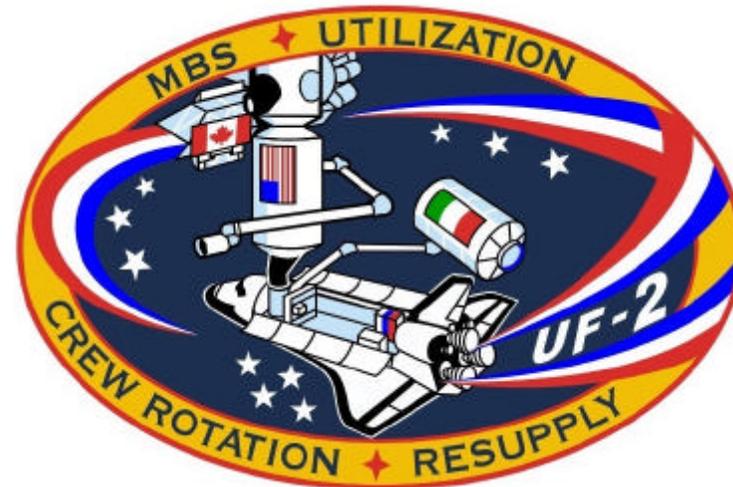


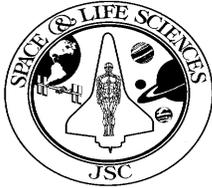
Space and Life Sciences Directorate  
Flight Readiness Review  
STS-111/UF2

C. L. Fischer

Date: May 16, 2002

# STS-111/ISS-UF2 Flight Readiness Review Space and Life Sciences Directorate





**Space and Life Sciences Directorate  
Flight Readiness Review  
STS-111/UF2**

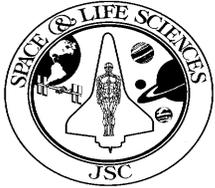
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**Space and Life Sciences Mission Activities**

- **Crew Health**
- **DTO**
- **DSO's**
- **Open Items, In-flight Anomalies, and Waivers**
- **Radiation and Dosimetry Support**
  - **STS-111 Radiation Prediction**
- **ISS Increment 4/5 Status**
  - **ISS Increment-5 Radiation Prediction**
  - **Issues**
- **Readiness Statement**

**SLSD has no constraints to the STS-111/UF2 launch**



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**Crew Health**

- **All Crew Physicals will be completed prior to flight**
  - **Applicable flight rules are in place**

**STS-111 Crew Surgeon**

**Joseph Dervay, M.D.**

**STS-111 Deputy Crew Surgeon**

**Jonathan Clark, M.D.**

**RSA Crew Surgeon**

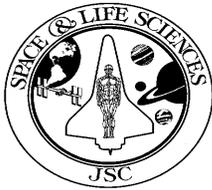
**Vladimir Matveev, M.D.**

**ISS Exp 4 Crew Surgeon**

**Chris Flynn, M.D.**

**ISS Exp 5 Crew Surgeon**

**Jeff Jones, M.D.**



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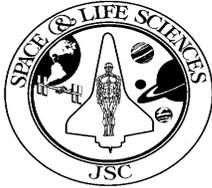
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**STS-111 DTO**

**The following SLSD DTO has been manifested or scheduled for STS-111**

**Inflight**

**DTO 694: Biotechnology Water Treatment System (1 operator, 1 back up)**



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**STS-111 DSO's**

**The following SLSD DSO's have been manifested or scheduled for STS-111**

**Inflight**

**DSO 634: Sleep/Wake Actigraphy and Light Exposure during Space Flight (2/4)**

**Pre/Postflight Only**

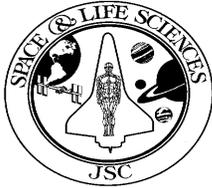
**DSO 498: Space Flight and Immune Function (4/4)**

**DSO 499: Eye Movements and Motion Perception Induced by Off-Vertical Axis Rotation (OVAR) at Small Angles of Tilt After Space Flight (1/4)**

