

Written summary provided by Bob Doremus regarding a conversation held on Jan. 31 between Carlisle Campbell, Robert Doremus and David Paternostro about STS-107:

Carlisle Campbell phoned DF52/Bob Doremus. DF53/David Paternostro was also in the office. Carlisle brought in Bob Daugherty and the 4 discussed the possibility of landing with 2 flat tires. Carlisle said that Howard Law had done an entry sim at Ames (the sim was evidently done on Friday) and that sim showed that the landing with 2 flat tires was survivable. Bob Doremus and David Paternostro expressed some skepticism as to the accuracy of the Ames sim in light of other data (Convair 990 testing), but appreciated the information. All four agreed at the end of the discussion that we were doing a "what-if" discussion and that we all expected a safe entry on Saturday.

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
2101 NASA Road 1
Houston, Texas 77058-3696



January 13, 2003

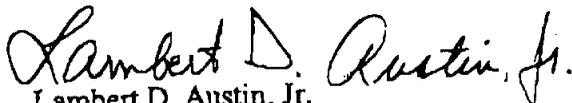
Reply to Attn of: MS2-03-003

TO: MT/Manager, Space Shuttle Customer and Flight Integration
FROM: MS/Manager, Space Shuttle Systems Integration
SUBJECT: Evaluation of Closed Circuit Television (CCTV) Monitor Shade (Biopack Application) Tape Adhesive Strength for Launch/Landing Loads

A CCTV Monitor Shade (SED33105633-301) has been adapted to provide on-orbit crewmember bump protection for a group of cables attached to the Biopack hardware installed in the orbiter middeck for STS-107. A diagram depicting an idealized representation of the Biopack/CCTV installation is provided in the enclosed analysis documentation.

The NASA-JSC Structures Working Group has reviewed the Biopack/CCTV installation analysis and found it to be acceptable per the enclosed letter, MSAD-02-0531, dated September 26, 2002. The analysis demonstrates positive adhesive margins of safety in all cases. The Space Shuttle Systems Integration Office recommends the approval of an exception to the 21000-IDD-MDK for the Biopack/CCTV Monitor Shade installation on STS-107 and all subsequent flights.

If you have any questions, please contact Ms. Dee Johnson/MS2 via e-mail: dexer.e.johnson@nasa.gov or contact her by telephone at 281-483-9434.


Lambert D. Austin, Jr.

Enclosure

cc:
See List

MS2-03-003

2

cc:

EA42/A. Lozano, Jr.

ES2/V. Fogt

ES2/D. Taylor

MA2/V. S. Ellerbe

MS/D. S. Noah

MS2/D. E. Johnson

MS2/C. E. Larsen

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MS2/R. O. Wallace

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MT2/L. J. Miller

MT2/F. Moreno

MV5/G. L. Morgan

MV5/JEC/K. Kruse

MV5/JEC/S. R. Stenzel

OZ/L. Roe

OZ2/J. S. Scheib

OZ2/USA/W. J. Redwine

SF3/D. J. Fitts

MSFC/Boeing-SPACEHAB/J. R. Miele

BNS-HB/H020-F609/J. Lai

BNS-Hou/HZ1-10/G. R. Tai

USA/USH-700D/E. Bruno

USA/USH-700D/N. Fox

USA/USH-700D/P. Pryor

Lockheed Martin Space Operations
Science, Engineering, Analysis, and Test Operation
2400 NASA Road 1, P.O. Box 58561 Houston, TX 77258-8561
Telephone (281) 333-5411

LOCKHEED MARTIN 

September 26, 2002
MSAD-02-0531

To: J.E. Rogers/ES2

Via: E.M. Rayos/B30 *EMR*
L.J. Mushung/B30 *LJM*

From: P.R. Romine/B30

Subject: Evaluation of CCTV Monitor Shade (BIOPACK Application) Tape Adhesive Strength for Launch/Landing Loads

A Closed Circuit Television (CCTV) Monitor Shade (SED33105633-301) has been adapted to provide on-orbit crewmember bump protection for a group of cables attached to the BIOPACK hardware installed in the Orbiter Mid-deck for STS-107. A diagram depicting an idealized representation of the BIOPACK/CCTV installation is provided in the attached analysis documentation.

Since the shade is intended to remain in place during liftoff and landing, the assessment documented herein evaluates the adhesive strength of the tape used to secure the monitor shade to the BIOPACK hardware against worst-case nominal liftoff/landing and emergency landing load conditions. The idealized shade geometry and effective tape adhesive areas used in the assessment are considered conservative, as are the worst-case liftoff/landing and emergency landing load conditions. Liftoff and landing (nominal and emergency) load cases are based on the root-sum-square (RSS) totals for the mid-deck load factors documented in NSTS-21000-IDD-MDK. To simplify the emergency landing case, the RSS total is based on a 20G load applied simultaneously in each coordinate direction.

The analysis demonstrates a positive adhesive margin of safety in all cases. Therefore, assuming that the shade is installed properly and in a manner consistent with the information provided by various Johnson Space Center (JSC)/Kennedy Space Center (KSC) representatives, the adhesive strength of the tape used in this application should be adequate to successfully hold the shade in place during liftoff/landing.



Paul Romine
paul.romine@lmco.com

PREPARED BY	NAME/DATE P. Romine - 9/23/02	LOCKHEED MARTIN <i>A</i> Mechanical Systems Analysis Department	PAGE NO. 1/5	DWG NO.
PROJECT	SWG		REPORT NO. MSAD-02-0531	
TITLE Evaluation of CCTV Monitor Shade (BIOPACK Application) Tape Adhesive Strength for Launch/Landing Loads				

ORIGIN = 1

Assumptions

The following set of assumptions was applied during this evaluation.

1. Each section of the CCTV Monitor Shade is assumed to lie flat against the BIOPACK Locker exterior. Tape preload due to the Monitor Shade being forced to lie flat against the exterior of the BIOPACK Locker is not accounted for.
2. During launch/landing, the only loads applied to the Monitor Shade are due to inertial loads generated by the shade mass.
3. The assessment is intended to evaluate the strength capacity/margin provided by the taped edges of the Monitor Shade. The shade strength itself is not evaluated. The CCTV Monitor Shade has already been evaluated against on-orbit crewmember induced bump loads in its original CCTV application. These loads are assumed to induce worst-case stress conditions on the Kydex shade material itself.
4. For the purposes of the evaluating the tape adhesive capacity to resist launch/landing induced loads, the CCTV Monitor Shade is assumed rigid.
5. The 2 inch width of the adhesive tape is assumed to be evenly split between the CCTV shade and BIOPACK. For further conservatism, only 1/2 of the available 1 inch width of tape is assumed to be adhesively attached to the BIOPACK surface.

Factor of Safety

$$FS := \begin{cases} 2.0 \\ 1.0 \end{cases} \quad \begin{array}{l} \text{Nominal Liftoff/Landing Factor of Safety} \\ \text{Emergency Landing Factor of Safety} \end{array}$$

Tape Strength Properties

$$F_{\text{tape}} := 2.3 \frac{\text{lb}}{\text{in}^2} \quad \text{Tape adhesive strength via 180 peel test (Ref. Tim McBride/USA e-mail correspondence to Penny Saunders/JSC-EA4, dated 9/16/2002.)}$$

CCTV Shade Mass Properties

$$\text{mass} := 0.57 \text{ lb} \quad \text{Total Mass of CCTV Monitor Shade (SED33105633-301) (Ref. Vic Studer/JSC-EV e-mail correspondence to Penny Saunders/JSC-EA4, dated 9/13/2002)}$$

Launch/Landing Load Conditions

Enveloping Nominal - (Ref. Table 4.1-1, NSTS-21000-IDD-MDK, Rev. B)

$$\text{nom} := \begin{cases} 6.25 \text{ g} \\ 3.4 \text{ g} \\ 12.5 \text{ g} \end{cases} \quad \text{RSS}_{\text{nom}} := |\text{nom}| \quad \text{RSS}_{\text{nom}} = 14.4 \text{ g}$$

Enveloping Emergency Landing - (Ref. Table 4.2-1, NSTS-21000-IDD-MDK, Rev. B)

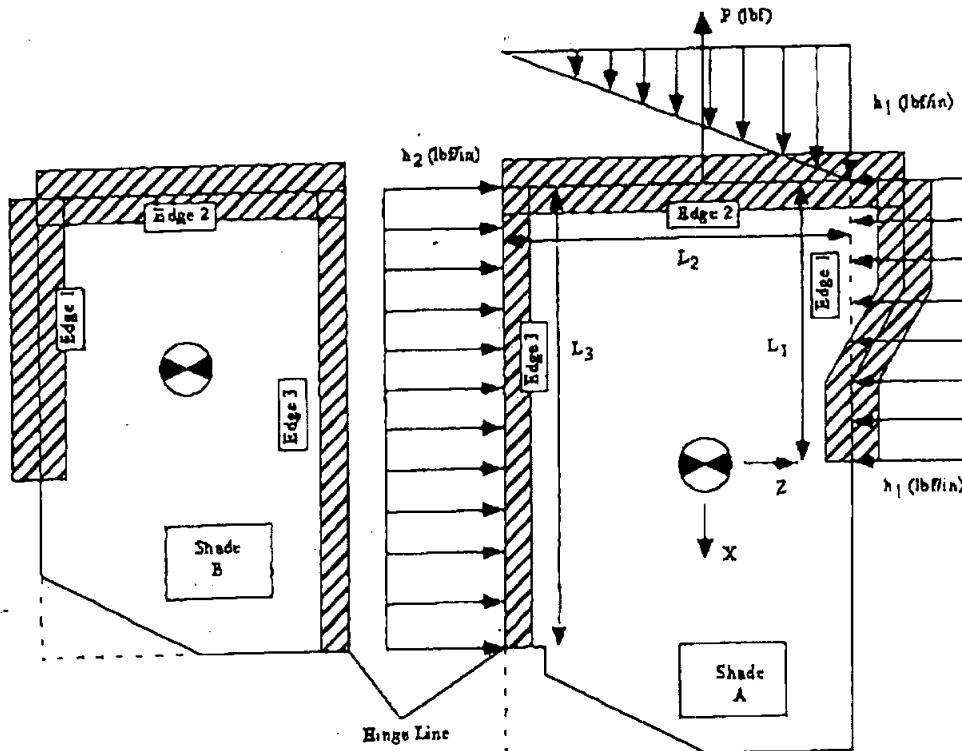
$$\text{emerg} := \begin{cases} 20 \text{ g} \\ 20 \text{ g} \\ 20 \text{ g} \end{cases} \quad \text{RSS}_{\text{emerg}} := |\text{emerg}| \quad \text{RSS}_{\text{emerg}} = 34.6 \text{ g}$$

PREPARED BY	NAME/DATE P. Romine - 9/23/02	LOCKHEED MARTIN Mechanical Systems Analysis Department	PAGE NO. 2/5	DWG NO.
PROJECT	SWG		REPORT NO. MSAD-02-0531	
TITLE Evaluation of CCTV Monitor Shade (BIOPACK Application) Tape Adhesive Strength for Launch/Landing Loads				

Analysis Approach

A diagram depicting the loads induced on 1/2 of the CCTV Monitor Shade is shown below. The crosshatched regions around the perimeter represent the taped area for this application.

1. To perform a conservative quick-look assessment of the CCTV Monitor Shade in its proposed BIOPACK application, input load conditions applied to the shade are based on the root sum square (RSS) totals for the nominal liftoff/landing and emergency landing load cases.
2. For further conservatism, the RSS inertial loads are assumed to act normal to the plane for each half of the CCTV Shade.
3. Inertial loads acting on each half of the shade are calculated based on the total mass of the shade (includes both Shade A and Shade B - see diagram below).
4. For simplification, each half of the CCTV Shade (indicated as A and B below) is idealized as rectangular for analysis purposes. The idealized sections of the shade perimeter are indicated with dashed lines.
5. The loads considered in this evaluation are those that act normal to the plane of the shade (i.e. only those loads that tend to peel the tape from the BIOPACK surface are considered). Therefore, the line load acting along the hinge line (h_2 on Edge 3) between the two halves of the shade is not considered since this load does not act to peel the tape from the BIOPACK interface.

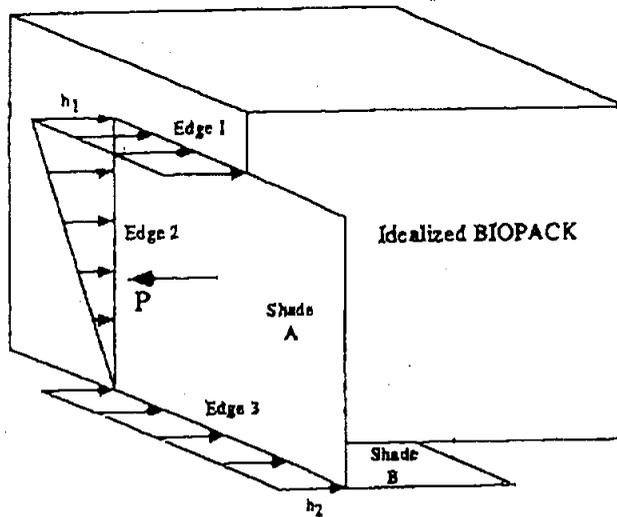


NOTE: The loads depicted in the above diagram act normal to the plane of the shade (refer to the diagram on the following page). The loads are depicted in this manner to demonstrate their relationship with respect to the planar geometry of Shade A.

PREPARED BY	NAME/DATE P. Romine - 9/23/02	LOCKHEED MARTIN Mechanical Systems Analysis Department	PAGE NO. 3/5	DWG NO.
PROJECT	SWG		REPORT NO. MSAD-02-0531	
TITLE Evaluation of CCTV Monitor Shade (BIOPACK Application) Tape Adhesive Strength for Launch/Landing Loads				

Analytical Approach (Continued)

For clarity, the idealized diagram below depicts the actual orientation of induced loads on Shade A. Induced loads on Shade B are determined in an analogous manner.



Induced Load Assessment - Shade A

$L_1 = 7.0\text{-in}$ (Edge 1 Length - Estimated from CCTV Monitor Shade fit-check pictures dated 7/03/02)

$L_2 = 8.3\text{-in}$ (Edge 2 Length - Ref. SED33105633)

$L_3 = 11.3\text{-in}$ (Edge 3 Length - Ref. SED33105633)

The total load due to the linear load distribution along Edge 2 : $P_{linear} = \frac{1}{2} \cdot L_2 \cdot h_1$

The total load due to the line load along Edge 1 : $P_{line} = L_1 \cdot h_1$

Emergency Landing Inertial Load : $P = \left[\begin{matrix} \text{mass} \cdot \text{RSS}_{nom} \\ \text{mass} \cdot \text{RSS}_{emerg} \end{matrix} \right] \quad P = \left[\begin{matrix} 8.2 \\ 19.7 \end{matrix} \right] \cdot \text{lbf}$

Summing moments about the hinge line (Edge 3) :

$$P \cdot \frac{L_2}{2} - \frac{2}{3} \cdot L_2 \cdot P_{linear} - P_{line} \cdot L_2 = 0 \text{ in} \cdot \text{lbf}$$

Substituting for P_{linear} and P_{line} :

$$\frac{1}{2} \cdot P \cdot L_2 - \frac{1}{3} \cdot L_2^2 \cdot h_1 - L_1 \cdot h_1 \cdot L_2 = 0 \text{ in} \cdot \text{lbf}$$

PREPARED BY	NAME/DATE P. Romine - 9/23/02	LOCKHEED MARTIN 	PAGE NO. 4/5	DWG NO.
PROJECT	SWG		REPORT NO. MSAD-02-0531	
TITLE Evaluation of CCTV Monitor Shade (BIOPACK Application) Tape Adhesive Strength for Launch/Landing Loads				

Induced Load Assessment - Shade A (Continued)

Solving for h_1 and simplifying:

$$h_1 := \frac{3}{2} \frac{P}{(L_2 + 3 \cdot L_1)} \qquad h_1 = \begin{bmatrix} 0.42 \\ 1.011 \end{bmatrix} \frac{\text{lbf}}{\text{in}}$$

Tape Adhesive Margin - Shade A

The adhesive strength of the tape is conservatively rated at: $F_{\text{tape}} = 2.3 \frac{\text{lbf}}{\text{in}^2}$

Width of tape available for adhesive contact with BIOPACK: $w := 1.0 \text{ in}$

As stated in Assumption #5, the contact area between the tape and BIOPACK surface was conservatively estimated to be 1/2 of the width available (w). Assuming this contact length is constant for the entire length of the taped interface, the line load capacity for the tape adhesive is estimated as:

$$F_{\text{tape}} := \frac{1}{2} \cdot F_{\text{tape}} \cdot w \qquad F_{\text{tape}} = 1.15 \frac{\text{lbf}}{\text{in}}$$

$i := 1..2$

$$MS_i := \frac{F_{\text{tape}}}{FS_i \cdot h_1} - 1 \qquad MS = \begin{bmatrix} 0.37 \\ 0.138 \end{bmatrix} \qquad \begin{array}{l} \text{Nominal Liftoff/Landing} \\ \text{Emergency Landing} \end{array}$$

Induced Load Assessment - Shade B

NOTE: The load/adhesive margin assessment for Shade B is analogous to that conducted to Shade A. The only difference in the analysis is the length of Edge 2. All other aspects/assumptions etc are identical.

$L_1 := 7.0 \text{ in}$ (Edge 1 Length - Estimated from CCTV Monitor Shade fit-check pictures dated 7/03/02)

$L_2 := 7.3 \text{ in}$ (Edge 2 Length - Ref. SED33105633)

$L_3 := 11.3 \text{ in}$ (Edge 3 Length - Ref. SED33105633)

The total load due to the linear load distribution along Edge 2: $P_{\text{linear}} = \frac{1}{2} \cdot L_2 \cdot h_1$

The total load due to the line load along Edge 1: $P_{\text{line}} = L_1 \cdot h_1$

Emergency Landing Inertial Load: $P = \begin{bmatrix} \text{mass} | \text{nom} | \\ \text{mass} | \text{emerg} | \end{bmatrix} \qquad P = \begin{bmatrix} 8.2 \\ 19.7 \end{bmatrix} \cdot \text{lbf}$

PREPARED BY	NAME/DATE P. Romine - 9/23/02	LOCKHEED MARTIN Mechanical Systems Analysis Department	PAGE NO. 5/5	DWG NO.
PROJECT	SWG		REPORT NO. MSAD-02-0531	
TITLE Evaluation of CCTV Monitor Shade (BIOPACK Application) Tape Adhesive Strength for Launch/Landing Loads				

Induced Load Assessment - Shade B (Continued)

Summing moments about the hinge line (Edge 3):

$$P \cdot \frac{L_2}{2} - \frac{2}{3} \cdot L_2 \cdot P_{\text{linear}} - P_{\text{line}} \cdot L_2 = 0 \text{ in} \cdot \text{lb} \cdot \text{f}$$

Substituting for P_{linear} and P_{line} :

$$\frac{1}{2} \cdot P \cdot L_2 - \frac{1}{3} \cdot L_2^2 \cdot h_1 - L_1 \cdot h_1 \cdot L_2 = 0 \text{ in} \cdot \text{lb} \cdot \text{f}$$

Solving for h_1 and simplifying:

$$h_1 = \frac{3}{2} \frac{P}{(L_2 + 3 \cdot L_1)}$$

$$h_1 = \left[\frac{0.435}{1.047} \right] \frac{\text{lb} \cdot \text{f}}{\text{in}}$$

Tape Adhesive Margin - Shade B

As estimated previously, tape adhesive strength:

$$F_{\text{tape}} = 1.15 \frac{\text{lb} \cdot \text{f}}{\text{in}}$$

is 1.2

$$MS_1 = \frac{F_{\text{tape}}}{FS_1 \cdot h_1} - 1$$

$$MS = \left[\begin{array}{l} 0.323 \\ 0.099 \end{array} \right]$$

Nominal Liftoff/Landing

Emergency Landing

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
2101 NASA Road 1
Houston, Texas 77058-3696



January 13, 2003

Reply to Attn of:

MS2-03-002

TO: Distribution

FROM: MS/Manager, Space Shuttle Systems Integration Office

SUBJECT: STS-107 Middeck Lockers Structural Analysis/Assessment

Please refer to the enclosed informal letter MV5-JEC-03-001, STS-107 Readiness Statement, dated, January 6, 2003.

Based on the above-referenced letter, all structural analyses/assessments of middeck lockers have been successfully completed for STS-107. The middeck lockers and avionics bay wire trays are within weight carrying capabilities of the orbiter structure per specifications identified in Technical Order MO72-661602 and NSTS 21000-IDD-MDK, Shuttle/Payload Interface Definition Document for Middeck Accommodations.

Please direct related questions to NASA JSC/MS2/Ms. Dee Johnson at (281) 483-9434 or facsimile (281) 483-6202.

A handwritten signature in black ink that reads "Lambert D. Austin, Jr." in a cursive style.

Lambert D. Austin, Jr.

Enclosure

Distribution:

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MS3/D. L. Ladrach
MT2/L. J. Miller
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OZ2/D. Szatkowski
SF3/K. Kruse
SF3/D. J. Fitts

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BNS-HB/H020-F609/J. Lai
BNS-Houston/HD2-20/S. L. Sharp
USA/USH-700D/E. E. Bruno
USA/USH-700D/P. A. Pryor

cc:

MA2/L. J. Ham
MS/D. S. Noah
MT/M. A. Brekke

January 6, 2003

MVS-JEC-03-001

TO: MS2/Integration Engineering
Attn: D. Johnson

FROM: MVS-JEC/Orbiter Stowage Manager

SUBJECT: STS-107 Readiness Statement

This office performed a weight and c.g. assessment of the middeck lockers and middeck stowage bags. The lockers and bags do not exceed the weight-carrying capabilities of the orbiter structure as identified in the specification of Shuttle Operational Data Book, Section 3.4.1.1.12, MO72-661602, NSTS 21000-IDD-MDK Shuttle/Payload Interface Definition Document for Middeck Accommodations, and Crew Equipment Stowage Volume Control ICD 3-0027-03. Each of the three middeck avionics bay wire trays does not exceed the allowable maximum avionics bay stowage weight per bay.

The specific locker/bag configuration is controlled by the CCCD SGD32104430:201,001, REV N, dated January 2, 2003, and may change prior to the launch. If a change in configuration is made, this office will make a new evaluation. If the evaluation indicates a new readiness statement is needed, it will be prepared and forwarded to you.

If you have further questions, please contact Gary Morgan at (281) 483-3740.

A. Morgan Jan. 06, 2003
Orbiter Stowage Manager

cc:
ES23/ Linda Estes
MVS/J. Lin
SF3/D. Fitts
USA- USH-700D/ Erica Bruno
EA42-/Anselmo Lozano
Boeing HSF/HDF
M/C: ZC20- Steven Sharp

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, AL 35812



Reply to Attn of:

ED44 (03-002)

January 24, 2003

TO: MP71/Steve Glover

FROM: ED44/Stewart Deaton

SUBJECT: STS-107 Countdown Surface Atmospheric Properties and In-flight Winds

This memorandum presents the countdown (propellant loading time frame to L-0) surface atmospheric properties and in-flight wind data for the STS-107 launch on January 16, 2003. Table 1 presents selected L-0 surface atmospheric conditions observed at 1039 EST (1539Z) and in-flight (1554Z) maximum wind data:

Table 1- STS-107 L-0 Surface Atmospheric Conditions and In-flight Maximum Wind

Temperature ^a (°F)	65
Relative Humidity ^a (%)	68
Pressure ^a (in Hg)	30.22
Surface Wind ^a (60 ft. elevation):	
Speed (kts)	1.5
Direction (deg)	173
Sky Condition ^b	Scattered clouds at 3,500 ft
Visibility ^b (miles)	10
In-flight Maximum wind ^c (below 60,000 ft):	
Altitude (ft)	39,500
Speed (ft/s)	184.5
Direction (deg)	270

a – Pad 39A, Camera Site #3 (SE) – one minute average, ending at L-0

b – Shuttle Landing Facility (SLF) – sky observing site

c – data from L+15 minute Jimsphere balloon profile

2

Countdown/Launch Comments of Meteorological Significance:

The STS-107 L-0 Final Meteorological Profile includes data from the L+15 minute (1554Z) Jimsphere and L-30 minute (1509Z) Automated Meteorological Profiling System Low Resolution Flight Element profiles. The L-0 Final Meteorological Profile consists of wind data, thermodynamic parameters, and systematic uncertainties versus height from surface to 400,000 ft altitude. The L-0 Final Meteorological Profile for STS-107 is complete and archived in the MSFC/Space Shuttle Data Base (SSDB).

Surface Winds (60 ft. elevation):

Figures 1 and 2 present the Camera Site #3 continuous surface wind trace (speed and direction) from L-300 sec to L+100 sec. Figures 3 and 4 present the Camera Site #3 surface wind trace from L-24 hours to L-0 (overlaid with Camera Site #3 atmospheric temperature trace at 6 ft. elevation).

In-flight Winds:

Figures 5 and 6 present the L+15 minute (1554Z) Jimsphere profile wind components (in-plane and out-of-plane), wind component monthly means, and 90% and 95% wind component monthly envelopes versus altitude with respect to a 90-degree launch azimuth.

If you have any questions or need further information, please contact my office at (256) 544-4291.



Stewart J. Deaton
Technical Manager, Shuttle Natural Environments
Environments Group

APPROVAL:



Stephen Rose, Group Lead
Environments Group

Enclosures

cc:

See Page 3

3

cc:

ED40/N. Parker

ED41/B. Vaughan

ED44/S. Rose/D. Johnson/ B. Roberts/S. Deaton

ED44/CSC/W. Batts/R. Leach

ED44/Raytheon/G. Overbey/L. Burns/F. Leahy

ED44/Sverdrup/R. Decker

MP71/J. Martin/A. Murphy

JSC/DA8/J.M. Heflin

JSC/MA/M. Henderson

JSC/MS/L. Austin

JSC/MS2/R. Wallace/C. Boykin

JSC/ZS8/F. Brody/Lead Forecaster

KSC/YA-D/J. Madura

45 WS/CC/N. Wyse

CSR 4500/H. Herring

USA/USM/T. King/J. Yeager/B. Whitworth

SPACE SHUTTLE DATA BASE STS107RT
LAST UPDATE: 01/18/2003 17:00:42

DATE: 01/16/2003
TIME: 19:00:11
PAGE: 46

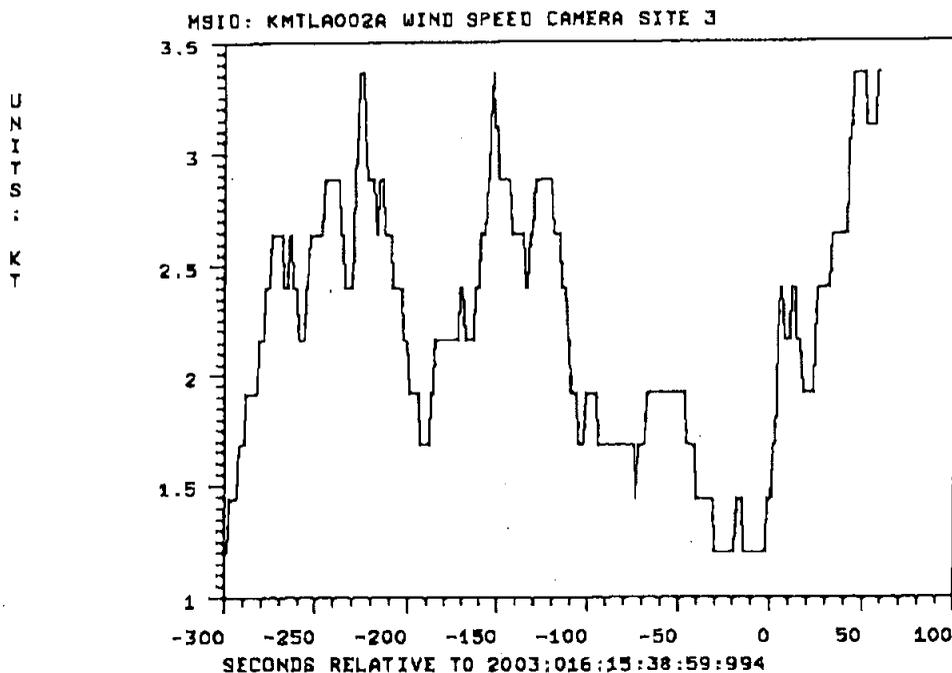


Figure 1

SPACE SHUTTLE DATA BASE STS107RT
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DATE: 01/16/2003
TIME: 19:00:44
PAGE: 46

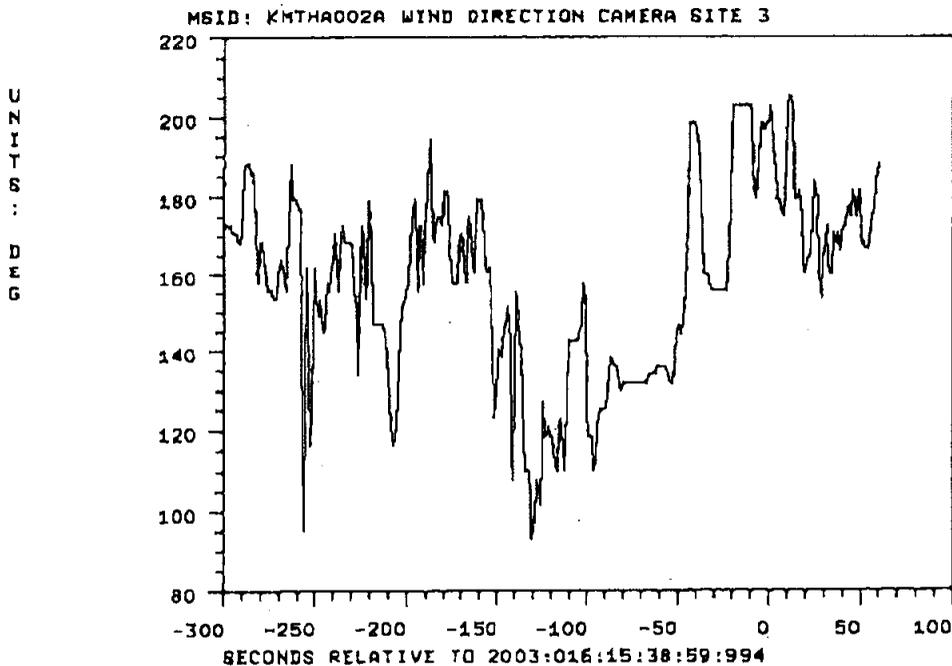


Figure 2

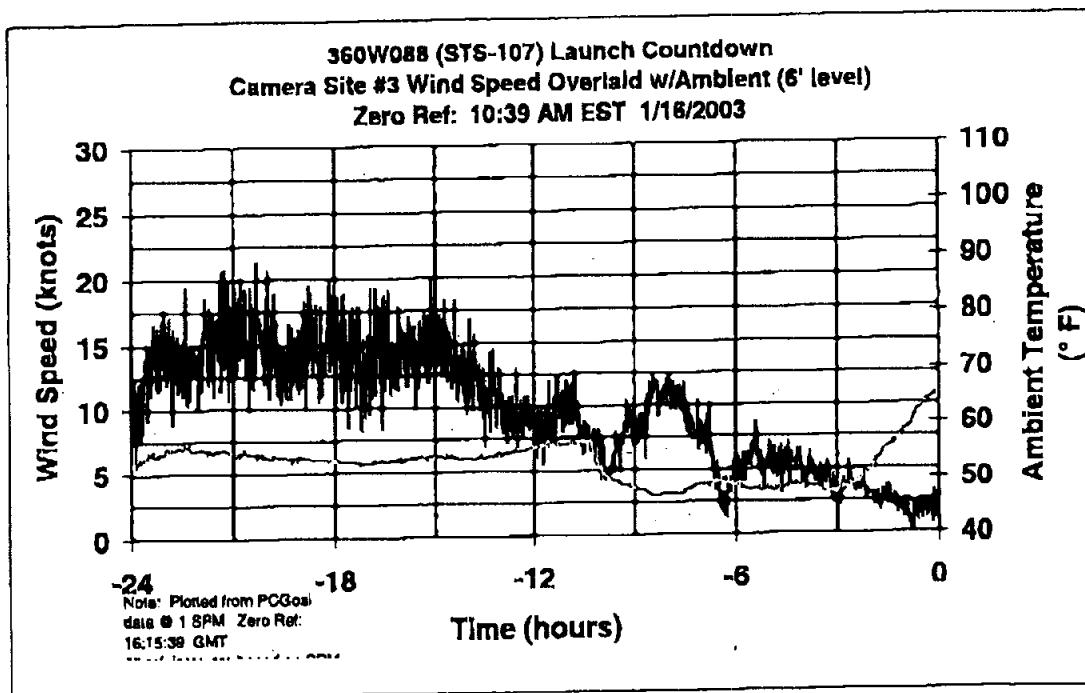


Figure 3

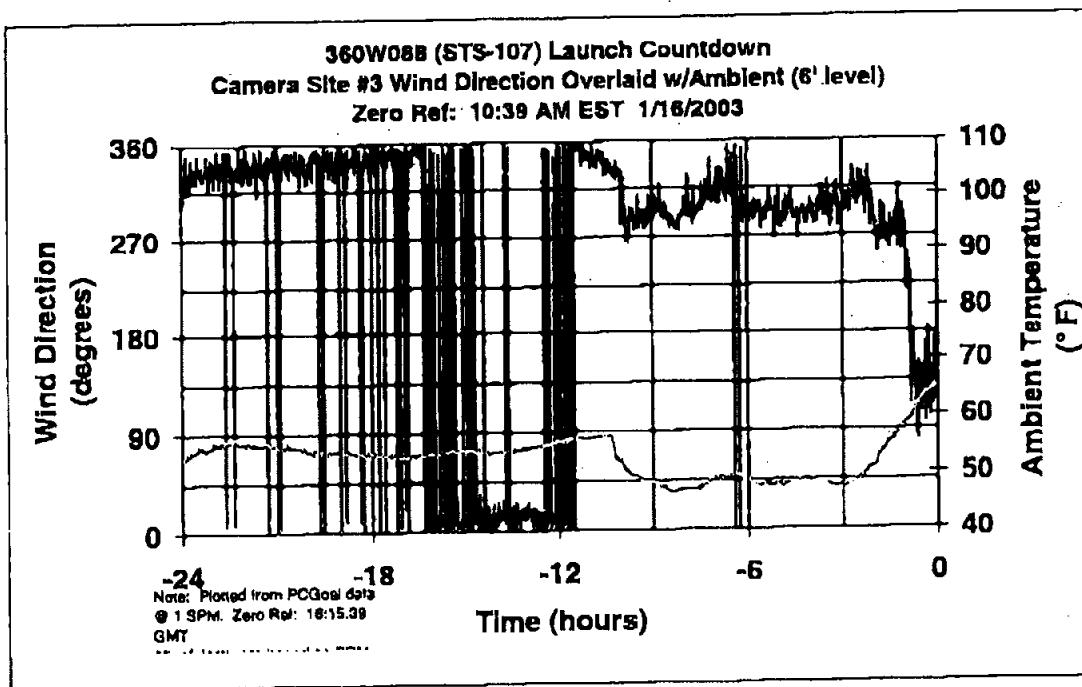


Figure 4

2003 1 18 1554Z Monthly Mean & 90-95% Envelopes for Month= 1 AZ= 90.

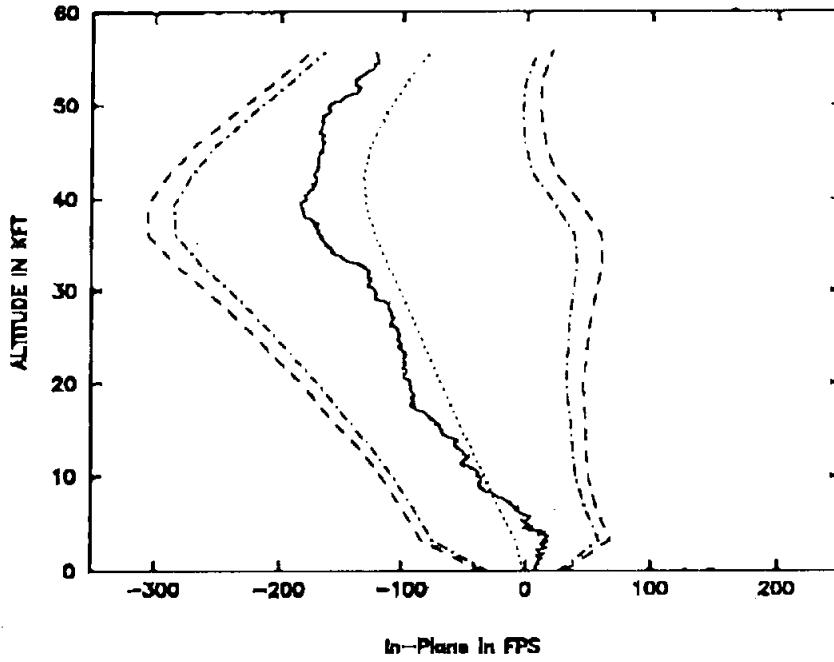


Figure 5

2003 1 18 1554Z Monthly Mean & 90-95% Envelopes for Month= 1 AZ= 90.

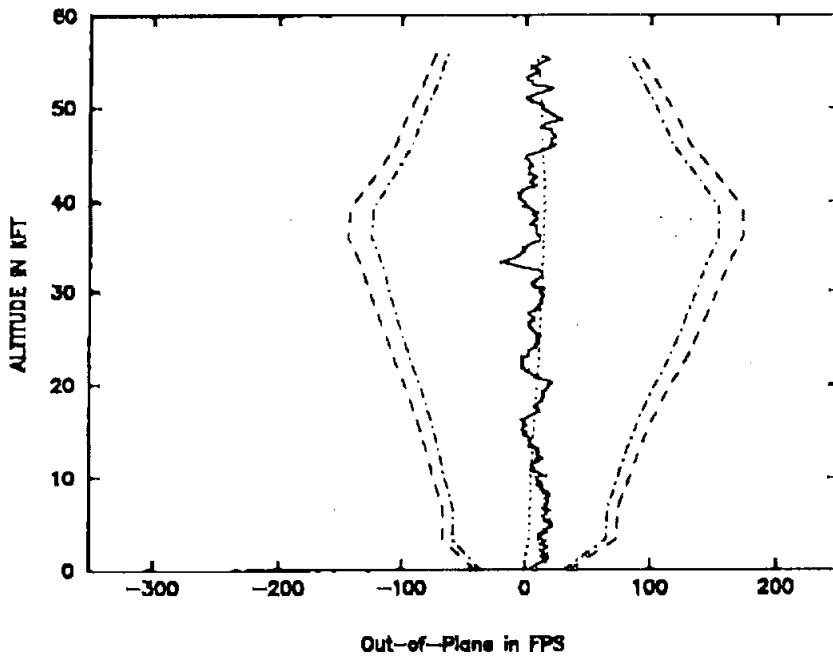


Figure 6

AUSTIN, LAMBERT D. (JSC-MS) (NASA)

From: JOHNSON, DE'XER E. (JSC-MS2) (NASA)
Sent: Wednesday, January 15, 2003 1:45 PM
To: ELLERBE, VANESSA S. (JSC-MA2) (NASA); MORENO, FRANK (JSC-MT2) (NASA)
Cc: AUSTIN, LAMBERT D. (JSC-MS) (NASA); NOAH, DONALD S. (DON) (JSC-MS) (NASA); LADRACH, DAVID L. (DAVE) (JSC-MS3) (NASA); WALLACE, RODNEY O. (ROD) (JSC-MS2) (NASA)
Subject: FW: BRICE allowable Weights and C.G's

Vanessa,
The BRIC payload has been weighed & c.g. by KSC. MS2 has approved BRIC's weight and c.g. for launch & landing on STS-107.
Steve Stenzel/MV5 will up date the STS-107 CCCD to reflect BRIC's turnover weight and c.g.

Dee

-----Original Message-----

From: Fox, Nelson P [mailto:Nelson.P.Fox@USAHQ.UnitedSpaceAlliance.com]
Sent: Wednesday, January 15, 2003 1:33 PM
To: 'Reed-2, David'; MORENO, FRANK (JSC-MT2) (NASA); 'Guy Etheridge KSC Pylds Program Mgr (E-mail)'; Boeing-Hsv - Glen Beatty (E-mail); Mike Huddleston (E-mail); Spacehab - Pete Pacey (E-mail); MORGAN, GARY (JSC-MV5) (JEC); STENZEL, STEVEN R. (STEVE) (JSC-MV5) (JEC); JOHNSON, DE'XER E. (JSC-MS2) (NASA); Bruno, Erica E; Pryor, Pat A; EDWARD KLEIN (E-mail); Ash, Kellee D
Cc: 'Louis Ostrach'; 'Gary Jahns'
Subject: RE: BRICE allowable Weights and C.G's

Team,

The following mass properties can be entered into the CCCD as acceptable for the BRIC P/L.

Weight: 65.6 lbs
Xcg: 10.1 in.
Ycg: 0.22 in.
Zcg: 1.13 in.

Per the as weighted BRIC mass properties specified below, all mass properties are within the NSTS-21000-IDD-MDK requirements and are good for flight.

Nelson Fox

-----Original Message-----

From: Reed-2, David [mailto:David.Reed-2@ksc.nasa.gov]
Sent: Wednesday, January 15, 2003 1:16 PM
To: 'MORENO, FRANK (JSC-MT2) (NASA)'; 'Guy Etheridge KSC Pylds Program Mgr (E-mail)'; 'Bionetics - David Reed (E-mail)'; Boeing-Hsv - Glen Beatty (E-mail); Mike Huddleston (E-mail); Spacehab - Pete Pacey (E-mail); MORGAN, GARY; STENZEL, STEVEN R; JOHNSON, DE'XER E; Bruno, Erica E; Fox, Nelson P
Cc: 'Louis Ostrach'; 'Gary Jahns'
Subject: RE: BRICE allowable Weights and C.G's

Measured values from the Level-IV calibrated wt and cg tables at Hangar L are as follows for the BRIC locker with a 4/2 foam cutout for the BRIC C. Elegans:

FW: Feedback on First SLF Visit

Page 1 of 2

AUSTIN, LAMBERT D. (JSC-MS) (NASA)

From: Hammond, Neal [Neal.Hammond@USAHQ.UnitedSpaceAlliance.com]
Sent: Friday, February 28, 2003 1:32 PM
To: AUSTIN, LAMBERT D. (JSC-MS) (NASA); NOAH, DONALD S. (DON) (JSC-MS) (NASA); Hinson, Fred R
Subject: FW: Feedback on First SLF Visit

FYI

Neal

H. Neal Hammond
VP&APM, Program Integration
United Space Alliance
email: neal.hammond@usahq.unitedspacealliance.com
voice: 281-212-6184
fax: 281-212-6320

-----Original Message-----

From: McCombs, John T
Sent: Friday, February 28, 2003 1:27 PM
To: Hinson, Fred R; Hammond, Neal
Subject: FW: Feedback on First SLF Visit

FYI

-----Original Message-----

From: Wain, Donna L. [mailto:DLWain@xch-bsco-06.ksc.nasa.gov]
Sent: Friday, February 28, 2003 2:15 PM
To: Klein, Ed; Vaughn, Michael E; EXT-Pryor, Pat A; EXT-Fox, Nelson P; EXT-Ladrach, David L; EXT-McCombs, John T
Cc: Engle, James M.; Luecking, Robert B.; Klepper, William M.; Barrett, James; Gaudio, Rick L.; Rodriguez, Alejandro
Subject: Feedback on First SLF Visit

All,

Just a note to let you all know where we are at with examining the Payload Accommodations / Cargo Integration Hardware at the SLF. We have established access for Rick Gaudio, Christina Howe, and Alejandro Rodriguez. They are now able to access the SLF as necessary. Rick and Alejandro went to both the main hanger and the clamshell yesterday afternoon to get an orientation and a first look at many of the bridges, including bay 8 stbd, bay 4 port, bay 10 port, bay 3 stbd, and bays 3, 12, and 11 (OARE) keels. None of this hardware has been cleaned, so it still has clay and mud on some areas. The M&P community has cleaned some hardware that has been deemed critical, and there are on-going discussions of whether cleaning should be done, or if it will cause us to lose some data. At this time, no one is allowed to bring in cameras, PDA's, laptops, or even notebooks to make notes with, so the gathering of data will take some time. We are utilizing the other data and photos available to us to help in the process. I have not been given any specific reporting requirements, so if there is any specific format anyone is looking for, please let me know. I plan to have the first more detailed report out early next week.

Please call me if you have any questions.

02/28/2003

DYER, DAVID W. (JSC-NT) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 16, 2003 10:34 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Launch Report

STS-107 Launch Report
GMT 16:16:30

Shift Lead: Andy Foster
Ascent Ops Specialist: Andy Foster
Tanking/MPS Specialists: Bill Prince, Dan Clements
Mission Engineer: Megan Bell (OJT)

STS-107 was successfully launched on January 16, 2003 at GMT 16:15:39 (09:30 CST). While some IPR's were worked, there were no LCC violations during the prelaunch countdown. Weather was never a concern during the launch for KSC or at the TAL sites.

Performance during powered flight was nominal. MECO occurred on time and inserted the vehicle into an initial 156 x 43 nm orbit. ET sep and all subsequent events were nominal. OMS 2 occurred at 16:16:20 GMT. The 186.1 fps burn boosted the vehicle into a 156 x 146 nm orbit.

There are no vehicle anomalies at this time.

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or

<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

DYER, DAVID W. (JSC-NT) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 17, 2003 8:59 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD01 Report

STS-107 Flight Day 01 Report
GMT 017:14:30

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally. Payload bay door opening was nominal and the port radiator was deployed. Spacehab activation also was nominal though a bit late. Spacehab activities are progressing nominally at this time. Orbiter consumables are above the levels required for the planned mission. Twenty-two hours of margin were reported at the Engineering meeting this morning.

Two items are being carried as MER anomalies at this time.

AC2 Phase B exhibited sluggish performance during the prelaunch and post-insertion timeframes. Sluggish performance was first noted at T-31 seconds in the launch countdown and then twice during post-insertion activities. During the operation of three motors, AC2 phases A and C would increase to expected values while phase B would rise to only half of what was expected but recover to nominal values within one second. Motor operation was nominal. The affected motors are: vent doors 8 and 9, Ku-band deploy motor 2, and port payload door open motor 2. There are no common circuits or motor control assemblies for these motors though they are all controlled via circuit breakers found on panel MA73C. However, other motors controlled by those circuit breakers are showing nominal operating signatures. Engineering is continuing to examine data, but there is no in-flight troubleshooting planned at this time. This anomaly holds no mission impact since all motors will operate nominally even if there were a complete failure of phase B. At this time, we believe the mission is at no additional risk. We are continuing to monitor and evaluate this anomaly.

During Spacehab activation, the crew reported they could not communicate to Spacehab from the Orbiter over the intercommunications (ICOM) B loop. ICOM A is working nominally, and this is considered to be a loss of redundancy impact. No mission impact is expected, and currently no in flight troubleshooting is planned.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab

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If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

DYER, DAVID W. (JSC-NT) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Tuesday, January 28, 2003 9:39 AM
To: 'srqa-mer listserver'
Subject: STS-107 Flight Day 12 Report

STS-107 Flight Day 12 Report
GMT 028:15:30

Shift Leads: David Witwer, Brandon Dick, Mike Etchells
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission continues nominally in a 154 x 140 nm orbit with all Orbiter subsystems performing satisfactorily. No new Orbiter issues or anomalies have been reported in the previous 24 hours.

Our MER Manager released the following update on the debris hit on the left wing last during ascent. "Systems integration personnel performed a debris trajectory analysis to estimate the debris impact conditions and locations. This analysis was performed utilizing the reported observations from the ascent video and film. It was assumed that the debris was foam from the external tank. Based on the results of the trajectory analysis, an impact analysis was performed to assess the potential damage to the tile and reinforced carbon carbon (RCC). The impact analysis indicates the potential for a large damage area to the tile. Damage to the RCC should be limited to coating only and have no mission impact. Additionally, thermal analyses were performed for different locations and damage conditions. The damage conditions included one tile missing down to the densified layer of the tile and multiple tiles missing over an area of about 7 in by 30 in. These thermal analyses indicate possible localized structural damage but no burn-through, and no safety of flight issue."

Previous flight day reports discuss the eight MER anomalies listed below.

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in Spacehab
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05	Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06	Loss of DR20 Tape Recording and Playback (GFE)
MER-07	LH2 Prevalve Open B Indicator Failed Off
MER-07A	MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08	70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

DYER, DAVID W. (JSC-NT) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 31, 2003 9:08 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 15 Report

STS-107 Flight Day 15 Report
GMT 031:14:50, MET 14:23:10

Shift Leads: David Witwer, James Gardner, David Melendez
Mission Engineer: Dan Zalik (OJT)

The STS-107 mission continues nominally with two issues reported over the previous 24 hours. The Orbiter consumables are above the levels required for completion of the planned mission. Weather forecasts for the two Saturday landing opportunities at KSC are well within flight rule limits; specifically scattered clouds at 3500 ft and 25,000 ft, visibility 7 sm, and crosswinds less than 10 knots.

Flight Control System (FCS) checkout is complete with FCS, APU and hydraulic system performance as expected. Following FCS checkout, the RCS hot-fire occurred satisfactorily. All thrusters fired at least once. The Orbiter is prepared for tomorrow's deorbit and landing.

However, two anomalies have been added to our MER Anomaly list. The first anomaly added is MER-09: SPACEHAB Water Loop Flow Degradation. Earlier in the flight (MET 01:21:21), the flight control team decided to use only SPACEHAB water pump 1. Recent data shows pump 1 is degrading, however the degradation is at a rate that will allow the flow to stay above nominal limits until the end of mission. SPACEHAB water pump 1 degradation does not currently have an impact to the mission. Post landing, a team at KSC will troubleshoot the Orbiter side of the interface to determine if Orbiter hardware either caused or impacted the problem.

The second anomaly added in the past 24 hours is MER-10: Forward DAP Auto A Contact Deselected. A review of the data indicates that the switch performed nominally until MET 13:04:49 and 13:05:53. At these two moments when the crew used the forward Digital Auto Pilot (DAP) auto push button switch, contact A did not close. Redundancy Management (RM) subsequently deselected contact A of the forward DAP. A switch tease, observed in the past on this type of switch, is the suspected cause. Although there is a loss of redundancy, no mission impact is expected and workarounds are in place for the next worst failure.

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in SPACEHAB
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)

MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)
MER-09 SPACEHAB Water Loop Flow Degradation (ORB or PLD)
MER-10 Forward DAP Auto A Contact Deselected (ORB)

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michael.j.penney1@jsc.nasa.gov

MORELAND, DEAN (JSC-NC) (NASA)

From: ELLERBE, VANESSA S. (JSC-MA2) (NASA)
Sent: Friday, January 03, 2003 1:27 PM
To: MORELAND, DEAN (JSC-NC) (NASA); GARCIA, HECTOR, PHD (JSC-SF) (WLS)
Cc: MORENO, FRANK (JSC-MT2) (NASA); LARSEN, AXEL M. (SKIP) (JSC-MA2) (NASA)
Subject: FW: STS-107 - CIBX and BRIC - Late Changes

FYI- Please be on the lookout for changes to CIBX and BRIC.

Vanessa

-----Original Message-----

From: ELLERBE, VANESSA S. (JSC-MA2) (NASA)
Sent: Friday, January 03, 2003 1:25 PM
To: DITTEMORE, RONALD D. (JSC-MA) (NASA); HALSELL, JAMES D (JSC-REMOTE);
HAM, LINDA J. (JSC-MA2) (NASA)
Cc: GALVEZ, ROBERTO S. (ROBERT) (JSC-MA2) (NASA);
'Randall.L.Segert@nasa.gov'; LARSEN, AXEL M. (SKIP) (JSC-MA2) (NASA)
Subject: FW: STS-107 - CIBX and BRIC - Late Changes

Hi guys,

Hope you had a great holiday. The note below is concerning a request from Code U to modify the BRIC payload by adding several passive canisters and to approve a late sample change to the CIBX payload. Skip Larsen and I discussed the changes this afternoon and feel that since both requests are concerning re-flight payloads, that do not require crew involvement, we support the requests.

However, whether the PI's and payload integrators can provide the data and products in time for flight is of concern. The BRIC payload addition requires PRCB approval, because a CCD change is involved. Frank Moreno is preparing a CR, and hopes to have it to support a Noon Board on Tuesday 1/7. He will not be able to support a Noon Board on Monday, because Bionetics does not have all of the data, and noted that are going to have work all weekend to have the data by Monday, to support a CR on Tuesday.

All parties will give their best efforts to get these changes accomplished, without impacting the success of the mission, while meeting all of the required payload integration requirements.

Vanessa

>-----Original Message-----

>From: Richard Zwierko [mailto:rzwierko@hq.nasa.gov]
>Sent: Tuesday, December 24, 2002 10:48 AM
>To: CHARLES, JOHN B. (JSC-SL) (NASA); MORENO, FRANK (JSC-MT2) (NASA);
>NEWKIRK, KATHERINE E. (LELE) (JSC-SM) (NASA)
>Cc: jemond@hq.nasa.gov; dliskows@hq.nasa.gov; lostrach@mail.hq.nasa.gov;
>gjahns@mail.arc.nasa.gov; britt.manfredi@lmco.com; lynn.pickett@lmco.com;
>MCPHERSON, THOMAS M. (TOM) (JSC-MT) (NASA); dtomko@mail.hq.nasa.gov;
>clivings@hq.nasa.gov; Mark.E.Nall@msfc.nasa.gov; John.West@msfc.nasa.gov;
>snichols@mail.hq.nasa.gov; dshortz@mail.hq.nasa.gov

>Subject: Fwd: STS-107 Late Sample Approval

>Importance: High

>

> Lele/Frank/John (et al.) - Reference the message ("Blue Text")
> following, you are requested to make every diligent effort to accommodate
> the late manifesting of the items indicated. Except for completing and
> accumulating the required paperwork, both these items require negligible
> to minimum indicated stowage, are reflights of materials previously
> approved, and, as is our understanding, require no or very minimal crew
> interaction. In the case of the experiment which would share the
> accommodations with BRIC, this is a precursor to a future ISS experiment
> which is familiar to one of the current crew; any brief refresher
> training can be conducted at the final crew walkthrough at KSC. In the
> case of CIBX, the two additional samples should be able to be
> accommodated within the existing facility and are "diluted" reflights of
> prior approved items that are connected to an educational outreach activity.

> It is recognized that this directed request is late relative to
> the normative payload process timeline. However, considering future
> science/research missions to ISS, this will very likely represent the
> reality of the situation for notification for reflight potential of very
> small science payloads. Given the holidays, we recognize implementation
> of this request at times may be difficult. Please keep me and this
> office advised of the status. As indicated in the message below, this
> request will be a good case study for the Reinvention Team effort due to
> convene at Headquarters O/A the 13th January.

> Best regards for a good, safe, holiday period to all.

>

>

>

>

>

>

>>X-Sender: muhran@mail.hq.nasa.gov

>>Date: Tue, 24 Dec 2002 11:01:24 -0500

>>To: rzwierko@hq.nasa.gov

>>From: Mark Uhran <muhran@hq.nasa.gov>

>>Subject: STS-107 Late Sample Approval

>>Cc: mkicza@mail.hq.nasa.gov, muhran@hq.nasa.gov, bkreyken@mail.hq.nasa.gov

>>

>>Rick,

>>

>>Based upon review of the sample requirements v. available flight
>>accommodations, together with the fact that these are both re-flights ,
>>please proceed with manifesting and flight of the following two sample sets:

>>

>>1. Re-flight of ancillary syringe sets to be accommodated in the 0.5 MDL
>>volume remaining available in the BRIC payload element, which is already
>>manifested; and,

>>2. Re-flight of the two Tin Crystal experiment samples to be accommodated
>>in the ITA CIBX-2 payload element, which is already manifested.

