

# Space Transportation Vehicle Division

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STS-119 MOD FRR

January 16, 2009

DS1/Mike Interbartolo

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	375.4	80.0	217.8
O2	5	3585.4	3410.2	175.3	161.2

- NOTES:
- 1) Assumes 14+1+2 day mission with 4 [+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- 41 hrs
  - 4) 300.0 lbm O2 offloaded evenly from Tanks 1, 2, 3, 4, & 5
  - 5) 49.0 lbm O2 protected for 25 lbm O2 transfer, 4 scheduled EVAs, 1 unscheduled EVA, and a PMA/ODS repress
  - 6) Analysis includes an Additional Day with an unscheduled EVA and SSPTS activated except 7 hrs during the EVA. Average power for the 24.0 hr day is 9.08 kW, which equates to 18.5 lbm H2 and 165.2 lbm O2.
  - 7) SSPTS output energy is 1357.0 kWh based on:
    - 3 converters at full power for 198.0 hrs (including additional day)
    - 2 converters at full power for 19.0 hrs
    - SSPTS deactivated during EVAs 1 & 2, two H2O dumps, SAW deploy, and unscheduled EVA for a total of 36.3 hrs.
  - 8) CSCS capability with 3 SSPTS converters allows for 27 days docked with 6.7 lbm additional O2 margin and unmanned undock on FD30. O2 margin includes ISS crew metabolic for the docked duration.

# SSP Environmental Summary

<b>Consumable</b>	<b>L/O Load</b>	<b>Min L/O</b>	<b>Margin</b>
<b>N2 (lb)</b>	<b>387.3<sup>1,2</sup></b>	<b>344.7<sup>3</sup></b>	<b>42.6</b>
<b>Supply H2O (lb)</b>	<b>353<sup>4</sup></b>	<b>353</b>	<b>0</b>
<b>LiOH (cans)</b>	<b>39<sup>5</sup></b>	<b>39</b>	<b>0</b>

NOTES: 1) Assumes 14+1+2 day mission

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

3) N2 loading protects for 4 scheduled ISS based EVAs and 1 unscheduled ISS based EVA

4) Supply H2O loading reflects a 180 lbm offload

5) 64 LiOH canisters are required for a 14+1+3 day mission. Liftoff quantity reflects planned stowage for this flight, 29 LiOH canisters in LiOH Box, 2 installed, 8 in MLEs. The equivalent of 25 canisters will be provided from ISS resources.

# Status of Standard Open Work Shuttle (Training – MCC)

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- **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)

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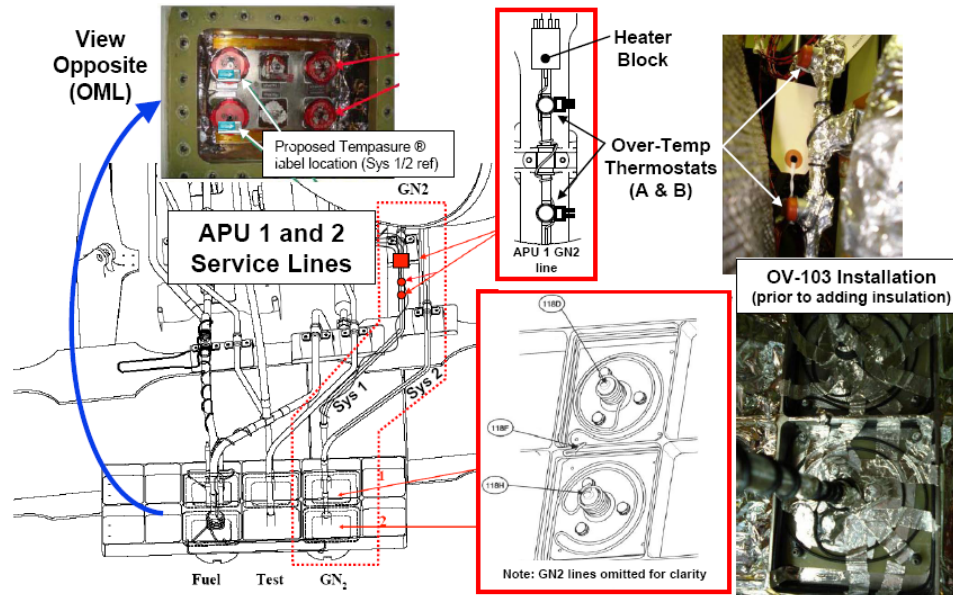
- **New Ops Work Status:** All significant differences from previous flights have been reviewed by FTP, POWG, or other appropriate operations forum and where required documented in either new procedures or new flight rules, except as follows:

