in the FDF and Flight Rules as required. Final memo expected L-4 weeks.

Status of Non-Standard Open Work Shuttle (MEL)

- LCC/MEL/MIL - The Launch Commit Criteria Minimum Equipment List and Mandatory Instrumentation Lists have been reviewed and verified as complete and accurate. Any flight unique requirements have been specified, exceptions as noted:

LCC AFM 10 Update – Prior to STS-124, LCC AFM-10 Landing Gear Uplock Indication Anomaly was updated by the LCCWG, MMACS team and the Landing/Decel PRT. The LCC was modified to require all landing gear sensors be functional for launch. The LCC is being modified again by KSC prior to STS-130 in order to update the measurements table, and subsequently update the GLS sensor monitoring. The LCC changes were approved by the PRCB on 12/14/2009 for STS-130 and subs.

Status of Non-Standard Open Work Shuttle (MEL)

- LCC/MEL/MIL -

LCC MPS-01 Discussion - KSC Ground Operations has proposed the addition of a Pre-Planned Contingency Procedure (PPCP) to the MPS Helium Bottle Pressure LCC (MPS-01). In the event of a violation of the current lower limit of 4100 psia, the PPCP would allow 4000 psia as long as the midbody tank temperature is below 96 degrees F. This PPCP is being pursued due to a concern over the ground supply regulators not performing at the point of maximum demand until just prior to launch, since the regulators are not set up at the point of maximum demand. DS65/Booster agrees with the pressure/temperature limits contained in the PPCP but is not in favor of the manual verification that KSC would perform at T-31 seconds. Booster would prefer to either do nothing, or update the LCC and GLS to reflect the new accepted values for pressure and temperature, which would preclude the need for manual verification. This topic was to be discussed at the 12/11 A/E FTP, but was deferred due to meeting delays. Other than the expected further discussion, there is no open work for Booster. It is very possible that this change will not be implemented for STS-130. It is scheduled to be discussed at the 1/10 PRCB.

Status of Non-Standard Open Work Shuttle (FTP- New Ops)

- **New Ops Work Status:** All significant differences from previous flights have been reviewed by FTP, POWG, or other appropriate operations forum and where required documented in either new procedures or new flight rules, except as follows:
- APU Operation While Docked - Analysis has been completed to examine the effect that the stack would experience from running a single APU while docked to ISS. The results of this analysis were used to update the 20A_C10-1 APU Operations While Docked flight rule. The rule is making its way through Workflow. ECD 01/2010
- Hook Requirements for Docked Operations - Analysis has been completed examining the docking interface loads that would be experienced during multiple hooks out scenarios. The 20A_C10-2 Hook Requirements for Docked Operations flight rule was updated to reflect the completion of the analysis. The rule is making its way through Workflow. ECD 01/2010

Status of Non-Standard Open Work Shuttle (FTP- New Ops)

- Centerline Camera Install Procedure - Photo TV personnel submitted a 482 to include steps to verify the proper lighting configuration for centerline camera checkout (based on STS-129 events).
- VRCS to Momentum Manager Direct Handover - The VRCS to Momentum Manager Direct Handover was successfully demonstrated on STS-129 and will be certified for STS-130. This procedure has obvious advantages for ISS (prop savings, reducing solar array loads, reduced complexity, etc). FDF and FR updates are in the process of being finalized.

Items of Interest

Right Main Gear Bracket Crack – There are two cracks in the composite bracket that serves as a mount for the brake lines and the telemetry lines to the MLG. This rotates with the gear and serves as an interface between the flex lines above and the hard lines mounted on the gear. One crack is ~1/4 inch long and the other is ~0.9in. The further growth of both are contained by one of the mounting bolt holes. A one-flight fly-as-is MR was approved at the OPOTT on 12/11/2009. Worst-case crack propagation looks like it would liberate the tab of material between the cracks.



Items of Interest

•STS-129 Waste Dump Line Blockage – During the post-undocking waste water dump, the dump flow rate dropped to approximately zero after about 10 minutes. Initial data reviews and subsequent camera views ruled out the presence of ice on the nozzle. The following day, a CWC was dumped successfully through the waste nozzle, indicating a blockage in the urine solids filter. A subsequent attempt of a waste water dump was unsuccessful. Post-flight analysis of the urine solids filter has confirmed blockage but its root cause is still unknown. Although this condition may occur again on future flight, EECOM does not expect any hardware or nominal procedure modifications to result from this anomaly. The IFMs that were reviewed and uplinked during STS-129/ULF3 would be available for use on subsequent missions if needed.

STS-130 Space Transportation Vehicle Division Readiness Statement

The Space Transportation Vehicle Division has performed the reviews necessary to assess the flight readiness relating to vehicle systems requirements definition, crew and flight controller training, and operations. We have determined all applicable responsibilities acceptable for flight pending closure of the identified open work and issues.

Original signed by

December 17, 2009

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As compiled by: DS1/Mike Interbartolo