>>

>>In addition, please assemble a comprehensive file on both of these

MORELAND, DEAN (JSC-NC) (NASA)

From: Koelle, William A [william.a.koelle@boeing.com]
Sent: Monday, January 06, 2003 2:24 PM
To: MORELAND, DEAN (JSC-NC) (NASA); MORELAND, DEAN (JSC-NC) (NASA)
Cc: Beatty, Glen; Procell, John W
Subject: FW: FSDP Clarifications - BRIC/C.elegans

Importance: High



FltSafety
:ICelegans 010603.l

Dean - this package has been reviewed and is found to be acceptable. Dr. Garcia reported no tox levels greater than Zero with the exception of the LIOH which is double bagged in Tyvek, contained in petri dishes within the BRIC Cannisters.
Best Regards - Bill

William A. Koelle
The Boeing Company
Manager, Safety and Product Assurance
Carrier Systems
System Safety Functional Manager, NASA Systems S&MA - Huntsville Site

Tel 256 716-4116
Fax - 4175
william.a.koelle@boeing.com

-----Original Message-----

From: McLamb-1, William [mailto:William.McLamb-1@ksc.nasa.gov]
Sent: Monday, January 06, 2003 1:07 PM
To: Koelle, William A; Bijvoet, Robert; Huddleston, Michael E
Cc: Reed-2, David; Ahmay-1, Frederick; Etheridge-1, Guy; Wells-1, Bill
Subject: RE: FSDP Clarifications - BRIC/C.elegans
Importance: High

Bill,
I have incorporated the comments and additional figure listed below directly into the FSDP document, and I am re-sending this updated FSDP, DATED 010603, as a PDF file.

Thanks.
Bill

<<FltSafety BRICelegans 010603.pdf>>

> -----Original Message-----

> **From:** McLamb-1, William
> **Sent:** Monday, January 06, 2003 12:54 PM
> **To:** 'william.a.koelle@boeing.com'

- > Cc: Reed-2, David; Ahmay-1, Frederick; Etheridge-1, Guy; Wells-1, Bill
- > Subject: FSDP Clarifications - BRIC/C.elegans
- > Importance: High
- >
- > Bill,
- > The following comments and attachments are in response to our discussions
- > this morning regarding the LSSC-BRIC-14CE-FSDP, BRIC/C.elegans Validation
- > Series/Reflow Flight Safety Data Package, submitted, January 6, 2003.
- > Listed below are your requested clarifications and recommendations to the
- > safety package.
- >
- > Experiment Configuration within BRIC canisters:
- >
- > I have enclosed a "cartoon" figure depicting the internal configuration of
- > the BRIC-60 canister, showing orientation of petri dishes, which are
- > secured by velcro straps. The teflon tubes are used to cushion the petri
- > dish stack, and are inserted between the petri dish stack and the inner
- > surface of the canister. See Attachment "BRIC/C.elegans expt config"
- >
- > Eight petri dishes with agar/media and worms will be contained in each of
- > the six canisters.
- > Each canister will contain one petri dish with 8 grams of LiOH granules.
- > The LiOH is DOUBLE-BAGGED in sealed Tyvek bags, which are stowed inside
- > the petri dish.
- > Three of the six canisters will contain one HOBO temperature data logger.
- > In these three canisters, the HOBO data logger will take the place of one
- > of the eight specimen dishes.
- >
- > page 12, section 7.3: Applicable Hazard Identification
- > The BRIC-007 hazard report is not applicable, since the hazardous material
- > (Purafil) is not used in this BRIC configuration.
- > The BRIC-008 hazard report is not applicable, since radioactive materials
- > are not used in this BRIC configuration.
- >
- > page 14, section 8.2.3.1: Hazard Report BRIC-003 Use of Flammable
- > Materials
- > Flammability Assessments per NSTS 22648 conclude that flammability is not
- > a credible hazard for the
- > this configuration. The petri dishes and data logger and not externally
- > exposed, and do not constitute a hazardous propagation path. The
- > container for the petri dishes and HOBO data logger (i.e., the BRIC-60
- > canisters) is composed of non-flammable aluminum, and the BRIC-60
- > canisters are stowed for the mission duration within the middeck locker.
- >
- > page 14, 8.2.4: Hazard Report BRIC-004 Contamination and Injury Caused
- > by Release of Hazardous Materials
- > Assuming the agar/media/worms are nonhazardous, pending JSC Toxicologist
- > assessment, the only hazardous material is the LiOH granules, which are
- > DOUBLE-BAGGED in sealed Tyvek bags. This double-Tyvek bag is contained
- > within a petri dish, and there is one LiOH petri dish in each BRIC
- > canister. This method of LiOH containment is previously approved by the
- > JSC Toxicologist.

>
> Appendix C, BRIC/C.elegans Re-verification Matrix:
>
> for Hazard Report BRIC-005, Sharp Edges,
> Although there are no new BRIC canisters that have been built for this
> BRIC flight, re-verification is performed as part of the standard sharp
> edge inspection prior to turnover.
>
>
> A .PDF file of the Flight Safety Data Package will be sent to you as a
> separate email, as well as re-sent to Robert Bijvoet and Mike Huddleston,
> since it did not make it through on the initial electronic transmittal,
> and some of the faxed pages were illegible.
>
> If you have any comments, please don't hesitate to call me at work or
> home.
> Thanks for your time and efforts.
>
> Kind regards,
>
> Bill McLamb
> 321-476-4302
> 321-476--4220 (fax)
> 321-773-4192 (home)
> << File: BRIC Celegans expt config.doc >>
>

MORELAND, DEAN (JSC-NC) (NASA)

From: KNUTSON, DENNIS L. (JSC-DO121) (USA)
Sent: Monday, January 06, 2003 4:12 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Reflight for STS-107

No comments.

-----Original Message-----

From: PSRPSEC
Sent: Monday, January 06, 2003 3:39 PM
To: DL PSRPSSP; MORENO, FRANK (JSC-MT2) (NASA); Altpater, J; Barton, Quentelle; Beaird, Grady; Beyer, M.; Card, Mike; Daniels, Maxine; Dasgupta, Rajib; Gabiola, R.V.; 'Gonzalez, S.>'; Green, A. B.; Hill, Charles S.; Kao, Henry; Keifenheim, J.; Kunkel, S. R.; Lively, Clint; Maltby, Harry; McDonald, P. D.; Phillips, Stephanie L.; Russell, Don; Sawyer, J.C.; 'Spem, C.W.>'; Stanton, M.A.; Sturm, R.; Vogel, Matt
Cc: MORELAND, DEAN (JSC-NC) (NASA); STEWART, CHRISTINE E. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC)
Subject: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Reflight for STS-107
Importance: High

Please see PSRP DMS, "**BRIC-107**", for the subject data (View SDP). Due to fast approaching launch date, this must be reviewed by **January 8, 2003**. Please provide comments to Mr. D. W. Moreland, 281-483-5549, e-mail: dwmorela@ems.jsc.nasa.gov ASAP.

<http://psrp.jsc.nasa.gov>

MORELAND, DEAN (JSC-NC) (NASA)

From: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Sent: Monday, January 06, 2003 4:51 PM
To: PSRPSEC; DL PSRPSSP; MORENO, FRANK (JSC-MT2) (NASA); 'Altpater, J'; 'Barton, Quentelle'; 'Beaird, Grady'; 'Beyer, M.'; 'Card, Mike'; 'Daniels, Maxine'; 'Dasgupta, Rajib'; 'Gabiola, R.V.'; 'Gonzalez, S.'; 'Green, A. B.'; 'Hill, Charles S.'; 'Kao, Henry'; 'Keifenheim, J.'; 'Kunkel, S. R.'; 'Lively, Clint'; 'Maltby, Harry'; 'McDonald, P. D.'; 'Phillips, Stephanie L.'; 'Russell, Don'; 'Sawyer, J.C.'; 'Sporn, C.W.'; 'Stanton, M.A.'; 'Sturm, R.'; 'Vogel, Matt'
Cc: MORELAND, DEAN (JSC-NC) (NASA); STEWART, CHRISTINE E. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC)
Subject: RE: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Refight for STS-107

fyi ... we received notice of this very late manifest item this morning ... it is slated for 107, i.e., real soon.

Thanks for your patience and cooperation ... if necessary, please direct any comments on this expedited review to me (rather than Dean or Mindi).

M

-----Original Message-----

From: PSRPSEC
Sent: Monday, January 06, 2003 3:39 PM
To: DL PSRPSSP; MORENO, FRANK (JSC-MT2) (NASA); Altpater, J; Barton, Quentelle; Beaird, Grady; Beyer, M.; Card, Mike; Daniels, Maxine; Dasgupta, Rajib; Gabiola, R.V.; Gonzalez, S.; Green, A. B.; Hill, Charles S.; Kao, Henry; Keifenheim, J.; Kunkel, S. R.; Lively, Clint; Maltby, Harry; McDonald, P. D.; Phillips, Stephanie L.; Russell, Don; Sawyer, J.C.; Sporn, C.W.; Stanton, M.A.; Sturm, R.; Vogel, Matt
Cc: MORELAND, DEAN (JSC-NC) (NASA); STEWART, CHRISTINE E. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC)
Subject: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Refight for STS-107
Importance: High

Please see PSRP DMS, "**BRIC-107**", for the subject data (View SDP). Due to fast approaching launch date, this must be reviewed by **January 8, 2003**. Please provide comments to Mr. D. W. Moreland, 281-483-5549, e-mail: dwmorela@ems.jsc.nasa.gov ASAP.

<http://psrp.isc.nasa.gov>

MORELAND, DEAN (JSC-NC) (NASA)

From: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Sent: Tuesday, January 07, 2003 8:22 AM
To: 'Vogel, Matt (N-HEI)'
Cc: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Reflight for STS-107

Thanks for the quick response Matt.

-----Original Message-----

From: Vogel, Matt (N-HEI) [mailto:matt.vogel@lmco.com]
Sent: Tuesday, January 07, 2003 8:11 AM
To: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Subject: RE: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Reflight for STS-107

To: Michael Ciancone
From: Matt Vogel
Cc: Robert Davis, Lance Mushung, Leo Benal
Date: 01/07/2002
Subject: LSSC-BRIC-14CE-FSDP

LSSC-BRIC-14CE-FSDP titled "BRIC/C. elegans Validation Series/Reflown Flight Safety Data Package" was reviewed from a Shuttle payload mechanism safety point of view in support of an expedited safety review.

Hardware presented in this safety data package will be stowed in the orbiter middeck locker for Shuttle launch and landing. The Velcro used to retain petri dishes is flight approved hardware and the configuration has not changed. Approval of the safety data package is recommended.

Matt R. Vogel
Lockheed Martin Space Operations
281.333.8071
matt.vogel@lmco.com

-----Original Message-----

From: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
[mailto:michael.l.ciancone@nasa.gov]
Sent: Monday, January 06, 2003 4:51 PM
To: PSRPSEC; DL PSRPSSP; MORENO, FRANK (JSC-MT2) (NASA); 'Altpater, J'; 'Barton, Quentelle'; 'Beaird, Grady'; 'Beyer, M.'; 'Card, Mike'; 'Daniels, Maxine'; 'Dasgupta, Rajib'; 'Gabiola, R.V.'; 'Gonzalez, S.'; 'Green, A. B.'; 'Hill, Charles S.'; 'Kao, Henry'; 'Keifenheim, J.'; 'Kunkel, S. R.'; 'Lively, Clint'; 'Maltby, Harry'; 'McDonald, P. D.'; 'Phillips, Stephanie L.'; 'Russell, Don'; 'Sawyer, J.C.'; 'Spern, C.W.'; 'Stanton, M.A.'; 'Sturm, R.'; 'Vogel, Matt'
Cc: MORELAND, DEAN (JSC-NC) (NASA); STEWART, CHRISTINE E. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC)

Subject: RE: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Reflight for STS-107

fyi ... we received notice of this very late manifest item this morning ... it is slated for 107, i.e., real soon.

Thanks for your patience and cooperation ... if necessary, please direct any comments on this expedited review to me (rather than Dean or Mindi).

M

> -----Original Message-----
> From: PSRPSEC
> Sent: Monday, January 06, 2003 3:39 PM
> To: DL PSRPSSP; MORENO, FRANK (JSC-MT2) (NASA); Altpater, J; Barton, Quentelle; Beaird, Grady; Beyer, M.; Card, Mike; Daniels, Maxine; Dasgupta, Rajib; Gabiola, R.V.; 'Gonzalez, S.'; Green, A. B.; Hill, Charles S.; Kao, Henry; Keifenheim, J.; Kunkel, S. R.; Lively, Clint; Maltby, Harry; McDonald, P. D.; Phillips, Stephanie L.; Russell, Don; Sawyer, J.C.; 'Sporn, C.W.'; Stanton, M.A.; Sturm, R.; Vogel, Matt
> Cc: MORELAND, DEAN (JSC-NC) (NASA); STEWART, CHRISTINE E. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC)
> Subject: EXPEDITED REVIEW/COMMENTS -- BRIC Series/Reflight for STS-107
> Importance: High
>
> Please see PSRP DMS, "BRIC-107", for the subject data (View SDP). Due to fast approaching launch date, this must be reviewed by January 8, 2003.
> Please provide comments to Mr. D. W. Moreland, 281-483-5549, e-mail: dwmorela@ems.jsc.nasa.gov ASAP.
>
> <http://psrp.jsc.nasa.gov>

MORELAND, DEAN (JSC-NC) (NASA)

From: Russell, Don G [don.g.russell@lmco.com]
Sent: Tuesday, January 07, 2003 8:18 AM
To: 'dean.moreland1@jsc.nasa.gov'; MORELAND, DEAN (JSC-NC) (NASA); david.e.tadlock1@jsc.nasa.gov; George Harvey; Henry Beard; James Rainwater; LEO BENAL; Quentelle Barton
Cc: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Subject: Avionics assessment of BRIC Reflight SDP for STS-107



Assessment of
BRIC-107 Ph3r.do...

MORELAND, DEAN (JSC-NC) (NASA)

From: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Sent: Tuesday, January 07, 2003 8:23 AM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: FW: System safety eval of S/R SDP for BRIC-107

Importance: High



02NS038-BRIC-10702NS038-BRIC-107
.doc



02NS038-BRIC-107
.pdf



02NS038CVR.pdf

-----Original Message-----

From: Green, Art [mailto:art.green@boeing.com]
Sent: Monday, January 06, 2003 5:09 PM
To: CIANCONE, MICHAEL L. (JSC-NC) (NASA); AlbertNguyen; AttibeleShamala;
BobDueease; BobPeercy; ChristopherCottrill; ClintLively;
CynthiaCheathem; MyrellaBeyer; RebeccaOlson; StephaniePhillips;
StevenOwens; SusanGaynor
Subject: System safety eval of S/R SDP for BRIC-107
Importance: High

The attached files are the Boeing Company System Safety evaluation of the series/reflight safety data package for Biological Research in Canisters-107. No formal PSRP meeting is scheduled. This report was requested on an expedited basis by 1/8/03.

<<02NS038-BRIC-107.doc>> <<02NS038-BRIC-107.pdf>> <<02NS038CVR.pdf>>

Art Green
Lead Payload Safety Integration Engineer
The Boeing Company
NASA Systems
Houston Operations
(281) 226-5821

Space Flight Operations Contract

SYSTEM SAFETY EVALUATION

OF THE SERIES/REFLIGHT SAFETY DATA PACKAGE FOR BIOLOGICAL RESEARCH IN CANISTER (BRIC)-107

**Prepared by The Boeing Company
NASA Systems**

Under Subcontract 1970483303, PDRD P1213c

January 6, 2003

DRD-1.2.1.3-c

Contract NAS9-20000





NS03HOU038

SYSTEM SAFETY EVALUATION
OF THE SERIES/REFLIGHT SAFETY DATA PACKAGE FOR
BIOLOGICAL RESEARCH IN CANISTER (BRIC)-107

January 6, 2003

USA Subcontract 1970483303

PDRD P1213c

WBS 1.2.1.3

Task 20017

Prepared by:

A. B. Green 116103

A. B. Green, Lead Cargo Safety Engineer
Systems and Cargo Integration Safety

gineer

Reviewed by:

A. B. Green 116103

System Safety En-
Systems and Cargo Integration Safety

Approved by:

R. A. Ducease 116103

R. A. Ducease, Manager
Systems and Cargo Integration Safety

The Boeing Company
NASA Systems

FOREWORD

This document is a contractual requirement of United Space Alliance Letter Contract Number 1970483303 and is prepared specifically in response to PDRD P1213C under WBS 1.2.1.3, Task 20017 by the Systems and Cargo Integration Safety Department of the Boeing Company, NASA Systems, for the United Space Alliance and the Space Shuttle Systems Integration Office of the National Aeronautics and Space Administration. This report is the Boeing Company System Safety evaluation of the **Biological Research In Canister (BRIC)-107, Series/Reflight, JSC Transmittal NC4-03-NONE, dated 1/6/03**. No formal safety review by the PSRP is scheduled. This report was requested (on an expedited basis) by 1/8/03.

References: None.

SUMMARY

The unique ICD is: not available. This is a middeck payload and, thus, must comply with NSTS-21000-IDD-MDK.

This payload is a series/reflight of the Biological Research in Canisters payloads previously flown. It will occupy the space remaining in the BRIC-14 middeck drawer. It will consist of six BRIC-60 half-canisters, each containing eight polystyrene petri dishes. Three HOB0 thermal monitoring devices will also be included. In addition, six small Tyvek bags of Lithium Hydroxide (LiOH) will be included to absorb excess CO₂ generated. The specimens are soil nematodes (*Caenorhabditis elegans*) in nutrient matter.

There are no avionic interfaces with the Orbiter. The LiOH is sized to be contained within the Tyvek bags, with the remaining hardware providing the required additional containment. JSC Toxicology approval has been requested. The small batteries and the small amount of flammable materials have been previously approved for flight.

SPECIFIC INTERFACE ISSUES

There are none.

WAIVERS, DEVIATIONS; AND EXCEEDANCES

The following is a listing of Waivers, Deviations, or Exceedances which have an impact to the safety of **BRIC-107**.
There are none.

DETAILS OF THE SAFETY CRITICAL ELECTRICAL INTERFACES WILL BE FOUND IN THE FOLLOWING EVALUATIONS

THERE ARE NONE.

The **BRIC-107** data package contained the following non-interface hazard reports: **Only reference HRs were provided.**

BERYLLIUM

Is Beryllium or Beryllium Oxide used anywhere in this payload? **None indicated.**

ENVIRONMENTAL IMPACT DATA

The following materials/components are present in this payload and could pose a threat to the general public or to the environment if indiscriminately released: **NONE.**

The HMST indicated no hazardous materials. The previously approved use of LiOH was included for reverification. System Safety concurs.

CONCLUSION

System Safety recommends: **Approval of the series/reflight SDP for BRIC-107.**

PAYLOAD SAFETY REQUIREMENTS DATA COMMENTS

DATA NO: NC4-03-NONE

DATA TITLE: SERIES/REFLIGHT SDP FOR BRIC-107

RECOMMENDED DISPOSITION:

APPROVED

DISAPPROVED

OTHER

REMARKS: NONE

RETURN TO: D. W. MORELAND/ NC4

BY: 1/8/03

SIGNED: _____ (USA-H) DATE: _____
(H. Maltby)

PART I - NUMBER REQUEST

DOCUMENT NO: NS03-101133
 ISSUED BY: (INITIALS) DATE:

BOEING **REPORT NUMBER REQUEST/APPROVAL**

1. TITLE: **System Safety EVALUATION OF THE SERIES/REFLIGHT SAFETY DATA PACKAGE FOR BIOLOGICAL RESEARCH IN CANISTER-107**

2. AUTHOR'S NAME: AUTHOR **A. GREEN** DEPT. **T613** MAIL CODE: **HS3-30** TELEPHONE: **281-266-5821**

3. CONTRACT/DNO/TPA/TMA/IR&D AUTHORITY:
NAS9-20000, DRD 1.2.1.3-c, SUBCONTRACT
PDRD P1213c, W.B.S. 1.2.1.3/Task 20017

4. SECURITY CLASSIFICATION.
 SOURCE OF AUTHORITY OR EXTRACTION
UNCLASSIFIED

CUSTOMER REQUEST: YES NO

5. DOCUMENT NUMBER APPROVAL (ML5 OR ABOVE)

6. LEDGER, GENERAL ORDER, AND SUBACCOUNT NUMBER
GVR70058

PART II - REPORT APPROVAL

7. DOCUMENT DATE
1/6/03

8. DOCUMENT CONTAINS LIMITED CIRCULATION INFORMATION YES NO
N/A

9. COST MATERIAL AND/OR INVENTIVE/INNOVATIVE MATERIAL
 MAY BE CONTAINED IN PAGES: **N/A**

10. IR&D DOCUMENTS:
 PROPRIETARY STAMP OMISSION AUTHORIZED
N/A

 IR&D PROGRAM MANAGER SIGNATURE

11. PROPRIETARY DATA STAMP
N/A

12. ELECTRONIC TRANSMITTAL REQUIRED: YES NO
 MEDIA/METHOD **N/A**

13. REMARKS/SPECIAL INSTRUCTIONS: **Document has been transmitted electronically**

14. MANAGEMENT RELEASE APPROVALS

TYPE NAME AND MANAGEMENT LEVEL R. A. Dueuease 1/6/03	TYPE NAME AND MANAGEMENT LEVEL
TYPE NAME AND MANAGEMENT LEVEL R. A. DUEEASE, MANAGER SYSTEMS AND CARGO INTEGRATION SAFETY	APPROVED FOR RELEASE BY: _____ DATA MANAGEMENT SIGNATURE: _____ DATE: _____

15. DISTRIBUTION (INTERNAL) NAME, DEPT., MAIL CODE S. PHILLIPS HS3-30 A. GREEN HS3-30 R. PEERCY 45N-E134 B. DUEEASE HS3-30	DISTRIBUTION (EXTERNAL) NAME, ADDRESS INCLUDING ZIP CODE NASA/JSC D. LADRACH JSC/MS3 D. MORELAND JSC/NC4 K. PACKARD JSC/MS3 US ALLIANCE S. R. KUNKEL USAH-700D R. FISHER USAH-700D H. MALTBY USAH-700D
---	---

RETURN ORIGINALS TO: **A. GREEN** MAIL CODE **HS3-** COMPLETED BY DATA MGMT: _____

MORELAND, DEAN (JSC-NC) (NASA)

From: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Sent: Tuesday, January 07, 2003 8:24 AM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: FW: Avionics assessment of BRIC Reflight SDP for STS-107

-----Original Message-----

From: Russell, Don G [mailto:don.g.russell@lmco.com]
Sent: Tuesday, January 07, 2003 8:18 AM
To: MORELAND, DEAN (JSC-NC) (NASA); MORELAND, DEAN (JSC-NC) (NASA); TADLOCK, DAVID E. (JSC-EV151) (NASA); George Harvey; Henry Beaird; James Rainwater; BENAL, LEO C. (JSC-EA) (NASA); Quentelle Barton
Cc: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Subject: Avionics assessment of BRIC Reflight SDP for STS-107



Assessment of
BRIC-107 Ph3r.do...

PAYLOAD SAFETY REQUIREMENTS DATA COMMENTS

DATA NO. NONE

DATA TITLE: Reflight Safety Review for Biological Research in Canister (BRIC) for STS-107

RECOMMENDED DISPOSITION:

APPROVED

DISAPPROVED

OTHER (N/A)

REMARKS:

The BRIC payload is passive, with no Avionics or electrical components other than three reflow HOB0 temperature recorders, which are not accessible to the crew and do not interface to the Orbiter. A Reflight assessment compliant to NSTS/ISS 13830C Section 9 is presented in Section 7 of the SDP.

RECOMMENDATIONS

It is recommended that the SDP be approved from an Avionics perspective.

RETURN TO: NC44/D. W. Moreland

BY: January 8, 2003

SIGNED: Don Russell

DATE: 1/07/03

PAYLOAD SAFETY REQUIREMENTS DATA COMMENTS

DATA NO. NONE

DATA TITLE: Reflight Safety Review for Biological Research in Canister (BRIC) for STS-107

RECOMMENDED DISPOSITION:

APPROVED

DISAPPROVED

OTHER (N/A)

REMARKS:

The BRIC payload is passive, with no Avionics or electrical components other than three reflow HOBO temperature recorders, which are not accessible to the crew and do not interface to the Orbiter. A Reflight assessment compliant to NSTS/ISS 13830C Section 9 is presented in Section 7 of the SDP.

RECOMMENDATIONS

It is recommended that the SDP be approved from an Avionics perspective.

RETURN TO: NC44/D. W. Moreland

BY: January 8, 2003

SIGNED: Don Russell

DATE: 1/07/03

MORELAND, DEAN (JSC-NC) (NASA)

From: MANHA, WILLIAM D. (BILL) (JSC-EP4) (LM)
Sent: Tuesday, January 07, 2003 10:31 AM
To: CIANCONE, MICHAEL L. (JSC-NC) (NASA); MORELAND, DEAN (JSC-NC) (NASA)
Cc: HOWARD FLYNN; LEO BENAL; SAMUEL JONES;
steven.r.kunkel@USAHQ.UnitedSpaceAlliance.com
Subject: BRIC STS-107 - haz cont - questions

See the attachment:



BRIC for
STS-107.doc

Bill Manha
Hernandez Engineering/Lockheed Martin
PSRP Engineering Support (EP4)
Propulsion, Fluid and Pressurized Systems
Phone 281 483-6439
FAX 281 483-3704
wmanha@ems.jsc.nasa.gov

=====

PAYLOAD SAFETY REQUIREMENTS DATA COMMENTS

DATA NO. NC4-02-

DATA TITLE: Biological Research in Canister (BRIC) for STS-107

RECOMMENDED DISPOSITION:

APPROVED

DISAPPROVED

OTHER

REMARKS:

The satisfactory containment of the hazardous material Lithium Hydroxide for this payload is unique in that it is based upon the **Lithium Hydroxide "pellets" are larger than the porosity size of the containment Tyvek bags**. The satisfactory, safe, containment of the Lithium Hydroxide for the specified conditions was done by the JSC Toxicologist in ~ 1994 - a long time ago.

Reference page 10, paragraph 6.1.3 Safety Hazards — The lithium hydroxide granule size will be verified — (larger than Tyvek pore size), page 28, HR BRIC-004 Contamination and injury caused by release of hazardous materials, Verification 2 JSC Toxicologist approval (attachment 3):

1. What is the toxic level of the Lithium Hydroxide and where is the Toxicity Report?
2. Where is the JSC Toxicological approval (attachment 3) of adequate containment?
3. Since the original JSC Toxicological approval was done so long ago shouldn't there be a new assessment, especially of the granular size of the lithium hydroxide, to assure all the same conditions exist to assure the JSC Toxicological approval is still valid?

Reference page F-1, Reverification Matrix, BRIC-004, Verification 2a. Obtain approval of LiOH containment configuration, Reverification Requirements - 2a. No reverification required, 2b. Verify configuration of containment levels:

4. Is **containment configuration** "no reverification required" based upon 1a. Verify LiOH granule size. and 1b. Verify cleanliness of Tyvek bags.?
5. Does the 2b. configuration of containment levels include all the items in HR BRIC -004 Verification 2b. verification including **"inspect bags for gaps and rips"**?
6. Is "Containment configuration" "No reverification required" acceptable now, since the containment configuration was approved so long ago and a copy of the JSC Toxicological approval is not provided?

RETURN TO: NC44/D. W. Moreland

BY: January 8, 2003

SIGNED: Bill Manha

DATE: January 7, 2003

MORELAND, DEAN (JSC-NC) (NASA)

From: Koelle, William A [william.a.koelle@boeing.com]
Sent: Tuesday, January 07, 2003 12:22 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: completion of OFK/PPK verifs for 107

Thanks Dean!

William A. Koelle
The Boeing Company
Manager, Safety and Product Assurance
Carrier Systems
System Safety Functional Manager, NASA Systems S&MA - Huntsville Site

Tel 256 716-4116
Fax - 4175
william.a.koelle@boeing.com

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA) [mailto:dean.moreland-1@nasa.gov]
Sent: Tuesday, January 07, 2003 12:22 PM
To: Koelle, William A
Subject: FW: completion of OFK/PPK verifs for 107

fyi

-----Original Message-----

From: CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Sent: Tuesday, January 07, 2003 11:27 AM
To: MORELAND, DEAN (JSC-NC) (NASA)
Cc: SMITH, BRENDA L. (JSC-NC) (SAIC); LARSEN, AXEL; O'BRIEN, DAVID; WILLIAMS, JEFFREY
Subject: completion of OFK/PPK verifs for 107

I received the final verif today (the USA packing form) ... all verifs closed for 107 OFK/PPK ... CoFR support chart has been updated accordingly.

MORELAND, DEAN (JSC-NC) (NASA)

From: McDonald, Patrick [patrick.mcdonald@lmco.com]
Sent: Tuesday, January 07, 2003 2:19 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: BRIC-107 comments



M030107.doc

Date: 01/07/03
To: D. M. Taylor/ES2
From: P. D. McDonald/B30

Subject: Series/Reflight Safety Review for Biological Research in Canister (BRIC)-14, Elegans Validation Experiment, on STS-107.

Deneen,

I have reviewed the safety data package for the Series/Reflight Safety Review for Biological Research in Canister (BRIC)-14, Elegans Validation Experiment, on STS-107.

BRIC is a standard middeck locker replacement enclosure that will be used to stow two small biological sample containers, and a small cryogenic freezer for freezing the biological samples. A number of Petri dishes, containing the biological samples, will be contained inside of the canisters. The hardware has flown numerous times before, with no anomalies, no noncompliances, and no deviations.

BRIC-14 is manifested to fly in the SPACEHAB Research Double Module (RDM) on STS-107. The safety compliance data for BRIC-14 was reviewed as part of the safety review for the SPACEHAB/RDM on STS-107. The BRIC-14 Elegans Validation Experiment is an additional set of experiment samples that will be included in the BRIC-14 container. There is no additional structural hardware for the Elegans Validation Experiment. The experiment has been reviewed to ensure that it meets the weight and center-of-gravity stowage requirements of the locker.

There are no structures issues with the data package, and approval is recommended.

Patrick D. McDonald

Lockheed Martin Space Operations
2400 NASA Road 1, Mail Code B30
Houston, TX, 77058-3799
phone: 281-333-7309
fax: 281-333-7072
e-mail: patrick.mcdonald@lmco.com

C:/My Documents/memos/m030107.doc

MORELAND, DEAN (JSC-NC) (NASA)

From: Bartori, Quentelle (N-HEI) [quentelle.barton@lmco.com]
Sent: Tuesday, January 07, 2003 2:13 PM
To: MORELAND, DEAN (JSC-NC) (NASA); BENAL, LEO C. (JSC-EA) (NASA); BRAGG, BOBBY J. (JSC-EP5) (NASA); EGUSQUIZA, ROBERTO M. (BOB) (JSC-EP5) (NASA); CIANCONE, MICHAEL L. (JSC-NC) (NASA)
Cc: Hughes, Brent; Beard, Grady; REHM, RAYMOND B (X-LM OPERATIONS SUPPORT); Russell, Don G
Subject: REVIEW COMMENTS, BIOLOGICAL RESEARCH IN CANISTER/C. ELEGANS VALIDATION EXPERIMENT FOR STS-107 REFLIGHT PAYLOADSAFETY REVIEW DATA PACKAGE



BRIC-STS-107-Reflight.doc

Attached are our comments from a review of the Biological Research in Canister (CRIC)/C. elegans Validation Experiment for Space Transportation System (STS)-107 Reflight Payload Safety Review Data Package.

<<BRIC-STS-107-Reflight.doc>>

Quentelle Barton
281.333.6138
EPDC Reviewer/Hernandez Engineering
Lockheed-Martin Space Operations
SEAT
2400 NASA Road 1, Mail Stop C18
Houston, TX 77258-8561

PAYLOAD SAFETY REQUIREMENTS DATA COMMENTS

DATA NO. Not Supplied

DATA TITLE: Reflight Safety Review for Biological Research in Canister (BRIC)/C. elegans Validation Experiment for STS-107

RECOMMENDED DISPOSITION:

APPROVED

DISAPPROVED

OTHER

A review of the Reflight Safety Data Package (SDP) for Biological Research in Canister (BRIC)/C. elegans Validation Experiment for STS-107 against the applicable requirements of NSTS 1700.7B, NSTS 1700.7B International Space Station (ISS) Addendum, and NSTS/ISS 13830 Section 9 has been completed. A formal safety review will not be held.

The BRIC/C. elegans Validation Experiment is an additional functional objective for the BRIC-14 payload, which has been previously reviewed. This experiment will fly additional Reflow hardware and will utilize the available single storage tray within the manifested BRIC-14 payload locker. The C. elegans Experiment has six BRIC-60 half-canisters and three Honest Observer By Onset (HOBO)TM temperature data loggers. The HOBOs will be recording temperatures within three of the six BRIC-60 canisters. These loggers are identical to the logger already assessed for the BRIC-14 payload. Note that there is no electrical connection to Orbiter or ISS power.

BATTERIES

The HOBO logger receives power from a Tadiran Model TL-5186 Lithium-Thionyl Chloride (LiSOCl₂) wafer cell. This battery type operates at 3.6 V and has a capacity of 370 mAh. The following comments address a Payload Hazard Report (PHR) associated with Batteries:

1. PHR HOBO-001 BATTERY LEAKAGE/SHORT

"Catastrophic"

Comments:

There have been no changes in the hazard reports, battery schematics, and the intended use of the equipment as analyzed and documented in the baseline hazard report.

Recommendation:

The recommendation is to approve PHR HOBO-001 for the Reflight review.

RETURN TO: NC44/SAIC/D. W. Moreland

BY: January 8, 2003

SIGNED: _____

DATE: _____

MORELAND, DEAN (JSC-NC) (NASA)

From: GARCIA, HECTOR, PHD (JSC-SF) (WLS)
Sent: Wednesday, January 08, 2003 11:26 AM
To: MORELAND, DEAN (JSC-NC) (NASA); KITMACHER, GARY H. (JSC-SM) (NASA)
Cc: CIANCONE, MICHAEL L. (JSC-NC) (NASA); JAMES, JOHN T. (JSC-SF) (NASA)
Subject: RE: BRIC 107 updates

Yes, all materials newly added to STS-107 BRIC other than the LiOH are toxicity hazard level zero. Previously approved (June, 2002) materials for STS-107 BRIC included toxicity hazard level 2 fixatives (glutaraldehyde and paraformaldehyde). The new and the old materials are flying in identical, but separate hardware.

Regards,
Hector

Hector D. Garcia, Ph.D.

JSC Toxicology Group
281-244-5113
hector.garcia2@jsc.nasa.gov

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA)
Sent: Wednesday, January 08, 2003 10:36 AM
To: KITMACHER, GARY H. (JSC-SM) (NASA)
Cc: CIANCONE, MICHAEL L. (JSC-NC) (NASA); GARCIA, HECTOR, PHD (JSC-SF) (WLS); JAMES, JOHN T. (JSC-SF) (NASA)
Subject: RE: BRIC 107 updates

Just to confirm , all the other materials were tox level zeros?

-----Original Message-----

From: KITMACHER, GARY H. (JSC-SM) (NASA)
Sent: Wednesday, January 08, 2003 10:35 AM
To: MORELAND, DEAN (JSC-NC) (NASA)
Cc: CIANCONE, MICHAEL L. (JSC-NC) (NASA); GARCIA, HECTOR, PHD (JSC-SF) (WLS); JAMES, JOHN T. (JSC-SF) (NASA)
Subject: BRIC 107 updates
Importance: High

Dr. Garcia has updated the HMST with the latest changes. Re the discussion on the LiOH particle size, since the canisters are certified for a tox level 2, we do not believe this is an issue-it would only effect the experiment success. Let us know if you need anything further.
GK

MORELAND, DEAN (JSC-NC) (NASA)

From: Koelle, William A [william.a.koelle@boeing.com]
Sent: Thursday, January 09, 2003 2:57 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: FSDP Clarifications - BRIC/C.elegans

Thanks Dean. We're good for now! - Bill

William A. Koelle
The Boeing Company
Manager, Safety and Product Assurance
Carrier Systems
System Safety Functional Manager, NASA Systems S&MA - Huntsville Site

Tel 256 716-4116
Fax - 4175
william.a.koelle@boeing.com

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA) [mailto:dean.moreland-1@nasa.gov]
Sent: Thursday, January 09, 2003 2:52 PM
To: Koelle, William A
Cc: Beatty, Glen; Procell, John W
Subject: RE: FSDP Clarifications - BRIC/C.elegans

The PSRP has reviewed the reflight data and found it to be acceptable for flight. Let me know if you guys need anything else, we'll be happy to help.

-----Original Message-----

From: Koelle, William A [mailto:william.a.koelle@boeing.com]
Sent: Monday, January 06, 2003 2:24 PM
To: MORELAND, DEAN (JSC-NC) (NASA); MORELAND, DEAN (JSC-NC) (NASA)
Cc: Beatty, Glen; Procell, John W
Subject: FW: FSDP Clarifications - BRIC/C.elegans
Importance: High

Dean - this package has been reviewed and is found to be acceptable. Dr. Garcia reported no tox levels greater than Zero with the exception of the LIOH which is double bagged in Tyvek, contained in petri dishes within the BRIC Cannisters.
Best Regards - Bill

William A. Koelle
The Boeing Company
Manager, Safety and Product Assurance
Carrier Systems
System Safety Functional Manager, NASA Systems S&MA - Huntsville Site

Tel 256 716-4116
Fax - 4175
william.a.koelle@boeing.com

-----Original Message-----

From: McLamb-1, William [mailto:William.McLamb-1@ksc.nasa.gov]
Sent: Monday, January 06, 2003 1:07 PM
To: Koelle, William A; Bijvoet, Robert; Huddleston, Michael E
Cc: Reed-2, David; Ahmay-1, Frederick; Etheridge-1, Guy; Wells-1, Bill
Subject: RE: FSDP Clarifications - BRIC/C.elegans
Importance: High

Bill,

I have incorporated the comments and additional figure listed below directly into the FSDP document, and I am re-sending this updated FSDP, DATED 010603, as a PDF file.

Thanks.

Bill

<<FltSafety BRICelegans 010603.pdf>>

> -----Original Message-----

> From: McLamb-1, William
> Sent: Monday, January 06, 2003 12:54 PM
> To: 'william.a.koelle@boeing.com'
> Cc: Reed-2, David; Ahmay-1, Frederick; Etheridge-1, Guy; Wells-1, Bill
> Subject: FSDP Clarifications - BRIC/C.elegans
> Importance: High

>

> Bill,

> The following comments and attachments are in response to our discussions
> this morning regarding the LSSC-BRIC-14CE-FSDP, BRIC/C.elegans Validation
> Series/Reflow Flight Safety Data Package, submitted, January 6, 2003.
> Listed below are your requested clarifications and recommendations to the
> safety package.

>

> Experiment Configuration within BRIC canisters:

>

> I have enclosed a "cartoon" figure depicting the internal configuration of
> the BRIC-60 canister, showing orientation of petri dishes, which are
> secured by velcro straps. The teflon tubes are used to cushion the petri
> dish stack, and are inserted between the petri dish stack and the inner
> surface of the canister. See Attachment "BRIC/C.elegans expt config"

>

> Eight petri dishes with agar/media and worms will be contained in each of
> the six canisters.

> Each canister will contain one petri dish with 8 grams of LiOH granules.

> The LiOH is DOUBLE-BAGGED in sealed Tyvek bags, which are stowed inside
> the petri dish.

- > Three of the six canisters will contain one HOBO temperature data logger.
- > In these three canisters, the HOBO data logger will take the place of one
- > of the eight specimen dishes.
- >
- > page 12, section 7.3: Applicable Hazard Identification
- > The BRIC-007 hazard report is not applicable, since the hazardous material
- > (Purafil) is not used in this BRIC configuration.
- > The BRIC-008 hazard report is not applicable, since radioactive materials
- > are not used in this BRIC configuration.
- >
- > page 14, section 8.2.3.1: Hazard Report BRIC-003 Use of Flammable
- > Materials
- > Flammability Assessments per NSTS 22648 conclude that flammability is not
- > a credible hazard for the
- > this configuration. The petri dishes and data logger and not externally
- > exposed, and do not constitute a hazardous propagation path. The
- > container for the petri dishes and HOBO data logger (i.e., the BRIC-60
- > canisters) is composed of non-flammable aluminum, and the BRIC-60
- > canisters are stowed for the mission duration within the middeck locker.
- >
- > page 14, 8.2.4: Hazard Report BRIC-004 Contamination and Injury Caused
- > by Release of Hazardous Materials
- > Assuming the agar/media/worms are nonhazardous, pending JSC Toxicologist
- > assessment, the only hazardous material is the LiOH granules, which are
- > DOUBLE-BAGGED in sealed Tyvek bags. This double-Tyvek bag is contained
- > within a petri dish, and there is one LiOH petri dish in each BRIC
- > canister. This method of LiOH containment is previously approved by the
- > JSC Toxicologist.
- >
- > Appendix C, BRIC/C.elegans Re-verification Matrix:
- >
- > for Hazard Report BRIC-005, Sharp Edges,
- > Although there are no new BRIC canisters that have been built for this
- > BRIC flight, re-verification is performed as part of the standard sharp
- > edge inspection prior to turnover.
- >
- >
- > A .PDF file of the Flight Safety Data Package will be sent to you as a
- > separate email, as well as re-sent to Robert Bijvoet and Mike Huddleston,
- > since it did not make it through on the initial electronic transmittal,
- > and some of the faxed pages were illegible.
- >
- > If you have any comments, please don't hesitate to call me at work or
- > home.
- > Thanks for your time and efforts.
- >
- > Kind regards,
- >
- > Bill McLamb
- > 321-476-4302
- > 321-476--4220 (fax)
- > 321-773-4192 (home)

MORELAND, DEAN (JSC-NC) (NASA)

From: MORENO, FRANK (JSC-MT2) (NASA)
Sent: Monday, January 13, 2003 10:11 AM
To: GALVEZ, ROBERTO S. (ROBERT) (JSC-MA2) (NASA); LARSEN, AXEL M. (SKIP) (JSC-MA2) (NASA); Bill Koelle Mgr. SHab Module Safety (E-mail); GARCIA, HECTOR, PHD (JSC-SF) (WLS); RAMANATHAN, RAGHUPATHY (JSC-SF) (WLS)
Cc: Mike Huddleston (E-mail); MORELAND, DEAN (JSC-NC) (NASA)
Subject: ****IMPORTANT**** STS-107 - Late HMST Updates for BIOPACK and APCF

Robert and Skip,

Here is a recap of late HMST concentration changes for STS-107 SPACEHAB Payloads.

1) Last Friday I received a call that BIOPACK has minor concentration changes for a couple of samples that would not change the current Tox Level 0 rating for those samples. SHAB supports the change and I also concurred.

2) Today (1/13/03) I received a call from SHAB/Boeing-HSV/Safety Mgr/Bill Koelle that APCF also had some minor concentration changes for a couple of samples. I gave concurrence to proceed provided that the current Tox Level 0 rating does not change.

Skip and Robert please provide concurrence once Dr. Garcia provides the official Tox Assessment that both of these items remain Tox level 0.

Frank Moreno
Payload Integration Manager
Space Shuttle Program

Address: NASA Johnson Space Center
Mailcode: MT2
Building 1, Room 728
Houston, TX 77058

Phone: (281) 483-1208
Fax: (281) 483-6400
EMail: FMoreno@ems.jsc.nasa.gov

MORELAND, DEAN (JSC-NC) (NASA)

From: Koelle, William A [william.a.koelle@boeing.com]
Sent: Monday, January 13, 2003 10:58 AM
To: '8774274173 (E-mail)
Cc: MORELAND, DEAN (JSC-NC) (NASA)
Subject: APCF & CIBX

APCF HMST changes approved by Larsen and Moreno, Flight manager will be apprised. CIBX temp exceedance is acceptable per Dean Moreland.
Regards - Bill

William A. Koelle
The Boeing Company
Manager, Safety and Product Assurance
Carrier Systems
System Safety Functional Manager, NASA Systems S&MA - Huntsville Site

Tel 256 716-4116
Fax - 4175
william.a.koelle@boeing.com

MORELAND, DEAN (JSC-NC) (NASA)

From: DeanMoreland [dmoreland1@houston.rr.com]
Sent: Monday, January 13, 2003 10:19 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: Fw:



bpspecial.ppt

----- Original Message -----

From: "Koelle, William A" <william.a.koelle@boeing.com>
To: <dmoreland1@houston.rr.com>
Cc: "Procell, John W" <john.w.procell@boeing.com>; "Smith, Stuart" <stuart.smith@boeing.com>
Sent: Monday, January 13, 2003 8:05 PM

<<bpspecial.ppt>>

William A. Koelle
The Boeing Company
Manager, Safety and Product Assurance
Carrier Systems
System Safety Functional Manager, NASA Systems S&MA - Huntsville Site

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william.a.koelle@boeing.com

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

CONNECT

- **CONNECT uses 10 Type-I containers**
 - Part-I Hardware containers will be eight (8) Type-I/E Containers containing “Plunger Box” hardware
 - Part-II Hardware containers will be two (2) Type-I/O Containers containing culture blocks
- “Plunger Box” configuration and design used for CONNECT-Part I is identical (series hardware - manufactured by CCM) to that flown on previous missions
 - STS-95 (BIOBOX-4 facility)
 - Biorack IML-2 (EGGS and MOUSE experiments)
 - Additionally, SMM-03, -05, -06 used a manual version



13 Jan 03
biopkspecial

- 1

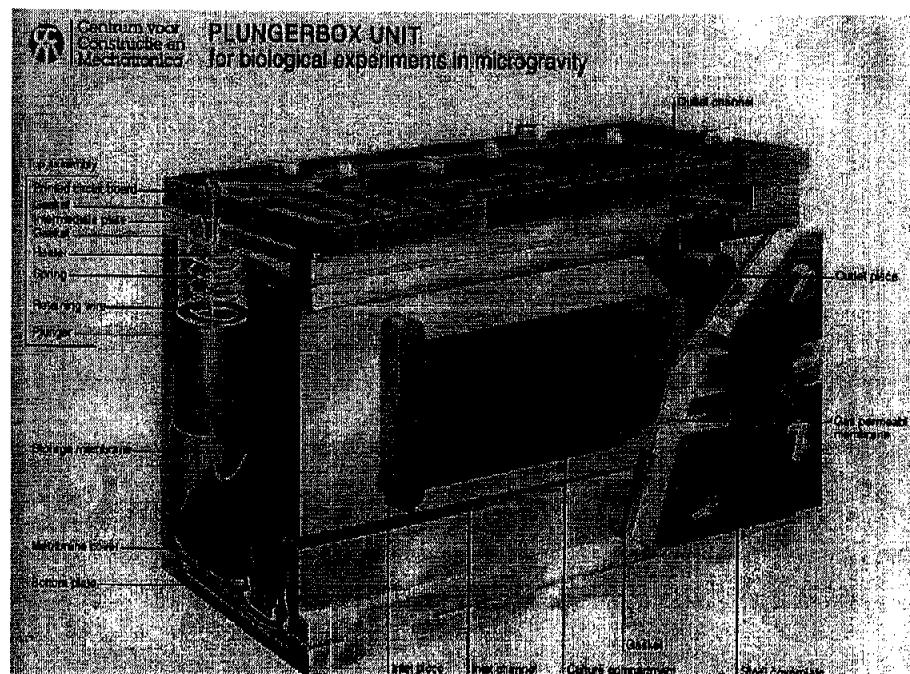


STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

- The containment scheme for the Lysing solution (toxicity level 2) is as follows:
 - Lysing solution is contained in a cylinder, fitted with a spring-loaded plunger
 - Ground command releases a spring which depresses the plunger and moves the fluid from the cylinder into the culture chamber
 - Cylinder, fluid lines and culture chamber are contained inside the sealed Plunger-Box unit, which is itself additionally contained by a Type I/E container
- Glass (Thermanox) cover slips (11 x 22 mm) are fully contained within the unit
 - Located inside the culture chamber (2 per container) and are protected by a silicone rubber gasket
 - Culture chamber is contained inside the sealed Plunger-Box unit
 - Additionally, the entire plunger-box unit is contained by the Type I/E container which is never opened in flight



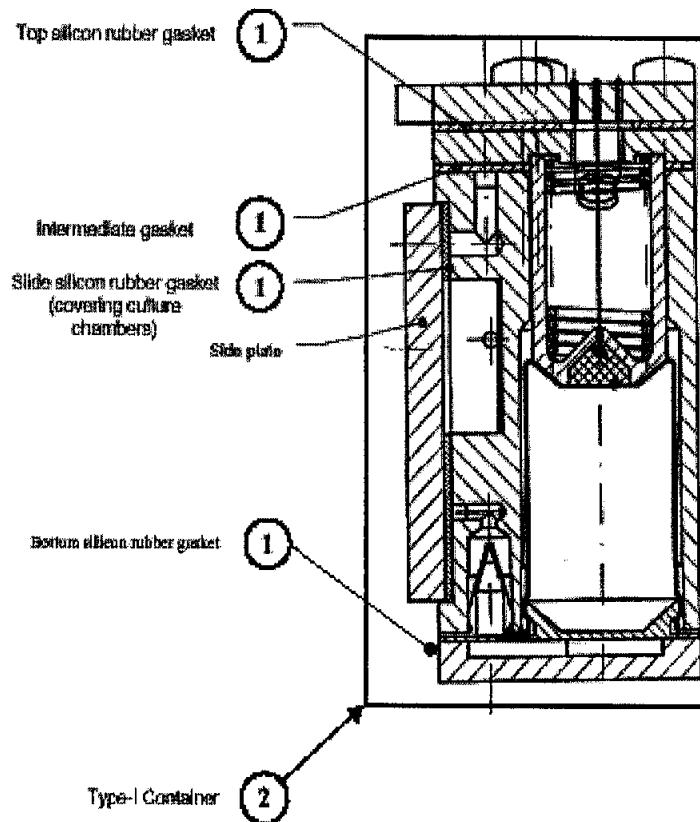
“Plunger Box”

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

- “Plunger Box” will be slightly modified, in order to allow some space for the electronics, required for the experiment activation in BioPack
 - Unit will be approximately 4 mm shorter
 - Mechanical construction and sealing of the liquids will not change
- **CONNECT Part 1 hardware contain toxicity level 2 samples**
- **Only two levels of containment are provided:**
 - O-rings (pistons, screws), and
 - **Silicon rubber gaskets (side gasket, between culture chamber and side plate, top gasket and intermediate gasket)**
- **Robustness/reliability of the Type I container level has been demonstrated and flight-proven in the past on six Biorack Spacelab (D-1, IML-1, IML-2) and SPACEHAB (S/MM-03, S/MM-05, S/MM-06)**



CONNECT Part-I Hardware

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

Baseline HR #	Mission	Baseline HR Title	STS-107 Re-baselined Hazard Report #	STS-107 HR Title
BRE-1	IML-2	Illness Caused by Leak of Chemical Fixatives	Unique # Biopack-EXP-1	Release of Toxic Chemicals into the Habitable Environment
G-4	IML-2	Exposure of Crew to Sharp Corners, Edges or Protrusions	JSC Form 1230 Item 3a	Sharp Edges
G-5	IML-2	Toxic Off-gassing Materials in Spacelab Module	JSC Form 1230 Item 6	Materials Off-gassing
G-6	IML-2	Use of Flammable Materials	JSC Form 1230 Item 5	Flammable Materials
..	..	..	JSC Form 1230 Item 4a	Shatterable Material Release
..	..	..	JSC Form 1230 Item 7.1a	EM Compatibility
..	..	..	JSC Form 1230 Item 9.1a	Touch Temperature
..	..	..	JSC Form 1230 Item 10a	Circuit Protection
..	..	..	JSC Form 1230 Item 13	Mating/ Demating Power Connectors
..	JSC Form 1230 Item 14	Contingency Return & Rapid Safing

CONNECT Hazard Control Applicability Matrix



13 Jan 03
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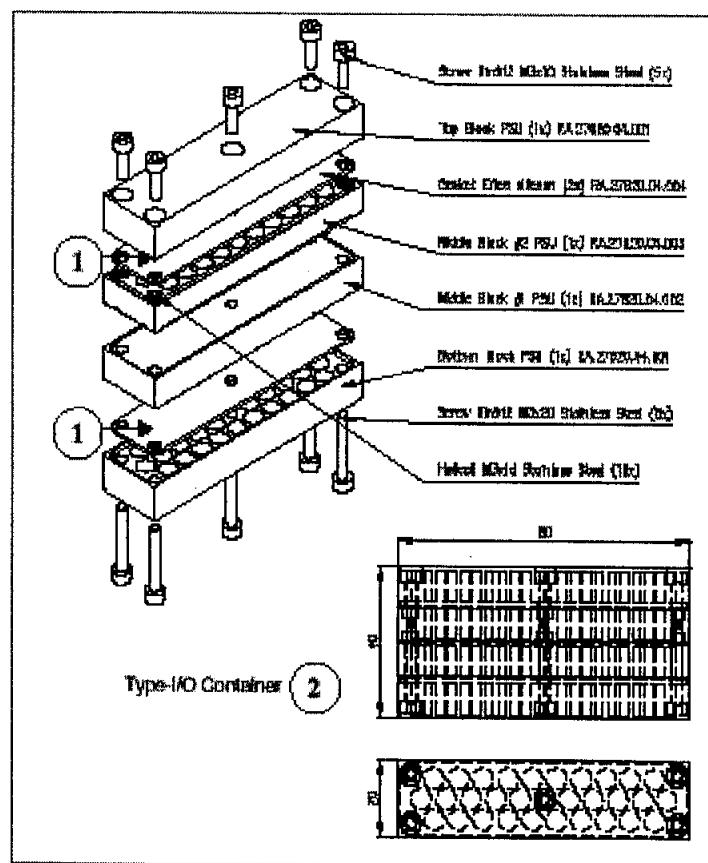


STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

- **CONNECT Part-II Hardware (New hardware)** containers consists of two (2) Type-I/O Containers
- The bacterial cells (*Pseudomonas aeruginosa*) (toxicity level 1) will be cultivated inside specially designed and newly built units
- Each unit consists of three culture blocks, made out of poly-sulfone, separated by inox plates and silicon gaskets, and assembled together by the mean of screws
- Each block has 30 cylindrical culture wells (~ 180 μ l)
- One assembly unit of 3 blocks, with a total of 90 culture wells, fits inside a standard Type I/O container



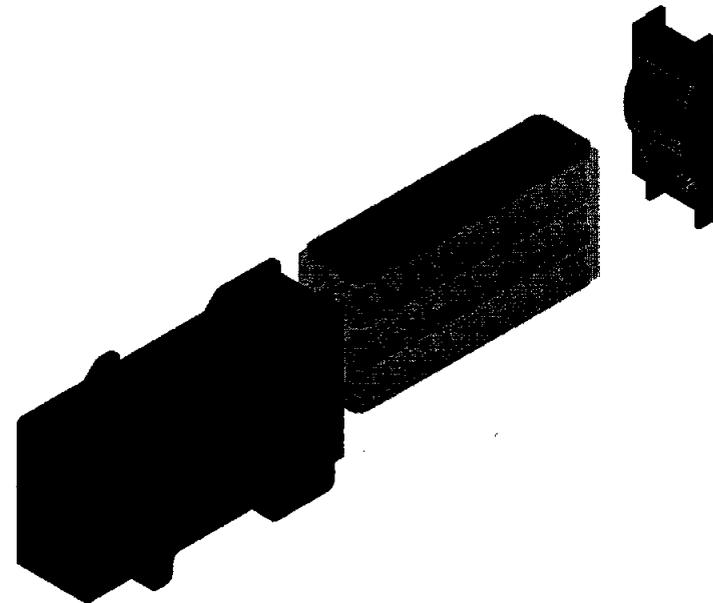
CONNECT Part-II Hardware (Details)