**DAP configurations and constraints** - (Awaiting C. S. Draper Laboratory Memo) The current versions of the flight rules contain the 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.  
ECD 1/16

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

**APU Fuel Tank Nitrogen QD Heater Mod** – During STS-123 (OV-105) APU 1 experienced a fuel tank nitrogen leak. Post-flight troubleshooting found that the nitrogen QD poppet leaks when contamination combined with a cold thermal environment are present. A modification to Tank/Fuel Line/H<sub>2</sub>O Sys heaters has been implemented to extend the System 1 and 2 heaters to the QD panel to thermally condition these QDs. This mod has been completed and will be transparent to the crew; no special operations will be required. A Flight-Specific SSSH drawing is being developed to document the vehicle configuration.

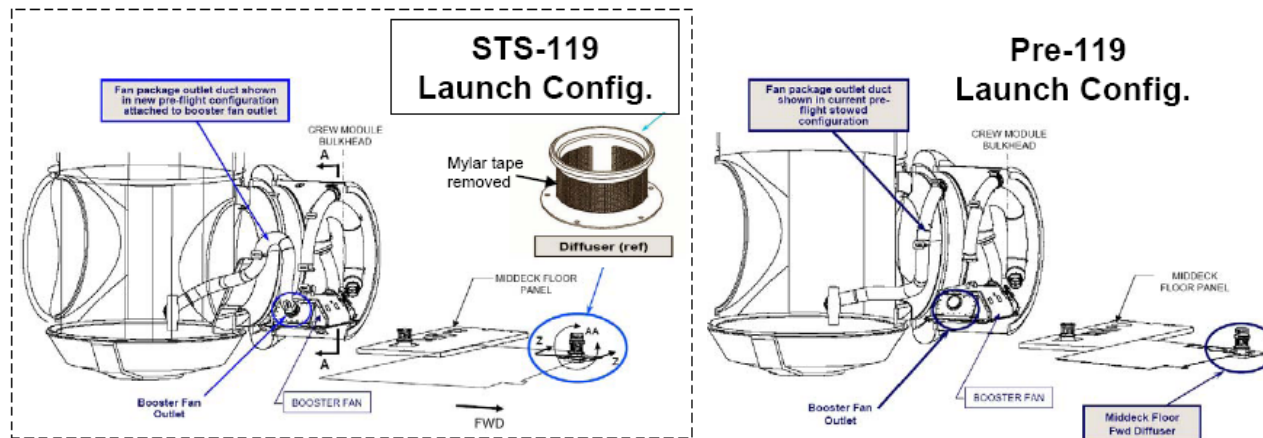
- APU Quick-Disconnect (QD) Heater Modification (APUs 1 & 2)



# Status of Non-Standard Open Work Shuttle (Flight Anomaly Resolution)

- FLIGHT ANOMALY RESOLUTION - All previous in-flight anomalies have been resolved and all operational or procedural changes required have been implemented and verified. Exceptions are noted below:

**CO2 / Airflow:** The STS-124 ducting configuration changes that resulted in no reports of CO2 issues during STS-124 and subs have been made generic and the procedures have been updated. Additionally, STS-119 will configure the bypass duct to the airlock fan inlet pre-launch as well as delete the installation of the mylar tape around the Forward Middeck Floor Fitting. These configuration changes will minimize the crew actions in post insertion. IFA will be closed out post STS-119.