**DSO 500: Space Flight-Induced Reactivation of Latent Epstein-Barr Virus (3/4)**

**DSO 503S: Test of Midodrine as a Countermeasure Against Postflight Orthostatic Hypotension (1/4)**

**DSO 635: Spatial Reorientation Following Space Flight (1/4)**



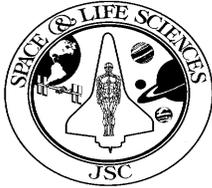
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**STS-111 Open Items, Inflight Anomalies (IFA's), and Waivers**

- **All remaining open work is planned and scheduled**
  - **Open items for STS-111**
    - **Crew Physicals**
    - **L-3 day Space Weather Analysis**
- **Exercise Countermeasures are in place**
- **Shuttle Water Quality is within specifications**
- **No open SSP IFA's or constraints**
- **Work/Rest Cycle Considerations**
  - **Mission Objectives have resulted in violations to accepted crew work/rest requirements (see next chart for details)**
  - **Waivers have been approved for each violation**



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**STS-111 Crew Work/Rest Cycle Violations**

Exemption Request #111-1 Pre-/Post- Sleep Less Than 2 hours

FD1 – Pre-Sleep for CDR, MS1, MS2 (1 hr 55 min; 1 hr 25 min; 1 hr 20 min respectively)

FD3 – Post-Sleep for CDR, PLT, MS1, MS2 (1 hr 5 min; 1 hr 40 min; 1 hr 45 min; 1 hr 40 min respectively)

FD5 – Post-Sleep for PLT, MS1, MS2 (1 hr; 1 hr, 50 min respectively)

FD7 – Post-Sleep for CDR, PLT, MS1, MS2 (1hr 20 min; 1 hr; 1 hr; 50 min respectively)

FD9 – Post-Sleep fro PLT, MS1, MS2 (1 hr; 1 hr; 50 min respectively)

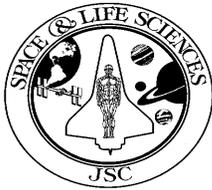
Exemption Request #111-3 Scheduled Crew Off Duty Time less that 6.75 hr

Minimum

CDR- 6 hrs 10 min, PLT-6 hrs 20 min, MS1-6 hr 40 min, MS2-6 hr 30 min

Added 1:05 hour Off Duty time on FD2.

Off Duty hours still do not meet requirements because of the way the blocks of time are scheduled



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**Radiation Analysis and Dosimetry Support**

**STS-111 Flight Specific Predictions**

• **Nominal mission (11 d 19 hr 4 m) IV crew exposure projection**

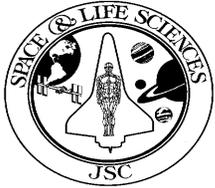
- Mission Exposure                      173 mrad                      (350 mrem)
- Daily Average Exposure:              16 mrad/day                      (32 mrem/day)

**EVA EXPOSURES (additional skin exposure):**

	<u>1 Hour early</u>	<u>Nominal</u>	<u>1 Hour late</u>
EVA1 (start MET 003/17:50)	2 mrad/4 mrem	35 mrad/35 mrem	35 mrad/35 mrem
EVA2 (start MET 005/17:50)	9 mrad/10 mrem	42 mrad/42 mrem	54 mrad/54 mrem
EVA3 (start MET 007/17:50)	32 mrad/32 mrem	57 mrad/57 mrem	72 mrad/72 mrem

**Worst case EVA additional skin exposure:**

- 4 hr EVA                      329 mrad/406 mrem
- 6.5 hr EVA                      396 mrad/472 mrem



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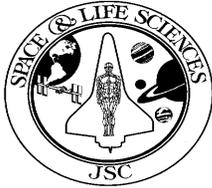
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**Radiation Analysis and Dosimetry Support, cont.**

**STS-111 Flight Specific Information**

- Onboard Radioactivity (experiment name (# sources) – isotope – activity)
  - Fire detectors (all flights) -- orbiter (9) -- Am-241 ==> 6.12  $\mu$ Ci
  - Operational TEPC (1) -- Cm-244 ==> 1.0  $\mu$ Ci