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

- **CONNECT Part-II is a totally passive experiment**
 - No crew interaction is required other than loading and unloading the Type I/O containers to and from the Biopack incubator
 - At no time during the mission the containers will be opened
- There is minimal leakage risk since a gel medium is used
- No shatterable materials or pressure systems are used for this experiment
- In addition, the ESA Type I/O containers will never be opened in flight, therefore two levels of containment will be continuously provided



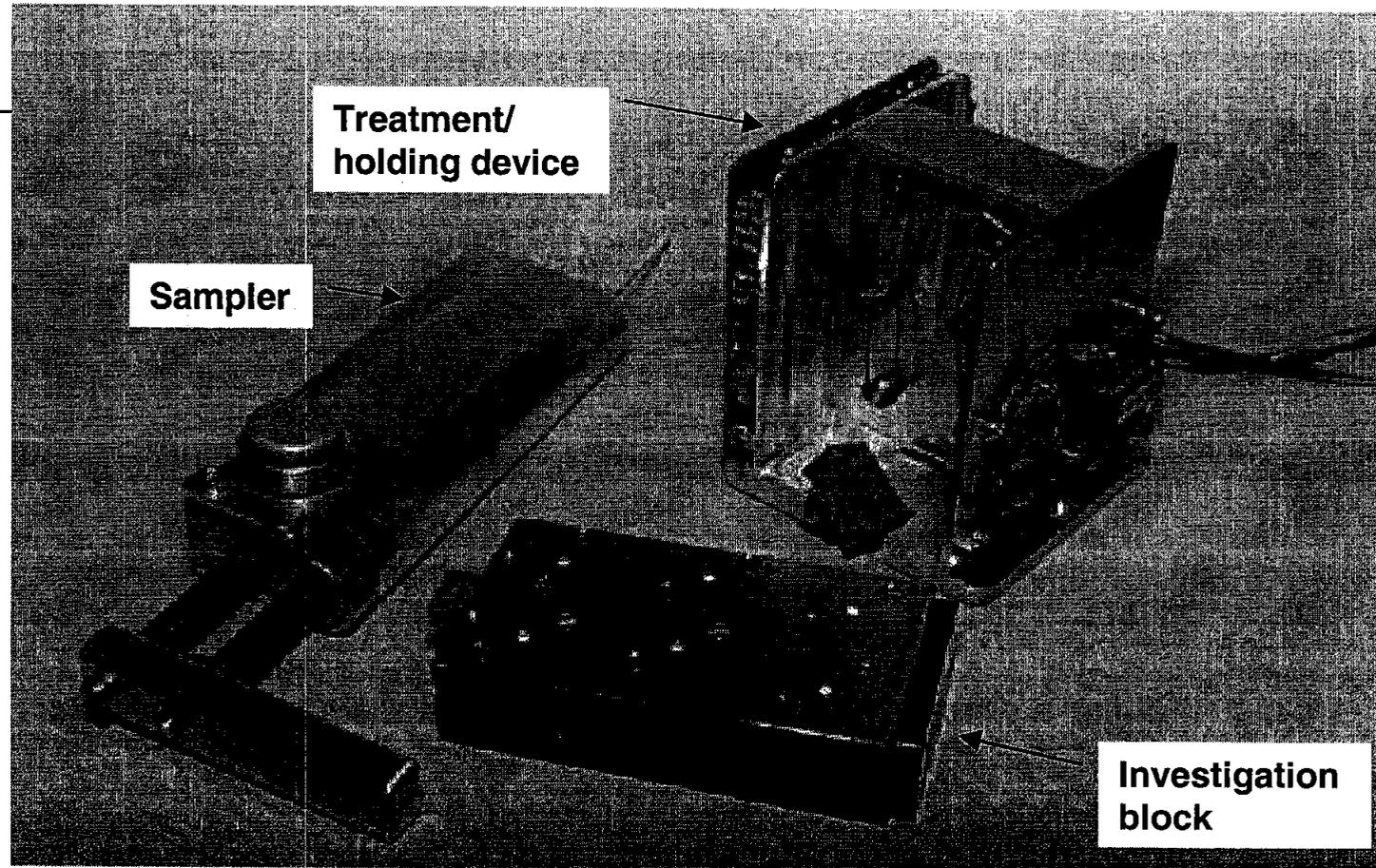
CONNECT Part-II Hardware (3-D model)



13 Jan 03
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BioPack



YSTRES Sampler, Investigation Block, Treatment/Holding Device

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

- **YSTRES" will use two Bioreactors (housed in Type-I/E containers) that are modified versions of the first Bioreactor flown on IML-2**
 - The volume of the culture chamber has been increased from 3 ml to 7 ml
 - The mechanical construction and the sealing of the liquids will not change
 - Stirrer is ~30 mm (<1.5 inches) in diameter (worst case speed is 100 RPM)
- **YSTRES Bioreactors contain toxicity level 0 culture media**
- **The pH of the culture is measured and controlled by means of a micro-sensor and electrodes**
- **Two elastic membranes are in contact with the culture medium to allow the diffusion of O₂ and CO₂ to and from the cells**



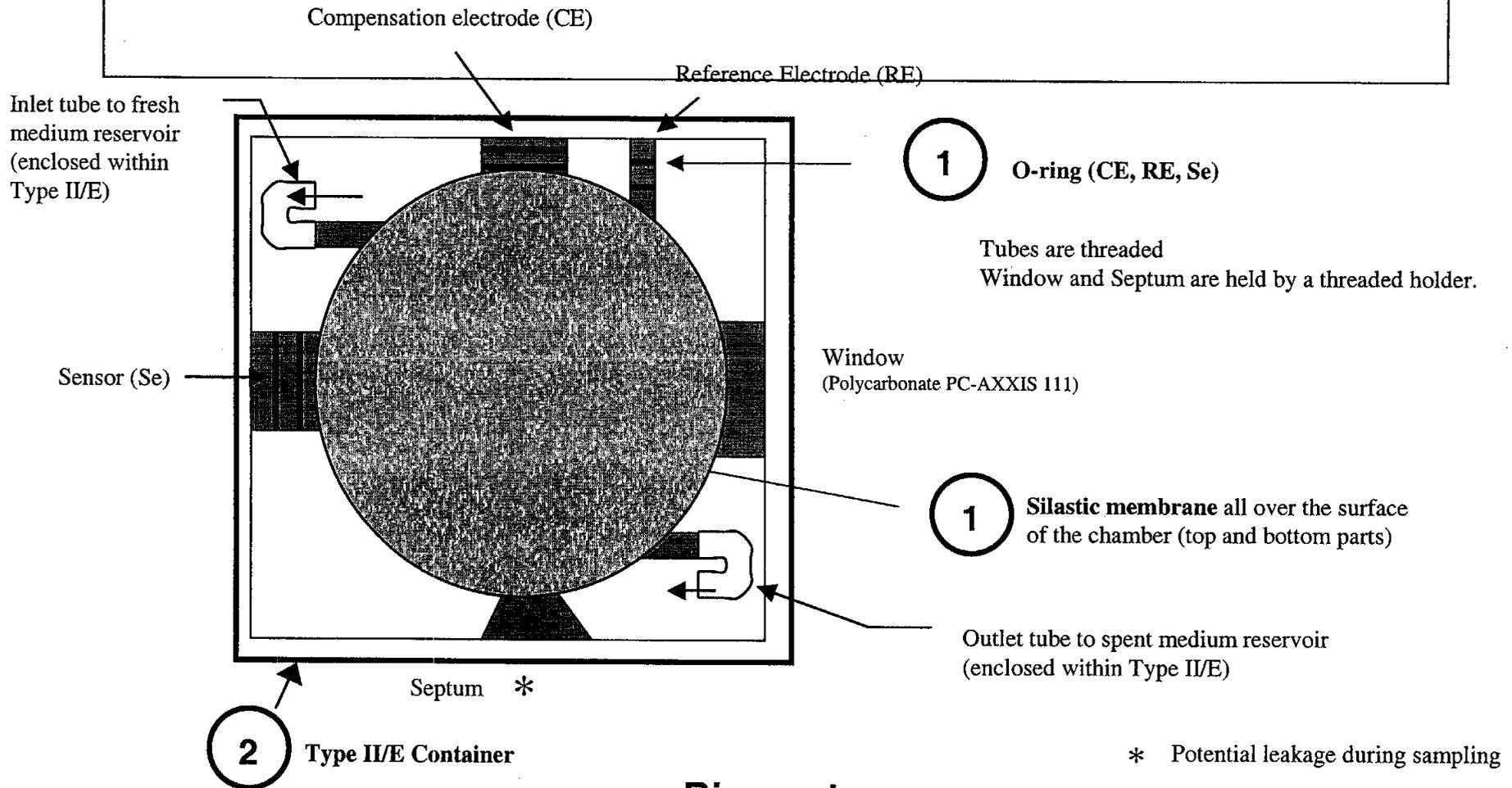
13 Jan 03
biopkspecial

- 8



STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack



Bioreactor

13 Jan 03
biopkspecial

BioPack



Culture Media Sampling Operation

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

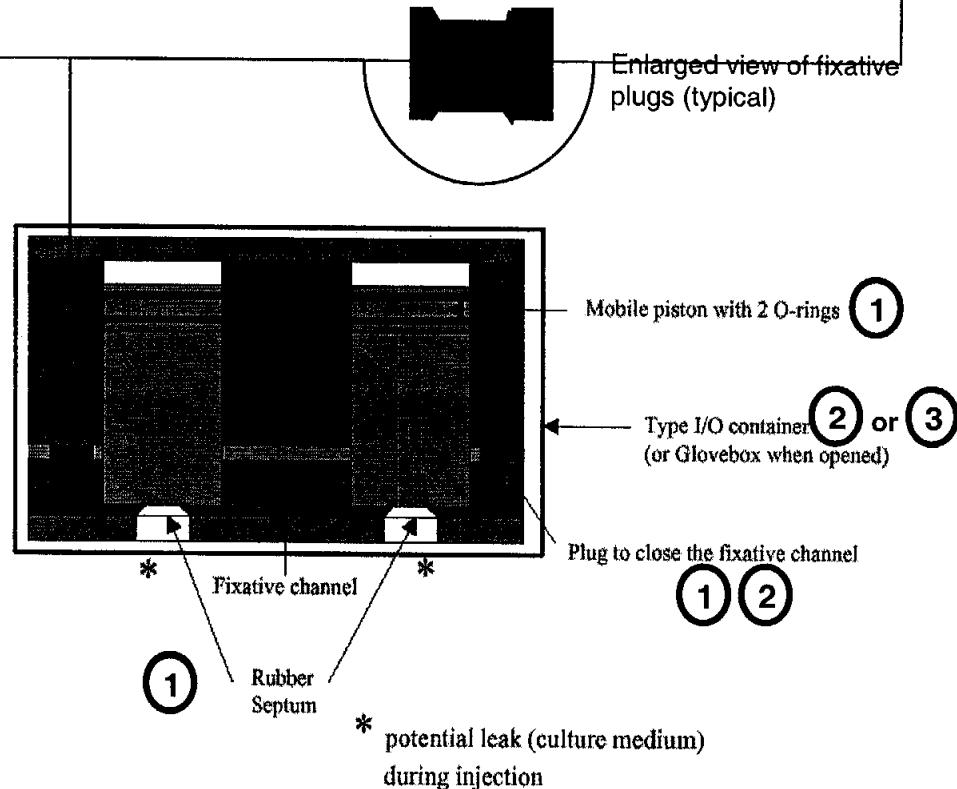
- The investigation blocks (12) consist of six small treatment chambers fixed together (2 control, 2 heat-shock and 2 osmotic shock chambers)
- Each chamber is closed by a mobile piston allowing the injection of the sample and of the fixative solution without air bubble and leakage (final volume is about 800 micro-l)
- Tiny Peltier elements are inserted in the heat-shock chamber to insure a rapid increase of the temperature to 37°C during stress
- Each chamber is fitted with a small magnetic agitator
 - Stirrer is <10 mm (<0.5 inches) in diameter
 - Worst case speed is 100 RPM
- A channel is filled with a fixative solution (toxicity level 2) that can be pushed manually into the chamber at the end of the treatment if desired

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

- YSTRES Investigation Block contains toxicity level 2 samples
- Adequate levels of containment are provided:
 - For Investigation chamber:
 - 2 O-rings (1st and 2nd level)
 - Rubber septum (1st level)
 - For Fixative chambers
 - Fixative plugs (1st and 2nd level prior to fixation)
 - Additional levels of containment
 - Type-I/O (or Type I/E) Container
 - Glovebox (PGBX actually provides two levels of containment)

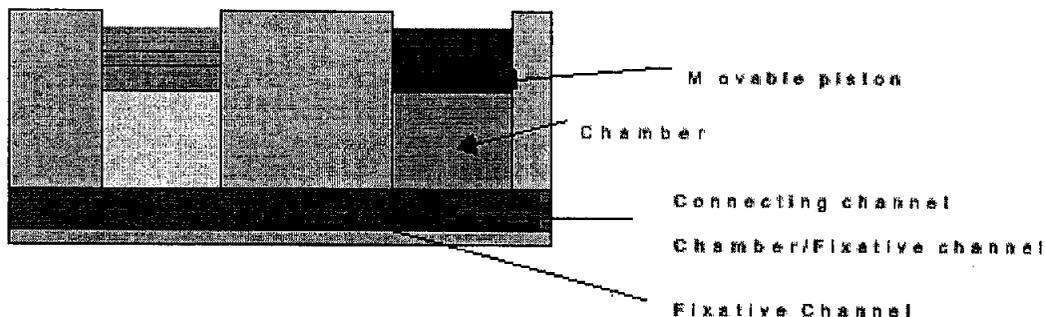


**YSTRES Levels of Containment
(1/3 of an Investigation Block)**

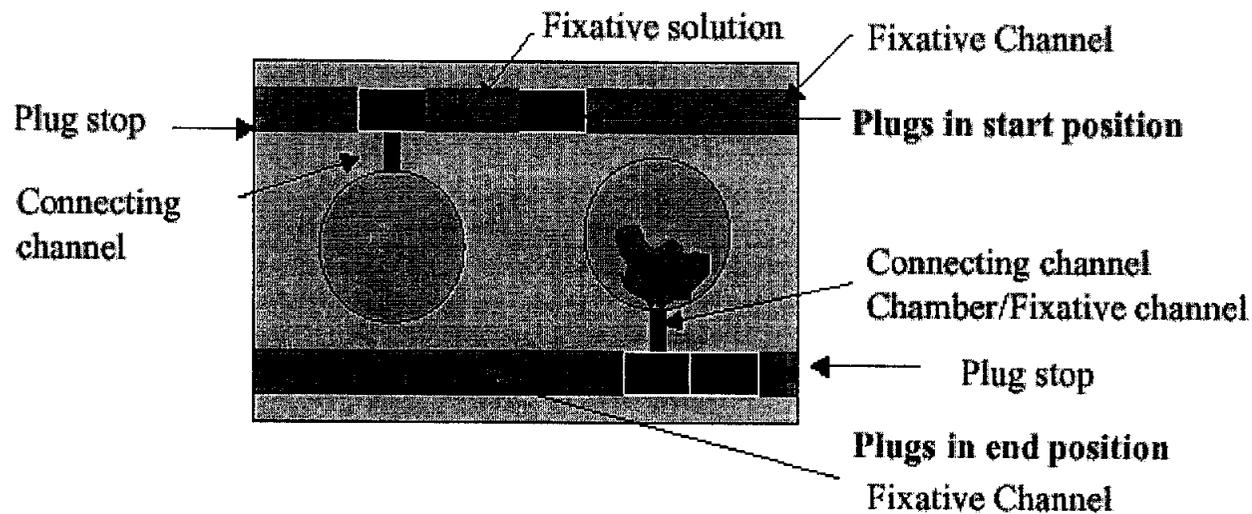
STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

Side View
Cross-section



Top View
Cross-section



Investigation Block (illustrating Fixative Channel)

BioPack

PAYLOAD DESCRIPTION

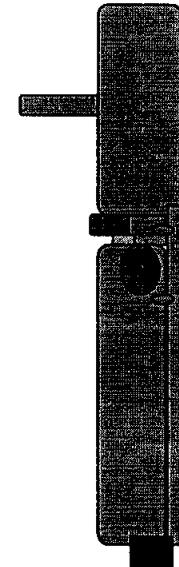
- **The fixative toxicity decreases from a toxicity level 2 to a toxicity level 1 once injected in the sample chamber**
 - **The initial concentration in the fixative channel is 3% (for a volume of 150 μ l) - TOX LEVEL 2**
 - **The final concentration, once injected in the sample chamber is only 0.5% - TOX LEVEL 1**
 - **The fixative solution pH remains relatively unaffected**
 - The initial pH of the fixative solution (inside the fixative channel) is 7.0
 - The final pH (once injected in the sample chamber) will be around 5.6
- **Robustness/reliability of the Type I/II containers has been demonstrated on six Biorack missions**
 - **Spacelab (D-1, IML-1, IML-2)**
 - **SPACEHAB (S/MM-03, S/MM-05, S/MM-06)**

STS-107 PHASE II FLIGHT SAFETY REVIEW

BioPack

PAYLOAD DESCRIPTION

- The sampling/dispensing device consists of a syringe with a needle allowing the withdrawal of liquid and the repetitive injection of a fixed amount of sample
 - modified commercially available dispenser from Hamilton
 - used to withdraw a portion of the culture from the Bioreactor through one septum and to inject part of this sample into the 12 treatment chambers (also through one septum)
- Each Bioreactor (2) will have its own dedicated sampling device
- Sampling device needle is inserted into a small recipient containing water to avoid injury and the drying of the needle



Needle

* possible leak after injection through septum

MORELAND, DEAN (JSC-NC) (NASA)

From: MORENO, FRANK (JSC-MT2) (NASA)
Sent: Tuesday, January 14, 2003 2:45 PM
To: GALVEZ, ROBERTO S. (ROBERT) (JSC-MA2) (NASA); NASA/HQ - Vanessa Ellerbe (E-mail); LARSEN, AXEL M. (SKIP) (JSC-MA2) (NASA); Mike Huddleston (E-mail); Bill Koelle Mgr. SHab Module Safety (E-mail); NEWKIRK, KATHERINE E. (LELE) (JSC-SM) (NASA); GARCIA, HECTOR, PHD (JSC-SF) (WLS); RAMANATHAN, RAGHUPATHY (JSC-SF) (WLS)
Cc: Boeing-Hsv - Glen Beatty (E-mail); MORELAND, DEAN (JSC-NC) (NASA)
Subject: STS-107 HMST Updates for AST and MPFE

The following HMST change has been requested and are supported by SPACEHAB, the PIM, and the Flight Manager (Vanessa) provided that the Tox level does not exceed Level 0:

AST - Addition of MS Nutrient solution to Agar. This item was not part of V1 but JSC Toxicologist has experience with it and Tox Level remains 0

Frank Moreno
Payload Integration Manager
Space Shuttle Program

Address: NASA Johnson Space Center
Mailcode: MT2
Building 1, Room 728
Houston, TX 77058

Phone: (281) 483-1208
Fax: (281) 483-6400
EMail: FMoreno@ems.jsc.nasa.gov

MORELAND, DEAN (JSC-NC) (NASA)

From: MORENO, FRANK (JSC-MT2) (NASA)
Sent: Tuesday, January 14, 2003 2:59 PM
To: MORENO, FRANK (JSC-MT2) (NASA); GALVEZ, ROBERTO S. (ROBERT) (JSC-MA2) (NASA); 'NASA/HQ - Vanessa Ellerbe (E-mail)'; LARSEN, AXEL M. (SKIP) (JSC-MA2) (NASA); 'Mike Huddleston (E-mail)'; 'Bill Koelle Mgr. SHab Module Safety (E-mail)'; NEWKIRK, KATHERINE E. (LELE) (JSC-SM) (NASA); GARCIA, HECTOR, PHD (JSC-SF) (WLS); RAMANATHAN, RAGHUPATHY (JSC-SF) (WLS)
Cc: 'Boeing-Hsv - Glen Beatty (E-mail)'; MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: STS-107 HMST Updates for AST and MPFE

OK here is the MPFE part

The following HMST change has been requested and are supported by SPACEHAB, the PIM, and the Flight Manager (Vanessa) provided that the Tox level does not exceed Level 0:

AST - Change the Cell concentration for one of the MPFE cards. Preliminary JSC Toxicologist assessment shows that the Tox Level remains 0.

Frank Moreno
Payload Integration Manager
Space Shuttle Program

Address: NASA Johnson Space Center
Mailcode: MT2
Building 1, Room 728
Houston, TX 77058

Phone: (281) 483-1208
Fax: (281) 483-6400
EMail: FMoreno@ems.jsc.nasa.gov

-----Original Message-----

From: MORENO, FRANK (JSC-MT2) (NASA)
Sent: Tuesday, January 14, 2003 2:45 PM
To: GALVEZ, ROBERTO S. (ROBERT) (JSC-MA2) (NASA); NASA/HQ - Vanessa Ellerbe (E-mail); LARSEN, AXEL M. (SKIP) (JSC-MA2) (NASA); Mike Huddleston (E-mail); Bill Koelle Mgr. SHab Module Safety (E-mail); NEWKIRK, KATHERINE E. (LELE) (JSC-SM) (NASA); GARCIA, HECTOR, PHD (JSC-SF) (WLS); RAMANATHAN, RAGHUPATHY (JSC-SF) (WLS)
Cc: Boeing-Hsv - Glen Beatty (E-mail); MORELAND, DEAN (JSC-NC) (NASA)
Subject: STS-107 HMST Updates for AST and MPFE

The following HMST change has been requested and are supported by SPACEHAB, the PIM, and the Flight Manager (Vanessa) provided that the Tox level does not exceed Level 0:

AST - Addition of MS Nutrient solution to Agar. This item was not part of V1 but JSC Toxicologist has experience with it and Tox Level remains 0

Frank Moreno
Payload Integration Manager
Space Shuttle Program

Address: NASA Johnson Space Center
Mailcode: MT2
Building 1, Room 728
Houston, TX 77058

MORELAND, DEAN (JSC-NC) (NASA)

From: JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Sent: Tuesday, January 21, 2003 8:59 AM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: FW: 10:00 am Space Hab Hum Sep meeting

-----Original Message-----

From: LONDRIGAN, DENISE L. (JSC-NC) (SAIC) **On Behalf Of** SR&QA MER Console
Sent: Tuesday, January 21, 2003 3:09 AM
To: FOSTER, ANDY (JSC-NC) (GHG); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Cc: BALU, BRIAN K. (JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); SR&QA MER Console
Subject: 10:00 am Space Hab Hum Sep meeting

FYI,

There is a meeting Tuesday, Jan 21st @ 10:00 a.m. Building 30 Room # 215 to discuss Space Hab Hum Sep trouble shooting procedures for RS #1. FD would like MER Safety, MER ECS & MER EPD&C to attend.

There will be a follow - up meeting at 5:30 p.m. to confirm procedures before they send them up to the Red crew to perform.

MOD will create a CHIT for all to sign before sending procedures to Red crew.

MORELAND, DEAN (JSC-NC) (NASA)

From: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Sent: Wednesday, January 22, 2003 5:55 PM
To: MORELAND, DEAN (JSC-NC) (NASA); ROSE, SUMMER L. (JSC-NC) (SAIC)
Cc: BALU, BRIAN K. (JSC-NC) (SAIC); SR&QA MER Console
Subject: FW: ICOM B Failure

Is there anything that you can add to this from the Spacehab point of view.



STS-107 ANOMALY
WORKSHEET#2-No..

Michael Penney

JSC SR&QA/SS&MA

281-244-1950

Brasil: Penta-champions of the world

-----Original Message-----

From: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Sent: Wednesday, January 22, 2003 5:46 PM
To: SR&QA MER Console
Cc: KOKOSZ, CHERYL M. (JSC-NC) (SAIC); ENGLE, ROSS K. (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC)
Subject: FW: ICOM B Failure

I updated a few sections.

Michael Penney

JSC SR&QA/SS&MA

281-244-1950

Brasil: Penta-champions of the world

-----Original Message-----

From: FOSTER, ANDY (JSC-NC) (GHG) On Behalf Of SR&QA MER Console
Sent: Saturday, January 18, 2003 7:35 AM
To: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Subject: ICOM B Failure



STS-107 ANOMALY
WORKSHEET#2-No..

Mike,

I'm forwarding this to you initially. If you feel like you're not the right SSE and especially if you know who is, forward this to them for completion and let us know whom it went to. Thanks.

Andy

STS-107 ANOMALY WORKSHEET #2

Subsystem: Spacehab COMM

Title: No ICOM B in Spacehab

Anomaly description: ICOM B in Spacehab did not work after Spacehab activation.

Applicable Subsystem Engineer: Orbiter - Michael Penney

Due Date & Time: 1700 Jan 22, 2003

RISK ASSESSMENT

Does the anomaly affect the safety of flight? No.

Define and describe the criticality, if one exists, for the actual failure mode: Loss of ICOM is a 2R3 situation (05-2A-21944-01) given the special case that the mission cannot continue without audio communications between the Hab and Orbiter. This function can be satisfied with A/A, A/G1, A/G2, ICOM A, or ICOM B. This mission has no specific requirement for audio between Hab and the Orbiter

What are the effects of the anomaly? ICOM A being used for communication between Orbiter and Spacehab.

Describe workarounds or actions that mitigate the failure effects: Use Spacehab ICOM A. The A/A and A/G cannels can also be used for Orbiter to Hab communications.

How will the anomaly impact the crew, vehicle and mission? No mission or vehicle impact. After all four audio communications paths are lost Hab operations would be impacted.

Is there an increase in risk? No.

What is the worst next failure? Loss of ICOM A.

What is the most probable cause? Switch misconfiguration.

What are your conclusions and SR&QA recommendations concerning this anomaly? When there's time, investigate whether all ICOM B switches are in the proper configuration for operation and repeat the voice check.

CONTROLS

Redundancy: ICOM A

Flight Rules: A11-68, Loss of intercom - Continue to nominal end of mission

Crew Procedures: OPCL, P.2-2 ICOM Lost

Launch Commit Criteria: N/A

SUPPORTING DOCUMENTATION

Describe previous failures that may help explain this anomaly: There has been a similar problem with ISS on the last two flights that appears to be a ISS problem.

Reference drawings: SSSH16.11 Audio/ACCU

MSIDs (Measurement / Stimulus Index): None

Other relevant information:

MORELAND, DEAN (JSC-NC) (NASA)

From: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Sent: Thursday, January 23, 2003 10:57 AM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: ICOM B Failure

That is the way it sounds to me to.

Thanks

Michael Penney
JSC SR&QA/SS&MA
281-244-1950

Brasil: Penta-champions of the world

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA)
Sent: Thursday, January 23, 2003 10:56 AM
To: PENNEY, MICHAEL J. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC)
Cc: BALU, BRIAN K. (JSC-NC) (SAIC); SR&QA MER Console
Subject: RE: ICOM B Failure

Looks ok to me, sounds like they're not going to mess with the B side unless A goes down.

-----Original Message-----

From: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Sent: Wednesday, January 22, 2003 5:55 PM
To: MORELAND, DEAN (JSC-NC) (NASA); ROSE, SUMMER L. (JSC-NC) (SAIC)
Cc: BALU, BRIAN K. (JSC-NC) (SAIC); SR&QA MER Console
Subject: FW: ICOM B Failure

Is there anything that you can add to this from the Spacehab point of view.

<< File: STS-107 ANOMALY WORKSHEET#2-No ICOM B in Spacehab.doc >>

Michael Penney
JSC SR&QA/SS&MA
281-244-1950

Brasil: Penta-champions of the world

-----Original Message-----

From: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Sent: Wednesday, January 22, 2003 5:46 PM
To: SR&QA MER Console
Cc: KOKOSZ, CHERYL M. (JSC-NC) (SAIC); ENGLE, ROSS K. (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC)
Subject: FW: ICOM B Failure

I updated a few sections.

Michael Penney
JSC SR&QA/SS&MA
281-244-1950

Brasil: Penta-champions of the world

-----Original Message-----

From: FOSTER, ANDY (JSC-NC) (GHG) On Behalf Of SR&QA MER Console
Sent: Saturday, January 18, 2003 7:35 AM
To: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Subject: ICOM B Failure

<< File: STS-107 ANOMALY WORKSHEET#2-No ICOM B in Spacehab.doc >>

Mike,

I'm forwarding this to you initially. If you feel like you're not the right SSE and especially if you know who is, forward this to them for completion and let us know whom it went to. Thanks.

Andy

MORELAND, DEAN (JSC-NC) (NASA)

From: BELL, MEGAN M. (JSC-NC) (GHG)
Sent: Friday, January 24, 2003 2:34 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: STS-107 Summary#2-January 23, 2003

I was asking because a woman asked me who was involved in the Biopack question. She probably asked me before she went to the discussion.

Thanks,

Megan

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA)
Sent: Friday, January 24, 2003 12:22 PM
To: BELL, MEGAN M. (JSC-NC) (GHG)
Subject: RE: STS-107 Summary#2-January 23, 2003

It's the orbiter vac we looked at during the dehumidifier discussions. This would be the same setup as they use to clean off the filters on other experiments that are setup for that type of maintenance.

-----Original Message-----

From: BELL, MEGAN M. (JSC-NC) (GHG)
Sent: Friday, January 24, 2003 11:26 AM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: STS-107 Summary#2-January 23, 2003

Dean, What type of filter does the vacuum have? (If you know.)

Thanks,

Megan

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA)
Sent: Friday, January 24, 2003 10:46 AM
To: FOSTER, ANDY (JSC-NC) (GHG); BALDWIN, ARNOLD B. (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); BELL, MEGAN M. (JSC-NC) (GHG); DICK, BRANDON N. (JSC-NE) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); ENGLE, ROSS K. (JSC-NC) (SAIC); ETCHHELLS, MICHAEL S. (JSC-NC) (SAIC); GARDNER, JAMES R. (JSC-NC) (GHG); GARDNER, RICHARD D. (JSC-NC) (GHG); KOKOSZ, CHERYL M. (JSC-NC) (SAIC); LONDRIGAN, DENISE L. (JSC-NC) (SAIC); MCMULLEN, DOUGLAS B. (JSC-NE) (GHG); MELENDEZ, DAVID T. (JSC-NC) (GHG); PENDERGAST, JAMES E. (JSC-NC) (GHG); PETERS, JEFFREY P. (JSC-NC) (SAIC); WITWER, DAVE W. (JSC-NC) (SAIC); ZALIT, DANIEL P. (JSC-NC) (GHG)
Cc: SR&QA MER Console; STEWART, CHRISTINE E. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC)
Subject: RE: STS-107 Summary#2-January 23, 2003

Thanks Andy, I've been discussing the BIOPACK situation with the Boeing guys. They're working with the experimenter on a possible solution, maybe by this afternoon. They believe the problem is being caused by a clogged internal air filter. The primary approach currently is to try and use the vacuum to pull some reverse airflow and pull some of the dust/lint back through the duct into the vacuum.

-----Original Message-----

From: FOSTER, ANDY (JSC-NC) (GHG)
Sent: Friday, January 24, 2003 10:33 AM
To: BALDWIN, ARNOLD; BALU, BRIAN; BELL, MEGAN; DICK, BRANDON; DYER, KEITH; ENGLE, ROSS; ETCHHELLS, MICHAEL; GARDNER, JAMES; GARDNER, RICHARD; KOKOSZ, CHERYL; LONDRIGAN, DENISE; MCMULLEN, DOUGLAS; MELENDEZ, DAVID; MORELAND, DEAN; PENDERGAST, JAMES; PETERS, JEFFREY; WITWER, DAVE; ZALIT, DANIEL
Cc: SR&QA MER Console
Subject: FW: STS-107 Summary#2-January , 2003

Hi Gang,

Doug wrote up a nice mission summary detailing where we are so far. I'm forwarding this to everyone with a

few words of my own about what was discussed at the MMT meeting this morning (1/24/03).

First, to address the Spacehab condensate problems, the flight control team has been able to stabilize humidity and temperature in the Spacehab by tweaking both Orbiter and Spacehab heat exchangers and air flow. At the present time, the team does not desire to execute the IFM that had been discussed to try to restore one of the RS pumps. Running this IFM would require turning off the cabin fan for 30 minutes, and that would be very undesirable. With things where they are, the only thing they want to do is take a look under the Spacehab floor toward EOM to make sure that all the water has been cleaned up.

Concerning the debris hit during ascent, while the exact area of impact is somewhat uncertain, the worst case condition is expected to be some tile damage. They are not carrying this as a safety of flight issue, as they do not believe burnthrough is a concern.

An issue has also arisen due to landing down weight which will exceed the current flight rule and NSTS 7700 limits. However, flight control and thermal analysis have been performed; and there are no violations for the expected weights. Abort landing weights envelope this case; also, the SODB states the landing weight limit for EOM is 249K, and STS-83 (the Spacelab flight we aborted early due to fuel cell problems) landed with a down weight of 235,286 lbs, significantly more than we are talking about here (which is 600-900 lbs over the 233K limit). We approved the chit associated with this just before 1000 this morning.

Biopack went into thermal shutdown due to some blockage. (Let's make sure Payload Safety knows that.)

There was no discussion of extension days.

First Shift leads, go ahead and send out the shift handover reports to those folks manning the mission behind you.

The next MMT meeting is Monday. I'll probably send out another summary at that time.

Andy

-----Original Message-----

From: MCMULLEN, DOUGLAS B. (JSC-NE) (GHG)
Sent: Thursday, January 23, 2003 10:27 AM
To: FOSTER, ANDY (JSC-NC) (GHG)
Subject: STS-107 Summary#2-January 23, 2003

In general, the mission continues to run smoothly, with the exception of one Spacehab Anomaly. The shuttle is currently in an 154 x 142 nm orbit.

Orbiter:

Orbiter consumables are still running ahead of requirements for the planned mission, and are ~ 983 lbs. above margin (due to Cryo and Prop). The Spacehab is not consuming as much electricity as planned. As reported earlier, this puts us close to downweight landing limits. A current listing of anomalies is below.

SpaceHab:

Spacehab operations are nominal at this time, with only minor problems with a few payloads. The prime Spacehab problem is centered around the WSA (Water Separator Assembly). The WSA is used to remove humidity from SpaceHab via one of two RS (Rotary Separators). On FD04 RS #1 failed due to flooding. The crew reported cleaning up ~ 2 qts of water in the WSA bay. RS#1 was turned off, RS#2 turned on. The next day RS#2 tripped circuit breakers in Spacehab, and was subsequently turned off. At this time, condensate collection/humidity removal is lost in Spacehab. The FCT attempted to modulate several heat exchanger valves to bring down the temperature, with no significant affect. MOD and the MER are working toward an IFM procedure to recover RS#1 and SpaceHab humidity collection. A CHIT is expected in the system soon, copies of the procedure are on the SR&QA console.

Console Admin:

The shift schedule and on-call pager number have been updated and are placed in the SafetyConsole notebook.

The patch list is sitting in the blue Logbook. Shift Leads, be sure to add the SSE's who work issues for us to the list. Jim G., please turn the list in before the end of the mission but close to the end so we get everyone.

Dan Zalit signed off for OJT#1. D. Witwer will be working with him on OJT#2.

Current listed Anomalies:

MER-01, AC2 Phase B Sluggish Current Signature-Mike Penney has to complete, Due Tues.

MER-02, No ICOM B in Spacehab-Mike Penney has.

MER-04, 70 mm Hasselblad Intermittent Motor Drive -Darwin Patterson has.*

MER-05, Suspect Fuel Cell Monitoring System (FCMS) Data Cable-Darwin Patterson has.*

MER-06, Loss of DR20 Tape Recording and Playback (GFE)-Darwin Patterson has.*

MER-07, MPS LH2 prevalve anomaly, worksheet started but not completed or sent out.

Doug McMullen

MORELAND, DEAN (JSC-NC) (NASA)

From: GARDNER, JAMES R. (JSC-NC) (GHG)
Sent: Thursday, January 30, 2003 5:46 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: Thanks, Got both pages / RE: Spacehab Coolant Flow Decay

OK!
Keith Dyer asked that I send them your way; I really don't think there is a 'payload' issue as such. But the idea of NOT letting you know didn't seem right, either. Ross Engle has explained to me that even if Spacehab gets an AC bus from Orbiter, the only thing it will affect is one tacan, and if that happens the tacan will reset OK.

-----Original Message-----

From: GARDNER, JAMES R. (JSC-NC) (GHG)
Sent: Thursday, January 30, 2003 5:36 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Cc: DYER, KEITH W. (JSC-NC) (SAIC)
Subject: RE: Spacehab Coolant Flow Decay

I FAXed you the CHIT STS-0017, and the Customer Support Room (CSR) FD14 Report.

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA)
Sent: Thursday, January 30, 2003 5:24 PM
To: GARDNER, JAMES R. (JSC-NC) (GHG)
Subject: RE: Spacehab Coolant Flow Decay

483-5205

-----Original Message-----

From: GARDNER, JAMES R. (JSC-NC) (GHG)
Sent: Thursday, January 30, 2003 5:24 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: Spacehab Coolant Flow Decay

If you have a FAX number, Dean, I will send this to you. there are two pages of information.

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA)
Sent: Thursday, January 30, 2003 5:21 PM
To: GARDNER, JAMES R. (JSC-NC) (GHG)
Subject: RE: Spacehab Coolant Flow Decay

that a WPP in Spacehab would be considered

I don't understand what you mean by a WPP in SPACEHAB would be considered.

-----Original Message-----

From: GARDNER, JAMES R. (JSC-NC) (GHG)
Sent: Thursday, January 30, 2003 5:19 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Subject: RE: Spacehab Coolant Flow Decay

Water Pump Package

-----Original Message-----

From: MORELAND, DEAN (JSC-NC) (NASA)
Sent: Thursday, January 30, 2003 5:18 PM
To: GARDNER, JAMES R. (JSC-NC) (GHG)
Subject: RE: Spacehab Coolant Flow Decay

WPP??

-----Original Message-----

From: GARDNER, JAMES R. (JSC-NC) (GHG)
Sent: Thursday, January 30, 2003 5:11 PM
To: MORELAND, DEAN (JSC-NC) (NASA)
Cc: DYER, KEITH W. (JSC-NC) (SAIC)
Subject: Spacehab Coolant Flow Decay

Dean:

This coolant loop issue has become a MER writeup Anomaly MER 09 and a CHIT STS-0017 for documentation.

There is the possibility that should delta pres and flow drop too much, that a WPP in Spacehab would be considered. Ross Engle is working the issue from the Orbiter Safety side.

Please check the MER Safety Console if you need additional information.

Thanks

MORELAND, DEAN (JSC-NC) (NASA)

From: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Sent: Thursday, January 30, 2003 6:26 PM
To: MORELAND, DEAN (JSC-NC) (NASA); ROSE, SUMMER L. (JSC-NC) (SAIC)
Cc: CIANCONE, MICHAEL L. (JSC-NC) (NASA); FOX, MARCHA (JSC-NC) (SAIC); STOERKEL, WALTER H. (JSC-NC) (GHG); DYER, KEITH W. (JSC-NC) (SAIC)
Subject: FYI: Potential AC Bus Transient due to Hab Fan using Orb AC

-----Original Message-----

From: DYER, KEITH W. (JSC-NC) (SAIC)
Sent: Thursday, January 30, 2003 6:22 PM
To: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Subject: FW: Potential AC Bus Transient due to Hab Fan using Orb AC

fyi

-----Original Message-----

From: ENGLE, ROSS K. (JSC-NC) (SAIC)
Sent: Thursday, January 30, 2003 6:12 PM
To: GARDNER, JAMES R. (JSC-NC) (GHG); WITWER, DAVE W. (JSC-NC) (SAIC); MELENDEZ, DAVID T. (JSC-NC) (GHG)
Cc: DYER, KEITH W. (JSC-NC) (SAIC); KOKOSZ, CHERYL M. (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); PENNEY, MICHAEL J. (JSC-NC) (SAIC); VEROSTKO, JEREMY E. (JSC-NC) (SAIC); NGUYEN, KHOI (JSC-NC) (SAIC)
Subject: Potential AC Bus Transient due to Hab Fan using Orb AC

This email is intended to address the risk to the Orbiter by a transient on an Orbiter AC bus due to the Hab Fan 2 switching On using Orbiter power during reentry.

A transient on an Orbiter AC bus during reentry poses minimal risk. All critical Guidance Navigation and Control, Flight Control, Data Processor Systems and Communications and Tracking subsystems are powered by DC, with the exception of the Gould TACANs. Gould TACANs are AC powered. TACAN 1 by AC1, TACAN 2 by AC2 and TACAN 3 by AC3. OV-102 has 3 Gould TACANs. FYI - Collins TACAN are DC powered.

DC powered hardware includes: Inertial Measurement Unit, Air Data Transducer Asy, Microwave Landing System, Accelerometer Asy, Orbiter Rate Gyro Asy, Aerosurface Servo Asy, Ascent Thrust Vector Controller, Multifunction Electronic Display System, S-Band PA, S-Band Pre-amp, S-Band Switch Asy, S-Band Switch Beam Control Asy, S-Band NSP and S-Band Transponder, General Purpose Computers and Multiplexer/Demultiplexers.

AC power is converted from DC power by the Power Static Inverter (PSI). Any transient on an AC bus would be 'filtered' by the PSI and would not be expected to appear on a DC bus.

Ross K. Engle
JSC SR&QA
281-244-1951
Fax 281-244-1849
Ross.K.Engle1@jsc.nasa.gov

From: SHANNON, JOHN P. (JSC-DA8) (NASA)
Sent: Wednesday, January 29, 2003 2:49 PM
To: HUDSON, ROBERT H. (JSC-NC) (NASA)
Subject: FW: Shuttle Support

Please treat this confidentially, but here is the scoop.

-----Original Message-----

From: STICH, J. S. (STEVE) (JSC-DA8) (NASA)
Sent: Wednesday, January 29, 2003 2:30 PM
To: SHANNON, JOHN P. (JSC-DA8) (NASA)
Subject: FW: Shuttle Support

The story that I heard is that Wayne got the DOD folks at KSC and Patrick spun up so they or Lambert Austin (rumor) turned on requests for data from USSTRAT and other resources. The SSP did not want any data and in fact there was never a formal MOD request made from the FDOs or the Flight Director. I told Roger Simpson that we appreciated the USSSTRAT support on this issue during a phone conversation on Wednesday or Thursday of last week. I told them that we did not require the data on this mission and that they could turn off their system which was in high gear to get the data. In hindsight I probably should have let them go since they had worked it very hard on the USSTRAT end and they may not respond as well next time since we "cried wolf on STS-107".

Roger is trying to make sure that there is a clear path for these requests per this note below.

-----Original Message-----

From: SIMPSON, ROGER D. (JSC-DM) (NASA)
Sent: Thursday, January 23, 2003 12:01 PM
To: 'ronald.hughes@spacecom.smil.mil'; 'robert.graves@spacecom.smil.mil'; 'david.ifflander@spacecom.smil.mil'; 'douglas.sersun@spacecom.smil.mil'
Cc: 'roger.simpson@spacecom.smil.mil'; 'linda.marchione@spacecom.smil.mil'; 'rodney.burnett@spacecom.smil.mil'; 'mcarthurj@spacecom.smil.mil'; STICH, J. S. (STEVE) (JSC-DA8) (NASA); ENGELAUF, PHILIP L. (JSC-DA8) (NASA); 'Newberry Stan SES AFSPC/NASA'
Subject: Shuttle Support

Col Ifflander and others,

Thank you for the enthusiastic response to the request for Shuttle support yesterday. Your quick response in arranging support was exceptional and we truly appreciate the effort and apologize for any inconvenience the cancellation of the request may have caused. I know that future requests will be met with the same effort.

Let me assure you that, as of yesterday afternoon, the Shuttle was in excellent shape, mission objectives were being performed and that there were no major system problems identified. The request that you received was based on a piece of debris, most likely ice or insulation from the ET, that came off shortly after launch and hit the underside of the vehicle. Even though this is not a common occurrence it is something that has happened before and is not considered to be a major problem.

The one problem that this has identified is the need for some additional coordination within NASA to assure that when a request is made it is done through the official channels. The NASA / USSTRAT (USSPACE) MOA identifies the need for this type of support and that it will be provided by USSTRAT. Procedures have been long established that identifies the Flight Dynamics Officer (for the Shuttle) and the Trajectory Operations Officer (for the International Space Station) as the POCs to work these issues with the personnel in Cheyenne Mountain. One of the primary purposes for this chain is to make sure that requests like this one does not slip through the system and spin the community up about potential problems that have not been fully vetted through the proper channels.

Two things that you can help us with is to make sure that future requests of this sort are confirmed through the proper channels. For the Shuttle it is via CMOC to the Flight Dynamics Officer. For the International Space Station it is via CMOC to the Trajectory Operations Officer. The second request is that no resources are spent unless the request has been confirmed. These requests are not meant to diminish the responsibilities of the DDMS office or to change any

previous agreements but to eliminate the confusion that can be caused by a lack of proper coordination.

Again, thank you for the support and we know that when the need arrives USSTRAT, CMOC, and the DDMS office will respond the same as they did for this one, with enthusiasm and a timely response.

*Roger D. Simpson
NASA Resident Office, Colorado Springs
United States Strategic Command West
Peterson AFB, CO 80914-3090
719-554-6729
1-888-376-4293 pager*

RAMSAY, CHRISTOPHER M. (JSC-NC1) (NASA)

03-367

From: BUTLER, SHARYL A. (JSC-NC) (NASA)
Sent: Friday, January 10, 2003 10:51 AM
To: RAMSAY, CHRISTOPHER M. (JSC-NC1) (NASA)
Subject: FW: STS-107 DR Downgrade Listing

fyi

Thanks and Have a Great Day!

Sharyl A. Butler

Mailcode - NC

(281) 483-5342 - office

(281) 483-9632 -- fax

-----Original Message-----

From: MAY, DARRYL W. (JSC-MV2) (NASA)
Sent: Tuesday, January 07, 2003 3:03 PM
To: Agres, John T; Bradt, David; Burton, Elliot; BUTLER, SHARYL; Corbin, Douglas W; Cory, Chris; Dooley, Mark; FEUSTEL, ANDREW; FRAZIER, STEPHEN; Gavert, Don; GRAHAM, DAVID; Jayne, Steve; KOTILA, CARL; MATTHEWS, DAVID; McClain, Terrell A; MOORHEAD, JANE; Olsen, Rosie; Peterson, Gene; PRUETT, WILLIAM; Reeves, Boyce; Swindells, Brian; Thornton, Patti; Townsend, J D; Ward, M A; Wilson, Peter T.
Subject: STS-107 DR Downgrade Listing



DGDR107.xls

Comments? Concurrence?

STS-107 DR DOWNGRADE LISTING

SEV	DR NUMBER	OI NO	112	113	107	OI NO	OI NO	SYSTEM AFFECTED	ORG ID	FACILITY	TITLE / RATIONALE
3	109791					29	30	MEDS	BOEING	LEVEL 6	LOSS OF DATA ON ONE FLIGHT CRITICAL BUS THE VISIBLE EFFECT OF THIS FSW DR IS THE COMPOSITE DISPLAY REFLECTING MISSING FC BUS DATA. THIS ISSUE CAN OCCUR WHEN ONE IDP IS SUPPORTING TWO MDUs, COMPOSITE DISPLAYS ARE SELECTED ON BOTH THE RIGHT STATION AND LEFT STATION MDU, AND SUBSEQUENTLY ONE OF THE STATION'S MDU IS POWERED OFF. THE MISSING FC DATA IN THIS CASE IS THE DUE TO THE FC BUS SELECTION ON THE REMAINING STATION MDU THAT WAS LAST DISPLAYED ON THE POWERED OFF STATION MDU. NO NOTE IS REQUIRED FOR STS-107.
3	111649			113				MAGR	BOEING	FLIGHT	SLUGGISH MAGRS-3S POST-INITIALIZATION RECOVERY THE VISIBLE EFFECT OF THIS FSW DR IS THE MAGR RECEIVER REQUIRING APPROXIMATELY 6 MINUTES TO PERFORM THE INITIAL ACQUISITION PROCESS. THIS CONDITION CAN OCCUR IF DURING THE INITIALIZATION PROCESS HW #1 HANGS UP PRIOR TO ESTABLISHING THE TIME BIAS FOR SATELLITE ACQUISITIONS BY THE REMAINING CHANNELS. THE MAGR WILL AUTONOMOUSLY MODE TO NORMAL TRACK AND ACQUIRE THE SATELLITE AFTER INITIAL ACQUISITION LOGIC TIME OUT. NO NOTE IS REQUIRED FOR STS-107.
3	120250	28						PASS	USA	DESK	INSUFFICIENT ARCTAN2 PROTECTION FOR RA_DEC THE VISIBLE EFFECT OF THIS FSW DR IS A GPC ERROR BEING GENERATED AND DOWNLISTED AFTER A STAR VECTOR THAT CORRESPONDS TO A TARGET DIRECTLY OVER THE NORTH OR SOUTH POLE HAS BEEN PROCESSED BY THE UNIVERSAL POINTING PROC. THIS CONDITION COULD OCCUR BECAUSE THE UNIVERSAL POINTING DISPLAY REQUIREMENTS DO NOT PROTECT AGAINST UNIT VECTOR VALUES OF ZERO FROM BEING INPUTTED. NO NOTE IS REQUIRED FOR STS-107.
4	120252	28				29		PASS	USA	TRAP	FSW VERSION OF COMPILER DR 120221

THESE FSW DISCREPANCIES HAVE BEEN DISPOSITIONED AS ACCEPTABLE FOR FLIGHT

DATE

03-367

GLANVILLE, ROY W. (JSC-NC) (NASA)

From: FOSTER, ANDY (JSC-NC) (GHG)
Sent: Tuesday, January 14, 2003 8:43 AM
To: Alan Peterson (E-mail)
Cc: DYER, KEITH W. (JSC-NC) (SAIC); GLANVILLE, ROY W. (JSC-NC) (NASA); HUDSON, ROBERT H. (JSC-NC) (NASA)
Subject: FW: Light Precip & Tile Damage

FYI..

-----Original Message-----

From: PETERS, JEFFREY P. (JSC-NC) (SAIC)
Sent: Tuesday, January 14, 2003 8:29 AM
To: GARDNER, JAMES R. (JSC-NC) (GHG); WITWER, DAVE W. (JSC-NC) (SAIC); FOSTER, ANDY (JSC-NC) (GHG)
Subject: FW: Light Precip & Tile Damage

Guys: Here's our answer from the GPO office. I'm going to query Chris Lessmann & Jim Harder on the subject.

-----Original Message-----

From: JONES, RICHARD S. (JSC-DM) (NASA)
Sent: Monday, January 13, 2003 3:22 PM
To: PETERS, JEFFREY P. (JSC-NC) (SAIC)
Cc: GONZALEZ, EDWARD P. (ED) (JSC-DM4) (NASA)
Subject: RE: Light Precip & Tile Damage

Jeff,

Alan Hochstein made an "engineering assessment" years ago on what a delta-coefficient of drag increment due to rain would do to touchdown energy. Basically, after applying this delta-drag increment to the aero database from 10k to touchdown, he showed the orbiter could lose 1000 ft of touchdown energy by flying through rain. To mitigate the increased drag effect, the flight rule was worded such that both the nominal and close-in required at least 2000 ft of energy, ie. $2000 - (1000 \text{ ft of rain drag}) = 1000 \text{ ft (minimum energy for go runway)}$. How Alan derived the increment, I'm not sure, but if you really need that history, you might want to check with either Chris Lessmann or Jim Harder for their recollection of how this was derived. By the way, "tile damage" was never assessed during his study.

Thanks,
Richard

-----Original Message-----

From: PETERS, JEFFREY P. (JSC-NC) (SAIC)
Sent: Monday, January 13, 2003 3:07 PM
To: JONES, RICHARD S. (JSC-DM) (NASA)
Subject: Light Precip & Tile Damage

Richard:

I'm looking at the new TAL Rainshower "Exception" annex rule for STS-107, and I was wondering if you can help me out with a question. I'm looking at the rule rationale and I see the following:

"Tile damage could result in a loss of up to 1000 ft of touchdown distance. Typical touchdown distances carry adequate margin to protect this type of energy loss."

I look back to the RTLS version of this, and I see it's there too. For my education purposes to try and understand the rule better, where did that data come from & what is it based on?

Thanks for your help.
Jeff

Jeff Peters
SR&QA Shuttle Operations
NASA-JSC
281-244-1937

GLANVILLE, ROY W. (JSC-NC) (NASA)

From: FOSTER, ANDY (JSC-NC) (GHG)
Sent: Thursday, January 09, 2003 4:03 PM
To: GLANVILLE, ROY W. (JSC-NC) (NASA)
Subject: FW: Deviation for STS-107



LD-079.pdf

Roy,

This deviation just arrived via e-mail. It's being walked onto the Noon Board tomorrow. Dean Moreland is the prime Payload Safety engineer for STS-107. I forwarded it to him. He said he was aware of it and had no issues. If you have any questions, I would recommend you contact Dean directly. If that fails and you need some help, call me back and I'll do what I can to assist.

Andy

-----Original Message-----

From: Curt Martin [mailto:Curtis.F.Martin@nasa.gov]
Sent: Thursday, January 09, 2003 3:24 PM
To: LEMAN, CHRISTOPHER L. (JSC-DF511) (USA); DeLisa Kennard; Jeff Gray; Shawn M. Greenwell; Thomas Milner; Jamie Shumbera; YORK, TIFFANY D. (JSC-NC) (GHG); Petrina Winfield-Gordon; FOSTER, ANDY (JSC-NC) (GHG); Lisa M. Agnew; Debbie Awtonomow; Stephen Bauder; Michale S. Bauer; Chris L. Best; Barbara K. Bitner; Kathy Blackburn; Pat Blackwell; O'KEEFFE, BARBARA L. (JSC-DA8) (USA); Larry P. Budnick; Suzanne R. Caillouet; Catherine Carr; Angie Daniels; Dawn Diecidue-Conners; BURTON, DOUG N. (JSC-DT6) (USA); Don Driscoll; Randy Duncan; Greg Holden; Malcolm Glenn; Syd Henderson; Terri Herst; Darrell Holloway; Jack Howell; PETERS, JEFFREY P. (JSC-NC) (SAIC); BROWN, KENNETH L. (JSC-MV6) (NASA); Roland LeBon; Dennis LeHouillier; Fred Lockhart; Tim Lovell; Curt Martin; Brent Martin; Jim McEuen; MILLER, LADONNA J. (JSC-MT2) (NASA); Mike Carlson; David A. Mohler; Robert C. Parks; Donna Patterson; DAVIS, PATRICIA L. (JSC-DA8) (USA); Stephanie Phillips; Shelly Pulz; Clay Ramsey; Douglas Reeves; Sandy Roller; Beth Rysdyk; Renee Sawyer; Steve Snell; HIRSHORN, STEVEN R. (JSC-DF) (NASA); Tracy E. Smith; MORAN, SHERI (JSC-NC) (GHG); Greg Stover; BRIDGES, TODD L. (JSC-NC) (GHG); Steve Thornton; Dean Tyre; Neal E. Van Scyoc; Carl Villanueva; William Voigt; Betty Wells; Doug White; MOFFITT, W. L. (LONNIE) (JSC-DA8) (USA); Jennifer Zuckerman
Subject: Deviation for STS-107

Attached is a copy of a deviation (against SSID RDM-05) for STS-107 that will be walked on to the Noon Board on Friday 1-10-03. If you have comments, please express them at the Board.