# Status of Non-Standard Open Work Shuttle (MMT Action)

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- LEVEL II ACTIONS - All Level II actions assigned to this area have been evaluated and determined to be neither an exception nor a constraint to the review.

LiOH EOM Protection – EECOM is working with DA8 and the JOP to document a plan to only protect for EOM+3 LiOH if both EGIL and PROP consumables can support EOM+3. If either cannot support EOM+3, then EECOM will submit a CHIT and request the program protect EOM+2 for LiOH.

# Info Only: L-5 Consumables MOU

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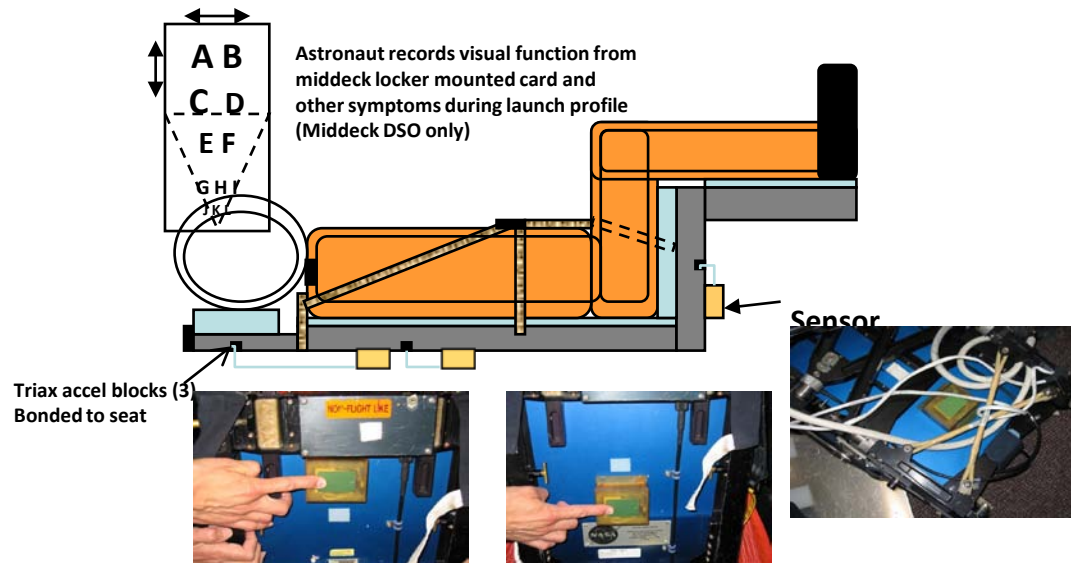
- **Documenting of New Process for Updating Minimum Lift-Off Quantities Inside L-5 Days** - An FCOH procedure is being developed to document a new process between KSC and JSC-MOD on how to appropriately make updates to the Minimum Lift-Off Quantities inside the L-5 day timeframe. A Memorandum of Understanding (MOU) will document this new agreement. The new process involves the creation of a JSC-MAS Chit follow by a redelivering of the consumables case and finally an update of the E-Consumables web site.

# Info Only: S-MIA Diode

- **MDM S-MIA Diode Mitigation** - Prior to STS-124, MDM FA2(S/N 124) failed which caused a set split due to a non-universal I/O Error (IPR 124V-0048). The root cause was discovered to be a failed diode in the MDMs which shapes the waveform for data bus communication with the GPCs. Further research into past failures identified two lot codes which contained potentially questionable diodes. After a review of flight hardware, diodes from these lot codes were found on primary port S-MIAs of both FF-4 (S/N 110) and FA-4 (S/N 122). To mitigate the exposure to these diodes, STS-119 will be launched with String 4 on Secondary Ports. KSC will port mode string 4 to secondary ports in the pre-launch, pre-egress timeframe. This plan has been fully coordinated with KSC, engineering, and MOD (including CB). Only one procedure change is needed to account for the difference in expected ports. This 482 has been fully signed off via Workflow and will be published in the STS-119 errata.

