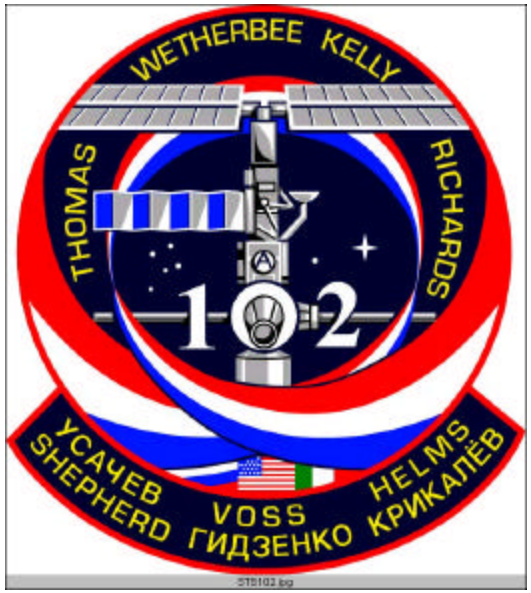
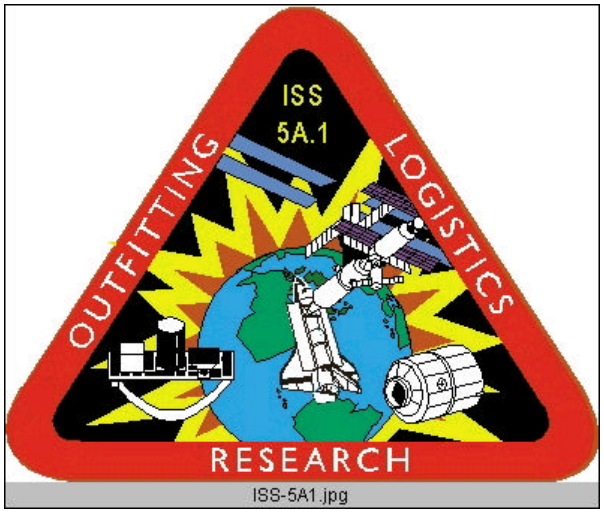
D. R. Williams

Date: February 27, 2001

ISS 5A.1/STS-102
Flight Readiness Review
Space and Life Sciences Directorate





STS-102 Space and Life Sciences Activities

- Crew Health
- DSO's
- Operations Support
- Open Items and In-flight Anomalies
- Radiation and Dosimetry Support
- Readiness Statement

Crew Health

- All Crew Physicals will be completed prior to flight

  - Applicable flight rules are in place

US Crew Surgeon	Phil Stepaniak, M.D.
US Deputy Flight Surgeon	Jonathan Clark, M.D.

DSO's

- The following SLSD DSO's have been manifested or scheduled for ISS 5A.1/STS-102:

  DSO 493 – Monitoring Latent Virus Reactivation and Shedding in Astronauts

  DSO 496 - Individual Susceptibility to Post-Spaceflight Orthostatic Intolerance (pre/postflight only)

  DSO 498 - Spaceflight and Immune Function (pre/postflight only)

Operational Support

- SLSD Flight Management support is ready
- Flight Surgeon/Biomedical Engineer support is ready
- Flight Projects Division Stowage Team ready to support
- Space Radiation Analysis Group (SRAG) ready to support
- Video Digital Analysis System (VDAS) Lab ready to support
- Earth Observation Group is ready to support
- Micrometeoroid/Orbital Debris (MMOD) ready to support; on call for contingency analysis

All Training and Flight procedures have been completed

Open Items and Inflight Anomalies (IFA's)

- All remaining open work is planned and scheduled

  The Stowage Team is working late stowage changes.
- No open SSP IFA's or constraints

There was one anomaly on STS-98/5A.

CO and HCL Readings on the Compound Specific Analyzer-Combustion Products (CSA-CP) were higher than limits in the checkout procedure. CO read 8 ppm and HCL read 1.3 ppm. The 7 day SMAC values are 10 ppm for CO and 1 ppm for HCL. The crew performed zero calibration of the CSA-CP at MET 1/00:35. Nominal readings were obtained following the calibration procedure. No further action is Required.