Curt Martin

SHUTTLE LAUNCH COMMIT CRITERIA WAIVER/DEVIATION

TRACKING NUMBER: LD-079

PCIN: S072380CP

MISSION: 107/102

ORIGINATOR: Richard J. Cole

DATE: 01-09-2003

PAGE 1 OF 3

SSID/PAGE: RDM-05

DESCRIPTION: Payload Aft Main B Power Anomaly

REQUIREMENT :

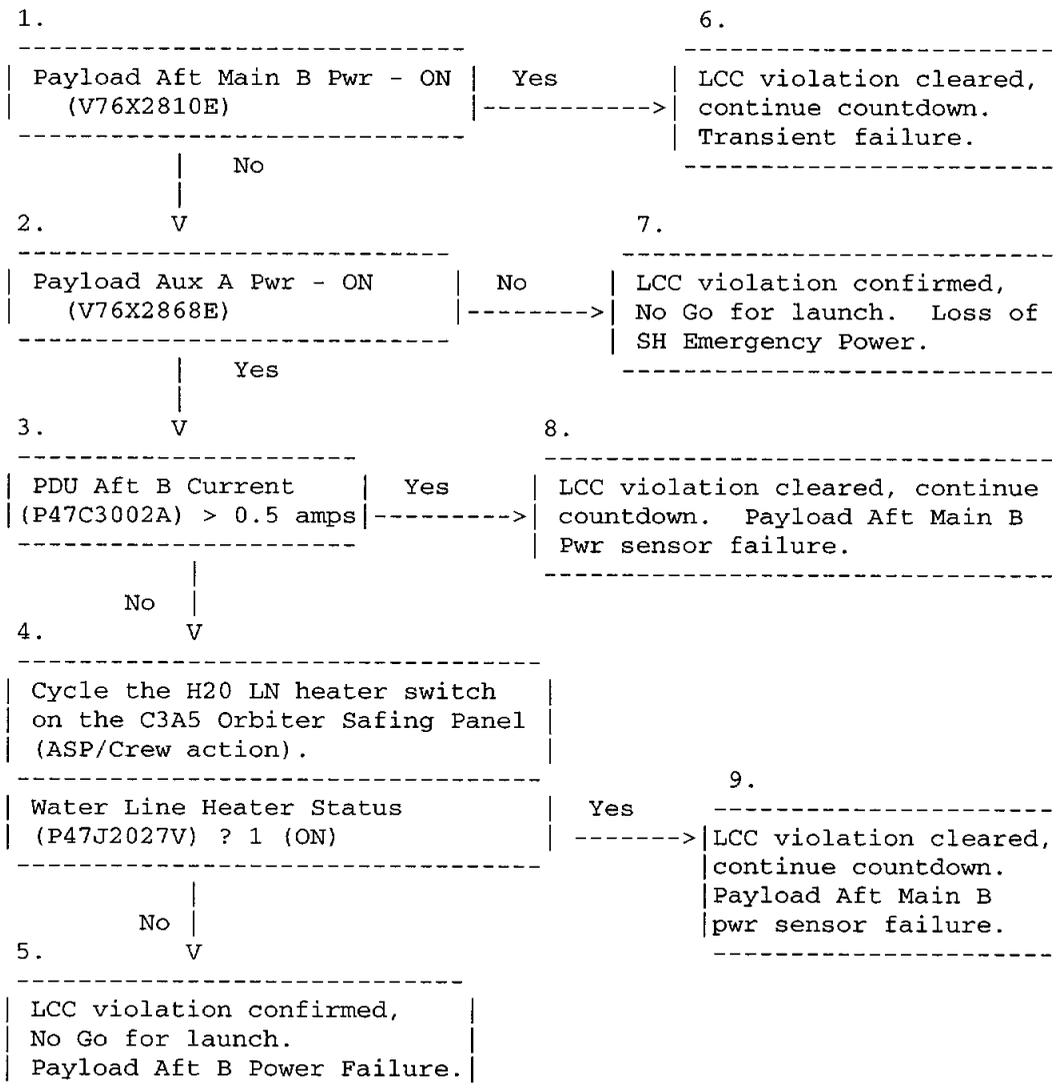


Figure 37-20, Payload Aft Main B Power Anomaly Contingency Procedure

SHUTTLE LAUNCH COMMIT CRITERIA WAIVER/DEVIATION

TRACKING NUMBER: LD-079

PCIN: S072380CP

MISSION: 107/102

ORIGINATOR: Richard J. Cole

DATE: 01-09-2003

PAGE 2 OF 3

WAIVER/DEVIATION:

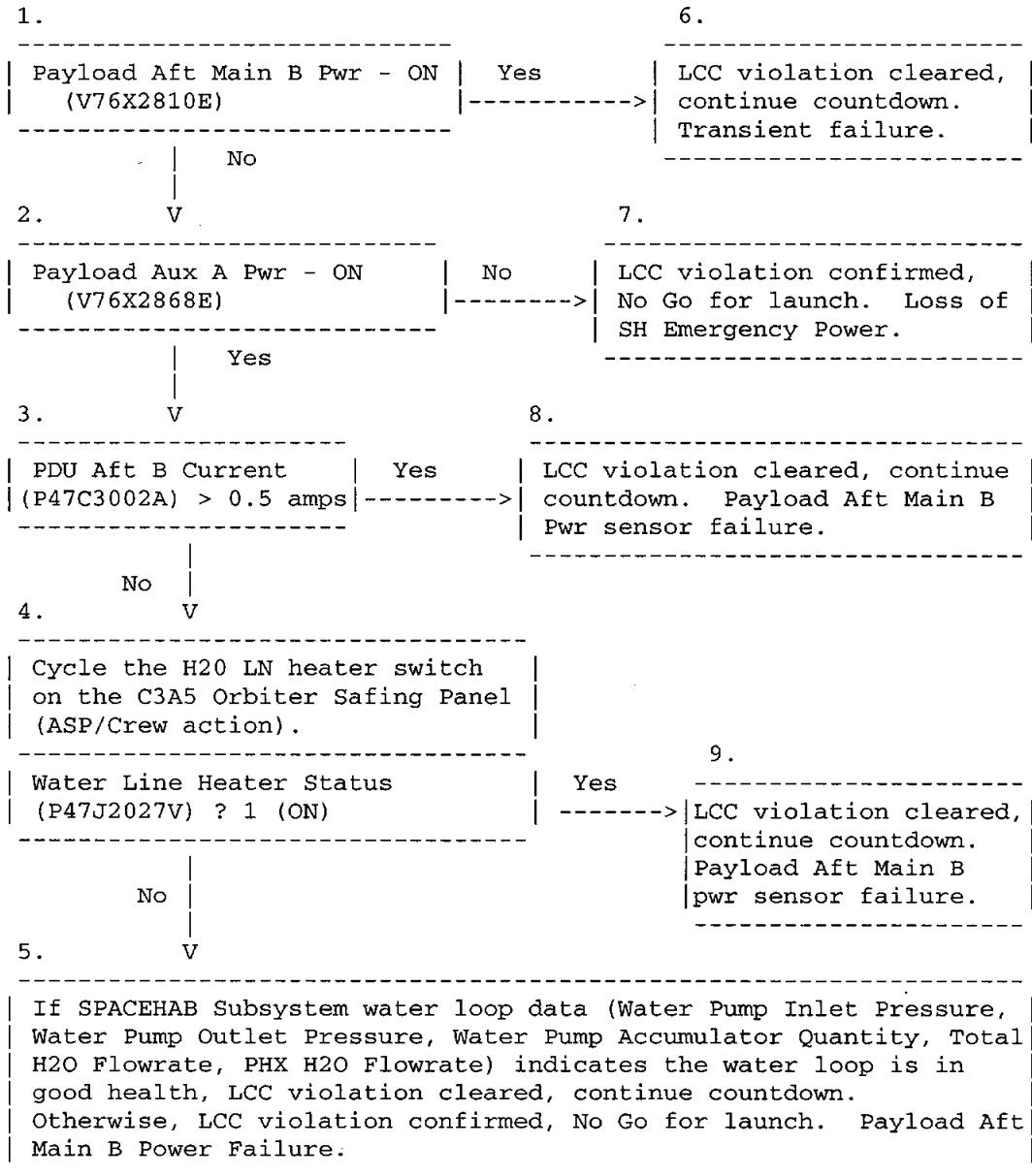


Figure 37-20, Payload Aft Main B Power Anomaly Contingency Procedure

SHUTTLE LAUNCH COMMIT CRITERIA WAIVER/DEVIATION

TRACKING NUMBER: LD-079

PCIN: S072380CP

MISSION: 107/102

ORIGINATOR: Richard J. Cole

DATE: 01-09-2003

PAGE 3 OF 3

JUSTIFICATION:

Loss of Aft Main B results in loss of redundancy for the SPACEHAB emergency bus and complete loss of capability to operate the SPACEHAB Water Line heaters. A second failure would be required to impact SPACEHAB mission success. Complete loss of SPACEHAB Emergency Bus prior to launch is protected by RDM-02 and loss of the RDM water Loop is protected by RDM-08, 09, 10 and 11. For a second failure on-orbit that would nominally require water line heater activation, Shuttle attitude control would be invoked per the Flight Rules.

WORKAROUND:

None.

APPROVALS:

Launch Director	Date	Manager, Launch Integration	Date
NR			
NASA Project Manager	Date	Manager, Space Shuttle KSC Integration	Date
NR		NR	
Contractor Manager	Date	Manager, Space Shuttle Projects MSFC	Date
NR		NR	
	Date	Manager, Space Shuttle SR&QA	Date
		NR	

LCC VIOLATION CALL: Payload Aft Main B Power Anomaly | EMERG COND: | None

Table with 7 columns: MEAS. NO., MEASUREMENT DESCRIPTION, CAT., MINIMUM, MAXIMUM, UNITS, CODE. Row 1: V76X2810E, Payload Aft Main B Pwr - ON, ON, NA, Event, CI

TIME PERIOD:

- (1) From Start of ET Cryo Tanking (T-6 hours) to Go for GLS Start (T-9 minutes)

REQUIREMENTS: FIGURES/TABLES: 37-20

- (2) This LCC is effective only for Spacehab RDM flights in which the module subsystems are powered during the LCC time period.
(3) For confirmed instrumentation failure, LCC violation cleared, continue countdown. (4)

PREPLANNED CONTINGENCY PROCEDURE:

- (4) See Figure 37-20, Payload Aft Main B Power Anomaly Contingency Procedure.

NOTES:

- (5) Mission Success LCC.
(6) This LCC will be monitored by the customer from a NASA/KSC console.

REDLINE DERIVATION: CRITICALITY:

- (7) PL Aft Main B and PL AUX A are combined to form the SH Emergency Bus.

CONSEQUENCES OF EXCEEDING REDLINE:

- (8) Possible loss of redundant power to SH safety critical hardware and possible loss of power to SH Water Line Heaters.

The following safety critical hardware is powered via the Emergency Bus:

- Fire Suppression System Firing Circuits (FSCU).
- Signal Conditioning for safety critical circuits.
- Smoke Sensor A.
- ARS Fan Delta Pressure #1.
- HFA Delta Pressure #1.
- PPCO2 #1.
- Forward Sensor Panel.
- PPO2 #1.

PL Aft Main B is the sole source of power to the SH Water Line Heaters.



CAUSES OF EXCEEDING REDLINE:

- (9) - Open or failed Power Contactor (K1 APC2).
- Loss of Discrete measurement power (ESS2CA AP&LC2).
 - Open Fuse (10 APC5).
 - Open limiting resistor (OV-102 A1R# APC2, OV103 and subs A2R6 APC2).
- Instrumentation failure: MDM/Card/Channel/SB OA2/Cd 05/Ch 00/Bit 11.
- Loss of Orbiter Main B busses: Main B DA2, APC5, APC2.
- Open Payload Aft Main B fuse APC2.

SPACE SHUTTLE SYSTEMS HANDBOOK:	DWG NO	SHEET	ZONE
INTEGRATED SYSTEMS SCHEMATIC:	DWG NO	SHEET	ZONE

ELEMENT: SPACEHAB SUBSYSTEM: EPS

MISSION: STS-107,112-999
AUTH: S072380BV

BU-2

37d-05.2

REVISION H
CHANGE NO. 026

SUPPORTING DATA:

<p>1.</p> <p>-----</p> <p>| Payload Aft Main B Pwr - ON | Yes |</p> <p>| (V76X2810E) |----->|</p> <p>-----</p> <p>| | No |</p> <p>| | |</p> <p>2. | V |</p> <p>-----</p> <p>| Payload Aux A Pwr - ON | No |</p> <p>| (V76X2868E) |----->|</p> <p>-----</p> <p>| | Yes |</p> <p>| | |</p> <p>3. | V |</p> <p>-----</p> <p>| PDU Aft B Current | Yes |</p> <p>| (P47C3002A) > 0.5 amps |----->|</p> <p>-----</p> <p>| | No |</p> <p>| | |</p> <p>4. | V |</p> <p>-----</p> <p>| Cycle the H2O LN heater switch |</p> <p>| on the C3A5 Orbiter Safing Panel |</p> <p>| (ASP/Crew action). |</p> <p>-----</p> <p>| Water Line Heater Status | Yes |</p> <p>| (P47J2027V) - 1 (ON) |----->|</p> <p>-----</p> <p>| | No |</p> <p>| | |</p> <p>5. | V |</p> <p>-----</p> <p>| LCC violation confirmed, |</p> <p>| No Go for launch. |</p> <p>| Payload Aft B Power Failure. |</p> <p>-----</p>	<p>6.</p> <p>-----</p> <p>| LCC violation cleared, |</p> <p>| continue countdown. |</p> <p>| Transient failure. |</p> <p>-----</p> <p>7.</p> <p>-----</p> <p>| LCC violation confirmed, |</p> <p>| No Go for launch. Loss of |</p> <p>| SH Emergency Power. |</p> <p>-----</p> <p>8.</p> <p>-----</p> <p>| LCC violation cleared, continue |</p> <p>| countdown. Payload Aft Main B |</p> <p>| Pwr sensor failure. |</p> <p>-----</p> <p>9.</p> <p>-----</p> <p>| LCC violation cleared, |</p> <p>| continue countdown. |</p> <p>| Payload Aft Main B pwr |</p> <p>| sensor failure. |</p> <p>-----</p>
--	---

Figure 37-20, Payload Aft Main B Power Anomaly Contingency Procedure

ERMINGER, MARK D. (JSC-NC) (NASA)

From: WETHERLEY, EDIE (JSC-REMOTE)
Sent: Tuesday, January 07, 2003 7:07 AM
To: Adam West; 'Ahmed, Anwar M'; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); ANGSTADT, TARA S. (JSC-EP) (NASA); ASHBY, JEFFREY S. (JSC-CB) (NASA); Ayott, Bill; BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BARCKHOLTZ, RANDALL J. (RANDY) (JSC-CB) (USA); BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG); Bihner; BRADLEY, KARLA F. (JSC-EP) (NASA); ELIASON, BRENDA J. (JSC-EA6) (NASA); Bryan Banks; Burghardt, Michael J; BWatkins; CERNA, NANETTE (JSC-MV) (NASA); COLLINS, EILEEN M. (JSC-CB) (NASA); Cowart, Jon; Danielson, Michael; CURRIE, DAVID W. (JSC-CB) (USA); Dean Kunz; Dinsel, Alison; DITTEMORE, RONALD D. (JSC-MA) (NASA); MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA); Doug Whitehead; ERMINGER, MARK D. (JSC-NC) (NASA); Eyman; Fugitt Mark D (E-mail); GALBREATH, GREGORY F. (GREG) (JSC-ES2) (NASA); GALVEZ, RONALD M. (JSC-EP5) (NASA); Gary Wentz; GRUSH, GENE R. (JSC-EP111) (NASA); George Hamilton-1; GERSTENMAIER, WILLIAM H. (BILL) (JSC-OA) (NASA); GUIDRY, BETTY J. (JSC-NC) (GHG); HAMILTON, DAVID A. (DAVE) (JSC-EA) (NASA); HAWLEY, STEVEN A. (JSC-SA13) (NASA); Heitzman, William; HENDERSON, EDWARD M. (MACK) (JSC-MA) (NASA); HERNANDEZ, FRANCISCO J. (JSC-EP) (NASA); HIEMER, ARTHUR T. (JSC-EV) (NASA); HUDSON, ROBERT H. (JSC-NC) (NASA); Hunt, John W; James Marczak; James McDede-1; JACOBS, JEREMY B. (JSC-ES4) (NASA); John Gurecki; JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); JONES, SAMUEL E. (JSC-EP) (NASA); Joyce Rozewski; jtinsley@hq.nasa.gov; KAUPP, HENRY J. (JSC-ER3) (NASA); KENNEDY, JOHN J. (JSC-MV6) (NASA); BROWN, KENNETH L. (JSC-MV6) (NASA); DUNN, KEVIN W. (JSC-EV) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); Lackey-1, Eddie; Lam, Gary; Launch-INT; Leba, Anne; 'Leba, Anthony T'; LEVY, VINCENT M. (JSC-EG) (NASA); Mai, Han D; Mark Kowaleski; Martt; MCCURDY, KERRI (JSC-EP5) (NASA); METCALF, JORDAN L. (JSC-EC6) (NASA); Michael Snyder; Michael Wilhoit; MILLER, JOHN D. (JSC-EV) (NASA); Minter, Larry V; ORTIZ-LONGO, CARLOS R., PHD (JSC-EA4) (NASA); OUELLETTE, FRED A. (JSC-MV6) (NASA); PETETE, PATRICIA (TRISH) (JSC-MV) (NASA); Peterson, William D; PLAISANCE, LANNY P. (JSC-EP5) (NASA); Powers; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); Reeves; Regina L. Hoover; RINGO, LESLIE A. (JSC-CB) (USA); ABBOTT, ROBERT (JSC-REMOTE); ROE, RALPH R. (JSC-MV) (NASA); ROMERO, DENISE M. (JSC-EV) (NASA); Ronald Woods; ROTTER, HENRY A. (HANK) (JSC-EC) (NASA); 'Schletz, Brian'; SCHOMBURG, CALVIN (JSC-EA) (NASA); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); Simon; SIMON, THOMAS M. (TOM) (JSC-EP4) (NASA); SIMPSON, SCOTT W. (JSC-NE) (SAIC); Stefanovic, Milivoje; THIBODEAU, JOSEPH R. (JOE) (JSC-EG) (NASA); Vonusa, Ed; WAGNER, HOWARD A., PHD (JSC-EP) (NASA); White; WILDER, Jim; Williams, Charlie; WILSON, SUE U. (JSC-EA) (NASA); WINKLER, H. E. (GENE) (JSC-EC) (NASA); YORK, TIFFANY D. (JSC-NC) (GHG); YOUNG, JOHN W. (JSC-AC5) (NASA)
Subject: Daily Status: 01/07/03



ORBITER STATUS
01-07-03.doc

SHUTTLE QUICK LOOK STATUS

Tuesday, January 07, 2003

A. STS-107/OV-102/PAD-A

1. Orbiter Aft Closeout Is In Work.
2. EMU Installation Is Complete; Check-Out Is In Work.
3. Preps For Ordnance Installation Are In Work.
4. OMBUU Mate Is Complete.

B. STS-114/OV-104/OPF-1

1. Heat Shield Installation Is In Work.
2. FRCS Installation Is In Work.

C. STS-115/OV-105/OPF-2

1. OMS Pod Checkout Is In Work.
2. MEC/PIC Verification Is Complete.
3. Fuel Cell Single Cell Voltage Test Is In Work.

D. STS-121/OV-103/OPF-3

1. OMM Inspections And Modifications Are In Work

IPR'S STS-107/OV-102:

No New UA's

NEW: IPR-091 (DPS). During vehicle power-up, the CDR powered on IDP1 and then powered off 4 seconds later (this is an OMRS violation requiring an IDP to remain powered on for a minimum of 30 seconds prior to powering off). Problem is result of CDR inadvertent switch throw. NOTE: This is the 4th violation for this IDP.

UPDATE: IPR-090 (Fuel Line Temp #3 Did Not Cycle Off for The "A" Heater). T/S of fuel pump bypass line temp sensor (V46T0328A)- of system 3A complete; heater worked but did not reach cutoff temp, trip limit was achieved with an increase on MN BUS C AFT PCA voltage from 29.3 to 30.1 VDC and an increased aft purge temp; thermostat cycled off after being at 98.8 deg. F for ~ 30 min; all parameters are within tolerance.

IPR'S STS-114/OV-104:

No New UA's

NEW: IPR-042 (OMS). Ammeter read 0.0 amps when switch S1021 was cooled (heaters 1021 and 1022); this heater string is for the right doghouse door/bellows assembly; t/s – heater was cooled to ~ 0 degrees; a similar test was performed on the left hand side with expected results; testing performed on the right hand side and failed the test again; t/s continues.

NEW: IPR-043 (OMS). Ammeter indicated 0.0 amps when switch S1151 was cooled (heaters 1151 and 1152); s/b 0.2 – 0.4 amps. For both of these IPR's the common denominator is AFT PCA #1. More t/s to come.

IPR'S STS-115/OV-105:

UPDATE: IPR-012 (Higher Than Expected Decay On O2 System). As reported 01/06 the R/R was completed but more t/s is planned; prior to additional mass spec leak checks a series of manifold decay checks will be performed in an attempt to isolate the potential leak source location to manifolds 1 and 2, or cross-over; possibility that O2 tank 1 check valve has an internal leak which could explain the problem as well as the increase in manifold decay indicated at the Pad last flow.

UPDATE: IPR-013 (Higher Than Expected Decay Noticed On H2 System). T/S – calculations show a 2.13 sccm decay over a 12 day period; fidelity level is 16 sccm (well below the fidelity of the test); plan to close IPR as an explained condition.

No New UA's

IPR'S OMDP (STS-121)/OV-103:

No New UA's.

NO NEW IPR'S TO REPORT.

NO UPDATES TO REPORT.

Window Inspection Status

http://xb70.ksc.nasa.gov/pvd/windows/templates/inspect_rpt.cfm

Milestones

Information may be obtained from the following web sites provided the user has the necessary access permissions.

MK Review milestones:

<http://usa1.unitedspacealliance.com/usago/orgs/kscspi001/launch/schedule.pdf>

MV Review milestones:

http://opic.cal.boeing.com/data_eng/vehicle/frr/index.htm

PAO Manifest Info:

<http://www-pao.ksc.nasa.gov/kscpao/schedule/schedule.htm>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Sent: Tuesday, January 07, 2003 1:12 PM
To: DL SRQA PAR SUPPORT; Leigh Martin (MSFC) (E-mail); Brenda Willis (E-mail); Alan Peterson (Boeing) (E-mail); Arnold Clifton T. (E-mail); Barnes Jeffrey E (Boeing) (E-mail); Bevels Vicki (E-mail); Bill Loewy (E-mail); 'Carol Rush' (E-mail); Chris Hill (MSFC) (E-mail); 'Cianciola C. (MSFC) @SMTP' (E-mail); Corey Harrell (MSFC) (E-mail); Daniels Angela (E-mail); Darrell Warner (Boeing) (E-mail); Dave Spacek (MSFC) (E-mail); 'Diana Heberling' (E-mail); donnie.george/msfc (E-mail); Dumetz Marisa (E-mail); Engler Tom (E-mail); Ernest-1 Stephen (E-mail); Fred Dadfar (MSFC) (E-mail); 'Gatto Leigh(IV&V)' (E-mail); Gordon-1 Mark (E-mail); Gregg George (MSFC) (E-mail); griffith (jamss) (E-mail); Haddad-1 Michael (E-mail); Hashimoto Rick (E-mail); 'Hill Bill (HQ) @SMTP' (E-mail); 'Howell. Nelda' (E-mail); James Halsell (KSC) (E-mail); John McPherson (MSFC) (E-mail); John. R. Dicks@ivv.nasa.gov (E-mail); Keith Pauley (E-mail); Kennedy Michael (E-mail); kim.carmean@msfc.nasa.gov (E-mail); 'Lackey Ed' (E-mail); Leigh Martin (MSFC) (E-mail); Linda Combs (E-mail); Mark Kowalesky (HQ) (E-mail); Mike Card (HQ); mikesmiles; Mitsui Masami (NASDA) (E-mail); Moorhead-III James L (E-mail); Mr. Takeuchi(nasda) (E-mail); Mullane Dan (E-mail); Nathan Kyser (jams) (E-mail); Nobles Noel R (E-mail); pollystenger; rich patrican; Roger Counts; 'Sandy'; Sharolee Huet-1 (E-mail); Sims, John (MSFC); Sue Fenn (HQ); 'Suzanne Little'; thomas S Touts (GDSFC); thomas.w.hartline@msfc.nasa.gov; Tom Hancock (MSFC); Walker, Angelia; Wbihner (E-mail); wbostick; 'Willis-1, Brenda'; Wren, Robert J (USA); Zavala, Velma (USA)
Subject: STS-107 PMMT Tagup and 10P PAR Agenda (1/10/03)

TO: Distribution
FROM: MQ/Manager, Space Shuttle SR&QA Office
SUBJECT: STS-107 PMMT Tagup and 10P PAR

The STS-107 PMMT Tagup and 10P PAR are scheduled for Friday, January 10, 2003, 10:00 AM EST, 09:00 AM CST. The meeting will be teleconferenced from JSC Building 9, Room 2160 (PAR Room). The basic agenda is shown below.

Presentation material is due January 8th.

STS-107 PMMT TAGUP JANUARY 10, 2003

INTRODUCTION

Vehicle Status (verbal)
Crew Status (verbal)
1-Pager Status (verbal)

JSC/NC/Mark Erminger
KSC
JSC/CB

SPECIAL TOPICS

1. SHUTTLE

OV-103 BSTRACK Crack

JSC/Bill Prince

MSFC

KSC

Action Items, Summary & Next Meeting Schedule

JSC/NC/Mark Erminger

**10P PAR (FOLLOWING 107 PMMT TAGUP)
JANUARY 10, 2003**

INTRODUCTION

Vehicle Status (verbal)
Crew Status (verbal)
1-Pager Status (verbal)

JSC/NC/Mark Erminger
KSC
JSC/CB

ISS 10P OVERVIEW

JSC/NE/Bobbie Jenkins

10P PAYLOAD OVERVIEW

JSC/Jeff Nill

SPECIAL TOPICS

1. STATION

JSC

2. INDEPENDENT ASSURANCE

JSC Independent Assessment
KSC SHIA
MSFC/Angelia Walker

JSC/Mac Himel
KSC/Mark Gordon
MSFC HEDS

Action Items, Summary & Next Meeting Schedule

JSC/NC/Mark Erminger

This memo is being released in accordance with Mr. Mark Erminger.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: Bill Bihner [wbihner@hq.nasa.gov]
Sent: Tuesday, January 07, 2003 2:35 PM
To: prutledg@hq.nasa.gov; jlloyd@hq.nasa.gov; mgreenfi@hq.nasa.gov; boconnor@hq.nasa.gov; wready@hq.nasa.gov; mkosteln@hq.nasa.gov; CARD, MIKE (JSC-REMOTE); wfrazier@hq.nasa.gov; rpatrica@hq.nasa.gov; Amanda.Goodson@msfc.nasa.gov; bob.peercy@west.boeing.com; john.branard@kmail.ksc.nasa.gov; BRISCOE, ALAN L. (LEE) (JSC-DA) (NASA); jmullin@hq.nasa.gov; GLANVILLE, ROY W. (JSC-NC) (NASA); YOUNG, JOHN W. (JSC-AC5) (NASA); WHITTLE, DAVID W. (JSC-MA2) (NASA); judith.hooper-1@ksc.nasa.gov; charlie.chesser@msfc.nasa.gov; steve.turner@maf.nasa.gov; ERMINGER, MARK D. (JSC-NC) (NASA); Gregory.R.Lain@maf.nasa.gov; Alex.C.Adams@msfc.nasa.gov; Daniel.J.Mullane@msfc.nasa.gov; David.J.Spacek@msfc.nasa.gov; William.Higgins-1@ksc.nasa.gov; Shannon.Bartell-1@ksc.nasa.gov; william.j.harris1@jsc.nasa.gov; Roy.Malone@msfc.nasa.gov; fgregory@hq.nasa.gov; Humberto.Garrido-1@ksc.nasa.gov; dominic.l.gorie1@jsc.nasa.gov; len.sirota@hq.nasa.gov; spitotti@mail.hq.nasa.gov; MARSHALL, YOLANDA Y. (JSC-NA) (NASA); DITTEMORE, RONALD D. (JSC-MA) (NASA); HAM, LINDA J. (JSC-MA2) (NASA); Craig.B.Clokey@USAHQ.UnitedSpaceAlliance.com; mkowales@mail.hq.nasa.gov; pcounts@hq.nasa.gov; bwatkins@hq.nasa.gov; whill@hq.nasa.gov; dwhitehe@hq.nasa.gov; sortega@hq.nasa.gov; awest@hq.nasa.gov
Cc: Roy.Bridges-1@ksc.nasa.gov; Jefferson.D.Howell1@jsc.nasa.gov; Arthur.G.Stephenson@nasa.gov; William.Parsons@ssc.nasa.gov
Subject: STS-107 FRR SMAR



STS-107_SMAR_F
RR.doc



ATT825150.txt

Good Afternoon,

Attached please find the Code Q FRR-Edition Safety and Mission Assurance Report (SMAR) for STS-107.

If there are any questions, please give me a call.

Thanks,

Bill

William J. Bihner, Jr
NASA/QE
(202) 358-4441

Safety and Mission Assurance Report for the STS-107 Mission

Flight Readiness Review Edition

January 7, 2003

**Enterprise Safety and Mission Assurance Division
Office of Safety and Mission Assurance
National Aeronautics and Space Administration
Washington, DC 20546**

SAFETY CERTIFICATION FOR THE FLIGHT READINESS REVIEW

The Enterprise Safety and Mission Assurance Division at NASA Headquarters has been involved in the review of safety risk factors affecting the risk level of this Space Shuttle mission. The Enterprise Safety and Mission Assurance Division has concurred with the decision by the Space Shuttle Program Manager in approval of Element Hazard Reports to baseline the program safety risk level. Changes to the risk baseline for the Space Shuttle Program arise from mission unique requirements, mission processing problems, in-flight anomalies, component testing, new analyses, and related issues from other vehicles. Their resolution has been evaluated for risk acceptability.

The items referred to as safety risk factors are listed in this report as either unresolved or resolved. Those safety risk factors that are unresolved must be resolved with adequate supporting flight rationale prior to the flight of this Space Shuttle mission.

The Enterprise Safety and Mission Assurance Division certifies the risk acceptability of the baseline safety risks with changes identified herein pending resolution of items identified in this report as constraints and subject to resolution of any changes to risk items.

Prepared by:

Original s/b Bill Bihner

Bill Bihner
Space Shuttle Safety and Mission Assurance
Enterprise Safety and Mission Assurance Division
Office of Safety and Mission Assurance

Table of Contents

CHANGE NOTICE4

1 INTRODUCTION..... 5

 1.1 PURPOSE 5

 1.2 SCOPE 5

 1.3 CUSTOMERS 5

2 MISSION SUMMARY 6

 2.1 MISSION & VEHICLE DATA..... 6

 2.2 MISSION ASSURANCE..... 7

3 SAFETY RISK FACTORS ASSESSMENT 8

Change Notice

This Safety and Mission Assurance Report (SMAR) has incorporated several changes from prior editions of this document. The underlying goals of these changes are to make the document more readable and useful to senior management.

1. No changes to this document.

1 Introduction

1.1 Purpose

This Safety and Mission Assurance Report (SMAR) is produced by the National Aeronautics and Space Administration (NASA) Headquarters, Office of Safety and Mission Assurance (OSMA). The SMAR provides the OSMA Associate Administrator (AA) and the Human Space Flight AA with a summary of the changes to the Shuttle Program's safety risk baseline as approved in the formal Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL) and Hazard Analysis process. Changes to the baseline since the previous flight are included to highlight their significance in risk level change. Flight rationale supporting any departure from the approved FMEA/CIL and Shuttle Program baseline is provided. The SMAR documents unresolved safety risk factors known up to this point impacting this flight.

The report is published on a mission-by-mission basis for use in the Flight Readiness Review (FRR) and is updated for the Pre-launch Mission Management Team (PMMT) Review (formerly the Launch Minus Two-Day Review), as needed.

1.2 Scope

The SMAR addresses the risk factors that represent a change from previous flights, factors from previous flights that have impact on this flight, and factors that are unique to this flight. Factors listed in the report are limited to items that affect, or have the potential to affect, Space Shuttle safety and mission assurance and have been elevated to Level I for discussion or approval. These changes are derived from a variety of sources such as issues, concerns, problems, and anomalies. It is not the intent to attempt to scour lower level files for items evaluated and closed at those levels and report them here; it is assumed that their significance is such that Level I discussion or approval is not appropriate for them. Items for which there is clearly no safety impact or potential concern will not be reported here, although items that were evaluated at some length and found not to be a concern will be reported as such.

1.3 Customers

The following are identified as the primary customers of this Safety and Mission Assurance Report:

- OSMA, Associate Administrator, Bryan D. O'Connor
- OSMA, Acting Deputy Associate Administrator, James D. Lloyd
- Office of Space Flight, Associate Administrator, William F. Readdy
- Office of Space Flight, Deputy Associate Administrator for ISS & SSP, Major General Michael Kostelnik

2 Mission Summary

2.1 Mission & Vehicle Data

Mission Data

- Launch Date: January 16, 2003
- Landing Date: February 1, 2003
- Mission Duration: 16 days
- Launch Site: KSC Pad 39A, MLP-1
- RTLS: KSC Shuttle Landing Facility
- Landing Site: KSC Shuttle Landing Facility
- TAL Site: Moron, Spain Alternate TAL Site: Zaragoza, Spain
- Inclination/Orbit: 39°/150 Nautical Miles Direct Insertion

Crew Size: 7 (click on hot links to see web-based descriptions)

Crew Position	Name	Flight Experience
Commander	<u>Rick Husband</u>	1 flight
Pilot	<u>William McCool</u>	First flight
Payload Commander	<u>Michael Anderson</u>	1 flight
Mission Specialist	<u>Kalpana Chawla</u>	1 flight
Mission Specialist	<u>David Brown</u>	First flight
Mission Specialist	<u>Laurel Clark</u>	First flight
Payload Specialist	<u>Ilan Ramon</u>	First flight

Vehicle Data

- Orbiter: OV-102 (Flight # 28, last mission STS-109, March 1-12, 2002)
- ET: ET-93 (Light Weight Tank)
- SRBs: BI-116
- RSRM Flight Set # 88
- SSME (Last Hot-fire): ME#1 (SSC Green Run), ME#2 (STS-109), ME#3 (STS-108)
 - All SSME's are Block II configuration.
- Orbiter Software Build: OI-29 (5th flight)

2.2 Mission Assurance

Priority	Mission Success Criteria
1	SPACEHAB commercial sponsored payloads
2	ESA/NASA sponsored payloads
3	NASA/ISS sponsored payloads
4	NASA/Code U sponsored payloads
5	FREESTAR
6	SIMPLEX
7	RAMBO
8	DTO's
9	DSO's

No EVA's are planned for this mission.

The following link is a detailed mission/crew timeline:

<http://mod.jsc.nasa.gov/do4/flightplan/STS107/Final/107sfin.pdf>

3 Safety Risk Factors Assessment

This section contains a summary of the risk factors and their safety assessment status. Unresolved risk items, those that could impact the safety and mission assurance of this flight and require further mitigation and statement of acceptable flight rationale, are filtered to the top of the list and appear first in these tables. Resolved risk items are those that are considered closed with acceptable flight rationale from a safety perspective.

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
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#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
1	<p>OV-103 17 Inch BSTRA Ball Crack</p> <p>(OV-103 currently in Orbiter Maintenance Down Period (OMDP) until 4/04)</p>	Unresolved	<p>Special Topic</p> <p>1. OMRSD inspection of OV-103 17 inch LO2 feedline revealed a crack in the ball of the Ball Strut Tie Rod Assembly (BSTRA) nearest the LO2 manifold.</p> <p>2. Failure of the ball could result in:</p> <p>a. Lack of articulation capability of the feedline resulting in structural failure of the feedline</p> <p>b. FOD generation</p>	<p>1. A detailed boroscope inspection of the BSTRA joints on OV-102 was last done prior to STS-109. No discrepancies were noted.</p> <p>2. Videos of the BSTRAs from the summer 2002 flowliner investigation is inconclusive for evaluating the BSTRA balls on OV-102. (Boroscope inspections of the BSTRA balls only shows about 25% of the ball.)</p> <p>3. BSTRA inspections on OV-103 and OV-104 are complete; OV-105 inspections are scheduled to be complete by Jan 8. Only one cracked ball was found (on OV-103).</p> <p>4. The test plan is designed to show that once a crack is initiated that it becomes self-limiting; that joint angulation capability is not compromised; and that FOD is not generated by cracked balls.</p> <p>5. As of Jan 7 testing is not complete and logic has not been clearly established to support flight rationale.</p>	TBD	<p><u>This Flight:</u> Flight Constraint for STS-107.</p> <p>Based on program analysis and testing as of Jan 7, SMA believes that there should be a 100% inspection of the cracked BSTRA ball on OV-103.</p> <p><u>Long-Term:</u> Program is working to develop inspection techniques, replacement criteria and to find and certify an additional vendor (in addition to Arrowhead).</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
4	SSME - Nozzle Leak Below Hatband 9 on STS-113	Resolved	<p>MSFC One Pager</p> <p>1. STS-113 launch video footage showed an external fire in the 10th bay of Nozzle 5007 near fuel feedline 5 on SSME 2050. The fire is thought to be caused by ignition of coldwall leakage and is near the vicinity of previously documented coldwall leakage.</p> <p>2. All pressure vessels in the vicinity of the fire were cooled by fuel flow; all non-cooled structures were protected by insulation.</p> <p>3. External fires were also noted on STS-44 and STS-53 with no resulting hardware damage or performance loss.</p>	<p>1. Post-flight leak checks showed the leakage was about 0.005 pounds mass per second (limit is less than 0.02 pounds mass per second). The leakage is not significant since most missions are tolerant to 3 tube ruptures at the aft manifold at about 5.7 pounds mass per second.</p> <p>2. Preliminary inspections of Engine 2050 after landing do not show any obvious signs of thermal damage.</p> <p>3. The magnitude of the coldwall leakage on STS-113 was insignificant to engine performance.</p>	None	This Flight: This is not an issue for the flight of STS-107.
5	SRB - Cleaning Solvent Specification Change	Resolved	<p>MSFC One Pager.</p> <p>1. Source Control Drawings (SCDs) for Spirit 126 and PF degreaser contain requirements limiting use of COTS products.</p> <p>2. The Spirit 126 batch failed SCD aniline point requirements.</p>	<p>1. Minor changes to SCD specs for PF degreaser allow purchase of COTS product.</p> <p>2. The basis for certification was "testing and similarity."</p>	None	None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
6	SRB - First Flight of Pacific Scientific Forward and Aft Separation Bolts	Resolved	<p>MSFC One Pager</p> <p>1. One new aft separation bolt was utilized in Tail Service Mast (TSM) configuration on STS-112/BI115.</p> <p>2. STS-107/BI116 will be the first use of forward and aft separation bolts in flight configuration.</p> <p>3. Bolt qual testing is complete. Bolt used in TSM for STS-112 performed nominally. Inspection shows typical fracture surfaces.</p>	<p>1. Bolt qual testing was successfully completed.</p> <p>2. The single new bolt used in the TSM for STS-112 performed nominally. Post-inspection showed typical fracture surfaces.</p>	None	None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
7	LO2 LWT Normal Mission and RTLS Ullage Pressure Curves for ET-93	Resolved	<p>MSFC One Pager</p> <p>During mission unique assessment of MPS prediction, LO2 tank pressurization analysis indicated violations for the LO2 tank nominal and RTLS missions. The worst case analysis prediction indicated a 0.15 psi violation between 82 and 102 seconds for nominal mission maximum limit, a 0.85 psi violation between 0 and 1 seconds and a 0.25 psi violation between 2 and 8 seconds for nominal mission minimum limit, and a 0.3 psi violation between 0 and 0.5 seconds and a 0.15 psi violation between 3 and 7 seconds for RTLS minimum limit.</p>	<p>An Interface Revision Notice (IRN) was implemented to revise the upper and lower pressure limits. The revised limits were presented to the Loads Panel on 12/02/02 and the IRN was approved on 12/10/02.</p> <p>The root cause for the ICD violations are due to use of Block II SSMEs with a Light Weight Tank.</p>	None	<p><u>This Flight:</u> Analysis indicates critical structural margins of safety are unaffected for the proposed maximum and minimum ICD limits for STS-107/ET-93.</p> <p>STS-107/ET-93 is safe for flight.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
8	ET Vent Valve Relief Pressure	Resolved	<p>MSFC One Pager</p> <p>Review of qualification data from the new vent/relief valve supplier (Ketema) identified reduced relief pressure during pre-press. When considering scatter in the valve cracking pressure, there is reduced margin to relief during LH2 tank pre-pressurization.</p>	<p>ET-93 is the first Light Weight Tank (LWT) to fly with three Block II SSMEs. An assessment using tank specific ullage pressure transducer biases was performed. The analysis still showed positive margins between minimum relief pressure and the maximum pressure allowed during pre-press.</p>	None	<p>This Flight: Analysis of ET-93 shows positive margin between the minimum ATP predicted valve relief pressure and the maximum ullage pressure during pre-press. STS-107/ET-93 is safe for flight</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
9	Flowliner Corrosion Resistant Steel (CRES) Issue	Resolved	<p>JSC One Pager</p> <p>Following STS-110 an OV-104 MPS LH2 propellant feedline flowliner was found to have cracks at three slot locations. Weld repairs were performed on the Inconel 718 flowliners. The repaired flowliner flew successfully on STS-112. STS-112 post-flight inspections revealed no cracks.</p> <p>Inspections on OV-102 revealed cracks in the LH2 downstream flowliner which is made from CRES 321.</p>	<p>OV-102 Actions Complete:</p> <ol style="list-style-type: none"> 1. Crack repair welds, post NDE, & clean-up of 3 observed OV-102 flowliner cracks are complete. Polishing of LH2 gimbal joint downstream and upstream flowliner slots is complete. 2. The LH2 feedline NDE inspections are complete and good. 2. The BSTRA joint was clear with no issues (ball not inspected), the bellows to gimbal weld was clear with 0.54 margin of safety at cryogenic proof pressure, the bellows was cleared for 51 missions using conservative analysis technique, and the gimbal ring was cleared for 100 plus missions. 3. Teardown and inspection of the LH2 qualification test and MPTA feedlines was completed with no issues. 	None	<p>This Flight: Based on the successfully completed crack repair welds, polishing of LH2 flowliner slots, internal feedline NDE inspections, and coupon testing, OV-102 was cleared for OPF rollout and flight.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
10	STS-113 Right Orbiter Manuvering System (OMS) Bi- Propellant Valve Open Indication	Resolved	<p>JSC One Pager.</p> <p>1. At the end of the OMS burn, the right ball valve 2 continued to indicate open. The indication dropped only 0.5% so that the reading was 95.8% when it should be 0%.</p> <p>2. Per the flight rules, the right OMS was declared usable only for deorbit. All remaining on-orbit OMS burns were performed using the single engine left OMS only.</p>	<p>Although the root cause is still under investigation, there is rationale for flight:</p> <p>1. Failure of an OMS engine ball valve to close is crit 1R/2. Subsequent failure of the second ball valve in series could result in loss of propellant;however, controls are in place to minimize propellant loss real time via isolation.</p> <p>2. The ball valves and Linear Variable Differential Transducers (LVDT) on OV-102 have no history of problems in 28 flights.</p> <p>3. The LVDTs on OV-102 have flown only one mission since they were last cleaned.</p> <p>4. A safe deorbit burn is still possible with either a failed open ball valve or failed LVDT.</p>	None	<u>This Flight:</u> None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
11	STS-113 Flash Evaporator System (FES) Primary B Controller Failure	Resolved	JSC One Pager. The FES shut down during a FES water dump on the PRI B controller. Attempts to restart on PRI B were unsuccessful.	1. Ice formation was the suspected cause on STS-113. A core flush procedure was successfully performed. The FES continued to operate nominally on the PRI A controller for the remainder of the flight. 2. The root cause of the failure is a leaking spray valve on the "B" system. The spray valve assembly has been removed and replaced.	None	<u>This Flight:</u> None A newly refurbished FES was installed in OV-102 at OMM and has successfully passed ATP and OMSRD testing. All the controller and control modes were verified.

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
12	STS-113 O2 leak in the Mid-Body	Resolved	<p>JSC One Pager.</p> <p>1. The mid-body and payload bay Hazardous Gas Detection System sample lines showed high levels of O2 during pre-launch. The levels measured 130 to 15 ppm and they should be approximately zero.</p> <p>2. Troubleshooting isolated the leakage to Pressure Control System (PCS) System 2 between the valve panel and the 576 bulkhead.</p> <p>3. Post-scrub inspection of the hardware found a blowing leak, 550 scim, on the flex hose on the upper side of the flex hose braid at the 576 bulkhead fitting. The flex hose braiding showed signs of bird caging deformation, typically an indication the flex hose has been subjected to an applied external load.</p>	<p>1. The leaking secondary O2 flex hose as well as the primary O2 and secondary N2 flex hoses, were removed and replaced.</p> <p>2. Failure analysis was performed on the leaking flex hose. The findings indicated the presence of cracks and fatigue striations in some flex hoses, which are a result of relatively low frequency reverse bending fatigue.</p> <p>3. Leak checks confirmed that the hoses were good for flight. There were no other problems with this system during the remainder of the STS-113 flight.</p> <p>The O2 and N2 lines on STS-107 were inspected and leak-checked with no issues for flight.</p>	None	<p><u>This Flight:</u> None</p> <p><u>Long Term:</u> Inspections and inspection frequency, and criteria for replacement will need to be developed.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
13	<p>STS-109 Freon Coolant Loop 1 Flow Degradation</p> <p>(STS-109 was OV-102's last flight, 3/1/02 - 3/12/02)</p>	Resolved	<p>JSC One Pager.</p> <p>1. On STS-109, several seconds after Main Engine Cut Off (MECO), the freon coolant loop (FCL) 1 aft coldplate flow rate decreased from 304 lb/hr to 226 lb/hr.</p> <p>2. The FCL 1 interchanger flow and payload heat exchanger flow increased at the same time, which confirmed a restriction in the aft coldplate branch.</p>	<p>1. The flow rate was stable following this event.</p> <p>2. The flight rule states that the minimum flow rate in the aft coldplate branch is 211 lb/hr actual, 236 lb/hr allowing for measurement uncertainty, for a one FCL entry.</p> <p>3. It was determined by analysis that FCL 1 would be able to provide sufficient cooling for the mission if FCL 2 failed and the mission continued as planned.</p> <p>4. The debris that caused the flow restriction was removed; X-ray and visual inspections verified acceptable system cleanliness.</p> <p>The contamination responsible for the STS-109 anomaly was removed from OV-102. OV-102 FCL 1 ACP leg orifice, FPM, and pump inlet filters were replaced. X-rays verified no additional contamination.</p>	None	<p><u>This Flight:</u> None.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
14	EOM Nosewheel Steering Flight Rule Change	Resolved	JSC One Pager Loss of both tires on one main gear strut and/or loss of one nosegear tire could result in loss of orbiter directional control during landing rollout with possible lateral runway departure culminating in structural breakup.	Flight rule change recognizes that KSC runway -- with recent load bearing shoulder improvements -- is now better than EDW or NOR.	None	<u>This Flight:</u> Flight rule will be STS-107 specific until the rule can be incorporated into the "all flights" document.
15	First Flight of Two AMECs	Resolved	JSC One Pager This is just a procedural notification. The Advanced Master Event Controller (AMEC) has flown as a single unit on 13 other flights. There were no anomalies on any of those flights.	The AMECs installed in OV-102 successfully completed acceptance testing and were subjected to over 1000 hours of burn-in testing at SAIL. They passed OMSRD testing with no anomalies. There are two AMEC LRUs per orbiter and each AMEC has two cores. Each core is capable of performing the separation functions for the Shuttle.	None	None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
16	SRB - Amphenol Connector Pin Lack of Retention	Resolved	<p>MSFC One Pager</p> <p>1. Inspections of Integrated Electronic Assembly (IEA) cables in the Solid Rocket Booster Assembly and Refurbishment Facility (ARF) revealed two cables with defective sockets that caused intermittent contact.</p> <p>2. Amphenol connectors on OV-102 are located on the SRB upper strut cables (BUS A&B), cable end which mates to the aft IEA.</p>	<p>1. This is a connector issue that was discovered during a bench test. One of the sockets on the connector was open and would not retain the pin.</p> <p>2. Further investigations discovered another cable assembly with the same connector problem. Will identify a root cause and contact the vendor (Amphenol).</p> <p>3. The root cause was isolated to two particular contacts. All STS-107 contacts were inspected and none were found to be bad.</p>	None	This Flight: No issues for STS-107

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
17	Body Flap Accuator Corrosion (Problem discovered while processing OV-104)	Resolved	Special Topic Internal corrosion (on the actuator housing gear teeth and the output shaft) was detected on the OV-104 body flap actuators while at the vendor (Hamilton Sundstrand) for external corrosion repairs.	1. The most probable cause of the actuator corrosion is water/moisture intrusion. A Magnetic Particle Inspection performed on the corroded OV-104 BF actuators revealed no cracks. Shaft corrosion was shallow and not a concern. The gear corrosion will not cause a near term failure of the BF actuator. The robust design of the BF actuator provides for load sharing between gear teeth. In the event of a weakened gear tooth, the load is redistributed within the outer gears. 2. Following OV-102's last flight (STS-109) close-out inspections found no corrosion or anomalies on the BF actuators. 3. When OV-103 - the fleet leader - was looked at very recently, another actuator was found with corrosion.	None	<u>This Flight:</u> None. Close-out photos verified no corrosion on OV-102 <u>Long Term:</u> Program will address actuator corrosion as a long-term flight issue.

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
18	EVA - STS-113 EVA Crew-member Boot Fit	Resolved	<p>JSC One Pager</p> <p>This is a procedural issue. The crew member trained with the proper suit which had been tailored following feedback from his flight on STS-92. When the suit was preped for the STS-113 mission, USA added the one inch spine growth length to the leg part of the suit and not the body section.</p>	The crew member was able to swap suit parts on orbit and by his third EVA, he had a suit that fit properly.	None	<p><u>This Flight:</u> NASA will work with USA to make sure that the suit meets crewmember requirements if needed for a contingency</p> <p><u>Long Term:</u> NASA will work with USA to elaborate the procedures for proper suit fit.</p>
19	STS-113 Post-Flight Observation - Foreign Material in RSRM Nozzle-to-Case Joint Radial Bolt Hole	Resolved	<p>MSFC One Pager</p> <p>A stainless steel washer (foreign object) was observed during the disassembly of STS-113 (RSRM-86) in the bottom of one of the nozzle-to-case joint radial holes. This could have potentially impacted joint clamping and seal integrity.</p>	<p>The root cause of the [problem has been determined to be a radial plug which became disassembled during removal; the washer was inadvertently not removed; and the condition was not detected by the assembly personnel.</p> <p>A PAS report has been generated to track corrective actions. There are no joint performance issues: adequate bolt preload verified by process controls and seal integrity verified by leak test.</p>	None	<p><u>This Flight:</u> No issues.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
20	STS-113 Post-Flight Observation - Flashing on RSRM Nozzle-to-Case Joint Packing with Retainers	Resolved	MSFC One Pager Post-flight assessments of STS-113 (RSRM-86) observed rubber flashing on the sealing element of five nozzle-to-case joint packing-with-retainers. Foreign material on these packing-with-retainers could impact the redundant sealing function on the nozzle-to-case joint.	The root cause and corrective actions are still being evaluated. A PAS report has been generated. The rationale for flight is based on leak checks (that verify seal integrity at high and low bolt torque and pressure), the packing-with-retainers are in high compression during motor operation, and engineering flaw testing demonstrated high tolerance for packing-with-retainer element defects.	None	<u>This Flight:</u> No issues
21	SSME Controller Coolant Duct Redesign - 1st Flight ECP	Resolved	MSFC One Pager The change is being incorporated to mitigate two issues: The controller coolant duct is in a congested area and there have been problems associated with maintaining the proper clearance to the powerhead; and the soft aluminum material is susceptible to handling damage.	The basis for certification is similarity; hotfire testing (over 29 starts and 17,030 seconds); and VCR 586 approval on 10/22/01.	None	<u>This Flight:</u> No issues

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
22	Orbital Debris and Micrometeoroid Risks	Resolved	Program calculates Orbital Debris risk probability for each mission	<p>1. Odds of Critical Penetration (OCP): 1/370 (Program requirement 1/200).</p> <p>2. Odds of Radiator Leak Penetration (ORLP): 1/315 (Program Requirement 1/61).</p>	<p>1. Risk level is within Program's risk acceptance range for Orbital Debris and Meteoroid exposure.</p> <p>2. Note that the risk level is slightly lower compared to STS-113, the previous mission (OCP was 1/244 and ORLP was 1/253).</p>	<u>Long Term:</u> The Program should continue to assess methods to further reduce the risk of orbital debris and micrometeoroids.