# Info Only: DTOs

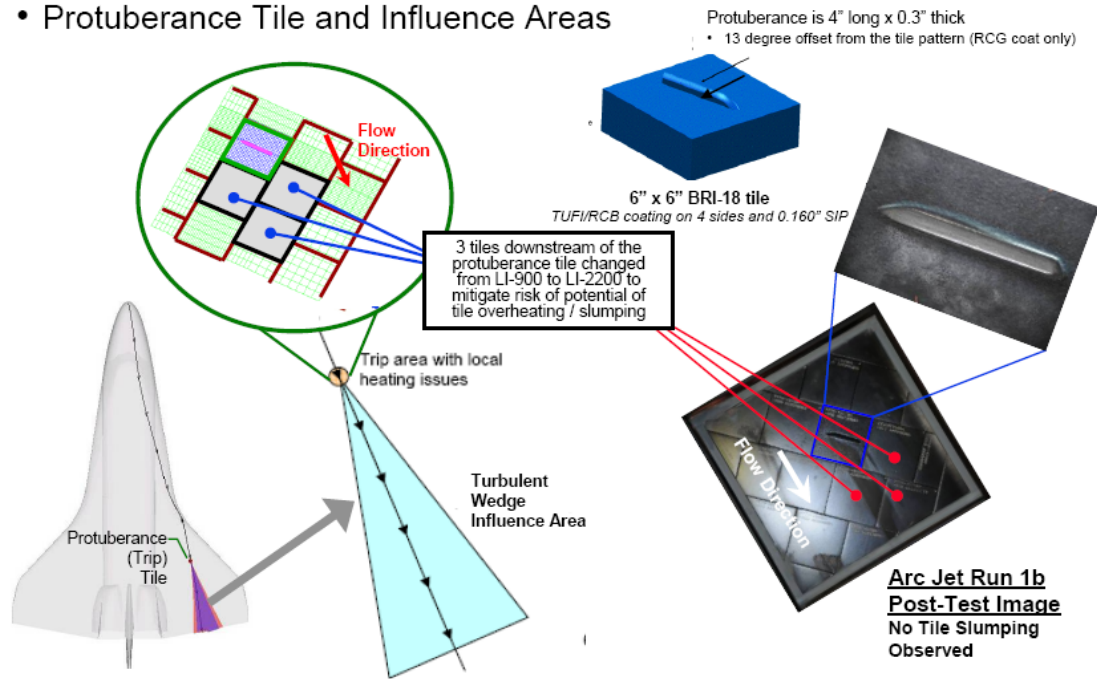
- **Crew Seat DTO** - The Crew Seat DTO (DTO 695 Thrust Oscillation Seat) is a project requested by the Space Medicine Organization (SD) and Human Systems Integration Division (ARC/TH) to collect ascent vibration data on the orbiter crew seats. This data will be provided back to SD AND ARC/TH to assist with the development of vibration specifications for unimpeded crew performance. This DTO will instrument three seats: seat 3 on the flight deck and seats 5 and 7 on the middeck. The seats were chosen to provide both flight deck and middeck vibration data. In addition seat 7 is mounted to the LiOH door and will have a different expected spectrum than seat 5. Accelerometers will be programmed and installed prior to crew ingress, active for launch, and stowed by the crew during Post Insertion. The accelerometers will not be installed for Entry.



# Info Only: DTOs

- **Boundary Layer Transition Flight Experiment (DTO 854)**- The objective of the DTO is to gather flight based science data on boundary layer transition at the high enthalpy, high mach numbers experienced during entry. This effort will play a major role in understanding boundary layer transition for manned spacecraft, and influence still developing high-fidelity computational modeling techniques. The vehicle will be configured with a special tile bonded on the underside of the port wing, just aft and outboard of the MLG door. Each flight of the DTO will utilize a unique tile manufactured with a fixed protuberance height. This OML geometry is intended to force boundary layer transition at Mach numbers within our previous flight experience. There will be three separate flights with incremental protuberance heights starting from ~0.25". The goal is to have successive missions that target transitions at Mach 15, 18, and 19.

- Protuberance Tile and Influence Areas



# Conclusion Shuttle

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All identified open work will be  
completed in time to support  
STS-119