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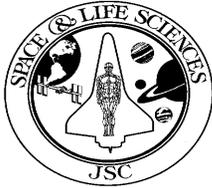
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**Space Weather Activity Summary and Forecast**

**SPACE WEATHER ACTIVITY**

- **Solar activity has reached severe storm levels since last FRR**
  - **No impact to STS-111/UF2**
- **During the past 30 days, high levels of solar activity with sporadic flares, geomagnetic storming, proton events and Corona Mass Ejections**
  - **No impact to STS-111/UF2**



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## **ISS Increment 4/5 Status**

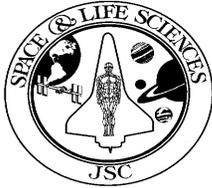
### **❖ ISS INCREMENT-5 IV Crew Exposure Prediction**

- Nominal ISS-5 mission (134 days) crew exposure prediction **2.1 rad (4.0 rem)**

### **❖ Issues**

#### **❖ Radiation Hardware Readiness**

- TEPC software was successfully installed during E4. However, TEPC is still experiencing intermittent problems with receiving and/or accepting commands. The data coming down 1553 has also been received corrupted.
  - Current plan is to wait 5 minutes between sending commands to see if this resolves both issues.
- IV-CPDS is currently not accepting the “acquire” command. This means the crew has to manually power cycle the IV-CPDS on days which we command.
  - Troubleshooting is ongoing.



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**ISS Increment 4/5 Status, continued**

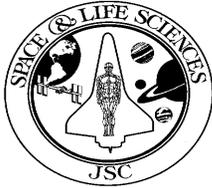
**❖ Issues, cont.**

**❖ Water Quality**

- Water Sampler & Archiver Kit was delivered short of 2 condensate sampling adapters (Russian hydro connectors are past their certified shelf-life)
- Waiver to deliver WS&A without adapters approved
- Request for additional hydro connectors being worked through Team 0
  - Impact is inability to take filter reactor condensate samples
- **TOCA**
- Insufficient time in timeline to perform test
- Last instrument session was mid-October 2001
- TOCA reagent mixing, calibration and one of two analysis sessions completed

**❖ Exercise and Countermeasure (Aerobic)**

- TVIS circuit breaker trip problem has necessitated a modified loading configuration for the crew. Operational workarounds are in place and will be used until problem is resolved.
- TVIS Subject Load Device is failed on one side. Plan to use of contingency bungees to provide subject loading. This approach is not optimal, but the overall exercise plan will be acceptable. Will require an increase in crew time for exercise.



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**ISS Increment 4/5 Status, continued**

**❖ Issues, cont.**

**❖ Acoustic Levels in SM**

- Acoustic levels in SM are unchanged and still non-compliant
- Remedial Action Plan implementation dates have been requested from the Russians through OC
- Latest Dosimetry (Increment 4) 24-hour measurement on 3/5/02:
  - CDR – No Data
  - FE1 – 70 dBA
  - FE2 – 64 dBA
  - Joint Ops Dosimetry FE2 - 70 dBA
- NCR is in signature cycle- closure expected prior to launch.
  - Rationale based on crew worn hearing protection

**❖ Behavioral Health & Performance**

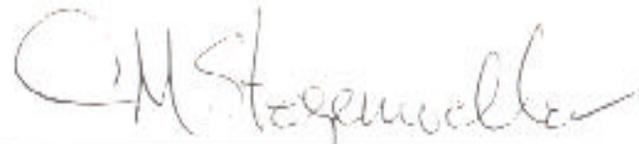
- Crew Work/Rest issues for daily activities are improved.



## Certification of Flight Readiness Statement

The activities required to support Flight UF-2/STS-111 have been accomplished except open work identified (Attachment 1). Space and Life Sciences Directorate (SLSD) is ready to support Flight UF-2/STS-111.

There are no constraints to proceeding with the planned Flight UF-2/STS-111 pending completion of scheduled open work.

 4/25/12

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**David R. Williams, M.D., Director  
Space and Life Sciences Directorate**