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ERMINGER, MARK D. (JSC-NC) (NASA)

From: McDede-1, James [James.McDede-1@ksc.nasa.gov]
Sent: Wednesday, January 08, 2003 7:11 AM
To: WETHERLEY, EDIE (JSC-REMOTE); 'Adam West'; 'Ahmed, Anwar M'; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); ANGSTADT, TARA S. (JSC-EP) (NASA); ASHBY, JEFFREY S. (JSC-CB) (NASA); 'Ayott, Bill'; BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BARCKHOLTZ, RANDALL J. (RANDY) (JSC-CB) (USA); BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG); 'Bihner'; BRADLEY, KARLA F. (JSC-EP) (NASA); ELIASON, BRENDA J. (JSC-EA6) (NASA); Banks-1 Bryan; 'Burghardt, Michael J'; 'BWatkins'; CERNA, NANETTE (JSC-MV) (NASA); COLLINS, EILEEN M. (JSC-CB) (NASA); 'Coward, Jon'; 'Danielson, Michael'; CURRIE, DAVID W. (JSC-CB) (USA); Kunz-1, Dean; Dinsel-1, Alison; DITTEMORE, RONALD D. (JSC-MA) (NASA); MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA); 'Doug Whitehead'; ERMINGER, MARK D. (JSC-NC) (NASA); Eyman, James R; 'Fugitt Mark D (E-mail)'; GALBREATH, GREGORY F. (GREG) (JSC-ES2) (NASA); GALVEZ, RONALD M. (JSC-EP5) (NASA); Wentz, Gary (MSFC); GRUSH, GENE R. (JSC-EP111) (NASA); Hamilton-1, George; GERSTENMAIER, WILLIAM H. (BILL) (JSC-OA) (NASA); GUIDRY, BETTY J. (JSC-NC) (GHG); HAMILTON, DAVID A. (DAVE) (JSC-EA) (NASA); HAWLEY, STEVEN A. (JSC-SA13) (NASA); Heitzman, William J; HENDERSON, EDWARD M. (MACK) (JSC-MA) (NASA); HERNANDEZ, FRANCISCO J. (JSC-EP) (NASA); HIEMER, ARTHUR T. (JSC-EV) (NASA); HUDSON, ROBERT H. (JSC-NC) (NASA); Hunt, John W; Marczak, James M; JACOBS, JEREMY B. (JSC-ES4) (NASA); Gurecki-1, John; JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); JONES, SAMUEL E. (JSC-EP) (NASA); Rozewski-1 Joyce; 'jtinsley@hq.nasa.gov'; KAUPP, HENRY J. (JSC-ER3) (NASA); KENNEDY, JOHN J. (JSC-MV6) (NASA); BROWN, KENNETH L. (JSC-MV6) (NASA); DUNN, KEVIN W. (JSC-EV) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); Lackey-1, Eddie; Lam, Gary ; 'Launch-INT'; 'Leba, Anne'; 'Leba, Anthony T'; LEVY, VINCENT M. (JSC-EG) (NASA); 'Mai, Han D'; 'Mark Kowaleski'; Martt, Anne V; MCCURDY, KERRI (JSC-EP5) (NASA); METCALF, JORDAN L. (JSC-EC6) (NASA); Snyder, Michael J; Wilhoit-1, Mike; MILLER, JOHN D. (JSC-EV) (NASA); 'Minter, Larry V'; ORTIZ-LONGO, CARLOS R., PHD (JSC-EA4) (NASA); OUELLETTE, FRED A. (JSC-MV6) (NASA); PETETE, PATRICIA (TRISH) (JSC-MV) (NASA); 'Peterson, William D'; PLAISANCE, LANNY P. (JSC-EP5) (NASA); 'Powers'; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); Reeves, William D; 'Regina L. Hoover'; RINGO, LESLIE A. (JSC-CB) (USA); ABBOTT, ROBERT (JSC-REMOTE); ROE, RALPH R. (JSC-MV) (NASA); ROMERO, DENISE M. (JSC-EV) (NASA); Woods-1 Ronald; ROTTER, HENRY A. (HANK) (JSC-EC) (NASA); 'Schletz, Brian'; SCHOMBURG, CALVIN (JSC-EA) (NASA); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); Simon, Alan L; SIMON, THOMAS M. (TOM) (JSC-EP4) (NASA); SIMPSON, SCOTT W. (JSC-NE) (SAIC); 'Stefanovic, Milivoje'; THIBODEAU, JOSEPH R. (JOE) (JSC-EG) (NASA); Vonusa, Edward; WAGNER, HOWARD A., PHD (JSC-EP) (NASA); White, Doug; Wilder, James; 'Williams, Charlie'; WILSON, SUE U. (JSC-EA) (NASA); WINKLER, H. E. (GENE) (JSC-EC) (NASA); YORK, TIFFANY D. (JSC-NC) (GHG); YOUNG, JOHN W. (JSC-AC5) (NASA)
Subject: Daily Status: 01/08/03
Importance: High



ORBITER STATUS
01-08-03.doc

SHUTTLE QUICK LOOK STATUS

Wednesday, January 08, 2003

A. STS-107/OV-102/PAD-A

1. Orbiter Aft Closeout Is In Work
2. EMU Installation Is Complete. Airlock Is Closed Out.
3. Ordnance Installation Is In Work
4. MMU Load, Dump, And Compare Is Complete

B. STS-114/OV-104/OPF-1

1. Heat Shield Installation Is In Work
2. FRCS Installation Is In Work
3. SSR Checkout Is Complete

C. STS-115/OV-105/OPF-2

1. OMS Pod Checkout Is In Work
2. Fuel Cell Single Cell Voltage Test Is Complete
3. Chin Panel Removal Planned For Today

D. STS-121/OV-103/OPF-3

1. OMM Inspections And Modifications Are In Work

IPR'S STS-107/OV-102:

No New UA's

NEW: IPR-092 (ECL): During EMU checkout an ox QD poppet on panel AW82B was stuck closed. It was R&R'd and the test completed.

NEW: IPR-093 (PRSD): Failed O2 GSE decay check during securing for EMU checkout. T/S isolated it to a GSE reg. After adjustment, decay test was successful.

UPDATE IPR-91 IDP#1 Power on less than 30 sec (DPS): Self test performed and passed after the problem occurred; waiver required due to OMRS violation.

IPR'S STS-114/OV-104:

No New UA's

NO NEW IPR'S TO REPORT.

NO UPDATES TO REPORT.

IPR'S STS-115/OV-105:

No New UA's

UPDATE IPR-002 (LOX): ET GHe purge bubbling; t/s complete, found three damaged conductors on a terminal board.

UPDATE IPR-009 (OMS/RCS): GSE flex hose with damaged braid; flex hose R&R complete.

IPR'S OMDP (STS-121)/OV-103:

No New UA's.

NO NEW IPR'S TO REPORT.

NO UPDATES TO REPORT.

Window Inspection Status

http://xb70.ksc.nasa.gov/pvd/windows/templates/inspect_rpt.cfm

Milestones

Information may be obtained from the following web sites provided the user has the necessary access permissions.

MK Review milestones:

<http://usa1.unitedspacealliance.com/usago/orgs/kscspi001/launch/schedule.pdf>

MV Review milestones:

http://opic.cal.boeing.com/data_eng/vehicle/frr/index.htm

PAO Manifest Info:

<http://www-pao.ksc.nasa.gov/kscpao/schedule/schedule.htm>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Sent: Wednesday, January 08, 2003 11:19 AM
To: DL SRQA PAR SUPPORT; Alan Peterson (Boeing) (E-mail); Arnold Clifton T. (E-mail); Barnes Jeffrey E (Boeing) (E-mail); Bevels Vicki (E-mail); Bill Loewy (E-mail); 'Carol Rush' (E-mail); Chris Hill (MSFC) (E-mail); 'Cianciola C. (MSFC) @SMTP' (E-mail); Corey Harrell (MSFC) (E-mail); Daniels Angela (E-mail); Darrell Warner (Boeing) (E-mail); Dave Spacek (MSFC) (E-mail); 'Diana Heberling' (E-mail); donnie. george/msfc (E-mail); Dumetz Marisa (E-mail); Engler Tom (E-mail); Ernest-1 Stephen (E-mail); Fred Dadfar (MSFC) (E-mail); 'Gatto Leigh(IV&V)' (E-mail); Gordon-1 Mark (E-mail); Gregg George (MSFC) (E-mail); griffith (jamss) (E-mail); Haddad-1 Michael (E-mail); Hashimoto Rick (E-mail); 'Hill Bill (HQ) @SMTP' (E-mail); 'Howell. Nelda' (E-mail); James Halsell (KSC) (E-mail); John McPherson (MSFC) (E-mail); John. R. Dicks@ivv. nasa. gov (E-mail); Keith Pauley (E-mail); Kennedy Michael (E-mail); kim. carmean@msfc. nasa. gov (E-mail); 'Lackey Ed' (E-mail); Leigh Martin (MSFC) (E-mail); Linda Combs (E-mail); Mark Kowalesky (HQ) (E-mail); Mike Card (HQ); mikesmiles; Mitsue Masami (NASDA) (E-mail); Moorhead-III James L (E-mail); Mr. Takeuchi (nasda) (E-mail); Mullane Dan (E-mail); Nathan Kyser (jams) (E-mail); Nobles Noel R (E-mail); pollystenger; rich patrican; Roger Counts; 'Sandy'; Sharolee Huet-1 (E-mail); Sims, John (MSFC); Sue Fenn (HQ); 'Suzanne Little'; thomas S Touts (GDSFC); thomas.w.hartline@msfc.nasa.gov; Tom Hancock (MSFC); Walker, Angelia; Wbihner (E-mail); wbostick; 'Willis-1, Brenda'; Wren, Robert J (USA); Zavala, Velma (USA)
Subject: PAR-5 Minutes for 01/03/2003



MIN010303.doc

<http://wwwsrqa.jsc.nasa.gov/par/>

Upcoming PARs:

01/07/03 STS-107 FRR Tag-up
01/10/03 STS-107 PMMT Tag-Up
01/10/03 10P PAR (immediately following the STS-107 PMMT Tagup)

Note: Current changes indicated to the right by *****

Presenters review your items and submit any changes to the PAR Coordinator as soon as possible.

Debbie Bazan, JSC PAR Coordinator
(281) 244-1862 dbazan@ems.jsc.nasa.gov

PAR-5 MINUTES JANUARY 03, 2003

<http://wwwsrqa.isc.nasa.gov/par/>

The next PAR-5 will be held on Friday, 1/17/02 at 09:30 am Central. (1/3, & 1/10 PAR5s are cancelled)

The PAR-5 is a weekly telecon for representatives in the PAR process.

Debbie Bazan, JSC PAR Coordinator, (281) 244-1862 dbazan@ems.jsc.nasa.gov Note: Current changes indicated to the right by *****
PRESENTERS REVIEW THEIR ITEMS AND SUBMIT ANY CHANGES OR REQUESTS FOR CHANGES TO THE PAR-5 COORDINATOR
PRIOR TO THE NEXT MEETING.

STS-107 (OV-102) FLIGHT MILESTONE DATES

SORR	NA	PAR:	12/20/02
FRR:	01/09/03	FRR Tagup:	01/07/03 (moved from 1/06/03)
Prelaunch MMT:	01/14/03	PMMT Tagup:	01/10/03
Shuttle Launch:	01/16/03		

Special Topics: Due COB 01/03/03

1. SHUTTLE
 - A. JSC-(VMI: Arnold Baldwin, Backup:Ross Engle)
 1. OV-103 BSTRACrack (Bill Prince/18)
 - B. MSFC
 1. SRB-Cable Connector (Randall Tucker)
 2. SRB-BSM Paint Chip FOD (Randall Tucker)
 - C. KSC-TBD
2. INDEPENDENT ASSURANCE (PAR only)
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA-No scheduled EVAs

JSC One Pagers (Shuttle): Due COB 01/03/03

1. Critical Process Changes/First Flight
 - A. tbd
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner/11)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight
 - A. tbd
2. New or Upgraded Hazards & Cils -NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils -NONE

THE FOLLOWING ITEMS WERE DISCUSSED AT THE STS-107 PAR, FRR TAGUP:

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner/1)
 - B. Shuttle Crew Constraint Exceptions (Jim Pendergast/2)
2. Payload Overview (includes NCRs)
 - A. JSC (Dean Moreland/5)
 - B. MSFC (tbd)
 - C. GDSFC (Roger Counts)
3. Shuttle Software Overview
 - A. JSC (Jane Moorhead/7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-(VMI: Arnold Baldwin, Backup:Ross Engle)
 1. Spacehab Hull Damage and Repair (see JSC payload overview) (Dean Moreland/8)
 2. OV-103 BSTRACRACK (Bill Prince/18)
 - B. MSFC
 1. SSME-STIS-113 Main Engine #1 Nozzle Leak (Martin Carson)
 2. SRB-Amphenol Connector Pin Lack of Retention (Randall Tucker)
 3. SRB-BSM Paint Chip FOD (Randall Tucker)
 - C. KSC-TBD
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 1. Space Hab & Experiment Package Configuration Management (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA-No scheduled EVAs

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight
 - A. First Flight of two AMECs (Al Arnold/10)
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner/11)
 - A. EOM Nosewheel Steering Flight Rule Change (Jim Gardener/11)
4. STS-109 Freon Coolant Loop 1 Flow Degradation (Tien Do/12)
5. STS-113 O2 Leak in Mid-body (Tien Do/Megan Bell/13)
6. STS-113 FES Primary B Controller Failure (Tien Do/Megan Bell/14)
7. STS-113 Right OMS Bi-propellant Valve Open Indication (Dan Clements/15)
8. Flowliner CRES Issue (Bill Prince-9)
9. Body Flap Actuator Corrosion (Dan Zalit/19)
10. EVA:STS-113 EVA Crewmember Boot Fit (Charles Sager/16)
11. EVA:Biomed Cable Damage (Charles Sager/17)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight
 - A. SRB-First flight of Pacific Scientific Separation Bolts (Randall Tucker)
 - B. SRB-Cleaning Solvent Specification Change (Randall Tucker)
 - C. SSME-First flight of Controller Coolant Duct Redesign (Rosalyn Patrick)
2. New or Upgraded Hazards & Cils -NONE
3. ET-Waive LO2 LWT Normal Mission & RTLS Ullage Pressure Curves for ET-93 (Keith Layne)
4. ET-Vent Valve Relief Pressure (Keith Layne)
5. SRB-BSM Motor FOD (Randall Tucker)
6. RSRM-STIS-113 Postflight Observations-Foreign Material in RSRM Nozzle-to-Case Joint Radial Bolt Hole (Chris Cianciola)
7. RSRM-STIS-113 Postflight Observations-Flashing on RSRM Nozzle-to-Case Joint Packing-with-Retainers (Chris Cianciola)

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils -NONE

10P FLIGHT MILESTONE DATES

10P SORR 01/16/03
10P Launch: 02/02/03

ISS 10P PAR: 01/10/03 (immediately following 107 PMMT)

Mission Overview:

1. Mission Success Criteria
 - A. 10P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 10P Payloads
(Jeff Nill)
3. ISS 10P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd *****
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

STS-114/ULF1 (OV-104) FLIGHT MILESTONE DATES

SORR	02/04/03	PAR:	tbd
FRR:	02/13/03	FRR Tagup:	tbd
Prelaunch MMT:	02/27/03	PMMT Tagup:	tbd
Shuttle Launch:	03/01/03 (NET)		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS S&MA Readiness Status
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. EVA Overview (includes NCRs)
(Trent Barrett-5)
4. Payload Overview (includes NCRs)
 - A. JSC (tbd-6)
 - B. MSFC (tbd)
5. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: Arnold Baldwin, Backup:Jeremy Verostko)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION
 - A. Pistol Grip Tool Undertorqued (EVA/Station)
 - B. SSRMS Close Call Lessons Learned (tbd)
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)
4. GFE: Prebreathe Protocol (Adrian Sanderlin)
5. GFE: Ergometer Use On ISS (Adrian Sanderlin)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight
 - A. RSRM 1st Flight of Press Fit Bushings on Oversized Pinholes *****
 - Replaces shrink fit method made obsolete by elimination of vapor degreaser
 - Certified by test and two static motor test firings
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE
3. ORCA Ops During Sleep Flight Rule (Scott Seyl)

6S FLIGHT MILESTONE DATES

6S SORR 04/03/03

ISS 6S PAR: tbd

6S Launch: 04/26/03

Mission Overview:

1. Mission Success Criteria
 - A. 6S
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 6S Payloads
(tbd)
3. ISS 6S Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

STS-115/12A (OV-105) FLIGHT MILESTONE DATES

SORR	05/01/03	PAR:	tbd
FRR:	05/08/03	FRR Tagup:	tbd
Prelaunch MMT:	05/21/03	PMMT Tagup:	tbd
Shuttle Launch:	05/23/03		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS S&MA Readiness Status
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. EVA Overview (includes NCRs)
(Stacie Greene-5)
4. Payload Overview (includes NCRs)
 - A. JSC (Walter Stoerkel-6)
 - B. MSFC (tbd)
5. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: tbd, Backup:tbd)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION-TBD
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
1. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

11P FLIGHT MILESTONE DATES

11P SORR 05/01/03
11P Launch: 05/26/03

ISS 11P PAR: tbd

Mission Overview:

1. Mission Success Criteria
 - A. 11P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 11P Payloads
(tbd)
3. ISS 11P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
3. New or Upgraded Hazards & Cils –NONE

ERMINGER, MARK D. (JSC-NC) (NASA)

From: McDede-1, James [James.McDede-1@ksc.nasa.gov]
Sent: Thursday, January 09, 2003 7:10 AM
To: McDede-1, James; WETHERLEY, EDIE (JSC-REMOTE); 'Adam West'; 'Ahmed, Anwar M'; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); ANGSTADT, TARA S. (JSC-EP) (NASA); ASHBY, JEFFREY S. (JSC-CB) (NASA); 'Ayott, Bill'; BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BARCKHOLTZ, RANDALL J. (RANDY) (JSC-CB) (USA); BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG); 'Bihner'; BRADLEY, KARLA F. (JSC-EP) (NASA); ELIASON, BRENDA J. (JSC-EA6) (NASA); Banks-1 Bryan; 'Burghardt, Michael J'; 'BWatkins'; CERNA, NANETTE (JSC-MV) (NASA); COLLINS, EILEEN M. (JSC-CB) (NASA); 'Coward, Jon'; 'Danielson, Michael'; CURRIE, DAVID W. (JSC-CB) (USA); Kunz-1, Dean; Dinsel-1, Alison; DITTEMORE, RONALD D. (JSC-MA) (NASA); MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA); 'Doug Whitehead'; ERMINGER, MARK D. (JSC-NC) (NASA); Eyman, James R; 'Fugitt Mark D (E-mail)'; GALBREATH, GREGORY F. (GREG) (JSC-ES2) (NASA); GALVEZ, RONALD M. (JSC-EP5) (NASA); Wentz, Gary (MSFC); GRUSH, GENE R. (JSC-EP111) (NASA); Hamilton-1, George; GERSTENMAIER, WILLIAM H. (BILL) (JSC-OA) (NASA); GUIDRY, BETTY J. (JSC-NC) (GHG); HAMILTON, DAVID A. (DAVE) (JSC-EA) (NASA); HAWLEY, STEVEN A. (JSC-SA13) (NASA); Heitzman, William J; HENDERSON, EDWARD M. (MACK) (JSC-MA) (NASA); HERNANDEZ, FRANCISCO J. (JSC-EP) (NASA); HIEMER, ARTHUR T. (JSC-EV) (NASA); HUDSON, ROBERT H. (JSC-NC) (NASA); Hunt, John W; Marczak, James M; JACOBS, JEREMY B. (JSC-ES4) (NASA); Gurecki-1, John; JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); JONES, SAMUEL E. (JSC-EP) (NASA); Rozewski-1 Joyce; 'jtinsley@hq.nasa.gov'; KAUPP, HENRY J. (JSC-ER3) (NASA); KENNEDY, JOHN J. (JSC-MV6) (NASA); BROWN, KENNETH L. (JSC-MV6) (NASA); DUNN, KEVIN W. (JSC-EV) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); Lackey-1, Eddie; Lam, Gary ; 'Launch-INT'; 'Leba, Anne'; 'Leba, Anthony T'; LEVY, VINCENT M. (JSC-EG) (NASA); 'Mai, Han D'; 'Mark Kowaleski'; Martt, Anne V; MCCURDY, KERRI (JSC-EP5) (NASA); METCALF, JORDAN L. (JSC-EC6) (NASA); Snyder, Michael J; Wilhoit-1, Mike; MILLER, JOHN D. (JSC-EV) (NASA); 'Minter, Larry V'; ORTIZ-LONGO, CARLOS R., PHD (JSC-EA4) (NASA); OUELLETTE, FRED A. (JSC-MV6) (NASA); PETETE, PATRICIA (TRISH) (JSC-MV) (NASA); 'Peterson, William D'; PLAISANCE, LANNY P. (JSC-EP5) (NASA); 'Powers'; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); Reeves, William D; 'Regina L. Hoover'; RINGO, LESLIE A. (JSC-CB) (USA); ABBOTT, ROBERT (JSC-REMOTE); ROE, RALPH R. (JSC-MV) (NASA); ROMERO, DENISE M. (JSC-EV) (NASA); Woods-1 Ronald; ROTTER, HENRY A. (HANK) (JSC-EC) (NASA); 'Schletz,Brian'; SCHOMBURG, CALVIN (JSC-EA) (NASA); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); Simon, Alan L; SIMON, THOMAS M. (TOM) (JSC-EP4) (NASA); SIMPSON, SCOTT W. (JSC-NE) (SAIC); 'Stefanovic, Milivoje'; THIBODEAU, JOSEPH R. (JOE) (JSC-EG) (NASA); Vonusa, Edward; WAGNER, HOWARD A., PHD (JSC-EP) (NASA); White, Doug; Wilder, James; 'Williams, Charlie'; WILSON, SUE U. (JSC-EA) (NASA); WINKLER, H. E. (GENE) (JSC-EC) (NASA); YORK, TIFFANY D. (JSC-NC) (GHG); YOUNG, JOHN W. (JSC-AC5) (NASA)
Subject: Daily Status: 01/09/03

Importance: High



ORBITER STATUS
01-09-03.doc

SHUTTLE QUICK LOOK STATUS

Thursday, January 09, 2003

A. STS-107/OV-102/PAD-A

1. Orbiter Aft Closeout Is In Work; s/b closed 2nd shift tonight.
2. Ordnance Installation Is Complete.
3. OMS/RCS Flight Pressurization Is Complete, in 48 hour stabilization
4. ET Purges Are In Work.
5. Changed out 3 micro WIS batteries, s/n 1061 still not recording data.

B. STS-114/OV-104/OPF-1

1. Heat Shield Installation Is In Work.
2. FRCS Installation Is In Work.
3. SCAPE to install a seal saver on thruster R1U planned for tomorrow.

C. STS-115/OV-105/OPF-2

1. OMS Pod Checkout Is In Work.
2. Preps For APU Catch Bottle Drain Are In Work.
3. Chin panel removed.
4. BSTRa boroscope. Prelim results look good.

D. STS-121/OV-103/OPF-3

1. OMM Inspections And Modifications Are In Work

IPR'S STS-107/OV-102:

No New UA's

NEW: IPR-094 (OMS). External GSE leak on RH GN2 fill, GHC MD 525. Isolated leak in GSE tubing union located beneath 107' level; leak repair is complete; nose seal has been R/R'd.

IPR'S STS-114/OV-104:

No New UA's

NEW: IPR-044 (APU). APU-3 test line temp 1 (V46T0383A1) at lower limit (-1 degree F); sb ambient at ~ 74 degrees ; more t/s planned for today.

IPR'S STS-115/OV-105:

No New UA's

NEW: IPR-014 (RCS). Leg secondary fuel HE regulator failed creep rate test is 1990 scch; s/b less than 1200 scch; t/s confirmed that this is a know problem with CV 301.

NEW: IPR-015 (DPS). DEU #1 byte error; this indicates a possible CRT 1 power supply failure in progress; t/s on hold; will continue to monitor for further errors.

NEW: IPR-016 (OMS). During APS functional, the LRCS Ox Ghe system B-leg primary reg creep rate was 1221 scch; s/b NMT 600 scch; t/s results - reg is probably bad and may require R/R (would need to be taken to the HMF).

UPDATE: IPR-012 (Higher Than Expected Decay On O2 System,). O2 manifold baseline leak is typically 13 sscm; is currently 44 sscm; limit is 500 sscm; testing points to fuel cell 1 as being the source of the increased leak rate; in engrg eval.

UPDATE: IPR-013 (Higher Than Expected Decay Noticed On H2 System). IPR closed as explained condition.

IPR'S OMDP (STS-121)/OV-103:

No New UA's.

NO NEW IPR'S TO REPORT.

NO UPDATES TO REPORT.

Window Inspection Status

http://xb70.ksc.nasa.gov/pvd/windows/templates/inspect_rpt.cfm

Milestones

Information may be obtained from the following web sites provided the user has the necessary access permissions.

MK Review milestones:

<http://usa1.unitedspacealliance.com/usago/orgs/kscspi001/launch/schedule.pdf>

MV Review milestones:

http://opic.cal.boeing.com/data_eng/vehicle/frr/index.htm

PAO Manifest Info:

<http://www-pao.ksc.nasa.gov/kscpao/schedule/schedule.htm>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Thursday, January 09, 2003 9:11 AM
To: Abbott, Robert; Adams, Alex - M; Balko, Laura - M; Barnette, Jack - K; Bartell, Shannon - K; Bihner, Bill - H; Branard, John - K; Brown, Mark - USA; Cianciola, Chris - M; Colloredo, Lisa - K; Cowart, Chris - M; Delgado, Hector - K; Dever, Lea - USA; DL SR&QA Standup Notes; Fairey, Chris - K; Franca, Chuck - K; Gawronski, Anne - K; Gedies, Robert; Glenn, Malcolm - K; Grant, Regina - M; Greenfield, Michael - H; Gregory, Fred - H; Gross, Sue - K; Hartline, Tom - M; Hashimoto, Rick - B; Higgins, Bill - K; Hill, Bill - H; Hill, Christopher; Kennedy, Mike - M; King Dave - M; Kinnan, Mike - K; Kinslow, Virginia - K; Kleinschmidt, Jane - K; Kowaleski, Mark - H; Martin, Leigh - M; McCombs, John - K/USA; McMullins, Margaret - M; Metts, Linder - M; Moorhead, James; Mullane, Dan - M; Myers, Penny - K; O'Connor, Brian - H; Pinch, Sue - K; Ridgway, Leslie - K; Scaltsas, Dick - K; Searcy, Sam; Smiles, Mike - S; Spacek, David - K; SRQAMer; Stevens, Alfred M. - K; Teehan, Paul - M; test123; Tilley, Randall - K; Trahan-Reyes, Melanie - USA; Walker, Angelia - M; Weathers, Shelby - M; Wetmore, Mike - K; Willingham, Terry; Yell, Dena - M
Subject: Shuttle Standup Notes 1/9/03

BSTRA Status

- CHIT to inspect OV-103 cracked ball to go to noon PRCB Friday 1/10
- M&P analysis results by end of week
- LH2 testing complete by weekend

OV-102

- Working to pick up count Sunday night

OV-104

- Heat shield installation underway
- FRCS work on 2nd shift today
- Close doors middle of next week
- Thruster R1U seal saver missing
- OPF rollout 1/29

OV-105

- 12" fuel line BSTRA inspection complete - no cracks noted
- APU catch bottle work Saturday

OV-103

- OMM continuing

Stennis

- 520 second test next week

Integration

- DOS support room was down for a period over the holidays but is back now
- STS-118 CIR in full swing

Flight Crew

- Crew goes into quarantine today

EVA

- 2 EMU's ready for flight

Upgrades

- Service Life Extension Program Summit Conference next Monday (1/13) at Galveston, TX

Halsell

- FRR today followed by Executive Session followed by Executive Security Review

Dittemore

- Orbiter will take an exception for the BSTRA problem at the FRR

ERMINGER, MARK D. (JSC-NC) (NASA)

From: LAUNCH-INT [Launch-INT@usago.ksc.nasa.gov]**Sent:** Thursday, January 09, 2003 4:18 PM**To:** HALE, N. W., JR (WAYNE) (JSC-DA8) (NASA); Bailey, Carol; Baran, Pam; Bejmuk, Bo; Biehl, Ginger; BLANKENSHIP, JEANNE K. (JSC-NA) (SAIC); Bob Tucker (E-mail); Boswell, Sue; Brenda Ross (E-mail); Brewster-Comer, Laura; Breznik-1, Greg (E-mail); Burnett, Patricia L; BUTLER, LEASA (JSC-OL) (NASA); Cargill, 'Sharon. (E-mail); CARR, CHERYL A. (JSC-OB) (MEI); Clark, Diane J; Cochran Kim (E-mail); Connelly, Carolyn S; CORBIN, MICHAEL E. (MIKE) (JSC-MG) (NASA); Coronado, Elvia; Cotten, Janice; Dan Brandenstein (E-mail); Darrell L Holloway (E-mail); Donald K Reed (E-mail); Donna R Cryer (E-mail); Duffy, Brian; Dutot, Margaret; DUTTON, JEFF (JSC-XA) (NASA); Elbon, John; Fellows, Connie A; Gary Huber-1 (E-mail); Garza, Valerie J; 'Gawel Michael GS-12 45RANS/DOUF' (E-mail); Gay, Katherine M; Gordon, Steve L; Greg A Ray (E-mail); PRIOTTO, GUSTAVO (JSC-OU) (ASI); HEFLIN, JAMES M., JR (MILT) (JSC-DA8) (NASA); HICKMAN, M. H. (HELEN) (JSC-AC) (NASA); Higgins, William; HOWELL, JEFFERSON D., JR (JEFF) (JSC-AA) (NASA); ISS PROGRAM REVIEWS; Johnson, Maxine; JOINER, CHERYL A. (JSC-EA2) (BAS); PAYETTE, JULIE (JSC-CB) (CSA); Kicklighter-1, Elliott (E-mail); Kimberly Page (E-mail); KING, CINDY L. (JSC-JA141) (NASA); Kinnan-1, Mike (E-mail); Krieter Bettye (E-mail); Lengyel, David; Lightfoot, Robert; LINDENMOYER, ALAN J. (JSC-OL) (NASA); Lisa C Garcia (E-mail); Lisa Walker (E-mail); Lockley Barbara (E-mail); Lockley, Barbara J ; Marcy Dunn-1 (E-mail); McKinney, Cheryl J; McLaughlin, Dottie; Mclean, Rachel. G. (E-mail); Mcnamara, 'Larry. (E-mail); Melnick, Bruce; CHANDLER, MICHAEL R. (MIKE) (JSC-SD) (WLS); MONBORNE, BRIAN A. (JSC-OC) (USA); Morelan, Jeannie. (E-mail); Moynihan, Linda M; Nave, Lionel R; Owens, Kathleen; Parrish, Teresa C; Parvathaneni, Srikanth; Perez, Susan Y; Pomaney, Bessie; Pribil, Sharon C; Reeves, William D; RICE, BARBARA L. (JSC-SK) (WLS); Robin E Bernal (E-mail); Roten, Karen S; RUIZ, LUCY (JSC-AG) (NASA); Sawyer, Daniel; SHAW, JACKIE F. (JSC-DA8) (USA); Sirota Len (E-mail); Smith Laura (E-mail); Sobchak Ted (E-mail); Spencer, Carolyn; Strause, Larue; Thoede, Leilani R; Thomas H Bond (E-mail); Trahan, Melanie C; Turner, Pennie; Vest, Deed L; 'von Puttkamer' (E-mail); Weems, Johnny; Weyant Timothy (E-mail); White Doug USA Orbiter (E-mail); Wilder, James; Wohrle, Rita M; Abner, Charlie A ; Adams, Alex; Allen, Andrew M (USA); Anthony Foster (E-mail); BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG); BERRY, JOYCE F. (JSC-XA) (NASA); Bihner Bill (E-mail); BONSAI, GRACE (JSC-XA) (HS); Bouchez-1, Melinda (E-mail); BRADDY, BEVERLY A. (JSC-MV) (NASA); Brewer, Shirley H; Burnett Patricia L (E-mail); Caliendo-1, Gennaro (E-mail); Cissell, Beverly S; Crawford, Gary L; Cunningham, Nancy L; Curry, Renee A; DAVIS, PATRICIA L. (JSC-DA8) (USA); Decker, Ron C; Diecidue-Conners Dawn (E-mail); Driver, Ross J; Dunbar Melissa (E-mail); DYER, KEITH W. (JSC-NC) (SAIC); Eden Scott (E-mail); ERMINGER, MARK D. (JSC-NC) (NASA); Ernest, Stephen P ; Erteschik, Ira; Fishkin-1, Jeff (E-mail); Frank-1, Daryl (E-mail); Gernand, J; Gordon-1, Mark (E-mail); Gray, Debra J; Green Patricia A (E-mail); Guidi, John ; Haddad-1, Michael (E-mail); Halverstadt-1, Mary (E-mail); Henderson Roger (E-mail); Herman, Robert S; Higginbotham-1, Scott (E-mail); Hilpertschauser, Brenda D; Hinson, Fred R; Hollister, Bill H; Hull Don (E-mail); Katnik Greg (E-mail); Kay S Compton (E-mail); Kim L Wunsch (E-mail); King, Eddie L; Lacey, Daniel R.; LaMunyon, Tim; Lang, J Robert; LEDNICKY, ED F. (JSC-NC) (SAIC); Leinbach, Michael ; LeMoine, Patrick K; Leonard, Wil E.; Lewis, Susan L; Lloyd Dense (E-mail); Logistics CM Receipt Desk; Loofboro, Rebecca J; MADURA, JOHN T (JSC-REMOTE); Mango, Ed J ; Marc Debord V (E-mail); Mark Kowaleski (E-mail); Mary E. Walsh (E-mail); MAYER, FRED F. (JSC-NC) (SAIC); McCombs, John T; MCCUE, SHIRLEY (JSC-NC) (NASA); McLean Kris (E-mail); Meckley, Sue; Minute-1, Stephen (E-mail); MOTWAY, JEAN C. (JSC-MG) (USA); Murphy, Charlie; Nash, Dale K; Pacheco, Brian M; Pataky, Kimberly E; Perry, Cheryl D; Phillis L. Berry (E-mail); Postonneely, Geneva; Presnell, John G; Radcliff, Judith L. (E-mail); Rahman, K.M.; Reynolds, Robert J; Richard N Richards (E-mail); Richmond, Frank D; RILEY, MATTHEW P; Rivera, Diane; ROBERTS, HARMON L. (JSC-SM) (NASA); Roberts Mickey (E-mail); Roberts, Kamala K; Ruddell Dan (E-mail 2); Samuel L Jenkins (E-mail); Schiffler, Jo Ann M.; Schroeder, Polly C; Schultz Chas (E-mail); Servay Lynn @MAF (E-mail); Smith, Laurie A; Spillers, Nanette L; Stevens, Alfred M; Stone, Jeffry A; Stratton, Patricia J; Sue Pinch (E-mail); Travassos, Frank M; Wanda L Price (E-mail); Weber, David A; Whitehead, Douglas; Willingham J. Terry (E-mail); Winters Kathy (E-mail)**Subject:** STS-107 PMMT Announcement

The STS-107 PMMT Review is scheduled for Tuesday, January 14, 2003, at 2 p.m., e.s.t., at the Kennedy Space Center, in the O&C Building, Mission Briefing Room. A list of attendees for PMMT and a separate list for launch attendees must be submitted by 9 a.m. on Monday, January 13, 2003.

Presentation material must be submitted electronically no later than noon, e.s.t. on Monday, January 13, 2003, to this address: Launch-INT@usago.ksc.nasa.gov

USA Program Integration

Launch Integration Support:

Sue Pinch, Manager

Deb Gray, Chas Schultz, Patricia Green

USK-C09, (321) 867-2003

Readiness Review/MMT website:

<http://usago1.ksc.nasa.gov/usago/orgs/kscspi001/launch/>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: WETHERLEY, EDIE (JSC-REMOTE)
Sent: Friday, January 10, 2003 7:19 AM
To: Adam West; 'Ahmed, Anwar M'; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); ANGSTADT, TARA S. (JSC-EP) (NASA); ASHBY, JEFFREY S. (JSC-CB) (NASA); Ayott, Bill; BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BARCKHOLTZ, RANDALL J. (RANDY) (JSC-CB) (USA); BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG); Bihner; BRADLEY, KARLA F. (JSC-EP) (NASA); ELIASON, BRENDA J. (JSC-EA6) (NASA); Bryan Banks; Burghardt, Michael J; BWatkins; CERNA, NANETTE (JSC-MV) (NASA); COLLINS, EILEEN M. (JSC-CB) (NASA); Cowart, Jon; Danielson, Michael; CURRIE, DAVID W. (JSC-CB) (USA); Dean Kunz; Dinsel, Alison; DITTEMORE, RONALD D. (JSC-MA) (NASA); MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA); Doug Whitehead; ERMINGER, MARK D. (JSC-NC) (NASA); Eyman; Fugitt Mark D (E-mail); GALBREATH, GREGORY F. (GREG) (JSC-ES2) (NASA); GALVEZ, RONALD M. (JSC-EP5) (NASA); Gary Wentz; GRUSH, GENE R. (JSC-EP111) (NASA); George Hamilton-1; GERSTENMAIER, WILLIAM H. (BILL) (JSC-OA) (NASA); GUIDRY, BETTY J. (JSC-NC) (GHG); HAMILTON, DAVID A. (DAVE) (JSC-EA) (NASA); HAWLEY, STEVEN A. (JSC-SA13) (NASA); Heitzman, William; HENDERSON, EDWARD M. (MACK) (JSC-MA) (NASA); HERNANDEZ, FRANCISCO J. (JSC-EP) (NASA); HIEMER, ARTHUR T. (JSC-EV) (NASA); HUDSON, ROBERT H. (JSC-NC) (NASA); Hunt, John W; James Marczak; James McDede-1; JACOBS, JEREMY B. (JSC-ES4) (NASA); John Gurecki; JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); JONES, SAMUEL E. (JSC-EP) (NASA); Joyce Rozewski; jtinsley@hq.nasa.gov; KAUPP, HENRY J. (JSC-ER3) (NASA); KENNEDY, JOHN J. (JSC-MV6) (NASA); BROWN, KENNETH L. (JSC-MV6) (NASA); DUNN, KEVIN W. (JSC-EV) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); Lackey-1, Eddie; Lam, Gary; Launch-INT; Leba, Anne; 'Leba, Anthony T'; LEVY, VINCENT M. (JSC-EG) (NASA); Mai, Han D; Mark Kowaleski; Martt; MCCURDY, KERRI (JSC-EP5) (NASA); METCALF, JORDAN L. (JSC-EC6) (NASA); Michael Snyder; Michael Wilhoit; MILLER, JOHN D. (JSC-EV) (NASA); Minter, Larry V; ORTIZ-LONGO, CARLOS R., PHD (JSC-EA4) (NASA); OUELLETTE, FRED A. (JSC-MV6) (NASA); PETETE, PATRICIA (TRISH) (JSC-MV) (NASA); Peterson, William D; PLAISANCE, LANNY P. (JSC-EP5) (NASA); Powers; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); Reeves; Regina L. Hoover; RINGO, LESLIE A. (JSC-CB) (USA); ABBOTT, ROBERT (JSC-REMOTE); ROE, RALPH R. (JSC-MV) (NASA); ROMERO, DENISE M. (JSC-EV) (NASA); Ronald Woods; ROTTER, HENRY A. (HANK) (JSC-EC) (NASA); 'Schletz,Brian'; SCHOMBURG, CALVIN (JSC-EA) (NASA); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); Simon; SIMON, THOMAS M. (TOM) (JSC-EP4) (NASA); SIMPSON, SCOTT W. (JSC-NE) (SAIC); Stefanovic, Milivoje; THIBODEAU, JOSEPH R. (JOE) (JSC-EG) (NASA); Vonusa, Ed; WAGNER, HOWARD A., PHD (JSC-EP) (NASA); White; WILDER, Jim; Williams, Charlie; WILSON, SUE U. (JSC-EA) (NASA); WINKLER, H. E. (GENE) (JSC-EC) (NASA); YORK, TIFFANY D. (JSC-NC) (GHG); YOUNG, JOHN W. (JSC-AC5) (NASA)
Subject: Daily Status: 01/10/03



ORBITER STATUS
01-10-03.doc

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 30, 2003 9:06 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD14 Report

STS-107 Flight Day 14 Report
GMT 030:14:50

Shift Leads: David Witwer, Brandon Dick, Mike Etchells
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally with no issues being reported over the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

The MER manager reported in reference to the intercommunications (ICOM) B problem discussed in the First Daily Report that, "the crew was asked to troubleshoot the problem by reconfiguring the ICOM system to ICOM B and performing a communications check. The crew reported that ICOM B worked satisfactorily and that the earlier problem was probably caused by a configuration error."

The weather for both landing opportunities at KSC looks good for Saturday with few to scattered clouds at 3500 ft, visibility 7 sm, and winds 10 knots or less.

Previous flight day reports discuss the nine MER anomalies listed below.

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in Spacehab
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05	Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06	Loss of DR20 Tape Recording and Playback (GFE)
MER-07	LH2 Prevalve Open B Indicator Failed Off
MER-07A	MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08	70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

To subscribe to this mailing list:

Send a message to the following address:

To: majordomo@listserver.jsc.nasa.gov

The body of the message should contain the following two lines:

```
subscribe srqa-mer  
end
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To unsubscribe from this mailing list:

Send a message to the following address:

To: majordomo@listserver.jsc.nasa.gov

The body of the message should contain the following two lines:

