

# Space Transportation Vehicle Division

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STS-134 MOD FRR

March 10, 2011

DS/Whitney Maples

# DS Shuttle CoFR Status Summary

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

# SSP Electrical Summary

<b>Reactants</b>	<b>Tanks</b>	<b>Liftoff Load</b>	<b>Min L/O</b>	<b>Margin</b>	<b>Padhold</b>
		<b>(lbm)</b>	<b>(lbm)</b>	<b>(lbm)</b>	<b>(hrs)</b>
<b>H2</b>	<b>5</b>	<b>455.5</b>	<b>375.6</b>	<b>79.9</b>	<b>217.2</b>
<b>O2</b>	<b>5</b>	<b>3495.0</b>	<b>3397.6</b>	<b>97.4</b>	<b>87.8*</b>

- 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) 390\* lbm O2 offloaded evenly from Tanks 1, 2, 3, 4, and 5
  - 5) 54 lbm O2 protected for 4 scheduled EVAs, 1 unscheduled EVA, PMA/ODS repress, and 30 lbm ISS O2 transfer
  - 6) SSPTS output energy provided is 1717.0 kWh based on:
    - 4 OPCU converters for 214.70 hrs (including Additional Day)
    - 2 OPCU converters for 21.75 hrs (EVAs 1, 3 & 4, and Water Dump)
    - 1 OPCU converter for 3.75 hrs (portions of EVAs 1 and 4)
    - SSPTS deactivated 8 hrs for EVA 2
  - 7) 2 KSC - 2 KSC - 2 EDW deorbit opportunities protected
  - 8) CSCS capability with 4 SSPTS converters allows for 25 days docked with 4 lbm O2 margin and unmanned undock on FD28. O2 margin includes metabolic for 6 ISS crew for the docked duration.

\* CR approved 2/25/11 decreases offload to 375 lbm O2 resulting in 101.8 hrs Padhold

# SSP Environmental Summary

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<b>Consumable</b>	<b>L/O Load</b>	<b>Min L/O</b>	<b>Margin</b>
<b>N2 (lb)</b>	<b>321.8<sup>1,2</sup></b>	<b>315.8</b>	<b>6.0</b>
<b>Supply H2O (lb)</b>	<b>353<sup>4</sup></b>	<b>353</b>	<b>0</b>
<b>LiOH (cans)</b>	<b>31<sup>5</sup></b>	<b>31</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) 87 LiOH canisters are required for a 14+1+3 day mission.

The equivalent of 56 canisters will be provided from ISS resources. 9 pre-positioned canisters will be taken from the LiOH stockpile, and the equivalent of 47 canisters will be provided by ISS CDRA (dual bed) and Vozdukh to support Shuttle docked operations.

# Status of Standard Open Work

Title	Actionee	Mand / Non-Mand	ECD
Waste H2O/Supply H2O/Pressure Plan	EECOM	Mand	ongoing
Draper Labs Memo	Draper	Mand	3/22/11
Certification/Proficiency/Physical	Various	Mand	4/1/11
Complete crew training	Various	Mand	4/12/11*
Complete Integrated training	Various	Mand	4/12/11*
Review previous in-flight anomalies	Various	Mand	4/12/11*
APDS Hook Requirements for Docked Operations Flight Rule	MMACS	Mand	3/15/11
APU Operation While Docked Flight Rule	MMACS	Mand	3/15/11
MEDS Configuration	DPS	Mand	4/1/11

\*Assumes a 4/19/11 launch date

# Status of Non-Standard Open Work

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- **APU Auto Shutdown Inhibit Management** - Management of the auto shutdown function on an APU that has shutdown before 10.5 seconds on a diagnostic restart will change based on newly identified failure modes in the APU. The new philosophy will be documented in the Flight Rule Annex. *The CR has been submitted and is making its way through Workflow.*
- **Hook Failure During Undock** - In an undock scenario where physical separation does not occur, there is a chance that the starred block procedure to close hooks may actually end up damaging the hooks in certain scenarios. A new starred block procedure has been drafted along with a new APDS Contingency Remate Procedure to help get the hooks in a good configuration if this scenario were to occur. *MMACS is working with the ODS IPT to get community agreement on the new philosophy. ECD 3/15/11*

# Info Only

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- **STORRM DTO** - The Sensor Test for Orion Rel-Nav Risk Mitigation (STORRM) DTO will be flown on STS-134. This operation involves a re-rendezvous to within 600 ft of ISS post-undock and flyaround. The orbiter will separate from ISS to a range of ~30,000 ft and then perform an approach on a co-elliptic path similar to what Orion is to fly. The DTO will test out various sensors that will be used by Orion in the RPODU phase. *The STORRM DTO is a higher priority than the flyaround, so to be go for the flyaround there must be enough propellant for 3-sigma usage of both the flyaround and STORRM DTO. Once the flyaround has begun if a breakout is required then there is very little chance of performing the STORRM DTO.*

# Info Only, cont.

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- **Antiskid Switch Guard** - During a generic, stand-alone BFS entry training run in the SMS, the training team accidentally sent a command to power off Antiskid after TAEM which resulted in a Loss of Control (LOC). Software review and SAIL testing showed this is expected behavior by the BFS per requirements. To mitigate the risk in flight, an AEFTP Splinter on January 20, 2011 decided to place a switch guard over the Antiskid switch prelaunch and keep it in the “ON” position the entire flight. For on-orbit power down, Antiskid power will instead be controlled solely by turning off the upstream Brake Power switches (nominal configuration for orbit). *Flight Rule and FDF updates have been completed.*



# STS-134 Space Transportation Vehicle Division Readiness Statement

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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*

*March 10, 2011*

Gregory T. Oliver

Chief, Space Transportation Vehicle Division

As compiled by: DS/Whitney Maples

# Backup

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# Training-MCC FCRs

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Position	Name	Team	Open Item	ECD
DPS	Judd Frieling	A/E	Proficiency Expires in April	4/1/11
DPS	Amanda Coots	Orbit 2	Physical Expires in March	3/31/11
EGIL	Mark Welch	Orbit 2	Cert Proficiency expires 5/2/11	4/1/11
GNC	Jason Helms	Orbit 3	Physical Expires 4/30/11	4/15/11
GNC	Andrea Prasse	Team 4	Physical Expires 3/31/11	3/31/11

# Training-MCC MPSRs

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Position	Name	Team	Open Item	ECD
DPS SPT	Luis Ramirez	Orbit 2	Proficiency Expires in April	4/1/11
Mech II	John Kennard	A/E	Proficiency expired 2/7/11	3/31/11
Life Support	Brad Bailey	Orbit 3	Certification Paperwork	3/14/11
Consumables	Jerry Thomas	A/E	Certification	3/24/11