RADIATION ANALYSIS & DOSIMETRY SUPPORT

- **STS-102 FLIGHT SPECIFIC**
  - **Nominal mission (11 d 18 h 52 m) crew exposure projection (AP-8 SOLMAX MODEL/USGS70(EPOCH 70) scaled by STS-92 & STS-97 measurements & Empirical GCR Model [F = 1025 mv ; 7.5 mrad/d; Q=3.0])**

202 mrad (414 mrem)

– **Daily Average Exposure:**	18 mrad/day	(35 mrem/day)
– **Day 1:**	**9 mrad/day**	**(25 mrem/day)**
– **Days 2:**	**12 mrad/day**	**(32 mrem/day)**
– **Days 3-12:**	**18 mrad/day**	**(36 mrem/day)**

Shuttle Exposure History
(through STS-101)

Max: 4310 mrad
Min: 6 mrad
Avg: 235 mrad
Median: 122 mrad

  - **Onboard Radioactivity (experiment name (# sources) – isotope – activity)**
    - » **Fire detectors (all flights) -- orbiter (9) -- Am-241 ==> 6.12 µCi**
    - » **Operational TEPC (1) -- Cs-244 ==> 1.0 µCi**
  - **No radiation related experiments/payloads on this flight**
    - » **RAM Swapout**
    - » **IVCPDS Delivery**

RADIATION ANALYSIS & DOSIMETRY SUPPORT cont.

- **EVA EXPOSURES (additional skin exposure)**
  - **Additional exposure due to protons in SAA and electrons in outer electron belt**

  - **EVA1 (start MET 002/17:00)**
    - **1 hr early start** — **10 mrad/16 mrem**
    - **Nominal** — **10 mrad/16 mrem**
    - **1 hr late start** — **37 mrad/38 mrem**
    - **2 hr late start** — **36 mrad/36 mrem**

  - **EVA2 (start MET 004/16:40)**
    - **1 hr early start** — **4 mrad/7 mrem**
    - **Nominal** — **4 mrad/7 mrem**
    - **1 hr late start** — **46 mrad/46 mrem**
    - **2 hr late start** — **46 mrad/46 mrem**

  - **EVA3- Contingency**
    - **1 hr early start** — **20 mrad/20 mrem**
    - **30 min early** — **20 mrad/20 mrad**
    - **Nominal** — **63 mrad/63 mrem**
    - **1 hr late start** — **66 mrad/66 mrem**
    - **2 hr late start** — **89 mrad/89 mrem**

RADIATION ANALYSIS & DOSIMETRY SUPPORT cont.

Recommendation for EVAs:

Evaluation of timeline to schedule an earlier departure
Encourage early departure/early return on flight day if possible
Needs to be re-evaluated with Post 5A trajectory information

EVA EXPOSURES (additional skin exposure)

- Worst case EVA additional skin exposures:
  - 4 hr **404 mrad / 555 mrem**
  - 6.5 hr **528 mrad / 686 mrem**

IVA EXPOSURES

- Daily **~17 mrad / 40 mrem**

Status of SLSD Support for STS-102

SLSD Support

Air Quality
Acoustic Noise
Water Quality
Countermeasure Capabilities
Trash Management

No Issues or Problems for this flight

Increment 1, End of Mission

- Personnel and facilities are ready to support.
- Crew exercise countermeasures on orbit, for the Increment 1 and 2 crews, are presently nominal. Contingency operations and procedures are in place if needed.
- Exercises must be performed during and after docked ops. But within existing constraints.
- Ready to support post flight rehabilitation activities.

Increment 2

Acoustics

- SM exceeds acoustic limits
- Requires crew hearing protection and in-flight monitoring
- Service Module remedial action plan is open; schedule for implementation of remedial measures is in work.

Treadmill Vibration Isolation System (TVIS)

- TVIS Operation presently nominal
- Plan in place for contingency exercise protocol using non active Treadmill, Cycle Ergometer IRED and Contingency Resistive Exercise System (CRES)
- Addition of spares on 5A.1 for Treadmill - GFE Office Special Topic

Interim Resistive Exercise Device (IRED)

- Showing increased signs of wear on Increment 1, may not remain operable until launch of resupply canisters/kit on 6A.
- The Contingency Resistive Exercise System (CRES) is available if a failure prior to 6A.

Radiation exposure for Increment 2 (124 day nominal mission)

- 1860 mrad / 3720 mrem (3.72 rem)
- Daily Average Exposure 15 mrad/day (35 mrem/day)

Crew Timeline

- Crew timeline is oversubscribed. This will increase stress & reduce sleep.
- Inadequate time for crew handover in current plan.

Certification of Flight Readiness 2 Statement

Certification of Flight Readiness Statement

The activities required to support Flight 5A.1/STS-102, Increment 2 and 3P have been accomplished except open work identified (attachment 1) . The Space and Life Sciences Directorate is ready to support Flight 5A.1/STS-102, Increment 2 and 3P.

There are no constraints to prceeding with the planned Flight 5A.1/STS-102, Increment 2 and 3P pending completion of scheduled open work.

W. A. Langdoc, Chief
Flight Projects Division

J. L. Robinson, Ph.D., Chief
Program Integration Office

G. J. Byrne, Earth Science & Solar System
Exploration Division

C. L. Fischer, M.D., Chief,
Medical Operations

C. M. Stegemoeller, Manager,
Human Space & Life Sciences
Program Office

M. L. Richardson, Chief,
Mission and Project Management
Office

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