```
unsubscribe srqa-mer  
end
```

The shift reports are also posted on the SR&QA bulletin board at the following internet address:

<http://wwwsrqa.jsc.nasa.gov/BBS/current/default.htm>

or

<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

SHUTTLE QUICK LOOK STATUS

Friday, January 10, 2003

A. STS-107/OV-102/PAD-A

1. Orbiter Aft Closeout Is Complete. Aft Confidence snapshot is in work.
2. ET Purges Are Complete.
3. Launch Countdown Preps Are In Work.

B. STS-114/OV-104/OPF-1

1. Heat Shield Installation Is Complete.
2. FRCS Installation Is In Work.
3. Preps For Thruster R1U Seal Saver Installation Are In Work.

C. STS-115/OV-105/OPF-2

1. OMS Pod Checkout Is In Work.
2. Preps For APU Catch Bottle Drain Are In Work.

D. STS-121/OV-103/OPF-3

1. OMM Inspections And Modifications Are In Work

IPR'S STS-107/OV-102:

No New UA's

NO NEW IPR'S TO REPORT.

NO UPDATES TO REPORT.

IPR'S STS-114/OV-104:

No New UA's

NEW: IPR-045 (COM). During checkout of the ITVC Camera B testing, the video from the ITVC (black & white) camera would not appear on Monitor 2 when the monitor was using the "Panel" Source. T/S found the video to be nominal on Monitor 1 and on downlink; Monitor 2 was able to display the video thru its "Downlink" Source, however, Monitor 2 is unable to recognize the black & white signal at the "Panel" Source input; t/s points to Monitor 2 as the source of the anomaly; more t/s needed to verify that the anomaly remains in Monitor 2.

UPDATE: IPR-035 (NH3 System B Pressure Increase). Waiver (WK10302) rejected by the VECB yesterday; subsystem manager will add more background info to the waiver, modify waiver and re-submit to ERB and VECB which is tentatively scheduled for 1-22-03.

IPR'S STS-115/OV-105:

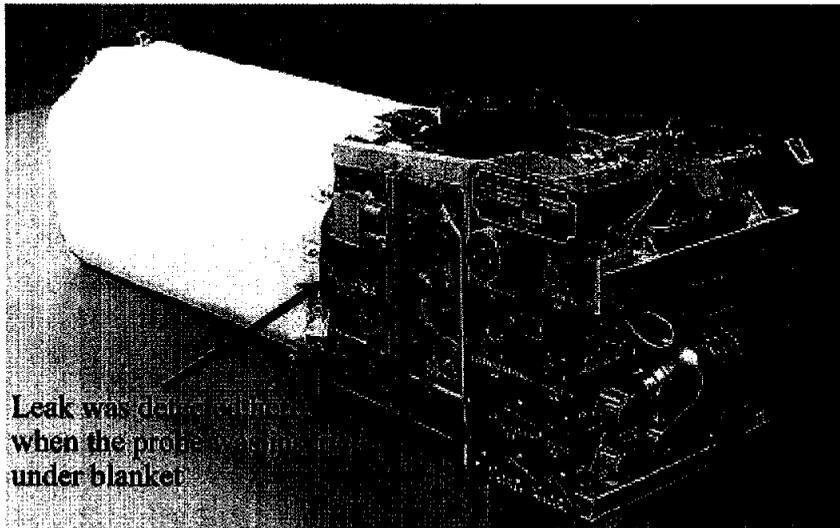
No New UA's

NEW: IPR-017 (OMS). During right oxidizer confidence checks, leak rate was 2941 scch; s/b nmt 100 scch; t/s disconnected the QD from the orbiter and verified no leak on the GSE portion of the QD; QD was reconnected and leak rate verified at 68 scch.

NEW: IPR-018 (OMS/RCS). Unable to obtain RRCS oxidizer helium system A-Leg secondary regulator creep rate data due to check valve (CV302) reverse leakage. More to come.

NEW: IPR-019 (OMS/RCS). RRCS Ox GHe B-Leg secondary reg creep is 659 scch; s/b nmt 600 scch; t/s will reperform creep check. T/s plan in work.

UPDATE: IPR-012 Higher than expected decay in O2 system (FCP). Mass specs isolated leak to end cap on fuel cell #1. Further T/S to follow.



IPR'S OMDP (STS-121)/OV-103:

No New UA's.

NO NEW IPR'S TO REPORT.

NO UPDATES TO REPORT.

Window Inspection Status

http://xb70.ksc.nasa.gov/pvd/windows/templates/inspect_rpt.cfm

Milestones

Information may be obtained from the following web sites provided the user has the necessary access permissions.

MK Review milestones:

<http://usa1.unitedspacealliance.com/usago/orgs/kscspi001/launch/schedule.pdf>

JSC Resident Office @ KSC 321-861-3040

MV Review milestones:

http://opic.cal.boeing.com/data_eng/vehicle/frr/index.htm

PAO Manifest Info:

<http://www-pao.ksc.nasa.gov/kscpao/schedule/schedule.htm>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Sent: Friday, January 10, 2003 2:28 PM
To: DL SRQA PAR SUPPORT; Leigh Martin (MSFC) (E-mail); Brenda Willis (E-mail); Alan Peterson (Boeing) (E-mail); Arnold Clifton T. (E-mail); Barnes Jeffrey E (Boeing) (E-mail); Bevels Vicki (E-mail); Bill Loewy (E-mail); 'Carol Rush' (E-mail); Chris Hill (MSFC) (E-mail); 'Cianciola C. (MSFC) @SMTP' (E-mail); Corey Harrell (MSFC) (E-mail); Daniels Angela (E-mail); Darrell Warner (Boeing) (E-mail); Dave Spacek (MSFC) (E-mail); 'Diana Heberling' (E-mail); donnie. george/msfc (E-mail); Dumetz Marisa (E-mail); Engler Tom (E-mail); Ernest-1 Stephen (E-mail); Fred Dadfar (MSFC) (E-mail); 'Gatto Leigh(IV&V)' (E-mail); Gordon-1 Mark (E-mail); Gregg George (MSFC) (E-mail); griffith (jamss) (E-mail); Haddad-1 Michael (E-mail); Hashimoto Rick (E-mail); 'Hill Bill (HQ) @SMTP' (E-mail); 'Howell. Nelda' (E-mail); James Halsell (KSC) (E-mail); John McPherson (MSFC) (E-mail); John. R. Dicks@ivv. nasa. gov (E-mail); Keith Pauley (E-mail); Kennedy Michael (E-mail); kim. carmean@msfc. nasa. gov (E-mail); 'Lackey Ed' (E-mail); Leigh Martin (MSFC) (E-mail); Linda Combs (E-mail); Mark Kowalesky (HQ) (E-mail); Mike Card (HQ); mikesmiles; Mitsui Masami (NASDA) (E-mail); Moorhead-III James L (E-mail); Mr. Takeuchi(nasda) (E-mail); Mullane Dan (E-mail); Nathan Kyser (jams) (E-mail); Nobles Noel R (E-mail); pollystenger; rich patrican; Roger Counts; 'Sandy'; Sharolee Huet-1 (E-mail); Sims, John (MSFC); Sue Fenn (HQ); 'Suzanne Little'; thomas S Toutsu (GDSFC); thomas.w.hartline@msfc.nasa.gov; Tom Hancock (MSFC); Walker, Angelia; Wbihner (E-mail); wbstick; 'Willis-1, Brenda'; Wren, Robert J (USA); Zavala, Velma (USA)
Subject: PAR-5 Minutes for 01/10/2003



MIN010303.doc

<http://wwwsrqa.jsc.nasa.gov/par/>

Upcoming PARs:

01/31/03	STS-114/ULF-1 PAR
02/12/03	STS-114/ULF-1 PAR
02/26/03	STS-114/ULF-1 PAR

Note: Current changes indicated to the right by *****

Presenters review your items and submit any changes to the PAR Coordinator as soon as possible.

Debbie Bazan, JSC PAR Coordinator
(281) 244-1862 dbazan@ems.jsc.nasa.gov

PAR-5 MINUTES JANUARY 10, 2003

<http://wwwsrqa.isc.nasa.gov/par/>

The next PAR-5 will be held on Friday, 1/17/02 at 09:30 am Central. (1/3, & 1/10 PAR5s are cancelled)

The PAR-5 is a weekly telecon for representatives in the PAR process.

Debbie Bazan, JSC PAR Coordinator, (281) 244-1862 dbazan@ems.jsc.nasa.gov **Note:** Current changes indicated to the right by *****
PRESENTERS REVIEW THEIR ITEMS AND SUBMIT ANY CHANGES OR REQUESTS FOR CHANGES TO THE PAR-5 COORDINATOR
PRIOR TO THE NEXT MEETING.

STS-107 (OV-102) FLIGHT MILESTONE DATES

SORR	NA	PAR:	12/20/02
FRR:	01/09/03	FRR Tagup:	01/07/03 (moved from 1/06/03)
Prelaunch MMT:	01/14/03	PMMT Tagup:	01/10/03
Shuttle Launch:	01/16/03		

THE FOLLOWING ITEMS WERE DISCUSSED AT THE STS-107 PAR, FRR TAGUP, & PMMT TAGUP:

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner/1)
 - B. Shuttle Crew Constraint Exceptions (Jim Pendergast/2)
2. Payload Overview (includes NCRs)
 - A. JSC (Dean Moreland/5)
 - B. MSFC (tbd)
 - C. GDSFC (Roger Counts)
3. Shuttle Software Overview
 - A. JSC (Jane Moorhead/7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-(VMI: Arnold Baldwin, Backup:Ross Engle)
 1. Spacehab Hull Damage and Repair (see JSC payload overview) (Dean Moreland/8)
 2. OV-103 BSTRA Crack (Bill Prince/18)
 3. OV-103 BSTRA Crack (Hugo Martinez/19) ****frr
 4. OV-103 BSTRA Crack (Bill Prince/20) ****pmt
 - B. MSFC
 1. SSME-STS-113 Main Engine #1 Nozzle Leak (Martin Carson)
 2. SRB-Amphenol Connector Pin Lack of Retention (Randall Tucker)
 3. SRB-BSM Paint Chip FOD (Randall Tucker)
 1. SRB-Cable Connector (Randall Tucker) ****frr
 2. SRB-BSM Paint Chip FOD (Randall Tucker) ****frr
 - C. KSC-TBD
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 1. Space Hab & Experiment Package Configuration Management (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA-No scheduled EVAs

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight
 - A. First Flight of two AMECs (Al Arnold/10)
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner/11)
 - A. EOM Nosewheel Steering Flight Rule Change (Jim Gardener/11)
4. STS-109 Freon Coolant Loop 1 Flow Degradation (Tien Do/12)
5. STS-113 O2 Leak in Mid-body (Tien Do/Megan Bell/13)
6. STS-113 FES Primary B Controller Failure (Tien Do/Megan Bell/14)
7. STS-113 Right OMS Bi-propellant Valve Open Indication (Dan Clements/15)
8. Flowliner CRES Issue (Bill Prince-9)
9. Body Flap Actuator Corrosion (Dan Zalit/19)
10. EVA:STS-113 EVA Crewmember Boot Fit (Charles Sager/16)
11. EVA:Biomed Cable Damage (Charles Sager/17)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight
 - A. SRB-First flight of Pacific Scientific Separation Bolts (Randall Tucker)
 - B. SRB-Cleaning Solvent Specification Change (Randall Tucker)
 - C. SSME-First flight of Controller Coolant Duct Redesign (Rosalyn Patrick)
2. New or Upgraded Hazards & Cils –NONE
3. ET-Waive LO2 LWT Normal Mission & RTLS Ullage Pressure Curves for ET-93 (Keith Layne)
4. ET-Vent Valve Relief Pressure (Keith Layne)
5. SRB-BSM Motor FOD (Randall Tucker)
6. RSRM-STS-113 Postflight Observations-Foreign Material in RSRM Nozzle-to-Case Joint Radial Bolt Hole (Chris Cianciola)
7. RSRM-STS-113 Postflight Observations-Flashing on RSRM Nozzle-to-Case Joint Packing-with-Retainers (Chris Cianciola)

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils –NONE

10P FLIGHT MILESTONE DATES

10P SORR 01/16/03
10P Launch: 02/02/03

ISS 10P PAR: 01/10/03 (immediately following 107 PMMT)

THE FOLLOWING ITEMS WERE DISCUSSED AT THE 10P PAR:**Mission Overview:**

1. Mission Success Criteria
 - A. 10P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 10P Payloads
(Jeff Nill)
3. ISS 10P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

STS-114/ULF1 (OV-104) FLIGHT MILESTONE DATES

SORR	02/04/03	PAR:	01/31/03 *****
FRR:	02/13/03	FRR Tagup:	02/12/03 *****
Prelaunch MMT:	02/27/03	PMMT Tagup:	02/26/03 *****
Shuttle Launch:	03/01/03 (NET)		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS S&MA Readiness Status
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. EVA Overview (includes NCRs)
(Trent Barrett-5)
4. Payload Overview (includes NCRs)
 - A. JSC (tbd-6)
 - B. MSFC (tbd)
5. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: Arnold Baldwin, Backup:Jeremy Verostko)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION
 - A. Pistol Grip Tool Undertorqued (EVA/Station)
 - B. SSRMS Close Call Lessons Learned (tbd)
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)
4. GFE: Prebreathe Protocol (Adrian Sanderlin)
5. GFE: Ergometer Use On ISS (Adrian Sanderlin)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight
 - A. RSRM 1st Flight of Press Fit Bushings on Oversized Pinholes *****
 - Replaces shrink fit method made obsolete by elimination of vapor degreaser
 - Certified by test and two static motor test firings
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE
3. ORCA Ops During Sleep Flight Rule (Scott Seyl)

6S FLIGHT MILESTONE DATES

6S SORR 04/03/03
6S Launch: 04/26/03

ISS 6S PAR: tbd

Mission Overview:

1. Mission Success Criteria
 - A. 6S
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 6S Payloads
(tbd)
3. ISS 6S Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

STS-115/12A (OV-105) FLIGHT MILESTONE DATES

SORR	05/01/03	PAR:	tbd
FRR:	05/08/03	FRR Tagup:	tbd
Prelaunch MMT:	05/21/03	PMMT Tagup:	tbd
Shuttle Launch:	05/23/03		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS S&MA Readiness Status
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. EVA Overview (includes NCRs)
(Stacie Greene-5)
4. Payload Overview (includes NCRs)
 - A. JSC (Walter Stoerckel-6)
 - B. MSFC (tbd)
5. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: tbd, Backup:tbd)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION-TBD
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
1. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

11P FLIGHT MILESTONE DATES

11P SORR 05/01/03
11P Launch: 05/26/03

ISS 11P PAR: tbd

Mission Overview:

1. Mission Success Criteria
 - A. 11P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 11P Payloads
(tbd)
3. ISS 11P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
3. New or Upgraded Hazards & Cils –NONE

ERMINGER, MARK D. (JSC-NC) (NASA)

From: WETHERLEY, EDIE (JSC-REMOTE)
Sent: Monday, January 13, 2003 6:45 AM
To: Adam West; 'Ahmed, Anwar M'; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); ANGSTADT, TARA S. (JSC-EP) (NASA); ASHBY, JEFFREY S. (JSC-CB) (NASA); Ayott, Bill; BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BARCKHOLTZ, RANDALL J. (RANDY) (JSC-CB) (USA); BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG); Bihner; BRADLEY, KARLA F. (JSC-EP) (NASA); ELIASON, BRENDA J. (JSC-EA6) (NASA); Bryan Banks; Burghardt, Michael J; BWatkins; CERNA, NANETTE (JSC-MV5) (NASA); COLLINS, EILEEN M. (JSC-CB) (NASA); Cowart, Jon; Danielson, Michael; CURRIE, DAVID W. (JSC-CB) (USA); Dean Kunz; Dinsel, Alison; DITTEMORE, RONALD D. (JSC-MA) (NASA); MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA); Doug Whitehead; ERMINGER, MARK D. (JSC-NC) (NASA); Eyman; Fugitt Mark D (E-mail); GALBREATH, GREGORY F. (GREG) (JSC-ES2) (NASA); GALVEZ, RONALD M. (JSC-EP5) (NASA); Gary Wentz; GRUSH, GENE R. (JSC-EP111) (NASA); George Hamilton-1; GERSTENMAIER, WILLIAM H. (BILL) (JSC-OA) (NASA); GUIDRY, BETTY J. (JSC-NC) (GHG); HAMILTON, DAVID A. (DAVE) (JSC-EA) (NASA); HAWLEY, STEVEN A. (JSC-SA) (NASA); Heitzman, William; HENDERSON, EDWARD M. (MACK) (JSC-MA) (NASA); HERNANDEZ, FRANCISCO J. (JSC-EP) (NASA); HIEMER, ARTHUR T. (JSC-EV) (NASA); HUDSON, ROBERT H. (JSC-NC) (NASA); Hunt, John W; James Marczak; James McDede-1; JACOBS, JEREMY B. (JSC-ES4) (NASA); John Gurecki; JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); JONES, SAMUEL E. (JSC-EP) (NASA); Joyce Rozewski; jtinsley@hq.nasa.gov; KAUPP, HENRY J. (JSC-ER3) (NASA); KENNEDY, JOHN J. (JSC-MV6) (NASA); BROWN, KENNETH L. (JSC-MV6) (NASA); DUNN, KEVIN W. (JSC-EV) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); Lackey-1, Eddie; Lam, Gary; Launch-INT; Leba, Anne; 'Leba, Anthony T'; LEVY, VINCENT M. (JSC-EG) (NASA); Mai, Han D; Mark Kowaleski; Martt; MCCURDY, KERRI (JSC-EP5) (NASA); METCALF, JORDAN L. (JSC-EC6) (NASA); Michael Snyder; Michael Wilhoit; MILLER, JOHN D. (JSC-EV) (NASA); Minter, Larry V; ORTIZ-LONGO, CARLOS R., PHD (JSC-EA4) (NASA); OUELLETTE, FRED A. (JSC-MV6) (NASA); PETETE, PATRICIA (TRISH) (JSC-MV) (NASA); Peterson, William D; PLAISANCE, LANNY P. (JSC-EP5) (NASA); Powers; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); Reeves; Regina L. Hoover; RINGO, LESLIE A. (JSC-CB) (USA); ABBOTT, ROBERT (JSC-REMOTE); ROE, RALPH R. (JSC-MV) (NASA); ROMERO, DENISE M. (JSC-EV) (NASA); Ronald Woods; ROTTER, HENRY A. (HANK) (JSC-EC) (NASA); 'Schletz, Brian'; SCHOMBURG, CALVIN (JSC-EA) (NASA); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); Simon; SIMON, THOMAS M. (TOM) (JSC-EP4) (NASA); SIMPSON, SCOTT W. (JSC-NE) (SAIC); Stefanovic, Milivoje; THIBODEAU, JOSEPH R. (JOE) (JSC-EG) (NASA); Vonusa, Ed; WAGNER, HOWARD A., PHD (JSC-EP) (NASA); White; WILDER, Jim; Williams, Charlie; WILSON, SUE U. (JSC-EA) (NASA); WINKLER, H. E. (GENE) (JSC-EC) (NASA); YORK, TIFFANY D. (JSC-NC) (GHG); YOUNG, JOHN W. (JSC-AC5) (NASA)
Subject: Daily Status: 01/13/03



ORBITER STATUS
01-13-03.doc

SHUTTLE QUICK LOOK STATUS

Monday, January 13, 2003

A. STS-107/OV-102/PAD-A

1. Launch Countdown Is In Work.

B. STS-114/OV-104/OPF-1

1. FRCS Installation Is Complete.
2. Thruster R1U Seal Saver Installation Is Complete.
3. FRCS Checkout Is In Work
4. Preps For R1U Manifold Backfill Are In Work.

C. STS-115/OV-105/OPF-2

1. OMS Pod Checkout Is In Work.
2. APU Catch Bottle Drain Is Complete.
3. Preps For FRCS Installation Are In Work.

D. STS-121/OV-103/OPF-3

1. OMM Inspections And Modifications Are In Work

IPR'S STS-107/OV-102:

No New UA's

NEW: IPR-095 (OMS). MD219 Flight cap found laying on pad structure at 107' level; cap was not defective and was reinstalled; IPR CRR'd to S0007.

NEW: IPR-096 (LPS). During TFL load and associated PCM swap, the active PCM FEPS was unable to process PCMMU data; t/s cycled a relay in the PCMMU2 data path and recovered the Standby FEP data processing; the anomalous data during the PCMMU switch was seen only in the firing room; the CDR verified the FCP circuit breakers associated with the FD were "OPEN"; LPS is continuing to work this IPR.

IPR'S STS-114/OV-104:

No New UA's

UPDATE: IPR-45 (No Video Present On Monitor 2 from ITVC Camera B). T/S (01/10) swapped connectors between CCTV Monitor 1 & 2, and the discrepancy switched to Monitor #1 (Monitor #2 video was nominal). Further t/s (01/11) and temporarily mated a spare camera to the bulkhead and the discrepancy was still present on Monitor #2. More t/s verified that the VSU is able to process black & white video but not when connected to the Camera B Bulkhead position; problem is likely with the VSU; t/s continues.

IPR'S STS-115/OV-105:

No New UA's

NEW: IPR-020 (CAPU). GHC QD TP11/21 was leaking at the B-nut; t/s R/R'd the QD and leak check passed.

UPDATE: IPR-002 (LO2 Sys Pri/Sec GHe Bubbling DP Xdcr Indications). IPR transferred to IPR PADA-2361 and is no longer a constraint to STS-107.

UPDATE: IPR-012 (Hgr Than Expected Decay Noticed On O2 System). T/s completed fuel cell 1 jumper tube installation; manifold decay with manifold 1 isolated, FC1 reactant valve is closed and with jumper tube installed, the decay rate was 4.9 sccm.

UPDATE: IPR-015 (1 time Hit DEU 1 Bite Error). CRT 1 experienced 14 additional Filament Current BITE hits as of 01/10. IPR was upgraded to a DIG PR and DU S/N 16 will be R/R'd. **NOTE:** Past history shows there have been several occurrences of this error; DEU 1 involved in this anomaly was S/N 20 installed in June of 2000 and the DU1 was S/N installed in May of 1999.

UPDATE: IPR-016 (LRCS Oxidizer GHe Sys B-leg Primary Reg Failed Creep Check @ 1221 SCCH; S/B NMT 600 SCCH). T/S complete and leakage is still out of spec at 1350; plan to R/R the reg and GHe iso valve requiring pod removal/transfer to HMF.

UPDATE: IPR-018 (Unable To Obtain RRCS A-Leg Secondary Reg Creep Rate). T/S – closed GHC MD316, eliminated CV302 rev pressure; leakage in spec @ 304 scch.

IPR'S OMDP (STS-121)/OV-103:

No New UA's.

NO NEW IPR'S TO REPORT.

NO UPDATES TO REPORT.

Window Inspection Status

http://xb70.ksc.nasa.gov/pvd/windows/templates/inspect_rpt.cfm

Milestones

Information may be obtained from the following web sites provided the user has the necessary access permissions.

MK Review milestones:

<http://usa1.unitedspacealliance.com/usago/orgs/kscspi001/launch/schedule.pdf>

MV Review milestones:

http://opic.cal.boeing.com/data_eng/vehicle/frr/index.htm

PAO Manifest Info:

<http://www-pao.ksc.nasa.gov/kscpao/schedule/schedule.htm>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: RUIZ, LUCY (JSC-AG) (NASA)
Sent: Monday, January 13, 2003 10:44 AM
To: BERNESTINE DICKEY; BONNIE DUNBAR; DAVID PETRI; FRANK BENZ; GARY MORSE;
GEORGE FLYNT; JAMES COSTELLO; James Halsell; JAMES HEFLIN; JEFFREY DAVIS;
JOHN YOUNG; JON HARPOLD; KENT ROMINGER; LAMBERT AUSTIN; LINDA HAM;
MARK CRAIG; MARK ERMINGER; MARK GEYER; MICHAEL SUFFREDINI; MICHELE
BREKKE; PATRICK DUFFIN; RALPH ROE; ROBERT CABANA; ROBERT HESELMAYER;
ROBERTO GALVEZ; RONALD DITTEMORE; SUSAN CREASY; TOM CREMINS; WILLIAM
GERSTENMAIER; WILLIAM HARRIS; YOLANDA MARSHALL
Cc: NAVY, LISA A. (JSC-AA) (NASA); COBBS, MABLE L. (JSC-AB) (NASA); SASSER, CAROL
A. (JSC-AC) (NASA); HICKMAN, M. H. (HELEN) (JSC-AC) (NASA)
Subject: STS-107 Pre-Flight Readiness Review (FRR) Minutes

Enclosed are the Minutes of the STS-107 Pre-FRR that was held on January 7, 2003:



AG-03-003 .doc

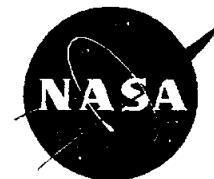


STS-107 Pre-FRR
Minutes 1-7-03...

Lucy Ruiz
AG/Office of The Chief Engineer
281-483-3459

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
2101 NASA Road 1
Houston, Texas 77058-3696



January 10, 2003

Reply to Attn of: AG-03-003

TO: Distribution

FROM: AG/JSC Chief Engineer

SUBJECT: STS-107 Pre-Flight Readiness Review (FRR) Minutes

Enclosed are the Minutes for the STS-107 Pre-FRR that was conducted by the JSC Center Director on Thursday, January 7, 2003. There were no Actions Items from this review.

If you have questions regarding the Minutes, you should contact David Petri at 281-483-9622 or david.a.petri1@jsc.nasa.gov.

Original Signed By:

Jay H. Greene

Enclosure

Distribution:

AA/J. D. Howell, Jr.	MG/R. H. Heselmeyer
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MA2/R. S. Galvez	KSC/MK/J. D. Halsell, Jr.

JSC CENTER DIRECTOR'S PRE-FLIGHT READINESS REVIEW (FRR)
FOR
STS-107

MINUTES

7 JANUARY 2003

The Center Director's Pre-FRR for STS-107 was held on Tuesday, January 7, 2003. The meeting was chaired by AA/General Jefferson Howell and was facilitated by MA2/Robert Galvez.

1. An overview of the mission objectives, payloads, margins, and preparation activities was discussed. Launch is scheduled for January 16, 2003.

It was noted that this will be the 28th flight of Columbia and it will be the first time that the lightweight tank will be flown in combination with the Block II SSME. There will be a crew of seven and they will conduct dual shift operations during the mission.

The SpaceHab double module will have its first flight on this mission. There are 30 space life sciences and microgravity experiments on-board the SpaceHab. Also during this mission, it will be the first time a crew will be able to exercise in the SpaceHab.

The Freestar Hitchhiker payload contains six experiments. A DoD experiment to observe a burn on the Orbiter will also be conducted during the mission.

The Extended Duration Orbiter (EDO) Pallet will provide additional non-propulsive consumables during the mission. The EDO Pallet has not been flown since 1998.

There will be no RMS flown on this mission.

2. MSFC Project Office will have two special topics at the FRR. They will be reporting on Orbiter to SRB power connectors that failed a pin retention test. All Orbiters have been inspected and the fleet has been cleared. An ART has been formed to look into the issue.

The second topic is in regard to contamination (five paint chips) found in the booster separation motor. A test has been done that shows that the paint chips will melt during the burn, and therefore this is not an issue for the flight.

3. MOD reported that the timeline is set with the minimum mission objectives covered and that the crew and ground teams are trained and ready to go.
4. The EVA Project Office reported that there are no scheduled EVA's during the mission. There will be one special topic, the results of the investigation into the suit biomedical cable fraying. The investigation concluded that the system could not put enough energy into the suit to cause an ignition event.
5. Orbiter reported that this is the 5th flight of OI-29 software load and that there are no issues with regard to software, flight crew equipment, or GFE.

There were 18 modifications to the flow for this mission and 2 new items are being flown, a battery module and a second Master Event Controller.

There were seven in-flight anomalies (IFA) during the last flight of Columbia. All have been checked out and cleared.

There were three IFA's from the last mission, STS-113: oxygen concentration, OMS bi-prop value open indicator, and RMS wrist roll stall. All three have been cleared for this flight.

There will be two special topics. Flowliner status for this mission has the cracks have been repaired, tested, and inspected.

A special topic presentation will also be made regarding the OV-103 inspection of the 17-inch LO2 feedline, where a crack was identified in the ball of the Ball Strut Tie Rod Assembly (BSTRA) nearest the LO2 manifold. The BSTRA ball is made of a cobalt-tungsten-chrome alloy. Failure of the ball could result in:

- Lack of articulation capability at the feedline resulting in structural failure of the feedline
- Foreign object debris (FOD) generation

An extensive test program is in progress at MSFC and Huntington Beach to investigate the problem. MSFC is determining what size of FOD the engines can tolerate if FOD is generated from the BSTRA ball. JSC Materials and Processes and SR&QA engineers are traveling to MSFC to monitor activities.

The STS-107 vehicle has been inspected and no cracks have been found, however only 25 percent of the ball is observable. A special inspection tool is being sent to KSC that will be able to rotate the ball in order to inspect the remaining 75 percent.

An exception will be taken regarding this issue and will be briefed at the FRR and at L-2.

6. Flight Crew Operations noted that the pilot exceeds the 20 hours per day max limit on the first day of the mission, given the current timeline. Crew and timeliners are reviewing the timeline and are expected to reach a resolution to accommodate sleep shifting for dual shift operations and not exceed the 20-hour limit.
7. Engineering reported the BSTRA ball crack as its only open issue. It was noted that, with regard to structural integrity, the cracks must be self-limiting but during testing a second crack did occur. Analysis of how representative the tests are is on going. Additional testing may be required. With respect to FOD generation, test and analysis is attempting to characterize the size of the FOD and determining if the engine can handle it.
8. Space and Life Sciences reported crew completed their L-10 medical evaluations and is healthy. It was noted that the Space and Life Sciences Directorate performed the payload integration for this flight, at Code U's request.
9. SR&QA reported that there are no new NSRS items, CIL's, or hazards. SR&QA is following the BSTRA tests and conducting a fault tree analysis.

It was noted that there will be 400 people supporting payload operations during the mission, including international participants. Additionally, digital TV will be provided to GSFC and an external POC has been set-up at the Florida Institute of Technology to support ESA.

There were no other open issues or concerns expressed at the meeting.

EA/David Petri

ERMINGER, MARK D. (JSC-NC) (NASA)

From: Bill Bihner [wbihner@hq.nasa.gov]
Sent: Monday, January 13, 2003 2:27 PM
Cc: Roy.Bridges-1@ksc.nasa.gov; Jefferson.D.Howell1@jsc.nasa.gov;
Arthur.G.Stephenson@nasa.gov; William.Parsons@ssc.nasa.gov
Subject: STS-107 PMMT SMAR



STS-107_SMAR_P
MMT.doc



ATT152680.txt

Good Afternoon,

Attached please find the Code Q Pre-Launch Mission Management Team Edition of the Safety and Mission Assurance Report (SMAR) for STS-107.

NOTE that the only change to this document from the FRR version is the update to the BSTRA ball status based on a special PRCB meeting on Sunday, January 12. OV-102 has been cleared to fly one additional mission, STS-107. Actions assigned by the Shuttle Program Manager will determine the longer term solution(s) to the BSTRA issue.

If there are any questions, please give me a call.

Thanks,

Bill

William J. Bihner, Jr.
NASA/QE
(202) 358-4441

Safety and Mission Assurance Report for the STS-107 Mission

Pre-Launch Mission Management Team Edition

January 13, 2003

**Enterprise Safety and Mission Assurance Division
Office of Safety and Mission Assurance
National Aeronautics and Space Administration
Washington, DC 20546**

SAFETY CERTIFICATION FOR THE FLIGHT READINESS REVIEW

The Enterprise Safety and Mission Assurance Division at NASA Headquarters has been involved in the review of safety risk factors affecting the risk level of this Space Shuttle mission. The Enterprise Safety and Mission Assurance Division has concurred with the decision by the Space Shuttle Program Manager in approval of Element Hazard Reports to baseline the program safety risk level. Changes to the risk baseline for the Space Shuttle Program arise from mission unique requirements, mission processing problems, in-flight anomalies, component testing, new analyses, and related issues from other vehicles. Their resolution has been evaluated for risk acceptability.

The items referred to as safety risk factors are listed in this report as either unresolved or resolved. Those safety risk factors that are unresolved must be resolved with adequate supporting flight rationale prior to the flight of this Space Shuttle mission.

The Enterprise Safety and Mission Assurance Division certifies the risk acceptability of the baseline safety risks with changes identified herein pending resolution of items identified in this report as constraints and subject to resolution of any changes to risk items.

Prepared by:

Original s/b Bill Bihner

Bill Bihner
Space Shuttle Safety and Mission Assurance
Enterprise Safety and Mission Assurance Division
Office of Safety and Mission Assurance

Table of Contents

CHANGE NOTICE4

1 INTRODUCTION..... 5

 1.1 PURPOSE 5

 1.2 SCOPE 5

 1.3 CUSTOMERS 5

2 MISSION SUMMARY 6

 2.1 MISSION & VEHICLE DATA..... 6

 2.2 MISSION ASSURANCE..... 7

3 SAFETY RISK FACTORS ASSESSMENT 8

Change Notice

This Safety and Mission Assurance Report (SMAR) has incorporated several changes from prior editions of this document. The underlying goals of these changes are to make the document more readable and useful to senior management.

1. No changes to this document.

1 Introduction

1.1 Purpose

This Safety and Mission Assurance Report (SMAR) is produced by the National Aeronautics and Space Administration (NASA) Headquarters, Office of Safety and Mission Assurance (OSMA). The SMAR provides the OSMA Associate Administrator (AA) and the Human Space Flight AA with a summary of the changes to the Shuttle Program's safety risk baseline as approved in the formal Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL) and Hazard Analysis process. Changes to the baseline since the previous flight are included to highlight their significance in risk level change. Flight rationale supporting any departure from the approved FMEA/CIL and Shuttle Program baseline is provided. The SMAR documents unresolved safety risk factors known up to this point impacting this flight.

The report is published on a mission-by-mission basis for use in the Flight Readiness Review (FRR) and is updated for the Pre-launch Mission Management Team (PMMT) Review (formerly the Launch Minus Two-Day Review), as needed.

1.2 Scope

The SMAR addresses the risk factors that represent a change from previous flights, factors from previous flights that have impact on this flight, and factors that are unique to this flight. Factors listed in the report are limited to items that affect, or have the potential to affect, Space Shuttle safety and mission assurance and have been elevated to Level I for discussion or approval. These changes are derived from a variety of sources such as issues, concerns, problems, and anomalies. It is not the intent to attempt to scour lower level files for items evaluated and closed at those levels and report them here; it is assumed that their significance is such that Level I discussion or approval is not appropriate for them. Items for which there is clearly no safety impact or potential concern will not be reported here, although items that were evaluated at some length and found not to be a concern will be reported as such.

1.3 Customers

The following are identified as the primary customers of this Safety and Mission Assurance Report:

- OSMA, Associate Administrator, Bryan D. O'Connor
- OSMA, Acting Deputy Associate Administrator, James D. Lloyd
- Office of Space Flight, Associate Administrator, William F. Readdy
- Office of Space Flight, Deputy Associate Administrator for ISS & SSP, Major General Michael Kostelnik

2 Mission Summary

2.1 Mission & Vehicle Data

Mission Data

- Launch Date: January 16, 2003
- Landing Date: February 1, 2003
- Mission Duration: 16 days
- Launch Site: KSC Pad 39A, MLP-1
- RTLS: KSC Shuttle Landing Facility
- Landing Site: KSC Shuttle Landing Facility
- TAL Site: Moron, Spain Alternate TAL Site: Zaragoza, Spain
- Inclination/Orbit: 39°/150 Nautical Miles Direct Insertion

Crew Size: 7 (click on hot links to see web-based descriptions)

Crew Position	Name	Flight Experience
Commander	<u>Rick Husband</u>	1 flight
Pilot	<u>William McCool</u>	First flight
Payload Commander	<u>Michael Anderson</u>	1 flight
Mission Specialist	<u>Kalpana Chawla</u>	1 flight
Mission Specialist	<u>David Brown</u>	First flight
Mission Specialist	<u>Laurel Clark</u>	First flight
Payload Specialist	<u>Ilan Ramon</u>	First flight

Vehicle Data

- Orbiter: OV-102 (Flight # 28, last mission STS-109, March 1-12, 2002)
- ET: ET-93 (Light Weight Tank)
- SRBs: BI-116
- RSRM Flight Set # 88
- SSME (Last Hot-fire): ME#1 (SSC Green Run), ME#2 (STS-109), ME#3 (STS-108)
 - All SSME's are Block II configuration.
- Orbiter Software Build: OI-29 (5th flight)

2.2 Mission Assurance

Priority	Mission Success Criteria
1	SPACEHAB commercial sponsored payloads
2	ESA/NASA sponsored payloads
3	NASA/ISS sponsored payloads
4	NASA/Code U sponsored payloads
5	FREESTAR
6	SIMPLEX
7	RAMBO
8	DTO's
9	DSO's

No EVA's are planned for this mission.

The following link is a detailed mission/crew timeline:

<http://mod.jsc.nasa.gov/do4/flightplan/STS107/Final/107sfin.pdf>

3 Safety Risk Factors Assessment

This section contains a summary of the risk factors and their safety assessment status. Unresolved risk items, those that could impact the safety and mission assurance of this flight and require further mitigation and statement of acceptable flight rationale, are filtered to the top of the list and appear first in these tables. Resolved risk items are those that are considered closed with acceptable flight rationale from a safety perspective.

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
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#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
1	<p>OV-103 17 Inch BSTRA Ball Crack</p> <p>(OV-103 currently in Orbiter Maintenance Down Period (OMDP) until 4/04)</p>	<p>Resolved for the next flight of OV-102, OV-104 and OV-105.</p>	<p>Special Topic</p> <p>1. OMRSD inspection of OV-103 17 inch LO2 feedline revealed a crack in the ball of the Ball Strut Tie Rod Assembly (BSTRA) nearest the LO2 manifold.</p> <p>2. Failure of the ball could result in:</p> <p> a. Lack of articulation capability of the feedline resulting in structural failure of the feedline</p> <p> b. FOD generation</p>	<p>1. A detailed boroscope inspection of the BSTRA joints on OV-102 was last done prior to STS-109. No discrepancies were noted.</p> <p>2. Videos of the BSTRAs from the summer 2002 flowliner investigation is inconclusive for evaluating the BSTRA balls on OV-102. (Boroscope inspections of the BSTRA balls only shows about 25% of the ball.)</p> <p>3. BSTRA inspections on OV-103, OV-104 and OV-105 are complete. Additionally by Jan 14, it is anticipated that 100% of the BSTRA balls on OV-103 will be inspected.</p> <p>4. In a special PRCB on Jan 12, the program after reviewing test data and a preliminary PRA analysis for SSME failure due to FOD, the program agreed to write paper to allow one more flight of OV-102, OV-104 and OV-105.</p> <p>5. The program has demonstrated that feedline joint articulation is not an issue and that FOD will be generated but within acceptable limits.</p>	<p>None for the next three missions.</p>	<p><u>This Flight:</u> Not a flight constraint for STS-107.</p> <p><u>Long-Term:</u> Program must work to develop inspection techniques, replacement criteria, and long term PRA analysis.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
4	SSME - Nozzle Leak Below Hatband 9 on STS-113	Resolved	<p>MSFC One Pager</p> <p>1. STS-113 launch video footage showed an external fire in the 10th bay of Nozzle 5007 near fuel feedline 5 on SSME 2050. The fire is thought to be caused by ignition of coldwall leakage and is near the vicinity of previously documented coldwall leakage.</p> <p>2. All pressure vessels in the vicinity of the fire were cooled by fuel flow; all non-cooled structures were protected by insulation.</p> <p>3. External fires were also noted on STS-44 and STS-53 with no resulting hardware damage or performance loss.</p>	<p>1. Post-flight leak checks showed the leakage was about 0.005 pounds mass per second (limit is less than 0.02 pounds mass per second). The leakage is not significant since most missions are tolerant to 3 tube ruptures at the aft manifold at about 5.7 pounds mass per second.</p> <p>2. Preliminary inspections of Engine 2050 after landing do not show any obvious signs of thermal damage.</p> <p>3. The magnitude of the coldwall leakage on STS-113 was insignificant to engine performance.</p>	None	<u>This Flight:</u> This is not an issue for the flight of STS-107.
5	SRB - Cleaning Solvent Specification Change	Resolved	<p>MSFC One Pager.</p> <p>1. Source Control Drawings (SCDs) for Spirit 126 and PF degreaser contain requirements limiting use of COTS products.</p> <p>2. The Spirit 126 batch failed SCD aniline point requirements.</p>	<p>1. Minor changes to SCD specs for PF degreaser allow purchase of COTS product.</p> <p>2. The basis for certification was "testing and similarity."</p>	None	None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
6	SRB - First Flight of Pacific Scientific Forward and Aft Separation Bolts	Resolved	MSFC One Pager 1. One new aft separation bolt was utilized in Tail Service Mast (TSM) configuration on STS-112/BI115. 2. STS-107/BI116 will be the first use of forward and aft separation bolts in flight configuration. 3. Bolt qual testing is complete. Bolt used in TSM for STS-112 performed nominally. Inspection shows typical fracture surfaces.	1. Bolt qual testing was successfully completed. 2. The single new bolt used in the TSM for STS-112 performed nominally. Post-inspection showed typical fracture surfaces.	None	None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
7	LO2 LWT Normal Mission and RTLS Ullage Pressure Curves for ET-93	Resolved	<p>MSFC One Pager</p> <p>During mission unique assessment of MPS prediction, LO2 tank pressurization analysis indicated violations for the LO2 tank nominal and RTLS missions. The worst case analysis prediction indicated a 0.15 psi violation between 82 and 102 seconds for nominal mission maximum limit, a 0.85 psi violation between 0 and 1 seconds and a 0.25 psi violation between 2 and 8 seconds for nominal mission minimum limit, and a 0.3 psi violation between 0 and 0.5 seconds and a 0.15 psi violation between 3 and 7 seconds for RTLS minimum limit.</p>	<p>An Interface Revision Notice (IRN) was implemented to revise the upper and lower pressure limits. The revised limits were presented to the Loads Panel on 12/02/02 and the IRN was approved on 12/10/02.</p> <p>The root cause for the ICD violations are due to use of Block II SSMEs with a Light Weight Tank.</p>	None	<p><u>This Flight:</u> Analysis indicates critical structural margins of safety are unaffected for the proposed maximum and minimum ICD limits for STS-107/ET-93.</p> <p>STS-107/ET-93 is safe for flight.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
8	ET Vent Valve Relief Pressure	Resolved	<p>MSFC One Pager</p> <p>Review of qualification data from the new vent/relief valve supplier (Ketema) identified reduced relief pressure during pre-press. When considering scatter in the valve cracking pressure, there is reduced margin to relief during LH2 tank pre-pressurization.</p>	<p>ET-93 is the first Light Weight Tank (LWT) to fly with three Block II SSMEs. An assessment using tank specific ullage pressure transducer biases was performed. The analysis still showed positive margins between minimum relief pressure and the maximum pressure allowed during pre-press.</p>	None	<p><u>This Flight:</u> Analysis of ET-93 shows positive margin between the minimum ATP predicted valve relief pressure and the maximum ullage pressure during pre-press. STS-107/ET-93 is safe for flight</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
9	Flowliner Corrosion Resistant Steel (CRES) Issue	Resolved	<p>JSC One Pager</p> <p>Following STS-110 an OV-104 MPS LH2 propellant feedline flowliner was found to have cracks at three slot locations. Weld repairs were performed on the Inconel 718 flowliners. The repaired flowliner flew successfully on STS-112. STS-112 post-flight inspections revealed no cracks.</p> <p>Inspections on OV-102 revealed cracks in the LH2 downstream flowliner which is made from CRES 321.</p>	<p>OV-102 Actions Complete:</p> <ol style="list-style-type: none"> 1. Crack repair welds, post NDE, & clean-up of 3 observed OV-102 flowliner cracks are complete. Polishing of LH2 gimbal joint downstream and upstream flowliner slots is complete. 2. The LH2 feedline NDE inspections are complete and good. 2. The BSTRA joint was clear with no issues (ball not inspected), the bellows to gimbal weld was clear with 0.54 margin of safety at cryogenic proof pressure, the bellows was cleared for 51 missions using conservative analysis technique, and the gimbal ring was cleared for 100 plus missions. 3. Teardown and inspection of the LH2 qualification test and MPTA feedlines was completed with no issues. 	None	<p><u>This Flight:</u> Based on the successfully completed crack repair welds, polishing of LH2 flowliner slots, internal feedline NDE inspections, and coupon testing, OV-102 was cleared for OPF rollout and flight.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
10	STS-113 Right Orbiter Maneuvering System (OMS) Bi- Propellant Valve Open Indication	Resolved	<p>JSC One Pager.</p> <p>1. At the end of the OMS burn, the right ball valve 2 continued to indicate open. The indication dropped only 0.5% so that the reading was 95.8% when it should be 0%.</p> <p>2. Per the flight rules, the right OMS was declared usable only for deorbit. All remaining on-orbit OMS burns were performed using the single engine left OMS only.</p>	<p>Although the root cause is still under investigation, there is rationale for flight:</p> <p>1. Failure of an OMS engine ball valve to close is crit 1R/2. Subsequent failure of the second ball valve in series could result in loss of propellant; however, controls are in place to minimize propellant loss real time via isolation.</p> <p>2. The ball valves and Linear Variable Differential Transducers (LVDT) on OV-102 have no history of problems in 28 flights.</p> <p>3. The LVDTs on OV-102 have flown only one mission since they were last cleaned.</p> <p>4. A safe deorbit burn is still possible with either a failed open ball valve or failed LVDT.</p>	None	<u>This Flight:</u> None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
11	STS-113 Flash Evaporator System (FES) Primary B Controller Failure	Resolved	JSC One Pager. The FES shut down during a FES water dump on the PRI B controller. Attempts to restart on PRI B were unsuccessful.	1. Ice formation was the suspected cause on STS-113. A core flush procedure was successfully performed. The FES continued to operate nominally on the PRI A controller for the remainder of the flight. 2. The root cause of the failure is a leaking spray valve on the "B" system. The spray valve assembly has been removed and replaced.	None	<u>This Flight:</u> None A newly refurbished FES was installed in OV-102 at OMM and has successfully passed ATP and OMSRD testing. All the controller and control modes were verified.

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
12	STS-113 O2 leak in the Mid-Body	Resolved	<p>JSC One Pager.</p> <ol style="list-style-type: none"> 1. The mid-body and payload bay Hazardous Gas Detection System sample lines showed high levels of O2 during pre-launch. The levels measured 130 to 15 ppm and they should be approximately zero. 2. Troubleshooting isolated the leakage to Pressure Control System (PCS) System 2 between the valve panel and the 576 bulkhead. 3. Post-scrub inspection of the hardware found a blowing leak, 550 scim, on the flex hose on the upper side of the flex hose braid at the 576 bulkhead fitting. The flex hose braiding showed signs of bird caging deformation, typically an indication the flex hose has been subjected to an applied external load. 	<ol style="list-style-type: none"> 1. The leaking secondary O2 flex hose as well as the primary O2 and secondary N2 flex hoses, were removed and replaced. 2. Failure analysis was performed on the leaking flex hose. The findings indicated the presence of cracks and fatigue striations in some flex hoses, which are a result of relatively low frequency reverse bending fatigue. 3. Leak checks confirmed that the hoses were good for flight. There were no other problems with this system during the remainder of the STS-113 flight. <p>The O2 and N2 lines on STS-107 were inspected and leak-checked with no issues for flight.</p>	None	<p><u>This Flight:</u> None</p> <p><u>Long Term:</u> Inspections and inspection frequency, and criteria for replacement will need to be developed.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
13	STS-109 Freon Coolant Loop 1 Flow Degradation (STS-109 was OV-102's last flight, 3/1/02 - 3/12/02)	Resolved	JSC One Pager. 1. On STS-109, several seconds after Main Engine Cut Off (MECO), the freon coolant loop (FCL) 1 aft coldplate flow rate decreased from 304 lb/hr to 226 lb/hr. 2. The FCL 1 interchanger flow and payload heat exchanger flow increased at the same time, which confirmed a restriction in the aft coldplate branch.	1. The flow rate was stable following this event. 2. The flight rule states that the minimum flow rate in the aft coldplate branch is 211 lb/hr actual, 236 lb/hr allowing for measurement uncertainty, for a one FCL entry. 3. It was determined by analysis that FCL 1 would be able to provide sufficient cooling for the mission if FCL 2 failed and the mission continued as planned. 4. The debris that caused the flow restriction was removed; X-ray and visual inspections verified acceptable system cleanliness. The contamination responsible for the STS-109 anomaly was removed from OV-102. OV-102 FCL 1 ACP leg orifice, FPM, and pump inlet filters were replaced. X-rays verified no additional contamination.	None	<u>This Flight:</u> None.

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
14	EOM Nosewheel Steering Flight Rule Change	Resolved	JSC One Pager Loss of both tires on one main gear strut and/or loss of one nosegear tire could result in loss of orbiter directional control during landing rollout with possible lateral runway departure culminating in structural breakup.	Flight rule change recognizes that KSC runway -- with recent load bearing shoulder improvements -- is now better than EDW or NOR.	None	<u>This Flight:</u> Flight rule will be STS-107 specific until the rule can be incorporated into the "all flights" document.
15	First Flight of Two AMECs	Resolved	JSC One Pager This is just a procedural notification. The Advanced Master Event Controller (AMEC) has flown as a single unit on 13 other flights. There were no anomalies on any of those flights.	The AMECs installed in OV-102 successfully completed acceptance testing and were subjected to over 1000 hours of burn-in testing at SAIL. They passed OMSRD testing with no anomalies. There are two AMEC LRUs per orbiter and each AMEC has two cores. Each core is capable of performing the separation functions for the Shuttle.	None	None

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
16	SRB - Amphenol Connector Pin Lack of Retention	Resolved	<p>MSFC One Pager</p> <p>1. Inspections of Integrated Electronic Assembly (IEA) cables in the Solid Rocket Booster Assembly and Refurbishment Facility (ARF) revealed two cables with defective sockets that caused intermittent contact.</p> <p>2. Amphenol connectors on OV-102 are located on the SRB upper strut cables (BUS A&B), cable end which mates to the aft IEA.</p>	<p>1. This is a connector issue that was discovered during a bench test. One of the sockets on the connector was open and would not retain the pin.</p> <p>2. Further investigations discovered another cable assembly with the same connector problem. Will identify a root cause and contact the vendor (Amphenol).</p> <p>3. The root cause was isolated to two particular contacts. All STS-107 contacts were inspected and none were found to be bad.</p>	None	<p><u>This Flight:</u> No issues for STS-107</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
17	Body Flap Accuator Corrosion (Problem discovered while processing OV-104)	Resolved	Special Topic Internal corrosion (on the actuator housing gear teeth and the output shaft) was detected on the OV-104 body flap actuators while at the vendor (Hamilton Sundstrand) for external corrosion repairs.	1. The most probable cause of the actuator corrosion is water/moisture intrusion. A Magnetic Particle Inspection performed on the corroded OV-104 BF actuators revealed no cracks. Shaft corrosion was shallow and not a concern. The gear corrosion will not cause a near term failure of the BF actuator. The robust design of the BF actuator provides for load sharing between gear teeth. In the event of a weakened gear tooth, the load is redistributed within the outer gears. 2. Following OV-102's last flight (STS-109) close-out inspections found no corrosion or anomalies on the BF actuators. 3. When OV-103 - the fleet leader - was looked at very recently, another actuator was found with corrosion.	None	<u>This Flight:</u> None. Close-out photos verified no corrosion on OV-102 <u>Long Term:</u> Program will address actuator corrosion as a long-term flight issue.

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
18	EVA - STS-113 EVA Crew-member Boot Fit	Resolved	<p>JSC One Pager</p> <p>This is a procedural issue. The crew member trained with the proper suit which had been tailored following feedback from his flight on STS-92. When the suit was preped for the STS-113 mission, USA added the one inch spine growth length to the leg part of the suit and not the body section.</p>	The crew member was able to swap suit parts on orbit and by his third EVA, he had a suit that fit properly.	None	<p><u>This Flight:</u> NASA will work with USA to make sure that the suit meets crewmember requirements if needed for a contingency</p> <p><u>Long Term:</u> NASA will work with USA to elaborate the procedures for proper suit fit.</p>
19	STS-113 Post-Flight Observation - Foreign Material in RSRM Nozzle-to-Case Joint Radial Bolt Hole	Resolved	<p>MSFC One Pager</p> <p>A stainless steel washer (foreign object) was observed during the disassembly of STS-113 (RSRM-86) in the bottom of one of the nozzle-to-case joint radial holes. This could have potentially impacted joint clamping and seal integrity.</p>	<p>The root cause of the [problem has been determined to be a radial plug which became disassembled during removal; the washer was inadvertently not removed; and the condition was not detected by the assembly personnel.</p> <p>A PAS report has been generated to track corrective actions. There are no joint performance issues: adequate bolt preload verified by process controls and seal integrity verified by leak test.</p>	None	<p><u>This Flight:</u> No issues.</p>

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
20	STS-113 Post-Flight Observation - Flashing on RSRM Nozzle-to-Case Joint Packing with Retainers	Resolved	MSFC One Pager Post-flight assessments of STS-113 (RSRM-86) observed rubber flashing on the sealing element of five nozzle-to-case joint packing-with-retainers. Foreign material on these packing-with-retainers could impact the redundant sealing function on the nozzle-to-case joint.	The root cause and corrective actions are still being evaluated. A PAS report has been generated. The rationale for flight is based on leak checks (that verify seal integrity at high and low bolt torque and pressure), the packing-with-retainers are in high compression during motor operation, and engineering flaw testing demonstrated high tolerance for packing-with-retainer element defects.	None	<u>This Flight:</u> No issues
21	SSME Controller Coolant Duct Redesign - 1st Flight ECP	Resolved	MSFC One Pager The change is being incorporated to mitigate two issues: The controller coolant duct is in a congested area and there have been problems associated with maintaining the proper clearance to the powerhead; and the soft aluminum material is susceptible to handling damage.	The basis for certification is similarity; hotfire testing (over 29 starts and 17,030 seconds); and VCR 586 approval on 10/22/01.	None	<u>This Flight:</u> No issues

#	Issue	Status this flight	Description	Actions Taken	Risk Level Change	Action Needed to Resolve (this flight & long-term)?
22	Orbital Debris and Micrometeoroid Risks	Resolved	Program calculates Orbital Debris risk probability for each mission	<p>1. Odds of Critical Penetration (OCP): 1/370 (Program requirement 1/200).</p> <p>2. Odds of Radiator Leak Penetration (ORLP): 1/315 (Program Requirement 1/61).</p>	<p>1. Risk level is within Program's risk acceptance range for Orbital Debris and Meteoroid exposure.</p> <p>2. Note that the risk level is slightly lower compared to STS-113, the previous mission (OCP was 1/244 and ORLP was 1/253).</p>	<u>Long Term</u> : The Program should continue to assess methods to further reduce the risk of orbital debris and micrometeoroids.

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ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 16, 2003 10:34 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Launch Report

STS-107 Launch Report
GMT 16:16:30

Shift Lead: Andy Foster
Ascent Ops Specialist: Andy Foster
Tanking/MPS Specialists: Bill Prince, Dan Clements
Mission Engineer: Megan Bell (OJT)

STS-107 was successfully launched on January 16, 2003 at GMT 16:15:39 (09:30 CST). While some IPR's were worked, there were no LCC violations during the prelaunch countdown. Weather was never a concern during the launch for KSC or at the TAL sites.

Performance during powered flight was nominal. MECO occurred on time and inserted the vehicle into an initial 156 x 43 nm orbit. ET sep and all subsequent events were nominal. OMS 2 occurred at 16:16:20 GMT. The 186.1 fps burn boosted the vehicle into a 156 x 146 nm orbit.

There are no vehicle anomalies at this time.

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or
<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: DISLER, JONATHAN M. (JON) (JSC-SX) (LM)
Sent: Thursday, January 16, 2003 6:37 PM
To: Armando Oliu (E-mail); BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); BARBARA A. CONTE (JSC-DM) (E-mail); Bill Lamkin; BOBBIE G. SWAN (JSC-CA) (E-mail); Brenda Eliason; BRIAN K. BALU (JSC-NC) (E-mail); Carlos Ortiz-Longo; Chris "The Man" Cloudt; Chris Hadfield (E-mail); Chris Lessmann; Christine Boykin; Curt Larsen / MS2; Dan Clements / NC-GH2; David Brown / CB (STS-107); David Moyer / MER Manager (E-mail); DAVID R. BRETZ (JSC-SN) (E-mail); David Rigby / MPS SSM (E-mail); DENA S. HAYNES (JSC-EV) (E-mail); Don Prevett; DONALD L. (DON) MCCORMACK (JSC-MV) (E-mail); Doug White; Douglas Powell (MAF); FRED F. MAYER (JSC-NC) (E-mail); Gail Hargrove Boeing-Houston Imagery Scrn.; Greg Katnik; Gregory Galbreath; GREGORY J. BYRNE (JSC-SN3) (E-mail); JAMES B. (BRITT) WALTERS (JSC-SF2) (E-mail); 'James Feeley' (E-mail); James Walters; JAVIER J. JIMENEZ (JSC-EA) (E-mail); Jeff Goodmark (E-mail); Jene Richart / MS2; Jill Lin; Jim Harder; 'John McKee' (E-mail); John Ventimiglia; JONATHAN M. (JON) DISLER (JSC-SN) (E-mail); Jorge Rivera; Julie Kramer; Karen Alfaro (E-mail); KENNETH L. BROWN (JSC-MV) (E-mail); KEVIN L. CROSBY (JSC-SN) (E-mail); 'L Lohrli' (E-mail); Malcolm Glenn; MARK D. ERMINGER (JSC-NC) (E-mail); Mark Erminger; MARK L. HOLDERMAN (JSC-MS) (E-mail); MARSHA S. IVINS (JSC-CB) (E-mail); MARTINEZ, HUGO E. (JSC-NC) (GHG); Michael Anderson / CB (STS-107); MICHAEL W. SNYDER (JSC-SN) (E-mail); Mike Cagle / Boeing Film Screen; Mike O'farrell; P J. (JEFF) BERTSCH (JSC-DD) (E-mail); Pam Madera (E-mail); PAUL F. DYE (JSC-DA8) (E-mail); PAYNE, ROBERT W. (JSC-SA13) (LM); 'Philip Kopfinger' (E-mail); Philip Peterson / Boeing Film Screen (E-mail); Philip Reid / Boeing Film Screen; PREMKUMAR SAGANTI PhD (JSC-SN) (E-mail); RANDALL W. ADAMS (JSC-MS2) (E-mail); RAYMOND T. (RAY) SILVESTRI (JSC-DM4) (E-mail); Rick Husband / CB (STS-107); Robbie Robinson; Robert Page; ROBERT SCHARF (JSC-SN) (E-mail); Robert Speece; ROBERT W. FRICKE JR (JSC-MV) (E-mail); Rodney Rocha / ES2 (E-mail); Rodney Wallace; Rohit Dhawan; Ronald Clayton / MS2; Roy Glanville; Rudy Ramon; SA REP; Sara Brandenburg; Scott Otto; Stephen Frick / CB; Steve Derry; Tom Rieckhoff; Tom Wilson; 'Treith' (E-mail)
Subject: JSC STS-107 Launch Video Screening Report

JSC STS-107 Launch Video Screening Report

January 16, 2003

**JSC Image Science and Analysis Group
Human Exploration Science Office / SX**

ANOMALY CANDIDATES

No potentially anomalous events were noted during the screening of the STS-107 launch videos that were received. The long range tracking videos (second engineering replays) have not been sent via satellite to JSC. When the second replays are received they will be screened and a report will be sent to distribution.

OBSERVATIONS

The following observations are not considered anomalous but are worth noting:

OTV070 - The SSME ignition appeared normal on the video views. The start times for SSME ignition as seen on the OTV070 video were:

SSME #3 15:38:55.218 UTC
SSME #2 15:38:55.371 UTC
SSME #1 15:38:55.468 UTC

The SSME Mach diamonds formed in the expected sequence (3,2,1). The times for the Mach diamond formation were:

SSME #3 15:38:56.769 UTC
SSME #2 15:38:56.835 UTC
SSME #1 15:38:57.187 UTC

(The above engine start and Mach diamond formation times will be refined using the high speed engineering films during the film screening this weekend.)

OTV051, OTV070 - A small, white-colored flash was observed on the exterior of SSME #1 after SSME ignition (15:38:57.972 UTC). This flash was probably a piece of hydrogen burn igniter contacting the engine bell and it is not considered an abnormal event.

OTV009, OTV054, OTV063 - Pieces of purge barrier material from the LH2 umbilical were seen falling aft along the -Z side of the body flap during SSME ignition (15:38:57.203 UTC).

OTV009, OTV054 - Right inboard and outboard elevon motion was apparent during liftoff. Elevon motion during liftoff is a normal event. However, the elevon motion seen on STS-107 may have been greater than that typically seen.

OTV009 - A small light-colored piece of debris, probably debris from the SRB flame duct, was seen on the east side of the launch pad (between the RSRB and the body flap as seen on the east looking OTV009 camera view) during liftoff (15:39:01.710 UTC).

OTV051 - A piece of RCS paper debris was seen falling from near the right RCS stinger between SSME #1 and SSME #3 during SSME ignition (15:38:59.308 UTC).

OTV051 - A light-colored streak or flash was seen in the SSME #1 exhaust plume after SSME ignition (15:38:59.722 UTC).

OTV009, OTV049, OTV054 - Typical of previous missions, multiple pieces of ice debris were seen falling from the ET/Orbiter umbilicals and along the -Z side of the body flap during SSME ignition through liftoff. A single piece of umbilical ice debris contacted the forward surface of the LO2 electric cable tray near the LO2 umbilical during SSME ignition (15:38:56.054 UTC). Ice debris was seen falling near the LH2 four inch recirculation line. No damage to the launch vehicle was noted.

OTV051, OTV070 - Orange vapor (possibly free burning hydrogen) was seen forward of the SSME rims during SSME ignition. Orange vapor forward of the SSME rims during SSME ignition has been seen on previous mission films and videos.

OTV061- Frost and vapors were visible on the -Y ET GOX vent louver prior to liftoff. Frost on the ET vent louvers has been seen on previous mission videos.

OTV060, OTV071 - The GH2 vent arm retraction and latch back appeared normal on the launch video views.

OTV050, OTV051 - Ice debris was seen falling from the LH2 and LO2 TSM T-0 umbilical disconnects at liftoff.

OTV051- A piece of probable SRB flame duct debris was seen aft of the LSRB during liftoff.

KTV4A, KTV13, KTV21A - Light or orange-colored flares in the SSME exhaust plume were seen during ascent at the following times:

15:39:12.468 UTC
15:39:14.550 UTC
15:39:33.390 UTC
15:39:33.441 UTC
15:39:35.609 UTC
15:39:40.332 UTC

A large flare was seen at 15:39:37.160 UTC. Flares in the SSME exhaust plume during ascent are sometimes caused by debris contacting the SSME plume. Usually this debris is RCS paper. Flares in the SSME exhaust plume have been observed on previous mission videos.

KTV4A - A single, light-colored piece of debris was seen exiting the SRB exhaust plume during ascent prior to SRB separation. This debris was probably instafoam from the aft end of the SRBs. The debris was seen at 15:40:19.871 UTC.

Other normal events observed included:

RCS paper debris from SSME ignition through liftoff, ice / frost on SSME purge drain-line vents, ET twang, ice and vapor from the LO2 and LH2 TSM T-0 umbilicals prior to and after disconnect, acoustic waves in the exhaust cloud after liftoff, ET aft dome outgassing and charring of the ET aft dome after liftoff, vapor off the SRB stiffener rings, and the roll maneuver.

Normal pad events observed were:

Hydrogen burn igniter operation, FSS and MLP deluge water activation, LH2 and LO2 TSM T-0 umbilical disconnect and retraction, LH2 TSM door closure.

NOTES:

The STS-107 launch of Columbia (OV-102) from Pad A occurred on Thursday, January 16, 2003 at 016:15:39:00.109 UTC as seen on camera OTV050. SRB separation occurred at approximately 016:15:41:06.500 UTC as seen on camera KTV4A.

On launch day, 19 videos were received and screened. The second engineering long range tracking videos were not received. The long range tracking videos will be screened upon receipt. Timing data was received on all of the videos received except KTV13.

The launch film screening will be conducted on Saturday and Sunday and a report will be sent to distribution on Monday, January 20, 2003.

Selected launch views are available for viewing at the following web address:

http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/launch_video/107launchvideo.shtml

Jon Disler / SX3-LM
Chris Cloudt / SX3-HEI
Joe Caruana / SX3-LM

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 17, 2003 8:59 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD01 Report

STS-107 Flight Day 01 Report
GMT 017:14:30

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally. Payload bay door opening was nominal and the port radiator was deployed. Spacehab activation also was nominal though a bit late. Spacehab activities are progressing nominally at this time. Orbiter consumables are above the levels required for the planned mission. Twenty-two hours of margin were reported at the Engineering meeting this morning.

Two items are being carried as MER anomalies at this time.

AC2 Phase B exhibited sluggish performance during the prelaunch and post-insertion timeframes. Sluggish performance was first noted at T-31 seconds in the launch countdown and then twice during post-insertion activities. During the operation of three motors, AC2 phases A and C would increase to expected values while phase B would rise to only half of what was expected but recover to nominal values within one second. Motor operation was nominal. The affected motors are: vent doors 8 and 9, Ku-band deploy motor 2, and port payload door open motor 2. There are no common circuits or motor control assemblies for these motors though they are all controlled via circuit breakers found on panel MA73C. However, other motors controlled by those circuit breakers are showing nominal operating signatures. Engineering is continuing to examine data, but there is no in-flight troubleshooting planned at this time. This anomaly holds no mission impact since all motors will operate nominally even if there were a complete failure of phase B. At this time, we believe the mission is at no additional risk. We are continuing to monitor and evaluate this anomaly.

During Spacehab activation, the crew reported they could not communicate to Spacehab from the Orbiter over the intercommunications (ICOM) B loop. ICOM A is working nominally, and this is considered to be a loss of redundancy impact. No mission impact is expected, and currently no in flight troubleshooting is planned.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab

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ERMINGER, MARK D. (JSC-NC) (NASA)

From: DISLER, JONATHAN M. (JON) (JSC-SX) (LM)
Sent: Friday, January 17, 2003 12:56 PM
To: Armando Oliu (E-mail); BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); BARBARA A. CONTE (JSC-DM) (E-mail); Bill Lamkin; BOBBIE G. SWAN (JSC-CA) (E-mail); Brenda Eliason; BRIAN K. BALU (JSC-NC) (E-mail); Carlos Ortiz-Longo; Chris "The Man" Cloudt; Chris Hadfield (E-mail); Chris Lessmann; Christine Boykin; Curt Larsen / MS2; Dan Clements / NC-GH2; David Brown / CB (STS-107); David Moyer / MER Manager (E-mail); DAVID R. BRETZ (JSC-SN) (E-mail); David Rigby / MPS SSM (E-mail); DENA S. HAYNES (JSC-EV) (E-mail); Don Prevett; DONALD L. (DON) MCCORMACK (JSC-MV) (E-mail); Doug White; Douglas Powell (MAF); FRED F. MAYER (JSC-NC) (E-mail); Gail Hargrove Boeing-Houston Imagery Scrn.; Greg Katnik; Gregory Galbreath; GREGORY J. BYRNE (JSC-SN3) (E-mail); JAMES B. (BRITT) WALTERS (JSC-SF2) (E-mail); 'James Feeley' (E-mail); James Walters; JAVIER J. JIMENEZ (JSC-EA) (E-mail); Jeff Goodmark (E-mail); Jene Richart / MS2; Jill Lin; Jim Harder; 'John McKee' (E-mail); John Ventimiglia; JONATHAN M. (JON) DISLER (JSC-SN) (E-mail); Jorge Rivera; Julie Kramer; Karen Alfaro (E-mail); KENNETH L. BROWN (JSC-MV) (E-mail); KEVIN L. CROSBY (JSC-SN) (E-mail); 'L Lohrli' (E-mail); Malcolm Glenn; MARK D. ERMINGER (JSC-NC) (E-mail); Mark Erminger; MARK L. HOLDERMAN (JSC-MS) (E-mail); MARSHA S. IVINS (JSC-CB) (E-mail); MARTINEZ, HUGO E. (JSC-NC) (GHG); Michael Anderson / CB (STS-107); MICHAEL W. SNYDER (JSC-SN) (E-mail); Mike Cagle / Boeing Film Screen; Mike O'farrell; P J. (JEFF) BERTSCH (JSC-DD) (E-mail); Pam Madera (E-mail); PAUL F. DYE (JSC-DA8) (E-mail); PAYNE, ROBERT W. (JSC-SA13) (LM); 'Philip Kopfinger' (E-mail); Philip Peterson / Boeing Film Screen (E-mail); Philip Reid / Boeing Film Screen; PREMKUMAR SAGANTI PhD (JSC-SN) (E-mail); RANDALL W. ADAMS (JSC-MS2) (E-mail); RAYMOND T. (RAY) SILVESTRI (JSC-DM4) (E-mail); Rick Husband / CB (STS-107); Robbie Robinson; Robert Page; ROBERT SCHARF (JSC-SN) (E-mail); Robert Speece; ROBERT W. FRICKE JR (JSC-MV) (E-mail); Rodney Rocha / ES2 (E-mail); Rodney Wallace; Rohit Dhawan; Ronald Clayton / MS2; Roy Glanville; Rudy Ramon; SA REP; Sara Brandenburg; Scott Otto; Stephen Frick / CB; Steve Derry; Tom Rieckhoff; Tom Wilson; 'Treith' (E-mail)
Subject: STS-107 Long Range Tracking Video Screening

JSC STS-107 Launch Screening - Long Range Tracking Videos

January 17, 2003

JSC Image Science and Analysis Group Human Exploration Science Office / SX

ANOMALY

ET204, ET208, ET212 - During ascent at approximately 81 seconds MET, a large light-colored piece of debris was seen to originate from an area near the ET/Orbiter forward attach bipod. The debris appeared to move outboard in a -Y direction, then fell aft along the left Orbiter fuselage, and struck the leading edge of the left wing. The strike appears to have occurred on or relatively close to the wing glove near the Orbiter fuselage. After striking the left wing the debris broke into a spray of white-colored particles that fell aft along the underside (-Z side) of the Orbiter left wing. The spray of particles was last seen near the LSRB exhaust plume.

Still views and a movie loop of this event are being placed on our web site for viewing at the following address:

http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/launch_video/107launchvideo.shtml

The times of this event are as follows:

Debris first seen near ET/Orbiter forward attach: 016:15:40:21.699 UTC

Debris contacted left wing: 016:15:40:21.882 UTC

Screening of the high speed and high resolution long range tracking films that may show more detail of this event will begin on Saturday morning, January 18th.

Normal Observations Noted Included:

Vapor off the SRB stiffener rings, recirculation, SRB plume brightening, and slag debris after SRB separation.

NOTES:

The long range video tracking views had very soft focus possibly due to clouds and haze.

SRB separation occurred at approximately 016:15:41:06.558 UTC as seen on camera ET208.

Five long range tracking videos were received and screened. Timing data was received on all of the videos received except ET207.

The launch film screening will be conducted on Saturday and Sunday and a report will be sent to distribution on Monday, January 20, 2003.

Jon Disler / SX3-LM

Joe Caruana / SX3-LM

Eric Nielsen / SX3-HEI

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Sent: Friday, January 17, 2003 3:05 PM
To: DL SRQA PAR SUPPORT; Leigh Martin (MSFC) (E-mail); Brenda Willis (E-mail); Alan Peterson (Boeing) (E-mail); Arnold Clifton T. (E-mail); Barnes Jeffrey E (Boeing) (E-mail); Bevels Vicki (E-mail); Bill Bihner (E-mail); Bill Loewy (E-mail); 'Carol Rush' (E-mail); Chris Hill (MSFC) (E-mail); 'Cianciola C. (MSFC) @SMTP' (E-mail); Corey Harrell (MSFC) (E-mail); Daniels Angela (E-mail); Darrell Warner (Boeing) (E-mail); Dave Spacek (MSFC) (E-mail); 'Diana Heberling' (E-mail); donnie.george/msfc (E-mail); Dumetz Marisa (E-mail); Engler Tom (E-mail); Ernest-1 Stephen (E-mail); Fred Dadfar (MSFC) (E-mail); 'Gatto Leigh(IV&V)' (E-mail); Gordon-1 Mark (E-mail); Gregg George (MSFC) (E-mail); griffith (jamss) (E-mail); Haddad-1 Michael (E-mail); Hashimoto Rick (E-mail); 'Hill Bill (HQ) @SMTP' (E-mail); 'Howell. Nelda' (E-mail); James Halsell (KSC) (E-mail); John McPherson (MSFC) (E-mail); John. R. Dicks@ivv. nasa. gov (E-mail); Keith Pauley (E-mail); Kennedy Michael (E-mail); kim. carmean@msfc. nasa. gov (E-mail); 'Lackey Ed' (E-mail); Leigh Martin (MSFC) (E-mail); Linda Combs (E-mail); Mark Kowalesky (HQ) (E-mail); Mike Card (HQ); mikesmiles; Mitsue Masami (NASDA) (E-mail); Moorhead-III James L (E-mail); Mr. Takeuchi(nasda) (E-mail); Mullane Dan (E-mail); Nathan Kyser (jams) (E-mail); Nobles Noel R (E-mail); polystenger; rich patrican; Roger Counts; 'Sandy'; Sharolee Huet-1 (E-mail); Sims, John (MSFC); Sue Fenn (HQ); 'Suzanne Little'; thomas S Toutsu (GDSFC); thomas.w.hartline@msfc.nasa.gov; Tom Hancock (MSFC); Walker, Angelia; Wbihner (E-mail); wbstick; 'Willis-1, Brenda'; Wren, Robert J (USA); Zavala, Velma (USA)
Subject: PAR-5 Minutes for 01/17/2003



MIN011703.doc

<http://wwwsrqa.jsc.nasa.gov/par/>

Upcoming PARs:

01/31/03	STS-114/ULF-1 JPAR
02/12/03	STS-114/ULF-1 JPAR
02/26/03	STS-114/ULF-1 JPAR

Note: Current changes indicated to the right by *****

Presenters review your items and submit any changes to the PAR Coordinator as soon as possible.

Debbie Bazan, JSC PAR Coordinator
(281) 244-1862 dbazan@ems.jsc.nasa.gov

PAR-5 MINUTES JANUARY 17, 2003

<http://wwwsrqa.jsc.nasa.gov/par/>

The next PAR-5 will be held on Friday, 1/24/02 at 09:30 am Central.

The PAR-5 is a weekly telecon for representatives in the PAR process.

Debbie Bazan, JSC PAR Coordinator, (281) 244-1862 dbazan@ems.jsc.nasa.gov Note: Current changes indicated to the right by *****
PRESENTERS REVIEW THEIR ITEMS AND SUBMIT ANY CHANGES OR REQUESTS FOR CHANGES TO THE PAR-5 COORDINATOR
PRIOR TO THE NEXT MEETING.

10P FLIGHT MILESTONE DATES

10P SORR 01/16/03

ISS 10P PAR: 01/10/03 (immediately following 107 PMMT)

10P Launch: 02/02/03

THE FOLLOWING ITEMS WERE DISCUSSED AT THE 10P PAR:

Mission Overview:

1. Mission Success Criteria
 - A. 10P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 10P Payloads
(Jeff Nill)
3. ISS 10P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils -NONE

STS-114/ULF1 (OV-104) FLIGHT MILESTONE DATES

SORR	02/04/03	PAR:	01/31/03
FRR:	02/13/03	FRR Tagup:	02/12/03
Prelaunch MMT:	02/27/03	PMMT Tagup:	02/26/03
Shuttle Launch:	03/01/03 (NET)		

Mission Overview: Due Noon 1/28/03

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. ISS S&MA Readiness Status *****
(Jim Wade)
4. EVA Overview (includes NCRs)
(Trent Barrett-5)
5. Increment 7 Russian EVA 9 Overview (includes NCRs) *****
(tbd-)
6. Payload Overview (includes NCRs)
 - A. JSC (Ann Garcia-Henley-6) *****
 - B. MSFC (tbd)
7. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics: Due Noon 1/28/03

1. SHUTTLE
 - A. JSC-TBD (VMI: Arnold Baldwin, Backup: Jeremy Verostko)
 1. STS-107 AC2 Phase B Bus Anomaly *****
(tbd)
 - B. MSFC
 1. SRB: Ringplate Material Properties *****
(Randall Tucker)
 - C. KSC-TBD
2. EVA-TBD
3. STATION
 - A. Pistol Grip Tool Undertorqued
(EVA/Station/Don Totton) *****
 - B. MSG Status *****
(Dan Londa)
 - Glove Box Power Supply
 - C. Software Transition Overview *****
(John Trainor)
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle): Due Noon 1/28/03

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts
(Jim Gardner)
4. BSTRA Ball Status *****
(Bill Prince)

MSFC One Pagers (Shuttle): Due Noon 1/28/03

1. Critical Process Changes/First Flight
A. RSRM 1st Flight of Press Fit Bushings on Oversized Pinholes
(Chris Cianciola) *****
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle): Due Noon 1/28/03

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils –NONE
3. Resupply Stowage Platform *****
(Sharolee Huet)
4. SHIA: CBC Contamination *****
(Sharolee Huet)
5. SHIA: Reflight Inspection of Flowliners *****
(Sharolee Huet)
6. SHIA: First Use of OMRS File X *****
(Sharolee Huet)
7. SHIA: Dryden Oil Contamination *****
(Sharolee Huet)
8. SHIA: Flying Without RMS *****
(Sharolee Huet)

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE
3. ORCA Ops During Sleep Flight Rule
(Scott Seyl)

6S FLIGHT MILESTONE DATES

6S SORR 04/03/03

ISS 6S PAR: tbd

6S Launch: 04/26/03

Mission Overview:

1. Mission Success Criteria
 - A. 6S
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 6S Payloads
(tbd)
3. ISS 6S Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

STS-115/12A (OV-105) FLIGHT MILESTONE DATES

SORR	05/01/03	PAR:	tbd
FRR:	05/08/03	FRR Tagup:	tbd
Prelaunch MMT:	05/21/03	PMMT Tagup:	tbd
Shuttle Launch:	05/23/03		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. ISS S&MA CoFR Status *****
(Jim Wade)
4. EVA Overview (includes NCRs)
(Stacie Greene-5)
5. Payload Overview (includes NCRs)
 - A. JSC (Walter Stoerkel-6)
 - B. MSFC (tbd)
6. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: tbd, Backup:tbd)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION-TBD
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

11P FLIGHT MILESTONE DATES

11P SORR 05/01/03
11P Launch: 05/26/03

ISS 11P PAR: tbd

Mission Overview:

1. Mission Success Criteria
 - A. 11P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 11P Payloads
(tbd)
3. ISS 11P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
3. New or Upgraded Hazards & Cils –NONE

STS-116/12A.1 (OV-104) FLIGHT MILESTONE DATES *****

SORR	07/01/03	PAR:	tbd
FRR:	07/10/03	FRR Tagup:	tbd
Prelaunch MMT:	07/22/03	PMMT Tagup:	tbd
Shuttle Launch:	07/24/03		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. ISS S&MA CoFR Status *****
(Jim Wade)
4. EVA Overview (includes NCRs)
(Dan Mulligan-5)
5. Payload Overview (includes NCRs)
 - A. JSC (-6)
 - B. MSFC (tbd)
6. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: tbd, Backup:tbd)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION-TBD
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
1. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

12P FLIGHT MILESTONE DATES *****

12P SORR	tbd	ISS 12P PAR:	tbd
12P Launch:	07/30/03		

Mission Overview:

1. Mission Success Criteria
 - A. 12P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 12P Payloads
(tbd)
3. ISS 12P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (tbd)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Saturday, January 18, 2003 7:23 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 2 Report

STS-107 Flight Day 02 Report
GMT 18:13:08

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT), Mike Penney

STS-107 mission is progressing nominally. The orbiter is currently in a 156X146 nm orbit. SpaceHab operations are progressing nominally at this time. Orbiter consumables are above the levels required by the mission plan. In fact, cryo margins are being monitored closely due to anticipated impacts to end of mission downweight and center of gravity. (SpaceHab is not drawing as much power as anticipated.)

There is one new MER anomaly. During performance of the O2 tank current level detector checkout, it was noted that the O2 tank 7 heater A1 and A2 ON discrete did not come on. Main bus current verified O2 tank 7 heater A did not come on. The B heaters functioned nominally and provided sufficient energy to the tank so there was no concern about being able to use it. The heaters had not yet been used in the AUTO mode; when the BLUE Crew switched the heater to the AUTO position on MCC call, the EGIL console observed nominal heater cycles. The tank heater is operating nominally.

While SpaceHab operations are progressing nominally, the SpaceHab Water Loop is showing some degradation. The Payload Heat Exchanger and total flow rates for the SpaceHab water loop have been steadily decreasing. Also, the Subsystem Water Pump outlet pressure is also decreasing. These signatures indicate pump filter blockage or pump degradation. Currently, the system is being run on Pump 2 and operation on Pump 2 will continue as long as possible. MCC plans to swap to Water Pump 1 at GMT 018:13:29 and remain on Pump 1 for the remainder of the mission. No mission impact is expected.

At the time of this report, the Crew is on Flight Day 3 performing blood draws and infusions, ARMS activities, and MEIDEX operations.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)

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<http://wwwsrqa.jsc.nasa.gov/BBS/current/default.htm>

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<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact
michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: DISLER, JONATHAN M. (JON) (JSC-SX) (LM)
Sent: Saturday, January 18, 2003 6:05 PM
To: Armando Oliu (E-mail); BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); BARBARA A. CONTE (JSC-DM) (E-mail); Bill Lamkin; BOBBIE G. SWAN (JSC-CA) (E-mail); Brenda Eliason; BRIAN K. BALU (JSC-NC) (E-mail); Carlos Ortiz-Longo; Chris "The Man" Cloudt; Chris Hadfield (E-mail); Chris Lessmann; Christine Boykin; Curt Larsen / MS2; Dan Clements / NC-GH2; David Brown / CB (STS-107); David Moyer / MER Manager (E-mail); DAVID R. BRETZ (JSC-SN) (E-mail); David Rigby / MPS SSM (E-mail); DENA S. HAYNES (JSC-EV) (E-mail); Don Prevelt; DONALD L. (DON) MCCORMACK (JSC-MV) (E-mail); Doug White; Douglas Powell (MAF); FRED F. MAYER (JSC-NC) (E-mail); Gail Hargrove Boeing-Houston Imagery Scrn.; Greg Katnik; Gregory Galbreath; GREGORY J. BYRNE (JSC-SN3) (E-mail); JAMES B. (BRITT) WALTERS (JSC-SF2) (E-mail); 'James Feeley' (E-mail); James Walters; JAVIER J. JIMENEZ (JSC-EA) (E-mail); Jeff Goodmark (E-mail); Jene Richart / MS2; Jill Lin; Jim Harder; 'John McKee' (E-mail); John Ventimiglia; JONATHAN M. (JON) DISLER (JSC-SN) (E-mail); Jorge Rivera; Julie Kramer; Karen Alfaro (E-mail); KENNETH L. BROWN (JSC-MV) (E-mail); KEVIN L. CROSBY (JSC-SN) (E-mail); 'L Lohrli' (E-mail); Malcolm Glenn; MARK D. ERMINGER (JSC-NC) (E-mail); Mark Erminger; MARK L. HOLDERMAN (JSC-MS) (E-mail); MARSHA S. IVINS (JSC-CB) (E-mail); MARTINEZ, HUGO E. (JSC-NC) (GHG); Michael Anderson / CB (STS-107); MICHAEL W. SNYDER (JSC-SN) (E-mail); Mike Cagle / Boeing Film Screen; Mike O'farrell; P J. (JEFF) BERTSCH (JSC-DD) (E-mail); Pam Madera (E-mail); PAUL F. DYE (JSC-DA8) (E-mail); PAYNE, ROBERT W. (JSC-SA13) (LM); 'Philip Kopfinger' (E-mail); Philip Peterson / Boeing Film Screen (E-mail); Philip Reid / Boeing Film Screen; PREMKUMAR SAGANTI PhD (JSC-SN) (E-mail); RANDALL W. ADAMS (JSC-MS2) (E-mail); RAYMOND T. (RAY) SILVESTRI (JSC-DM4) (E-mail); Rick Husband / CB (STS-107); Robbie Robinson; Robert Page; ROBERT SCHARF (JSC-SN) (E-mail); Robert Speece; ROBERT W. FRICKE JR (JSC-MV) (E-mail); Rodney Rocha / ES2 (E-mail); Rodney Wallace; Rohit Dhawan; Ronald Clayton / MS2; Roy Glanville; Rudy Ramon; SA REP; Sara Brandenburg; Scott Otto; Stephen Frick / CB; Steve Derry; Tom Rieckhoff; Tom Wilson; 'Treith' (E-mail)
Subject: JSC STS-107 Launch Film Review Status

JSC STS-107 Launch Film Screening Status

JSC Image Science and Analysis Group Human Exploration Science Office / SX

The screening of the STS-107 long range tracking camera films is complete except for the viewing of camera film E204 which will be screened Sunday morning (1/19). Camera E212 provided an additional look at the Orbiter left wing at the time of the debris strike (described in the previous report on the video screening). No significant new information was learned from today's film screening.

Crew acquired down linked video imaging the External Tank (ET), probably the source of the debris that struck the Orbiter left wing, was reviewed this afternoon. Unfortunately the view is of the far side of the ET and provided no information as to the source of the debris object. A down linked view of the Orbiter left wing upper surface from a payload bay camera did not image the suspected impact area.

Enhanced movie loops of the debris strike event have been placed on the web at the following address:

http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/launch_video/107launchvideo.shtml

Screening of the remaining STS-107 launch films is expected to be completed Sunday afternoon and a report will be sent to distribution on Monday January 20th.

Jon Disler / SX3-LM
Chris Cloudt / SX3-HEI

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Sunday, January 19, 2003 8:22 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 3 Report

STS-107 Flight Day 03 Report
GMT 019:13:30

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT)

STS-107 is continuing with its investigation of various scientific activities in a micro-g environment. The mission is progressing nominally with only minor problems. The Orbiter is still in a 156 x 146nm orbit. Consumables are still above mission requirements.

At this time, there are no impacts associated with the Spacehab water loop degradation. We continue to run on pump 1.

One item came to our attention yesterday after we sent out the daily report. High-speed film analysis from ascent showed a large, light-colored piece of debris break off the Orbiter/ET forward attach bipod at MET 81 seconds. The piece struck the wing leading edge of the left wing on or near the wing glove and broke into a spray of white colored particles that streamed under the left wing and was last seen near the left SRB exhaust plume. Analysis of high speed and high resolution tracking films are being conducted to get more detail of this event. See the following URL:
http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/index107.shtml
1.

There are two new MER anomalies, both minor GFE impacts.

The motor drive on one of the 70mm Hasselblad cameras (serial number 1036) jammed after 3 shots. The crew swapped out camera body batteries, motor drive batteries, and the film magazine; but the camera continued to jam. The crew is using the remaining 70mm camera.

The crew was attempting to use a PGSC for a data take utilizing the Fuel Cell Monitoring System (FCMS) but got error messages. After verifying the PGSC configuration, the crew replaced the FCMS cable with a backup and got good results.

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in Spacehab
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05	Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)

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<http://wwwsrqa.jsc.nasa.gov/BBS/current/default.htm>

or

<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: DISLER, JONATHAN M. (JON) (JSC-SX) (LM)
Sent: Sunday, January 19, 2003 8:30 PM
To: Armando Oliu (E-mail); BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); BARBARA A. CONTE (JSC-DM) (E-mail); Bill Lamkin; BOBBIE G. SWAN (JSC-CA) (E-mail); Brenda Eliason; BRIAN K. BALU (JSC-NC) (E-mail); Carlos Ortiz-Longo; Chris "The Man" Cloudt; Chris Hadfield (E-mail); Chris Lessmann; Christine Boykin; Curt Larsen / MS2; Dan Clements / NC-GH2; David Brown / CB (STS-107); David Moyer / MER Manager (E-mail); DAVID R. BRETZ (JSC-SN) (E-mail); David Rigby / MPS SSM (E-mail); DENA S. HAYNES (JSC-EV) (E-mail); Don Prevet; DONALD L. (DON) MCCORMACK (JSC-MV) (E-mail); Doug White; Douglas Powell (MAF); FRED F. MAYER (JSC-NC) (E-mail); Gail Hargrove Boeing-Houston Imagery Scrn.; Greg Katnik; Gregory Galbreath; GREGORY J. BYRNE (JSC-SN3) (E-mail); JAMES B. (BRITT) WALTERS (JSC-SF2) (E-mail); 'James Feeley' (E-mail); James Walters; JAVIER J. JIMENEZ (JSC-EA) (E-mail); Jeff Goodmark (E-mail); Jene Richart / MS2; Jill Lin; Jim Harder; 'John McKee' (E-mail); John Ventimiglia; JONATHAN M. (JON) DISLER (JSC-SN) (E-mail); Jorge Rivera; Julie Kramer; Karen Alfaro (E-mail); KENNETH L. BROWN (JSC-MV) (E-mail); KEVIN L. CROSBY (JSC-SN) (E-mail); 'L. Lohrli' (E-mail); Malcolm Glenn; MARK D. ERMINGER (JSC-NC) (E-mail); Mark Erminger; MARK L. HOLDERMAN (JSC-MS) (E-mail); MARSHA S. IVINS (JSC-CB) (E-mail); MARTINEZ, HUGO E. (JSC-NC) (GHG); Michael Anderson / CB (STS-107); MICHAEL W. SNYDER (JSC-SN) (E-mail); Mike Cagle / Boeing Film Screen; Mike O'farrell; P J. (JEFF) BERTSCH (JSC-DD) (E-mail); Pam Madera (E-mail); PAUL F. DYE (JSC-DA8) (E-mail); PAYNE, ROBERT W. (JSC-SA13) (LM); 'Philip Kopfinger' (E-mail); Philip Peterson / Boeing Film Screen (E-mail); Philip Reid / Boeing Film Screen; PREMKUMAR SAGANTI PhD (JSC-SN) (E-mail); RANDALL W. ADAMS (JSC-MS2) (E-mail); RAYMOND T. (RAY) SILVESTRI (JSC-DM4) (E-mail); Rick Husband / CB (STS-107); Robbie Robinson; Robert Page; ROBERT SCHARF (JSC-SN) (E-mail); Robert Speece; ROBERT W. FRICKE JR (JSC-MV) (E-mail); Rodney Rocha / ES2 (E-mail); Rodney Wallace; Rohit Dhawan; Ronald Clayton / MS2; Roy Glanville; Rudy Ramon; SA REP; Sara Brandenburg; Scott Otto; Stephen Frick / CB; Steve Derry; Tom Rieckhoff; Tom Wilson; 'Treith' (E-mail)
Subject: JSC STS-107 Launch Film Screening Report

STS-107
Launch Film Screening Report
January 20, 2003
JSC Image Science and Analysis Group
Human Exploration Science Office / SX

ANOMALY

E204, E208, E212- During ascent at approximately 81 seconds MET, a large light-colored piece of debris was seen to originate from an area near the ET/Orbiter forward attach bipod. The debris appeared to move outboard in a -Y direction, then fell aft along the left Orbiter fuselage, and struck the underside (-Z) of the leading edge of the left wing. The strike appears to have occurred on or relatively close to the wing glove near the Orbiter fuselage. After striking the left wing, the debris broke into a spray of white-colored particles that fell aft along the underside (-Z side) of the Orbiter left wing. The spray of particles was last seen near the LSRB exhaust plume.

Comparison views of the strike area immediately before and after the event were examined for indications of damage to the wing. The resolution on the films and videos is insufficient to see individual tiles. However, no indications of damage at a larger scale as indicated by changes in brightness of the wing surface area(s) that may indicate damage was noted.

Still views and enhanced movie loops of this event are available for at the following web address:

http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/launch_video/107launchvideo.shtml

The times of this event are as follows:

Debris first seen near ET/Orbiter forward attach: 016:15:40:21.699 UTC

Debris contacted left wing: 016:15:40:21.882 UTC

Crew acquired down linked video imaging the External Tank (ET), probably the source of the debris that struck the Orbiter left wing, was reviewed. Unfortunately the view is of the far side of the ET and provided no information as to the source of the debris object.

A down linked view of the Orbiter left wing upper surface from a payload bay camera did not image the suspected impact area.

OBSERVATIONS:

Selected launch views are available for viewing at:

http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/launch_film/107launchfilm.shtml

Other launch film screening event observations similar to those seen on previous missions are:

On the launch video screening report dated 1/16/03 we reported that the right elevon motion may have been greater on STS-107 than has been typically seen. A comparison of the elevon motion was done with views from STS-113 and the previous Columbia flight (STS-109). It was concluded that the motion on STS-107 was normal in that it was similar to the elevon motion seen on STS-113 and STS-109.

E5, E17, E18, E19, E20 - Orange vapor (possibly free burning hydrogen) was seen forward of the SSME rims and near the base heat shield during SSME ignition. The orange vapor on the STS-107 films appeared to be similar to those typically seen on previous mission films and videos.

E19, E20, E76 - During SSME start-up, the SSME Mach diamonds formed in the expected sequence (3, 2, 1). The times for the Mach diamond formation given below are from the engineering film E76:

SSME #3 - 15:38:56.736 UTC

SSME #2 - 15:38:56.816 UTC

SSME #1 - 15:38:57.227 UTC

The start times for SSME ignition based on the E76 film were:

SSME #3 - 15:38:55.215 UTC

SSME #2 - 15:38:55.355 UTC

SSME #1 - 15:38:55.455 UTC

E5, E76 - Movement of the SSME #3 Dome Mounted Heat Shield (DMHS) blanket was seen during SSME ignition on camera E5. On camera E76, SSME #2 and SSME #3 DMHS blanket movement was seen during SSME ignition (15:38:56.466 UTC). This event has been seen on previous mission films.

E1, E2, E4, E5, E20, E31 - Typical of previous missions, multiple pieces of ice debris were seen falling from the ET/Orbiter umbilicals and along the body flap during SSME ignition through liftoff. Ice debris was seen falling near the LH2 umbilical four inch recirculation line. None of the debris were seen to contact the launch vehicle.

E5, E18, E20, E31 - A line of frost was visible at the juncture of the base of SSME #2 and the Dome Mounted Heat Shield (DMHS) during liftoff.

E18, E20 - Typical of previous missions, small areas of tile surface material erosion were seen forming on the base heat shield and on the RCS stingers at the following times:

15:38:56.000 UTC - Erosion mark inboard of the left RCS stinger

15:38:56.562 UTC - Erosion mark outboard of SSME #2 near the body flap

15:38:57.329 UTC - Erosion mark on the tip of the left RCS stinger

15:38:58.639 UTC - Erosion mark on the left OMS pod between the OMS nozzle and vertical stabilizer

E2, E19- Faint, light-orange-colored flashes were seen in the SSME exhaust plumes, possibly debris induced, during SSME ignition and through liftoff at the times shown below:

SSME #1 - 15:38:57.728 UTC

SSME #1 - 15:38:58.385 UTC

SSME #1 - 15:38:58.779 UTC

SSME #1 - 15:38:59.019 UTC

SSME #3 - 15:38:57.395 UTC

SSME #3 - 15:38:59.532 UTC

Flashes in the SSME exhaust plume prior to liftoff have been seen on previous mission films.

E17 - Several small, dark-colored pieces of debris (possibly paint chips) were seen falling from a seam line on the -Z side of the LO2 TSM just before liftoff (15:38:59.566 UTC).

E1, E5, E17, E52 - As typically seen on previous missions, multiple pieces of SRB throat plug and/or SRB flame duct debris were seen near the right and left SRBs during liftoff. On camera E1, two pieces of SRB flame duct debris were seen arcing between the two SRB's and falling aft along the -Z side of the body flap during liftoff (15:39:00.4 UTC). On camera E17, a large appearing, light-colored piece of probable SRB throat plug material was seen aft of the vehicle during liftoff (15:39:01.873 UTC). At liftoff, light-colored debris was seen falling aft near the +Y side of the RSRB aft skirt (15:39:02.456 UTC). On camera E52, debris from the base of the SRB's was seen traveling north of the MLP at liftoff (15:39:02.203 UTC).

E5- A light-colored piece of debris was seen falling aft from near the ET/RSRB aft attach during liftoff (15:39:01.235 UTC).

E8 - SRB ignition was at 15:39:00.000 UTC based on the observation of the PIC firing at RSRB holddown post M-2.

E18 - A dark-colored, flexible, strap or tag-like object was seen on the LH2 TSM T-0 umbilical disconnect prior to liftoff.

E19 - A long, dark-colored, flexible, strap-like object was seen coming from the top of the LH2 TSM T-0 door before detaching and falling aft in front of the TSM T-0 door after liftoff (15:39:03.582 UTC)

E8, E13 - The left and right SRB GN2 purge lines appeared wrapped, upright, and intact until they were obscured by exhaust plumes at 15:39:00.000 UTC (right purge line) and 15:39:00.003 UTC (left purge line).

E7, E10, E11, E14 - The left and right SRB north holddown post blast shields closed prior to when the SRB nozzle exit plane rose past the level of the SRB holddown post shoes, as they are designed to do. However, the holddown post M4 blast shield may have closed quicker than typical.

E33, E34, E36, E39, E52- The GH2 vent arm retraction appeared normal. Ice and vapors were seen falling aft along the ET during the vent arm retraction. The GH2 vent arm contact with the deceleration cable on the E39 camera close-up view from inside the FSS of the vent arm capture was visible. As designed, the arm appeared to make contact very close to the center position of the deceleration cable. The vent arm appeared to latch normally with no rebound. A measurement of the position of the vent arm with respect to the center of the deceleration cable at the time of initial contact will be made and reported separately.

E207, E212 - An assessment of the body flap motion during ascent compared to that seen on previous missions could not be made because of the soft focus on the STS-107 long range tracking camera views.

E52, E212, E213, E222, E223- Multiple pieces of debris, too numerous to count (mostly umbilical ice and RCS paper debris), were seen falling aft of the launch vehicle during ascent. Umbilical ice and RCS paper debris during ascent has been seen on previous mission films and videos. Examples are:

15:39:17.021 UTC: Forward RCS paper debris noted falling aft along the right wing (E52)

15:39:20.093 UTC: RCS paper debris noted. (E223)

15:39:20.169 UTC: Spray of RCS paper debris noted aft of the SSMEs. (E222)

15:39:23.9 UTC: Debris from ET/Orbiter umbilicals noted falling aft along body flap. (E213)

Frame 960: RCS paper debris noted falling aft of SSME exhaust plume. (E212)

E5, E20, E31, E52, E212, E222 - Pieces of orange-colored umbilical purge barrier material were seen falling aft along the -Z side of the body flap during SSME ignition (15:38:57.703 UTC). On camera E20, three pieces of light-orange colored umbilical purge barrier material were noted falling aft near SSME #2 prior to liftoff (15:38:58.394 UTC). Umbilical purge barrier material was seen falling along the body flap during tower clear on camera E52. On camera E222, a piece of umbilical purge barrier material was seen near the Orbiter right wing during liftoff (15:39:03.014 UTC). During early ascent, multiple pieces of umbilical purge barrier material were seen falling aft of the left wing on the camera E52 view. On camera E212, a piece of umbilical purge barrier material was seen falling along the body flap. On camera E222, a piece of umbilical purge barrier material was seen falling aft of the body flap at approximately 32 seconds MET (15:39:31.840 UTC). Purge barrier material falling from the ET umbilicals has been typically seen on previous mission tracking camera views.

Cameras E52, E213, E220, E222, E223 - Light-colored flares (possibly debris induced) were seen in the SSME exhaust plumes during ascent on the intermediate and long range tracking camera films. Examples of the flares observed are:

15:39:14.576 UTC: Flare noted in SSME exhaust plume (E52)

15:39:33.178 UTC: Flare seen in SSME exhaust plume (E213)

15:39:33.424 UTC: Flare seen in SSME exhaust plume (E213)

15:39:33.471 UTC: Flare seen in SSME exhaust plume (E222)

15:39:33.475 UTC: Flare seen in SSME exhaust plume (E213)

15:39:35.469 UTC: Flare seen in SSME exhaust plume (E213)

15:39:35.633 UTC: Flare seen in SSME exhaust plume (E213)

15:39:37.175 UTC: Flare seen in SSME exhaust plume (E222)

15:39:37.177 UTC: Flare seen in SSME exhaust plume (E213)

15:39:40.367 UTC: Flare seen in SSME exhaust plume (E213)

15:39:33.168 UTC: Flare seen in SSME exhaust plume (E213)

15:39:41.992 UTC: Flare seen in SSME exhaust plume (E213)

15:39:51.001 UTC: Flare seen in SSME exhaust plume (E220)

15:39:57.060 UTC: Flare seen in SSME exhaust plume (E223)

Flares in the SSME exhaust plumes have been seen on previous missions films and videos.

E204, E207, E220, E222, E223 - As on previous missions, debris was seen exiting the SRB exhaust plumes.

The debris exiting the SRB exhaust plumes during the majority of ascent is probably instafoam from the aft end of the SRBs. The more dense appearing debris near the time of tail-off, just prior to SRB separation, is probably SRB slag debris. Examples of this debris are:

15:39:27.186 UTC: Debris seen falling along SRB exhaust plume (E223)

15:39:48.926 UTC: Debris seen falling along SRB exhaust plume (E220)

15:39:49.350 UTC: Debris seen falling along SRB exhaust plume (E223)

SRB separation was timed at 15:41:06.536 UTC on camera E207.

Other normal events observed included: RCS paper debris, ice and vapor from the LO2 and LH2 TSM T-0 umbilicals prior to and after disconnect, ET twang, multiple pieces of debris in the exhaust cloud after liftoff including rope-like debris (probable water baffle material), acoustic waves in the exhaust cloud after liftoff, charring of the ET aft dome, ET aft dome outgassing, vapor off the SRB stiffener rings, expansion waves, linear optical effects, recirculation, SRB plume brightening, and SRB slag debris after SRB separation.

Normal Pad events observed included: Hydrogen igniter operation, MLP deluge water activation, FSS deluge water operation, LH2 and LO2 TSM door closure, and sound suppression system water operation.

NOTES:

Twelve 16 mm films, thirteen 35 mm films, and 24 launch videos were screened. The focus on several of the long range tracking camera film views was very soft which hindered imagery analysis and the analysis of the debris strike to the Orbiter wing.

This concludes the routine JSC STS-107 launch film and video screening. Image enhancements of the debris strike event, web site updates, or other special support requests, will be performed prior to landing.

Jon Disler / SX3-LM

Chris Cloudt / SX3-HEI

Joe Caruana / SX3-LM

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Monday, January 20, 2003 8:02 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 04 Report

STS-107 Flight Day 04 Report
GMT 019:13:30

Shift Leads: Andy Foster, Ross Engle, Denise Londrigan
Mission Engineer: Megaqn Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables continue to remain above the levels required for completion of the planned mission.

With respect to the debris hit on the left wing leading edge discussed in the Second Daily Report, JSC image analysis personnel have completed their review of the high-speed and high-resolution long-range tracking films. Comparison views of what can be seen of the strike area immediately before and after the event were examined for indications of damage to the wing. The resolution on the films and videos is insufficient to see individual tiles. However, no indications of larger scale damage were noted as indicated by the lack of changes in the brightness of the port lower wing surface.

There are no new MER anomalies

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)

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ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Tuesday, January 21, 2003 9:03 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS 107 FD05 report

STS-107 Flight Day 05 Report
GMT 021:14:00

Shift Leads: Doug McMullen, Andy Foster, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

The crew reported that the DSR20 video tape recorder (VTR) tapes were not incrementing. The crew worked the photo/television (TV) malfunction procedure for the VTR error. This ejected the micro-tape that was in the VTR. Power cycles of VTR and digital television (DTV) system were performed with no effect. A visual inspection and cleaning of the VTR was performed; however, the VTR would not accept tapes and place the tapes into the correct configuration inside the VTR. Standard-sized tapes were also rejected. Ground testing has been able to recreate this problem by failing parts of the tape transport. The workaround will be to use a V10 recorder to record the payload video and a Camcorder for playback.

There is one new MER anomaly

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)

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ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Wednesday, January 22, 2003 8:40 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD06 Report

STS-107 Flight Day 06 Report
GMT 022:12:00

Shift Leads: Doug McMullen, Richard Foster, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

One item currently under investigation is the Space Shuttle Main Engine (SSME) 3 liquid hydrogen (LH2) prevalve (PV6) open indicator "A" that initially failed to the off state at 016:17:25 GMT (00:01:46 MET). Four additional data dropouts of this same measurement have been observed in the last five days. The measurement in question is provided to the general purpose computer (GPC) via multiplexer/demultiplexer (MDM) flight aft (FA) 4 Card 08 Channel 00. Review of all measurements routed through the same MDM card and channel revealed four liquid oxygen (LO2) Pogo Valve Open indications that had also failed to the off state. Of the nine measurements that indicated a failed off state, only one LO2 and one LH2 indication occurred at the exact same time. The investigation of the cause of these indications is underway.

Shuttle held two meetings to address the SpaceHab Humidity/Water Separator Assembly (WSA) problems. Shuttle and Payload safety attended. There were two issues that the flight director wanted to address, (1) water loop valve modulation to reduce the temperature/humidity, and (2) an IFM to remove water and possible debris from RS#1, and an electrical troubleshooting. After the Valve Modulation didn't yield expected results the Program has decided to go ahead with the WSA IFM, which will repair one of the failed water separators, it is currently being modified to suit the current situation. A copy of the most current rev is at the console. The crew will continue to try and attain better results using the Valve Modulation, but the program will probably look more to trying to recover one of the water separators if possible. The IFM will require MT approval before proceeding. Execution of the IFM at this time is TBD.

There is one new MER anomaly

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in Spacehab
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05	Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06	Loss of DR20 Tape Recording and Playback (GFE)
MER-07	LH2 Prevalve Open B Indicator Failed Off

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If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: DISLER, JONATHAN M. (JON) (JSC-SX) (LM)
Sent: Wednesday, January 22, 2003 12:53 PM
To: Armando Oliu (E-mail); BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); BARBARA A. CONTE (JSC-DM) (E-mail); Bill Lamkin; BOBBIE G. SWAN (JSC-CA) (E-mail); Brenda Eliason; BRIAN K. BALU (JSC-NC) (E-mail); Carlos Ortiz-Longo; Chris "The Man" Cloudt; Chris Hadfield (E-mail); Chris Lessmann; Christine Boykin; Curt Larsen / MS2; Dan Clements / NC-GH2; David Brown / CB (STS-107); David Moyer / MER Manager (E-mail); DAVID R. BRETZ (JSC-SN) (E-mail); David Rigby / MPS SSM (E-mail); DENA S. HAYNES (JSC-EV) (E-mail); Don Prevett; DONALD L. (DON) MCCORMACK (JSC-MV) (E-mail); Doug White; Douglas Powell (MAF); FRED F. MAYER (JSC-NC) (E-mail); Gail Hargrove Boeing-Houston Imagery Scrn.; Greg Katnik; Gregory Galbreath; GREGORY J. BYRNE (JSC-SN3) (E-mail); JAMES B. (BRITT) WALTERS (JSC-SF2) (E-mail); 'James Feeley' (E-mail); James Walters; JAVIER J. JIMENEZ (JSC-EA) (E-mail); Jeff Goodmark (E-mail); Jene Richart / MS2; Jill Lin; Jim Harder; 'John McKee' (E-mail); John Ventimiglia; JONATHAN M. (JON) DISLER (JSC-SN) (E-mail); Jorge Rivera; Julie Kramer; Karen Alfaro (E-mail); KENNETH L. BROWN (JSC-MV) (E-mail); KEVIN L. CROSBY (JSC-SN) (E-mail); 'L Lohrli' (E-mail); Malcolm Glenn; MARK D. ERMINGER (JSC-NC) (E-mail); Mark Erminger; MARK L. HOLDERMAN (JSC-MS) (E-mail); MARSHA S. IVINS (JSC-CB) (E-mail); MARTINEZ, HUGO E. (JSC-NC) (GHG); Michael Anderson / CB (STS-107); MICHAEL W. SNYDER (JSC-SN) (E-mail); Mike Cagle / Boeing Film Screen; Mike O'farrell; P J. (JEFF) BERTSCH (JSC-DD) (E-mail); Pam Madera (E-mail); PAUL F. DYE (JSC-DA8) (E-mail); PAYNE, ROBERT W. (JSC-SA13) (LM); 'Philip Kopfinger' (E-mail); Philip Peterson / Boeing Film Screen (E-mail); Philip Reid / Boeing Film Screen; PREMKUMAR SAGANTI PhD (JSC-SN) (E-mail); RANDALL W. ADAMS (JSC-MS2) (E-mail); Raymond Jones / Manager Boeing Flt. Syst. Analysis; RAYMOND T. (RAY) SILVESTRI (JSC-DM4) (E-mail); Rick Husband / CB (STS-107); Robbie Robinson; Robert Page; ROBERT SCHARF (JSC-SN) (E-mail); Robert Speece; ROBERT W. FRICKE JR (JSC-MV) (E-mail); Rodney Rocha / ES2 (E-mail); Rodney Wallace; Rohit Dhawan; Ronald Clayton / MS2; Roy Glanville; Rudy Ramon; SA REP; Sara Brandenburg; Scott Otto; Stephen Frick / CB; Steve Derry; Tom Rieckhoff; Tom Wilson; 'Treith' (E-mail)
Subject: STS-107 Debris Strike and Previous Mission Information - Preliminary

Preliminary - Information, including views on the STS-107 debris strike to the left wing can be found at the following web site:

http://sn-isag/shuttleweb/mission_support/sts-107/debris_report/107_debris_report.shtml

STS-112 and STS-50 both had debris damage caused by missing TPS from the ET forward bipod ramp.

Measurement of the debris size on STS-107 and the debris size seen on STS-112 are shown.

Information from previous missions STS-112 and STS-50 are included.

Jon Disler / SX3 - LM

ERMINGER, MARK D. (JSC-NC) (NASA)

From: DISLER, JONATHAN M. (JON) (JSC-SX) (LM)
Sent: Wednesday, January 22, 2003 1:03 PM
To: Armando Oliu (E-mail); BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); BARBARA A. CONTE (JSC-DM) (E-mail); Bill Lamkin; BOBBIE G. SWAN (JSC-CA) (E-mail); Brenda Eliason; BRIAN K. BALU (JSC-NC) (E-mail); Carlos Ortiz-Longo; Chris "The Man" Cloudt; Chris Hadfield (E-mail); Chris Lessmann; Christine Boykin; Curt Larsen / MS2; Dan Clements / NC-GH2; David Brown / CB (STS-107); David Moyer / MER Manager (E-mail); DAVID R. BRETZ (JSC-SN) (E-mail); David Rigby / MPS SSM (E-mail); DENA S. HAYNES (JSC-EV) (E-mail); Don Prevett; DONALD L. (DON) MCCORMACK (JSC-MV) (E-mail); Doug White; Douglas Powell (MAF); FRED F. MAYER (JSC-NC) (E-mail); Gail Hargrove Boeing-Houston Imagery Scrn.; Greg Katnik; Gregory Galbreath; GREGORY J. BYRNE (JSC-SN3) (E-mail); JAMES B. (BRITT) WALTERS (JSC-SF2) (E-mail); 'James Feeley' (E-mail); James Walters; JAVIER J. JIMENEZ (JSC-EA) (E-mail); Jeff Goodmark (E-mail); Jene Richart / MS2; Jill Lin; Jim Harder; 'John McKee' (E-mail); John Ventimiglia; JONATHAN M. (JON) DISLER (JSC-SN) (E-mail); Jorge Rivera; Julie Kramer; Karen Alfaro (E-mail); KENNETH L. BROWN (JSC-MV) (E-mail); KEVIN L. CROSBY (JSC-SN) (E-mail); 'L Lohrli' (E-mail); Malcolm Glenn; MARK D. ERMINGER (JSC-NC) (E-mail); Mark Erminger; MARK L. HOLDERMAN (JSC-MS) (E-mail); MARSHA S. IVINS (JSC-CB) (E-mail); MARTINEZ, HUGO E. (JSC-NC) (GHG); Michael Anderson / CB (STS-107); MICHAEL W. SNYDER (JSC-SN) (E-mail); Mike Cagle / Boeing Film Screen; Mike O'farrell; P J. (JEFF) BERTSCH (JSC-DD) (E-mail); Pam Madera (E-mail); PAUL F. DYE (JSC-DA8) (E-mail); PAYNE, ROBERT W. (JSC-SA13) (LM); 'Philip Kopfinger' (E-mail); Philip Peterson / Boeing Film Screen (E-mail); Philip Reid / Boeing Film Screen; PREMKUMAR SAGANTI PhD (JSC-SN) (E-mail); RANDALL W. ADAMS (JSC-MS2) (E-mail); Raymond Jones / Manager Boeing Flt. Syst. Analysis; RAYMOND T. (RAY) SILVESTRI (JSC-DM4) (E-mail); Rick Husband / CB (STS-107); Robbie Robinson; Robert Page; ROBERT SCHARF (JSC-SN) (E-mail); Robert Speece; ROBERT W. FRICKE JR (JSC-MV) (E-mail); Rodney Rocha / ES2 (E-mail); Rodney Wallace; Rohit Dhawan; Ronald Clayton / MS2; Roy Glanville; Rudy Ramon; SA REP; Sara Brandenburg; Scott Otto; Stephen Frick / CB; Steve Derry; Tom Rieckhoff; Tom Wilson; 'Treith' (E-mail)
Subject: STS-107 Debris Strike and Previous Mission Information - Preliminary

For those that are outside of JSC, the following link should be used to access the information on the STS-107 debris strike:

http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/debris_report/107_debris_report.shtml

Thank you-

Preliminary - Information, including views on the STS-107 debris strike to the left wing can be found at the following web site:

http://sn-isag/shuttleweb/mission_support/sts-107/debris_report/107_debris_report.shtml

STS-112 and STS-50 both had debris damage caused by missing TPS from the ET forward bipod ramp.

Measurement of the debris size on STS-107 and the debris size seen on STS-112 are shown.

Information from previous missions STS-112 and STS-50 are included.

Jon Disler / SX3 - LM

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 23, 2003 7:24 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD7 Report

STS-107 Flight Day 07 Report
GMT 023:13:00

Shift Leads: Doug McMullen, Richard Gardner, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

There is one new MER anomaly

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off

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If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Thursday, January 23, 2003 8:21 AM
Subject: Shuttle Standup Notes 1/23/03

STS-114 (OV-104) 3/1/03

- Payload Bay Doors closed
- Aft close-outs complete
- VAB rollout Wednesday morning

STS-115 (OV-105) 5/23/03

- FRCS installation complete
- OMS Crossfeed drain
- Preps for pod removal
- RMS removal in work
- MPS feedline inspections

VAB

- STS-114 stack close-outs

Stennis

- Battleship flowliner 520 second test completed
 - Will boroscope strain gauges and then run another test on Monday
- Gen Kostelnick, Art Stevenson, STS-113 crew, and John Young observed the test

SSME

- All Stennis test data on the engine was nominal

USA Booster

- Post flight reviews look good so far

Motor

- Post flight review is going well
- Test firing 1 PM MST today

ET

- Gen Kostelnick visited MAF yesterday
- Are working the debris issue
 - We know generally where the debris came from
 - We will have to wait until the Orbiter gets back

USA Orbiter

- Vehicle is doing well on orbit
- Working debris analysis
- BSTRA TIM next week at MSFC
 - Will focus on plans for OV-103
- Are developing a tool to inspect the 12" lines

Vehicle Engineering

- OMM Review next week

USA Integration

- Debris analysis completed a couple of runs looking at 20x10x6 and 20x16x6
 - Provided input area, velocity, and impact to Orbiter

EVA

- 6 Hr 51 Min EVA on Station last week

Upgrades

- SLEP Summit kicked off last week

Hale

- STS-114 Orbiter Rollout Review Tuesday

Ham

- Flight is going well
 - Working end of mission weight because of extra cryo
 - Are controlling Spacehab temperature and humidity with the Orbiter
- MMT tomorrow, Monday and Thursday
- Landing is Saturday 7:49 AM CST

Other info after the meeting

- The STS-114/ULF-1 FRR may slip to 2/19 or 2/20

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 24, 2003 7:20 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 FD8 Report

STS-107 Flight Day 08 Report
GMT 024:13:00

Shift Leads: Doug McMullen, Richard Gardner, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

MER anomaly # 7 has been changed from MPS to DPS (MDM), it is labeled #7A.

There are seven vehicle anomalies at this time. (no new anomalies)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)

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If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Sent: Friday, January 24, 2003 1:24 PM
To: DL SRQA PAR SUPPORT; Alan Peterson (Boeing) (E-mail); Arnold Clifton T. (SSC) (E-mail); Barnes Jeffrey E (Boeing) (E-mail); Bill Bihner (HQ) (E-mail); Bill Loewy (HQ) (E-mail); 'Carol Rush' (BOEING) (E-mail); Chris Hill (MSFC) (E-mail); 'Cianciola C. (MSFC) @SMTP' (E-mail); Corey Harrell (MSFC) (E-mail); Daniels Angela (MSFC) (E-mail); Darrell Warner (Boeing) (E-mail); Dave Spacek (MSFC) (E-mail); 'Diana Heberling' (SSC) (E-mail); donnie.george (USA) (E-mail); Dumetz Marisa (BOEING) (E-mail); Engler Tom (MSFC) (E-mail); Ernest-1 Stephen (KSC) (E-mail); Fred Dadfar (MSFC) (E-mail); 'Gatto Leigh (IV&V) ' (E-mail); Gordon-1 Mark (KSC) (E-mail); Gregg George (MSFC) (E-mail); Haddad-1 Michael (KSC) (E-mail); Hashimoto Rick (BOEINGWEST) (E-mail); 'Hill Bill (HQ) @SMTP' (E-mail); 'Howell. Nelda' (BOEING) (E-mail); James Halsell (KSC) (E-mail); John McPherson (MSFC) (E-mail); John Stealey () (E-mail); John. R. Dicks@ivv. nasa. gov (IVV) (E-mail); Keith Pauley (IVV) (E-mail); Kennedy Michael (MSFC) (E-mail); kim. carmean@msfc. nasa. gov (MSFC) (E-mail); 'Lackey Ed' (KSC) (E-mail); Leigh Martin (MSFC) (E-mail); Linda Combs (USA) (E-mail); Mark Kowalesky (HQ) (E-mail); Mike Card (HQ); mikesmiles (SSC); Moorhead-III James L (BOEING) (E-mail); Mullane Dan (MSFC) (E-mail); Nobles Noel R (BOEINGWEST) (E-mail); pollystenger (BOEING); rich patrican (HQ); Roger Counts (GDSFC); 'Sandy' (SAIC); Sharolee Huet-1 (KSC) (E-mail); Sims, John (MSFC); Sue Fenn (HQ); 'Suzanne Little' (USA); thomas S Touts (GDSFC); thomas.w.hartline@msfc.nasa.gov (MSFC); Tom Hancock (MSFC); Vicki Rorex (MSFC) (E-mail); Walker, Angelia (MSFC); Wbihner (HQ) (E-mail); wboostick (BOEING); 'Willis-1, Brenda' (KSC); Wren, Robert J (USA); Zavala, Velma (USA)
Subject: PAR-5 Minutes for 01/24/2003



MIN012403.doc

<http://wwwsrqa.jsc.nasa.gov/par/>

Upcoming PARs:

01/31/03 STS-114/ULF-1 JPAR
02/12/03 STS-114/ULF-1 JFRR TAGUP
02/26/03 STS-114/ULF-1 JPMMT TAGUP

Note: Current changes indicated to the right by *****

Presenters review your items and submit any changes to the PAR Coordinator as soon as possible.

Debbie Bazan, JSC PAR Coordinator
(281) 244-1862 dbazan@ems.jsc.nasa.gov

**PAR-5 MINUTES
JANUARY 24, 2003**

<http://wwwsrqa.jsc.nasa.gov/par/>

The next PAR-5 will be held on Friday, 2/7/03 at 09:30 am Central. (1/31 PAR5 cancelled)

The PAR-5 is a weekly telecon for representatives in the PAR process.

Debbie Bazan, JSC PAR Coordinator, (281) 244-1862 dbazan@ems.jsc.nasa.gov Note: Current changes indicated to the right by *****
PRESENTERS REVIEW THEIR ITEMS AND SUBMIT ANY CHANGES OR REQUESTS FOR CHANGES TO THE PAR-5 COORDINATOR
PRIOR TO THE NEXT MEETING.

10P FLIGHT MILESTONE DATES

10P SORR 01/16/03
10P Launch: 02/02/03

ISS 10P PAR: 01/10/03 (immediately following 107 PMMT)

THE FOLLOWING ITEMS WERE DISCUSSED AT THE 10P PAR:

Mission Overview:

1. Mission Success Criteria
 - A. 10P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 10P Payloads
(Jeff Nill)
3. ISS 10P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

STS-114/ULF1 (OV-104) FLIGHT MILESTONE DATES

SORR	02/11/03 *****	PAR:	01/31/03
FRR:	02/20/03 U/R *****	FRR Tagup:	02/12/03
Prelaunch MMT:	02/27/03	PMMT Tagup:	02/26/03
Shuttle Launch:	03/01/03 (NET)		

Mission Overview: Due Noon 1/28/03

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. ISS S&MA Readiness Status (Jim Wade)
4. EVA Overview (includes NCRs) (Trent Barrett-5)
5. Increment 7 Russian EVA 9 Overview (includes NCRs) (tbd-)
6. Payload Overview (includes NCRs)
 - A. JSC (Ann Garcia-Henley-6)
 - B. MSFC (tbd)
7. Increment 7 Payload Overview (includes NCRs) ***** (Richard Guidry)
8. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics: Due Noon 1/28/03

1. SHUTTLE
 - A. JSC-TBD (VMI: Arnold Baldwin, Backup:Jeremy Verostko)
 1. STS-107 AC2 Phase B Bus Anomaly (Michael Penney-8) *****
 2. STS-107 ET Foam Loss (to be presented @ FRR Tagup) ***** (George Ishmael-)
 - B. MSFC
 1. SRB: ET Attach Ring Material Properties Nonconformance ***** (Randall Tucker)
 2. ET: STS-107 ET Foam Loss (to be presented @ FRR Tagup) ***** (Keith Layne)
 - C. KSC-TBD
2. EVA-TBD
3. STATION
 - A. Pistol Grip Tool Undertorqued (EVA/Station/Don Totton)
 - B. Software Transition Overview (John Trainor)
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle): Due Noon 1/28/03

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts
(Jim Gardner)
4. BSTRA Ball Status
(Bill Prince)
5. Flowliner Certification (to be presented @ FRR Tagup) *****
(Bill Prince)
6. EVA: EMU Item 145 Release Valve *****
(Charles Sager)
7. EVA: EMU Upper/Lower Arm Restraint Bracket Loose Screw *****
(Charles Sager)

MSFC One Pagers (Shuttle): Due Noon 1/28/03

1. Critical Process Changes/First Flight
 - A. RSRM 1st Flight of Press Fit Bushings on Oversized Pinholes
(Chris Cianciola)
 - B. SSME Main Fuel Valve Cap-to-Housing Joint Redesign *****
(Roz Patrick)
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle): Due Noon 1/28/03

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils –NONE
3. Resupply Stowage Platform
(Sharolee Huet)

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE
3. ORCA Ops During Sleep Flight Rule
(Scott Seyl)

6S FLIGHT MILESTONE DATES

6S SORR 04/03/03
6S Launch: 04/26/03

ISS 6S PAR: tbd

Mission Overview:

1. Mission Success Criteria
 - A. 6S
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 6S Payloads
(tbd)
3. ISS 6S Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

STS-115/12A (OV-105) FLIGHT MILESTONE DATES

SORR	05/01/03	PAR:	tbd
FRR:	05/08/03	FRR Tagup:	tbd
Prelaunch MMT:	05/21/03	PMMT Tagup:	tbd
Shuttle Launch:	05/23/03		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. ISS S&MA CoFR Status
(Jim Wade)
4. EVA Overview (includes NCRs)
(Stacie Greene-5)
5. Payload Overview (includes NCRs)
 - A. JSC (Walter Stoerkel-6)
 - B. MSFC (tbd)
6. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: tbd, Backup:tbd)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION-TBD
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)
4. BSTRA Ball *****
(Bill Prince)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
2. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

11P FLIGHT MILESTONE DATES

11P SORR 05/01/03
11P Launch: 05/26/03

ISS 11P PAR: tbd

Mission Overview:

1. Mission Success Criteria
 - A. 11P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 11P Payloads
(tbd)
3. ISS 11P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Mark Gordon)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
3. New or Upgraded Hazards & Cils –NONE

STS-116/12A.1 (OV-104) FLIGHT MILESTONE DATES

SORR	07/01/03	PAR:	tbd
FRR:	07/10/03	FRR Tagup:	tbd
Prelaunch MMT:	07/22/03	PMMT Tagup:	tbd
Shuttle Launch:	07/24/03		

Mission Overview:

1. Mission Success Criteria
 - A. Shuttle (Jim Gardner-1)
 - B. Station (Boeing)
 - C. Shuttle Crew Constraint Exceptions (Jim Pendergast-2)
2. Station Overview (Boeing)
 - Open work
 - ISS Software (IV&V)
 - On-orbit Status & - Vehicle Status
 - ISS on orbit repair priority table
3. ISS S&MA CoFR Status
(Jim Wade)
4. EVA Overview (includes NCRs)
(Dan Mulligan-5)
5. Payload Overview (includes NCRs)
 - A. JSC (-6)
 - B. MSFC (tbd)
6. Shuttle Software Overview
 - A. JSC (Jane Moorhead-7)
 - B. MSFC SSME S/W (Roz Strickland)

Special Topics:

1. SHUTTLE
 - A. JSC-TBD (VMI: tbd, Backup:tbd)
 - B. MSFC-TBD
 - C. KSC-TBD
2. EVA-TBD
3. STATION-TBD
4. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (Sharolee Huet)
 - C. MSFC HEDS (Angelia Walker)

JSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils -NONE
3. Flight Rules with Safety Impacts (Jim Gardner)

MSFC One Pagers (Shuttle):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils-NONE

KSC One Pagers (Shuttle):

1. Critical Process Changes/First Flight -NONE
1. New or Upgraded Hazards & Cils –NONE

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

12P FLIGHT MILESTONE DATES

12P SORR tbd
12P Launch: 07/30/03

ISS 12P PAR: tbd

Mission Overview:

1. Mission Success Criteria
 - A. 12P
(Bobbie Jenkins)
2. Payload Overview (includes NCRs)
 - A. 12P Payloads
(tbd)
3. ISS 12P Overview
(Bobbie Jenkins)
4. ISS S&MA CoFR Status
(Jim Wade)

Special Topics:

1. STATION
 - A. tbd
2. INDEPENDENT ASSURANCE
 - A. JSC Independent Assessment (Mac Himel)
 - B. KSC SHIA (tbd)
 - C. MSFC HEDS (Angelia Walker)
3. EVA
 - A. tbd

JSC One Pagers (Station):

1. Critical Process Changes/First Flight –NONE
2. New or Upgraded Hazards & Cils –NONE

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Saturday, January 25, 2003 7:05 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 09 Report

STS-107 Flight Day 09 Report
GMT 025:13:00

Shift Leads: Jim Pendergast, Brandon Dick, Mike Etchells
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission. The SpaceHab is performing well and science continues to be conducted 24 hours a day.

There are eight vehicle anomalies at this time. (one new anomaly)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Sunday, January 26, 2003 6:54 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 10 Report

STS-107 Flight Day 10 Report
GMT 026:13:00

Shift Leads: Jim Pendergast, Jim Gardner, Mike Etchells
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remain well above the levels required for completion of the planned mission. The SpaceHab is performing well and science continues to be conducted 24 hours a day.

There are eight vehicle anomalies at this time. (no new anomalies)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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If you need additional information about this mailing list, please contact michael.j.penneyl@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Monday, January 27, 2003 8:08 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 11 Report

STS-107 Flight Day 11 Report
GMT 027:14:00

Shift Leads: Jim Pendergast, Brandon Dick, Mike Etchells
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. Science continues and the ground has been very happy with the performance of the experiments.

There are eight vehicle anomalies at this time. (no new anomalies)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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<http://wwwsrqa.jsc.nasa.gov/BBS/current/default.htm>

or

<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: GLANVILLE, ROY W. (JSC-NC) (NASA)
Sent: Monday, January 27, 2003 9:33 AM
Subject: Shuttle Standup Notes 1/27/03

STS-114 (OV-104) 3/1/03

- Completed closeouts.
- In to final water proofing
- Jack down weight & CG today.
- VAB rollout Wednesday morning at 9 AM.

STS-115 (OV-105) 5/23/03

- Sent the left hand OMS pod to the HMF for a regulator replacement.
- MPS flow liners OK.
- Window 11 replaced.
- Will replace fuel cell 1 this week.
- Pulling right hand pod for structural inspections.

STS-121 (OV-103) 7/29/04

- OMM work continues.

VAB

- STS-114 stack close-outs continue.

Stennis

- Battleship flow liner post test inspections completed
 - Will run another test today (580 seconds).
 - This is the 12th test of Pratt Unit 11.

USA Booster

- Looked at two ETA rings over the weekend.
 - Rings had 13 flights on them, 7 since the last NDE.
 - 98 high stress areas examined, nothing found.
 - Planning hardness testing.
- Regarding last flight's FIV flicker, the splash down tore the cable harness off of the valve so nothing to see, more to come.
- Sending team to CSD to pound flat the FOD issue.

Motor

- Nozzles have been sent to Utah and should arrive at plant on Wednesday.
- Early FSM 10 report: Nominal.

ET

- Hardware going well.
- 4th production friction stir weld in work.
- Still need to look at the pictures from the disconnect area to find out where the debris came from on the last flight.
- SOFI pull test won't find situations where suspected liquid air is off gassing between the slaw and the

SOFI.

USA Orbiter

- Analysis of ET debris hit indicates that Orbiter tile damage is within family and not a safety of flight issue.
- Analysis showed we're OK with the loss of a couple of tiles around wheel well.

Vehicle Engineering

- BSTRA team at MSFC.
- OMM monthly review in Florida this week.

Integration

- Working to assure photo ops expedite hand held photograph processing.
- Vehicle landing weight 233.7 to 233.9. Nozzle bluing not an issue, vehicle within certification predicted.

EVA

- Connecticut Quarterly review this week.

JSC/Norbraten

- All SLEP Summit Panels are working
- GAO Audit of upgrades in work - will be at entrance meeting this Friday

Shuttle Processing

- Servers corrupted by worm software attack. Email currently down.

KSC/Segert

- OV-104 rollout review Tuesday 10 AM EST.

USA/DeCastro

- Looking at margin charts for the STS114 through STS-120.
- Tiger team to look at OMM/OMDP

JSC/Dittemore

- The STS-107 IFA PRCB 2/6
- The STS-114/ULF-1 Topics 2/13
- The STS-114/ULF-1 FRR 2/20
 - Start time may be earlier than usual depending on ISS topics.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Tuesday, January 28, 2003 9:39 AM
To: 'srqa-mer listserver'
Subject: STS-107 Flight Day 12 Report

STS-107 Flight Day 12 Report
GMT 028:15:30

Shift Leads: David Witwer, Brandon Dick, Mike Etchells
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission continues nominally in a 154 x 140 nm orbit with all Orbiter subsystems performing satisfactorily. No new Orbiter issues or anomalies have been reported in the previous 24 hours.

Our MER Manager released the following update on the debris hit on the left wing last during ascent. "Systems integration personnel performed a debris trajectory analysis to estimate the debris impact conditions and locations. This analysis was performed utilizing the reported observations from the ascent video and film. It was assumed that the debris was foam from the external tank. Based on the results of the trajectory analysis, an impact analysis was performed to assess the potential damage to the tile and reinforced carbon carbon (RCC). The impact analysis indicates the potential for a large damage area to the tile. Damage to the RCC should be limited to coating only and have no mission impact. Additionally, thermal analyses were performed for different locations and damage conditions. The damage conditions included one tile missing down to the densified layer of the tile and multiple tiles missing over an area of about 7 in by 30 in. These thermal analyses indicate possible localized structural damage but no burn-through, and no safety of flight issue."

Previous flight day reports discuss the eight MER anomalies listed below.

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in Spacehab
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05	Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06	Loss of DR20 Tape Recording and Playback (GFE)
MER-07	LH2 Prevalve Open B Indicator Failed Off
MER-07A	MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08	70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Wednesday, January 29, 2003 9:37 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD13 Report

STS-107 Flight Day 13 Report
GMT 029:15:30

Shift Leads: David Witwer, Brandon Dick, Mike Etchells
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission continues nominally in a 151 x 140 nm orbit with all Orbiter subsystems performing satisfactorily. No new Orbiter issues or anomalies have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

Previous flight day reports discuss the eight MER anomalies listed below.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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end

The shift reports are also posted on the SR&QA bulletin board at the following internet address:

<http://wwwsrqa.jsc.nasa.gov/BBS/current/default.htm>

or

<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: Page-1, Robert [Robert.W.Page@nasa.gov]
Sent: Wednesday, January 29, 2003 12:56 PM
To: Abner, Charlie; ALFARO, KAREN (JSC-SP5) (LM); Atkinson, Bill C.; Ayotte-1, William; BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); BALU, BRIAN K. (JSC-NC) (SAIC); Bauder, Stephen P; Blue, John B; Brewer, John M; BROWN, KENNETH L. (JSC-MV6) (NASA); Bursian, Henry; Burt, Rick; Butler, Mike; BYRNE, GREGORY J., PHD (JSC-SX) (NASA); Cash, Steve; Chapman, John; Chitko, Pete J.; BOYKIN, CHRISTINE M. (JSC-MS2) (NASA); Clever, William W.; Davis, Benny; DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA); DISLER, JONATHAN M. (JON) (JSC-SX) (LM); DYE, PAUL F. (JSC-DA8) (NASA); Engler, Tom; ERMINGER, MARK D. (JSC-NC) (NASA); Fagan, Michael; Ferris, Frances; Fisher, Gary; Fricke, Robert W.; Fuller, Mike; GALBREATH, GREGORY F. (GREG) (JSC-ES2) (NASA); Gardze, Eric P.; GLANVILLE, ROY W. (JSC-NC) (NASA); Glenn-1, Malcolm; Goldman, Gene; GOMEZ, REYNALDO J. (RAY) (JSC-EG3) (NASA); Gordon, Steve L; Greenwood, Terry F.; BYRNE, GREGORY J., PHD (JSC-SX) (NASA); Guidi-1, John; HALSELL, JAMES D (JSC-REMOTE); HAM, LINDA J. (JSC-MA2) (NASA); Harris, Yolanda; Hawkins, Tyrell; HAYNES, DENA S. (JSC-EV) (NASA); Herst, Terri; Holderman, Mark L.; Holmes, Steven G.; Hopson, George; Huff, Joy N.; IVINS, MARSHA S. (JSC-CB) (NASA); Jim Ross; Jones-1, Frank; Kaminsky, James; Kelley-1, David; Kienitz, Fred; Kynard, Mike; Lafleur, Tom C; Laufenberg, Katherine M; Leggett, Kenneth D; Leinbach-1, Mike; LIN, JILL D. (JSC-MV5) (NASA); Lorelei Lohrli-Kirk; Maddux, Lewis; Mango, Ed; Martin, David M.; MARTINEZ, HUGO E. (JSC-NC) (GHG); MAYER, FRED F. (JSC-NC) (SAIC); MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA); Moore, Dennis; Moyer, David; Muddle, William H.; Muhar, Mark; Murphy, Alan; Nagle, Scott M; Nash, Richard; Newton, John; Oliu-1, Armando; Ortiz-Longo, Carlos V.; Otte, Neil; Otto, Scott; Owens, Karen K.; Page-1, Robert; PATTERSON, JOE K. (KEN) (JSC-DM) (USA); Preston, Ken; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); Purtle, Lawrence; Ramon, Rudolph; Revay, Kenneth P; Rieckhoff, Tom; Rivera, Jorge; Rudolphi, Michael; Segert-1 Randall; Smelser, Jerry; Snoddy, Jim; SNYDER, MICHAEL W. (JSC-SX) (LM); Sofge, Al (NASA HQ); Speece-1, Bob; Stevenson-1, Charlie; Sutton, Marcy; Swan, Bobbie G.; Teehan, Paul; Tepool, Ronald; Tinsley, John; WALLACE, RODNEY O. (ROD) (JSC-MS2) (NASA); WALTERS, JAMES B. (BRITT) (JSC-SM) (NASA); White, Doug; Williams, Tom; Wilson, David; Wilson, Thomas F.; Woolhouse, Dwight; Worlund, Len
Subject: STS-107 Launch+4 Day Consolidated Film/Video Report



107CFVR_L+4.pdf

Attached is a copy of the STS-113 Launch+4 Day Consolidated Film/Video Report.

<<107CFVR_L+4.pdf>>

During my computer replacement, I lost the distribution list and have been working to restore it. Please review over the list of names that this is being sent to and verify that the proper individuals are getting it. Also, the following were getting it before and I cannot find e-mail addresses for them. If you have one, please provide it to me; Bakes, Russell; Conte, Barbara A; Counts, Parker; Feeley, James; Jones, Ferdinand; Kan, Kenneth; Kopfinger, Philip; Lamkin, Bill; Nichols, Stanley; Robertson, James; Sanofsky, Kerry; Schomburg, Calvin.

Bob Page
KSC/MK-SIO
(321) 867-8516

STS-107
Launch+4 Day
Consolidated Film/Video Report
KSC, JSC, MSFC and Program Integration
Film/Video Analysis Teams

22 January 2003

This report consolidates the multi-center post flight photo reviews into a single list of observations for engineering review. This integrates the photo review process into the IFA / PRACA process to ensure that the identified observations are assessed and dispositioned prior to the next flight per established problem reporting criteria.

CFVR-107-01

Camera: E204, E208, E212
Time: UTC 016:15:40:21.699

During ascent at approximately 81 seconds MET, debris was seen to originate from an area near the ET/Orbiter forward attach bipod. Due to lighting conditions in the area, it is not known whether the debris originated as a single item which broke up or if it originated as several separate items. Four objects are seen or surmised from the data.

Object #1, the largest of the items, was a light-colored piece of debris which appeared (016:15:40:21.699 UTC) to move outboard in a -Y direction, then fell aft along the left Orbiter fuselage and struck the underside (-Z) of the leading edge of the left wing (016:15:40:21.882 UTC). The strike appears to have occurred on or relatively close to the wing glove near the Orbiter fuselage. After striking the left wing, the debris broke into a spray of white-colored particles that fell aft along the underside (-Z side) of the Orbiter left wing. The spray of particles was last seen near the LSRB exhaust plume.

Object #2, darker and smaller in appearance than the first, is visible in the frame immediately following the appearance of Object #1. Its travel path seems to be slightly more outboard and more in the -Z direction than the first. This object actually strikes the wing before Object #1. (A spray of particles is seen traversing aft prior to the strike from Object #1).

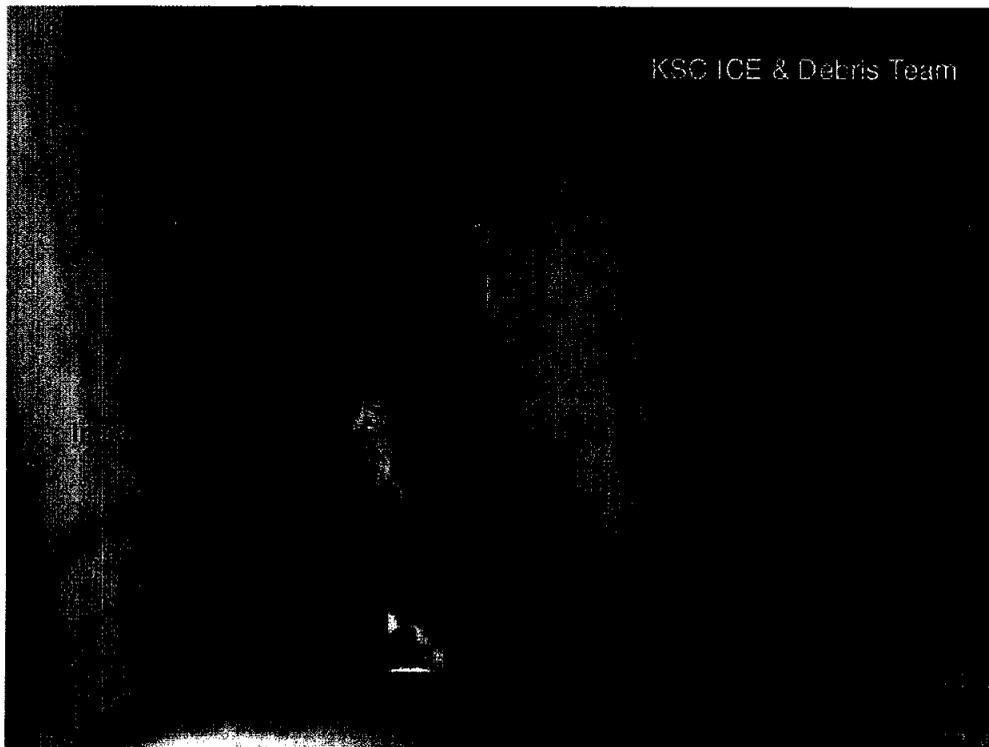
Object #3 is not seen directly in any views. However, evidence of its existence comes from a second spray of particles at the same time as and parallel to the spray from Object #2.

Object #4 does not appear to strike the Orbiter, but is seen as it crosses over the ET vertical strut. This object may be part of the debris cloud from Object #2/3.

STS-107
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STS-107
Launch+4 Day
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STS-107
Launch+4 Day
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Comparison views of the strike area immediately before and after the event were examined for indications of damage to the wing. The resolution on the films and videos is insufficient to see individual tiles. Of the multiple views that should have been available to view this event, many were unuseable. Based on the resolution of the views available, no conclusions can be reached on the extent of any damage that may have occurred from this event.

Secondary effects from the spray of materials following the strikes was also considered. The MER was contacted to determine the Elevon positions at the time of the strike. Since the Left Inboard Elevon was slightly down, there is also the possibility of strikes there.

Time		Elevon Position (deg)	
G.m.t.	MET (sec)	LIB	LOB
016:15:40:20	80	2.56	-4.87
016:15:40:21	81	1.63	-4.87
016:15:40:22	82	0.71	-4.87
016:15:40:23	83	0.24	-3.71
016:15:40:24	84	0.24	-2.09

Note: For the elevons, a negative deflection is Up, positive is Down

A preliminary assessment of debris impact conditions predicted an impact to the Orbiter lower surface at location Xo1049, Yo185 (results provided on January 17, 2003) Impact velocity was estimated to be approximately 750 ft/sec with an impact angle estimated to be less than 20 degrees.

Further analysis will be performed.

**STS-107
Launch+4 Day
Consolidated Film/Video Report
KSC, JSC, MSFC and Program Integration
Film/Video Analysis Teams**

CFVR-107-02

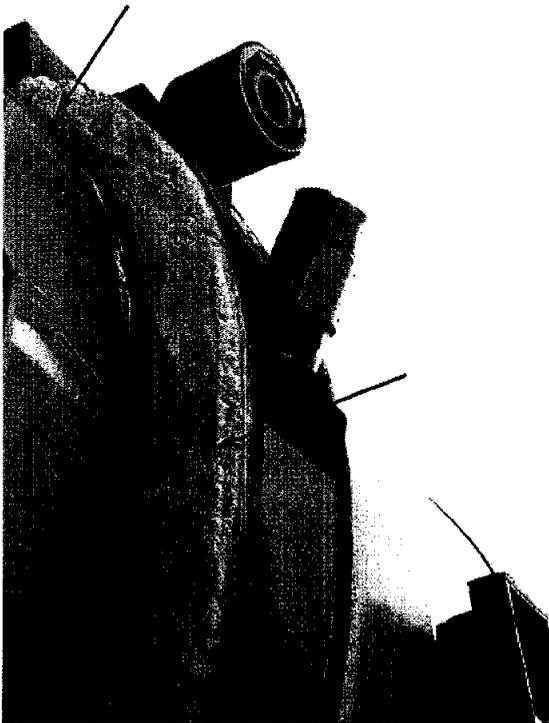
Camera: E-220, E-222, E-223, E-224
Time: UTC 15:39:33.196

Approximately 33 seconds after T-0 (15:39:33.196 UTC) several particles are observed falling away from the -Z portion of the LH SRB ETA ring. Particles are probably pieces of the instafoam closeout on the ETA ring. (E-220, E-222, E-223, E-224)

From Post-Flight SRB Inspection:

The LH ETA ring instafoam closeout exhibited missing foam on the aft side. The areas of missing foam were sooted, indicating they came off in flight and not as the result of water impact. The largest area was approximately 3 inches in diameter by 2-1/2 inches deep. This appears to correlate with the debris seen coming from this area on the tracking films (E-220, E-222, E-223, E-224).

Missing instafoam, with sooting, from the aft side of the LH ETA ring.



STS-107
Launch+4 Day
Consolidated Film/Video Report
KSC, JSC, MSFC and Program Integration
Film/Video Analysis Teams

Bob Page
KSC/MK-SIO
(321)867-8516

ERMINGER, MARK D. (JSC-NC) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 31, 2003 9:08 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 15 Report

STS-107 Flight Day 15 Report
GMT 031:14:50, MET 14:23:10

Shift Leads: David Witwer, James Gardner, David Melendez
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission continues nominally with two issues reported over the previous 24 hours. The Orbiter consumables are above the levels required for completion of the planned mission. Weather forecasts for the two Saturday landing opportunities at KSC are well within flight rule limits; specifically scattered clouds at 3500 ft and 25,000 ft, visibility 7 sm, and crosswinds less than 10 knots.

Flight Control System (FCS) checkout is complete with FCS, APU and hydraulic system performance as expected. Following FCS checkout, the RCS hot-fire occurred satisfactorily. All thrusters fired at least once. The Orbiter is prepared for tomorrow's deorbit and landing.

However, two anomalies have been added to our MER Anomaly list. The first anomaly added is MER-09: SPACEHAB Water Loop Flow Degradation. Earlier in the flight (MET 01:21:21), the flight control team decided to use only SPACEHAB water pump 1. Recent data shows pump 1 is degrading, however the degradation is at a rate that will allow the flow to stay above nominal limits until the end of mission. SPACEHAB water pump 1 degradation does not currently have an impact to the mission. Post landing, a team at KSC will troubleshoot the Orbiter side of the interface to determine if Orbiter hardware either caused or impacted the problem.

The second anomaly added in the past 24 hours is MER-10: Forward DAP Auto A Contact Deselected. A review of the data indicates that the switch performed nominally until MET 13:04:49 and 13:05:53. At these two moments when the crew used the forward Digital Auto Pilot (DAP) auto push button switch, contact A did not close. Redundancy Management (RM) subsequently deselected contact A of the forward DAP. A switch tease, observed in the past on this type of switch, is the suspected cause. Although there is a loss of redundancy, no mission impact is expected and workarounds are in place for the next worst failure.

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in SPACEHAB
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05	Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06	Loss of DR20 Tape Recording and Playback (GFE)
MER-07	LH2 Prevalve Open B Indicator Failed Off
MER-07A	MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08	70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)
MER-09	SPACEHAB Water Loop Flow Degradation (ORB or PLD)
MER-10	Forward DAP Auto A Contact Deselected (ORB)

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<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Monday, February 03, 2003 12:34 PM
Subject: Shuttle Standup Notes

Ron

- He appreciates everyone's efforts throughout the program with the utmost professionalism under very difficult circumstances
- Employee Assistance Program services are available
- Memorial Noon Tuesday
- Columbia Accident Investigation Board - Admiral Gehman leading
- HQ Contingency Action Team (HCAT)
- Linda Ham leading Mishap Response Team (MRT)
- Mishap Investigation Team and Engineering Teams report to the MRT
- The MIT is at Barksdale AFB
- Records Team meeting this afternoon at 4 PM

Future Ramifications

- Continue processing OV-103 OMDP
 - There may be additional inspections
- OV-105 continue processing
- OV-104 in VAB - leave in VAB
 - USA find out how long we can leave in the VAB stacked
- Cancelled Supplier Symposium
- Our highest priority is to support Accident Investigation Board and MRT
- Continue normal work if not involved in investigation
- Will decide what to do with SLEP

Roe

- Vehicle Engineering Working Group is organized much the same way as for large problems recently

McCool

- Have 5 teams
- Paul Monafa team is at MAF developing ET Fault Tree

KSC

- 80 people in the field supporting Dave Whittle

MOD

- Still supporting 3 crewmembers on orbit
- 10P docking is tomorrow

Norbraten

- Will recover the history and rationale for Safety Upgrades we have implemented

Ham

- 1/560 will be tied into the MRT

Fred Gregory

- MR O'Keefe is briefing the White House today
 - Fred spent some time with the teams at Barksdale yesterday

Ron Dittmore

- No FRR on 2/20
- Leave everything else as it was
- Go into a holding pattern

ERMINGER, MARK D. (JSC-NC) (NASA)

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Thursday, February 06, 2003 9:21 AM
Subject: Shuttle Standup Notes 2/6/03

Dittemore

- Meeting with the Columbia Accident Investigation Board (CAIB) today at 8 AM
- **As of today, the MRT and MIT will be under the CAIB**
- Task Force led by Frank Buzzard will be the Admin arm of the CAIB

Ham

- MRT will be at 10 AM today
 - Hope to move to Bld 1 on Monday
 - Will start asking for formal charts
- **Requests for interviews from the press need to go through Ron Dittemore**
- **FOIA requests need to go through Linda Ham and the CSR**

Dittemore

- **Have pre-approved certain people to be able to talk to the media about background info**
- The investigation will not involve every single person and he understands their desire to participate
 - Managers need to keep the program going and not conflict with the investigation
 - Infrastructure revitalization, SLEP, Training, and other things would be good things to work on

MSFC

- **Alex McCool will have bypass surgery tomorrow**

STS-114 (OV-104)

- Finished Orbiter ET Mate and Shuttle Interface Test

STS-115 (OV-105)

- Fuel Cell installed

OV-103

- Mods and inspections

SSME

- One more test at Stennis on the flowliner

USA Booster

- SRB IA Team looking at hardware and paperwork
- Will start processing flight hardware today

Motor

- RSRM IA Team is at KSC this week and Utah next week

USA Orbiter

- Engineering team is looking at OV-104 in VAB Payload Bay Moisture requirement
- Working the design of the BSTR tool

Vehicle Engineering

- Deep into data review
- Data request go through the MER

USA Integration

- Integration Management Review next week in Houston

KSC

- Memorial Service at KSC on Friday

USA Flight Ops

- All MCC and Training systems back on line

MOD

- ISS support continues
- Will start training again next week

Upgrades

- *Direction from HQ on SLEP Summit to maintain dates in March*
 - Support for each of the panels varies
 - Will decide for sure next week

HQ

- Memorial at the National Cathedral at 10 EST today

USA

- Working optimum use of vehicles to support the manifest

Dittemore

- *Asked the manifest people to work options assuming 4/1 or 6/1 resumption of flights*

ERMINGER, MARK D. (JSC-NC) (NASA)

From: NAKAMURA, STACEY T. (JSC-NS) (NASA)
Sent: Monday, January 13, 2003 10:55 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA)
Cc: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Subject: RE: STS-107 Readiness Statement

No issues....sorry about the mixup.

will have this completed today.

-
Stacey T. Nakamura
Phone: (281) 483-4345
Fax: (281) 483-6275

-----Original Message-----

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Monday, January 13, 2003 10:26 AM
To: NAKAMURA, STACEY T. (JSC-NS) (NASA)
Cc: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Subject: STS-107 Readiness Statement

Debbie tells me you haven't sent her your Readiness Statement for STS-107 yet?

Do you have any issues that I need to know about?

ERMINGER, MARK D. (JSC-NC) (NASA)

From: PENDERGAST, JAMES E. (JSC-NC) (GHG)
Sent: Monday, January 13, 2003 2:27 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: RE: STS-107 PAR Action Items

This action is being worked. There are going to be several meetings schedule the week of Jan 20th with the most recently flown Commanders to get their input of the requirements. Alan Bartos, who is the book manager of the Shuttle Crew Scheduling Constraints Requirements, and I are then going to take those inputs along with my data and Alan's to MOD to address changing the requirements to be more inline with real world and to bring CBs request of which requirements do not need to be changed, just more strictly enforced. When the action was assigned I knew this was going to be several months in the work to address the requirements and possibly changing them. I will keep you apprised of our progress.

Jim

-----Original Message-----

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Monday, January 13, 2003 1:28 PM
To: PENDERGAST, JAMES E. (JSC-NC) (GHG)
Subject: STS-107 PAR Action Items

Do you have something you could send me to close this action?

The following action was assigned at the STS-107 PAR Tag-up held on Friday, December 20, 2002:

Action # 122002-1
Actionee: JSC-Jim Pendergast
Action: Discuss with MOD the possibility of making three hour pre-sleep and three hour post-sleep a requirement on non-EVA/non-rendezvous days.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: ROSS, CLARENCE L. (JSC-NE) (NASA)
Sent: Tuesday, January 14, 2003 1:45 PM
To: THELEN, DAVID F. (JSC-NT) (NASA)
Cc: LAWS, BURT A. (JSC-EC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); DYER, DAVID W. (JSC-NT) (NASA); WATKINS, VINCENT D. (JSC-NT) (NASA); RIVERA, PEDRO L. (JSC-NT) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: EMU Contamination Status....
Importance: High

Dave, this just happen this morning. There were meetings in B7/EC5 to try and understand exactly what type of situation we have and to identify the impacts for tomorrow's EVA ,on orbit units and flight. Yes, this is a routine water sampling test which was conducted at the **HAMILTON SUNDSTRAND PLANT** (not FEPC or onsite JSC). Base on a 12 noon meeting with XA, EC, SA and Hamilton it has been determined that the location of the strontium chromate (SrCrO4) or chromium is upstream of the item I 145 located in line #111 which is a oxygen vent line. However, the contaminated location is downstream of the flow into the suit helmet area.

Problem:

PLSS #1008 hardware evaluation of I 145 relief valve and orifice extension identified .25 mg (176 ft3 of volume needed to meet the requirements) of strontium chromate (SrCrO4) on dead end side of valve.

Potential Sources:

BR 127 primer (or MIL-P-23377 primer) is used on water tank structure, aluminum horn and then coated with **PD George**.
* BR 127 is 2% strontium chromate
* water tends to leach strontium chromate out of the BR 127 coating if PD George coating lifts.

Transport Mechanism:

* Gas, vapor and water.
* Most likely mechanism is the moisture/water droplets behind the bladders

Findings:

* Current findings are indicating that the SrCrO4 is trapped behind the I 145 and is not present in the "vent loop" portion of the valve.

Bottom Line:

* Meeting in B7 with NT, XA, EC and Hamilton Sundstrand are currently on going. Chemist to determine impact of SrCrO4 ?????
* I 145 relief valve has been on PLSS 1008 for 19 years with out removal.
* PLSS 1006 was tested with no SrCrO4 identified. The age is similar to PLSS 1008 (19 to 20 years).
* Suffredini meeting move to 4pm 1/16/03
* SR&QA action to determine the probability of performing a EVA as a result of Shuttle payload bay door failure. (IN WORK)

Stay tuned.....

C. L. Ross

NASA SR&QA EVA Projects Office Lead
281-244-5095 (o) 888-265-9748 (P)
cross@ems.jsc.nasa.gov

-----Original Message-----

From: ROSS, CLARENCE L. (JSC-NE) (NASA)
Sent: Tuesday, January 14, 2003 11:05 AM
To: DYER, DAVID W. (JSC-NT) (NASA); WATKINS, VINCENT D. (JSC-NT) (NASA)
Cc: THELEN, DAVID F. (JSC-NT) (NASA); LAWS, BURT A. (JSC-EC) (NASA)
Subject: FW: PCAR Presentations

FYI The meeting was deferred due to 2pm meeting to discuss the PLSS Chromium contamination with Suffredini.

The contamination was discovered during the USA FCE processing and water sampling. The sources has not yet been identified. We are also supporting this meeting. STAY TUNED....

C. L. Ross

NASA SR&QA EVA Projects Office Lead
281-244-5095 (o) 888-265-9748 (P)
cross@ems.jsc.nasa.gov

-----Original Message-----

From: HUYNH, ANH H. (JSC-XA) (NASA)
Sent: Tuesday, January 14, 2003 9:43 AM
To: BONSAL, GRACE (JSC-XA) (HS); NEWMAN, RONNY L. (JSC-DX12) (NASA); 'Monroe, Jesse USA'; 'Donald Campbell (E-mail)'; ROSS, CLARENCE L. (JSC-NE) (NASA); TOLER, RODERICK C. (ROD) (JSC-NT) (WGI); DINSMORE, CRAIG E. (JSC-EC5) (NASA); RUCKER, MICHELLE A. (JSC-EC) (NASA); LEWIS, KEVIN W. (JSC-ER) (NASA); 'Jackie Manning (E-mail)'; David Etter (E-mail)
Subject: RE: PCAR Presentations

Due to an unexpected event, the XA PCAR meeting will begin at 3:00 (Houston time) this afternoon instead of 2:00. The meeting will only be 1-hour long, so please be prepared to limit the discussion to cover the highlights in your presentations.

Thanks for your support.

Jesse, please forward to Sharon (?).
All, please forward to others who plan to attend.

-----Original Message-----

From: BONSAL, GRACE (JSC-XA) (HS)
Sent: Tuesday, January 14, 2003 9:04 AM
To: HUYNH, ANH H. (JSC-XA) (NASA); NEWMAN, RONNY L. (JSC-DX12) (NASA); 'Monroe, Jesse USA'; 'Donald Campbell (E-mail)'; ROSS, CLARENCE L. (JSC-NE) (NASA); TOLER, RODERICK C. (ROD) (JSC-NT) (WGI); DINSMORE, CRAIG E. (JSC-EC5) (NASA); RUCKER, MICHELLE A. (JSC-EC) (NASA); LEWIS, KEVIN W. (JSC-ER) (NASA); 'Jackie Manning (E-mail)'
Subject: PCAR Presentations
Importance: High

Please send me your PCAR presentation electronically by noon today so that I can distribute the information to the telecon participants.

Thanks in advance,
Grace

Grace Larson

EVA Project Office
Hamilton Sundstrand Management Services
Building 1, Room 328
281.483.3393 Office
713.786.4241 Pager

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Tuesday, January 14, 2003 4:06 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: STS-107

We have reviewed the Aclar issue discussed at L-2 and are OK. We'll review the waiver before the Noon Board tomorrow. The BSTRA ball offset was real late breaking news that we did not discuss in our 10:00 AM meeting. We are having a 4:30 PM CST meetig today to discuss the new info. We'll Email the results and our position. With regard to 104 and 105, they have inspected both vehicles, but we have not spun the balls. We have not talked about doing that yet, because we weren't sure that it could be done until several days ago. Now that it can be done, it needs to be addressed again. I'll have to get back with you.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: ROSS, CLARENCE L. (JSC-NE) (NASA)
Sent: Wednesday, January 15, 2003 9:51 AM
To: THELEN, DAVID F. (JSC-NT) (NASA); LAWS, BURT A. (JSC-EC) (NASA); DYER, DAVID W. (JSC-NT) (NASA); WATKINS, VINCENT D. (JSC-NT) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); SEYL, SCOTT A. (JSC-NE) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); TOTTON, DONALD W. (DON) (JSC-OE) (NASA)
Cc: KRUEGER, HAYDEN A. (JSC-NT) (SAIC); ROACH, JACK G. (JSC-NT) (SAIC); EADS, DENNIS (JSC-NT) (SAIC); SAGER, CHARLES L. (JSC-NT) (SAIC); FUENTES, JOSE (JSC-NT) (SAIC)
Subject: FW: SR&QA EVA Contingency.ppt

Dave, attached you will find the XA EVA pitch presented during this morning's L-1 meeting for STS-107. I would like to personally thank Charles Sager/NT and Jose Fuentes/NT for supporting the problem resolution team meetings in building 7 and 30 (MMT) last night and this morning's EVA. I would also like to commend the NC/SAIC PRA group (Roger Boyer, Jim Teel & Bruce Reistle) for providing an exceptional product assessment which addressed the probability of performing a contingency EVA.

C. L. Ross

NASA SR&QA EVA Projects Office Lead
281-244-5095 (o) 888-265-9748 (P)
[*cross@ems.jsc.nasa.gov*](mailto:cross@ems.jsc.nasa.gov)

-----Original Message-----

From: JOHNSON, BRIAN J. (JSC-XA) (NASA)
Sent: Tuesday, January 14, 2003 11:14 PM
To: FLYNT, GEORGE A. (ALLEN) (JSC-XA) (NASA); DUTTON, JEFF (JSC-XA) (NASA); LUTZ, GLENN C. (JSC-XA) (NASA)
Cc: ROSS, CLARENCE L. (JSC-NE) (NASA)
Subject: RE: SR&QA EVA Contingency.ppt



EMU L-1 Pitch.ppt

It was a blast. See ya in the morning.

Brian

-----Original Message-----

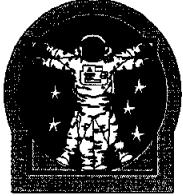
From: ROSS, CLARENCE L. (JSC-NE) (NASA)
Sent: Tuesday, January 14, 2003 9:38 PM
To: JOHNSON, BRIAN J. (JSC-XA) (NASA); FLYNT, GEORGE A. (ALLEN) (JSC-XA) (NASA); DUTTON, JEFF (JSC-XA) (NASA)
Subject: SR&QA EVA Contingency.ppt

Here is the PowerPoint version of the chart we discuss post the MMT. This might change based on a 7am meeting with SR&QA management.

<< File: SR&QA EVA Contingency.ppt >>

C. L. Ross

NASA SR&QA EVA Projects Office Lead
281-244-5095 (o) 888-265-9748 (P)
[*cross@ems.jsc.nasa.gov*](mailto:cross@ems.jsc.nasa.gov)



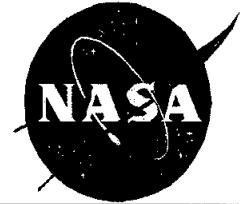
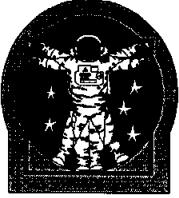
*EVA
PROJECT
OFFICE*



Strontium Chromate in EMU Investigation Results

STS 107 L-1 Review

**G. Allen Flynt
EVA Project Office
Johnson Space Center
1/15/03**

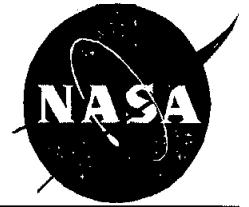


- **Background**

- During life extension evaluation of the I-145 Relief Valve on the fleet leader EMU (19 years of age) approximately 0.25 mg of Strontium Chromate (SrCrO_4) was identified.
- This valve is connected to the ventilation loop, however is not in the direct flow path to the crewmember.
- Strontium Chromate exists within the EMU System as a minor component (2%) of BR-127 Primer (MIL-P-23377)
- BR 127 primer is utilized on the water tank structure and aluminum horn, both of which are exposed to the ventilation loop. The primer is then over-coated with PD George for corrosion prevention.

- **General Finding**

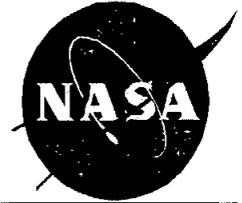
- Over time water can leach SrCrO_4 out of exposed BR 127



- **Findings associated with BR 127 use in the Water Tank**
 - Neoprene water bladders installed on EMUs prior to 1990 leached water into the water tank structure. Corrosion of the water tank and flaking of coatings was not uncommon
 - A flow path between the water tank and I-145 exists and would explain for the contamination exhibited on the EMU fleet leader (PLSS 1008)
 - Post 1990 installation of Fluorel bladders eliminated water access to the water tank structure
 - All EMU water tanks are inspected every 2 years to ensure no exposure of BR 127
 - The migration of contamination as witnessed in PLSS 1008 into the ventilation loop is not considered possible
 - The only probable flow path to the vent loop from the water tank is during unmanned SOP check outs because the I-145 valve is not functional during EVA operations
 - In the event of leakage of the relief valve gas flow will be in the direction away from the vent loop

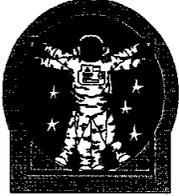


EMU Systems Investigation



- **Findings associated with BR 127 use in the Aluminum Horn**
 - The Aluminum Horn is not considered to be a contamination source
 - This item is inspected every 2 years
 - No failure history associated with loss of coatings and exposure of BR 127

- **EMU Systems Conclusion**
 - There is no probable mechanism to introduce SrCrO_4 into the EMU ventilation loop during EVA



- **Toxicology Findings**

- Strontium Chromate is a carcinogen and long term exposure above the industry standards is considered to increase the risk of cancer
- Current industry standards for acceptable long term daily exposure to SrCrO₄ range from 0.002 mg/m³ to 0.2 mg/m³
- JSC Toxicology has determined that in the improbable event that the 0.25 mg of SrCrO₄ found in the EMU fleet leader were released into the ventilation loop for the duration of a single EVA the crewmember would be exposed to the equivalent of 1 hour to 12 days of the daily limit for repeated long term career exposure

- **Toxicology Conclusion**

- JSC toxicology has determined this type of exposure to be a minimal risk to crew health and does not represent an appreciable increase in risk in performing EVA operations

ERMINGER, MARK D. (JSC-NC) (NASA)

From: PENNEY, MICHAEL J. (JSC-NC) (SAIC)
Sent: Friday, January 17, 2003 2:51 PM
To: JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); DYER, KEITH W. (JSC-NC) (SAIC); SR&QA MER Console; CAZES, DAVID (JSC-NA) (SAIC); BROWNE, DAVID M. (JSC-NC) (NASA); BALU, BRIAN K. (JSC-NC) (SAIC); NGUYEN, KHOI (JSC-NC) (SAIC); DEFRANCIS, MICHAEL A. (JSC-NC) (SAIC); VEROSTKO, JEREMY E. (JSC-NC) (SAIC); KOKOSZ, CHERYL M. (JSC-NC) (SAIC); ROSE, SUMMER L. (JSC-NC) (SAIC); MORELAND, DEAN (JSC-NC) (NASA)
Cc: FOSTER, ANDY (JSC-NC) (GHG)
Subject: Problem Tracking Telecon.

I attended the STS-107 problem tracking telecon where 3 "Funny Under Investigation" items were discussed. Included below is the text of the MER Funny/Problem Tracing List and additional notes

MER - 1
Funny Under Investigation; EPD&C - Hardware; AC2 Phase B "Sluggish" Current Signature (ORB)
Summary:
During the pre-launch/post-insertion time period, AC2 phase B exhibited sluggish current increase during motor operation on three motors. The first occurrence of the sluggish performance was noted at T-31 seconds, and the second and third occurrences were noted during the post-insertion activities. AC2 phases A and C would increase to their expected values, but phase B would increase only to about half of expected value, then recover to the expected value within about a second. The affected motors are: vent doors 8 and 9, Ku-band deploy motor 2, and port payload bay door open motor 2. There was no impact to motor drive times. There is no common circuit breaker/motor control assembly. All other motor signatures analyzed were nominal, some of which are powered from the same circuit breaker/motor control assemblies as the affected motors.

MJP notes
During Ku Deploy motor operation phase B recovered in about 1/2 or 1/3 second.

Other motors on the same circuits have operated correctly indicating a possible intermittent problem.

KSC is going to check the data from the operation of these three motors during the last flow in the OPF. The Payload bay doors were not opened in the vertical this flow.

The only work that KSC mentioned for this area was the replacement of a phase A circuit breaker AC-1 MID 1 on panel MA73C due to UA 109V-0357. This UA is deferred till Failure analysis of the circuit breaker can be completed. The phase A problem was the loss of that phase, however the new phase B problem is a two step up to the expected value.

Here is a Web PCASS link to the old UA:

http://adam.usano.ksc.nasa.gov:8080/adamvweb/plsql/kscpr.KSC_IPD_Report.wp_execDetail?wv_pCode=741106&wv_poldsc=&wv_rAll>=

MER - 2
Funny Under Investigation; C&T - Audio; No ICOM B in SpaceHab (ORB)
Summary: During Spacehab activation, the crew reported that transmissions from the Orbiter on the intercommunications (ICOM) B loop were not being heard in the Spacehab module. Communications on the ICOM A loop were satisfactory. This loss of redundancy should not affect the continuing mission operations.

MJP notes
Per KSC the nominal launch configuration is for ICOM B to be off at the panel however the on orbit checkout procedure does check both ICOM A & B. INCO is developing a checkout procedure for the flight crew to use to isolate the problem.

MER - 3; Funny Under Investigation; O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
Summary: During performance of the O2 tank current level detector checkout, it was noted that the O2 tank 7 heater A1 and A2 ON discretes did not come on. This procedure calls for the tank heaters being turned on manually then verifying

that the sensor trips out the heater. Main bus current verified that the O2 tank 7 A heaters did not come on. The heaters have not yet been used in the AUTO mode but MOD is currently planning to request this configuration in the near future. The B heaters functioned nominally and will provide sufficient energy to the tank so there is no concern about being able to use O2 tank 7.

The Flight Rules state that with the loss of a tank heater, that tank should be used until the remaining consumables from the other tanks support nominal EOM+2 days.

However, CG concerns for early EOM call for tanks 4 and 5 to be depleted first and those tanks are currently being used.

MJP notes

This item was not on the list printed for the meeting; however it was a late breaking item that we discussed.

MJP Notes Item 4

The last item discussed was problems getting one type of data from SpaceHab to the POC via Ku-band. This was believed to be a ground equipment problem at the time of the this telecon, Friday morning (about MET 24 hr 20 min)

Next telecon scheduled for Tuesday

Michael Penney

JSC SR&QA/SS&MA

281-244-1950

Brasil: Penta-champions of the world

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Thursday, January 23, 2003 1:22 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA)
Cc: BROWNE, DAVID M. (JSC-NC) (NASA); BALU, BRIAN K. (JSC-NC) (SAIC); BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG); SKAINS, CYNDI L. (JSC-NC) (GHG)
Subject: FW: STS-107 FRR Tagup Action Item

None of the balls failed the screening at Arrowhead, but about 45% failed the sub-vendor's check. This should close the action. Let me know if you need more info. Thanks,

Hugo

-----Original Message-----

From: Stoica, David [mailto:david.stoica@boeing.com]
Sent: Thursday, January 23, 2003 11:19 AM
To: Hirakawa, Earl M; MARTINEZ, HUGO E. (JSC-NC) (GHG); Peller, Mark E; ALMASRI, WALEED (JSC-REMOTE)
Cc: Rigby, David A; Fineberg, Laurence H
Subject: RE: STS-107 FRR Tagup Action Item

Arrowhead performs penetrant inspection both before and after the LN2 immersion test. None of the balls failed penetrant inspection, either before or after the LN2 immersion test.

In other words, none of the balls failed the LN2 immersion test.

However the gamma ray radiographic inspection of balls made by Stody Company of Whittier, California, had significant numbers of rejects. The x-rays of their balls had a 45% rejection rate for shrinkage cavities and gas holes. Stody Company made all the balls in the fleet.

Arrowhead procured balls in 1992 from Deloro Stellite of Canada.

Stody 2 balls made by Deloro Stellite received a hot isostatic press process called "HIP".

The HIP cycle for Stody 2 balls consisted of 2125 F at 15,000 psi for 3 hours.

These balls had a 4% rejection rate (1 ball out of 27).

(None of the Deloro Stellite balls are installed in the fleet. None of the fleet balls received the HIP process.)

Attached is a matrix showing the x-ray rejection rates of the various lots of balls.

Dave Stoica 714-372-4118

-----Original Message-----

From: Hirakawa, Earl M
Sent: Thursday, January 23, 2003 7:39 AM
To: EXT-Martinez, Hugo E
Cc: Rigby, David A; Fineberg, Laurence H; Stoica, David
Subject: RE: STS-107 FRR Tagup Action Item

I've seen some numbers from Dave Stoica's investigative work in researching the build data. The numbers were quite significant. I'll have him forward some stuff out to you folks.

Earl

-----Original Message-----

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)

[mailto:hugo.e.martinez1@jsc.nasa.gov]
Sent: 23 January, 2003 7:08 AM
To: 'Hirakawa, Earl'
Cc: 'Rigby, David A'; 'Fineberg, Laurence H'
Subject: FW: STS-107 FRR Tagup Action Item

Earl, do you know how many balls failed the original ATP screening? I guess it'll be stated in terms of percent of those tested. I'm sorry to ask this of you, but this was a question from HQ management at an earlier SRQA meeting.

Hugo

> -----Original Message-----

> From: ERMINGER, MARK D. (JSC-NC) (NASA)
> Sent: Thursday, January 23, 2003 8:26 AM
> To: MARTINEZ, HUGO E. (JSC-NC) (GHG)
> Cc: BALU, BRIAN K. (JSC-NC) (SAIC)
> Subject: FW: STS-107 FRR Tagup Action Item

> Do you have anything you can send me to close out this action yet?

> -----Original Message-----

> From: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
> Sent: Tuesday, January 07, 2003 11:15 AM
> To: DL SRQA PAR SUPPORT; Alan Peterson (Boeing) (E-mail); Arnold Clifton
> T. (E-mail); Barnes Jeffrey E (Boeing) (E-mail); Bevels Vicki (E-mail);
> Bill Loewy (E-mail); RUSH, CAROL (JSC-REMOTE); Chris Hill (MSFC) (E-mail);
> 'Cianciola C. (MSFC) @SMTP' (E-mail); Corey Harrell (MSFC) (E-mail);
> Daniels Angela (E-mail); Darrell Warner (Boeing) (E-mail); Dave Spacek
> (MSFC) (E-mail); 'Diana Heberling' (E-mail); donnie.george/msfc (E-mail);
> Dumetz Marisa (E-mail); Engler Tom (E-mail); Ernest-1 Stephen (E-mail);
> Fred Dadfar (MSFC) (E-mail); 'Gatto Leigh (IV&V)' (E-mail); Gordon-1 Mark
> (E-mail); Gregg George (MSFC) (E-mail); griffith (jamss) (E-mail);
> Haddad-1 Michael (E-mail); Hashimoto Rick (E-mail); 'Hill Bill (HQ) @SMTP'
> (E-mail); 'Howell. Nelda' (E-mail); James Halsell (KSC) (E-mail); John
> McPherson (MSFC) (E-mail); John. R. Dicks@ivv.nasa.gov (E-mail); Keith
> Pauley (E-mail); Kennedy Michael (E-mail); kim.carmean@msfc.nasa.gov
> (E-mail); 'Lackey Ed' (E-mail); Leigh Martin (MSFC) (E-mail); LEWIS,
> PHILIP R. (JSC-NE) (SAIC); Linda Combs (E-mail); Mark Kowalesky (HQ)
> (E-mail); 'mikesmiles'; Mitsue Masami (NASDA) (E-mail); Moorhead-III
> James L (E-mail); Mr. Takeuchi (nasda) (E-mail); Mullane Dan (E-mail);
> Nathan Kyser (jams) (E-mail); Nobles Noel R (E-mail); 'pollystenger';
> 'rich patrican'; 'Roger Counts'; 'Sandy'; Sharolee Huet-1 (E-mail); 'Sims,
> John (MSFC)'; 'Sue Fenn (HQ)'; 'Suzanne Little'; 'thomas S Toutsu
> (GDSFC)'; 'thomas.w.hartline@msfc.nasa.gov'; 'Tom Hancock (MSFC)';
> 'Walker, Angelia'; Wbihner (E-mail); BOSTICK, WADE (JSC-REMOTE);
> 'Willis-1, Brenda'; 'Wren, Robert J (USA)'; 'Zavala, Velma (USA)'
> Subject: STS-107 FRR Tagup Action Item

> The following topic is planned for the STS-107 PMMT Tag-up:

> JSC
> 1. BSTRACK Crack

> The following action was assigned at the STS-107 FRR Tag-up
> held on Tuesday, January 07, 2003:

> Action # 010703-1
> Actionee: JSC-Hugo Martinez
> Action: How many BSTRACK balls failed the ATP nitrogen
> immersion test?

ERMINGER, MARK D. (JSC-NC) (NASA)

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Thursday, January 23, 2003 1:28 PM
To: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Cc: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Subject: Close STS-107 FRR Tagup Action Item

Action # 010703-1
Actionee: JSC-Hugo Martinez
Action: How many BSTRA balls failed the ATP nitrogen immersion test?
Response: None of the balls failed the screening at Arrowhead but about 45% failed the sub-vendor's check.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BAZAN, DEBORAH S. (DEBBIE) (JSC-NC) (GHG)
Sent: Friday, January 24, 2003 12:58 PM
To: DL SRQA PAR SUPPORT; Alan Peterson (Boeing) (E-mail); Arnold Clifton T. (SSC) (E-mail); Barnes Jeffrey E (Boeing) (E-mail); Bill Bihner (HQ) (E-mail); Bill Loewy (HQ) (E-mail); 'Carol Rush' (BOEING) (E-mail); Chris Hill (MSFC) (E-mail); 'Cianciola C. (MSFC) @SMTP' (E-mail); Corey Harrell (MSFC) (E-mail); Daniels Angela (MSFC) (E-mail); Darrell Warner (Boeing) (E-mail); Dave Spacek (MSFC) (E-mail); 'Diana Heberling' (SSC) (E-mail); donnie.george (USA) (E-mail); Dumetz Marisa (BOEING) (E-mail); Engler Tom (MSFC) (E-mail); Ernest-1 Stephen (KSC) (E-mail); Fred Dadfar (MSFC) (E-mail); 'Gatto Leigh (IV&V) ' (E-mail); Gordon-1 Mark (KSC) (E-mail); Gregg George (MSFC) (E-mail); Haddad-1 Michael (KSC) (E-mail); Hashimoto Rick (BOEINGWEST) (E-mail); 'Hill Bill (HQ) @SMTP' (E-mail); 'Howell. Nelda' (BOEING) (E-mail); James Halsell (KSC) (E-mail); John McPherson (MSFC) (E-mail); John Stealey () (E-mail); John. R. Dicks@ivv. nasa. gov (IVV) (E-mail); Keith Pauley (IVV) (E-mail); Kennedy Michael (MSFC) (E-mail); kim. carmean@msfc. nasa. gov (MSFC) (E-mail); 'Lackey Ed' (KSC) (E-mail); Leigh Martin (MSFC) (E-mail); Linda Combs (USA) (E-mail); Mark Kowalesky (HQ) (E-mail); Mike Card (HQ); mikesmiles (SSC); Moorhead-III James L (BOEING) (E-mail); Mullane Dan (MSFC) (E-mail); Nobles Noel R (BOEINGWEST) (E-mail); pollystenger (BOEING); rich patrican (HQ); Roger Counts (GDSFC); 'Sandy' (SAIC); Sharolee Huet-1 (KSC) (E-mail); Sims, John (MSFC); Sue Fenn (HQ); 'Suzanne Little' (USA); thomas S Touts (GDSFC); thomas.w.hartline@msfc.nasa.gov (MSFC); Tom Hancock (MSFC); Vicki Rorex (MSFC) (E-mail); Walker, Angelia (MSFC); Wbihner (HQ) (E-mail); wboostick (BOEING); 'Willis-1, Brenda' (KSC); Wren, Robert J (USA); Zavala, Velma (USA)
Subject: STS-107 FRR Tagup Action Item Closed (#1)

The following action assigned at the STS-107 FRR Tag-up held on Tuesday, January 07, 2003 has been closed:

Action # 010703-1

Actionee: JSC-Hugo Martinez

Action: How many BSTRA balls failed the ATP nitrogen immersion test?

Response:

None of the balls failed the screening at Arrowhead but about 45% failed the sub-vendor's check.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: WITWER, DAVE W. (JSC-NC) (SAIC)
Sent: Thursday, February 13, 2003 9:57 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: Phone Call

Mark,

As a follow up to your voice mail from Saturday, I did not hear any Boeing presentations in the 7:00 am MER Meetings (I was working from Jan 28th to EOM). Since it's now Thursday, did you already find out the answer to your question? If you did not then I could find out if and when the presentation was given earlier in the flight. Here's a list of the other first shift personnel during STS-107, who I'd contact.

Dave

<u>1</u>	<u>ANDY FOSTER *- FL MEGAN BELL- OJT 1/16-1/19</u>	<u>D. MCMULLEN- SL DAN ZALIT-OJT 1/20-1/23</u>	<u>J. PENDERGAST - SL MEGAN BELL - OJT 1/24 - 11/27</u>	<u>DAVE WITWER-SL DAN ZALIT-OJT 1/28 - EOM</u>
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ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Wednesday, January 01, 2003 2:23 PM
To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE); TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)
Subject: RE: BSTRA ball test status

Testing at Huntington Beach and MSFC continues, as does the development of thermal and stress models in an attempt to build flight rationale for STS-107. The generation of FOD has not at all been alleviated after branched cracking was detected on an MSFC ball subjected to extreme temperature gradients.

Huntington Beach testing continues on the 3 balls in an effort to first create cracks and then to show arrest (no surface growth) under a repeated load profile. All testing described in the original email below is complete, but no cracks have been created. Huntington Beach is adding steps to their test procedure to incorporate crack initiation techniques developed at MSFC: the use of a dry ice/alcohol bath (-100°F) which allows for quicker quenching.

Test #1 Update: Since dunking the notched 2.24" cabinet ball in LN2 created no cracks (nor did boiling water to ice water thermal shocks), the ball is now being heated to an incrementally higher temperature and quenched at -100°F dry ice/alcohol. This series of thermal shocks is in effort to "sneak up" on the critical conditions required to crack a ball. The first set of 5 thermal shock cycles began at 200°F, and subsequent sets beginning at 225°F and 250°F yielded no cracks. As of December 30th, the set beginning at 275°F was in work. Plans are to continue incrementing the initial temperature by 25°F, running 5 cycles. Inspections are run visually and with eddy current after the first and 5th cycles in each set.

Test #2a Update: Taking the notched 2.24" flight spares ball through a series of flight-like thermal mechanical cycles described below yielded no cracking. The same series of thermal shocks is being used on this ball as in test #1 above, that is, purely thermal cycles, in an effort to crack it. On 200°F cycles, saw an eddy current indication and again during 225°F cycles deep in the notch. It appears to be growing about an 1/8th of an inch on one edge of the notch but is not yet visible on the surface. Once it is seen on the surface, testing will proceed to Phase II, testing for crack arrest under flight-like thermal mechanical/loading. Eddy current and visual inspections are being conducted after every cycle at this time. Testing is now in the set of 5 cycles at 250°F, but so far no surface cracks have appeared.

Test #2b Update: Taking the second 2.24" flight spares ball (without a notch) through a series of flight-like thermal mechanical cycles described below yielded no cracking. In an effort to expedite the creation of a crack, two in-line notches are being EDM'd into the ball, approximately 0.050" between them. The ball will then be subjected to a total of 1000 rapid thermal cycles from boiling water to ice water in an effort to crack it before resuming flight-like thermal/mechanical cycling.

MSFC Status: Besides developing a technique for quicker quenching, MSFC personnel have cracked both notched and pristine 2.24" balls using severe thermal cycles. In addition, they have cracked a flight spares ball (one of 1.75" diameter, without a notch, that had pre-existing subsurface flaws) with nominal thermal cycles (from ambient to LN2 temperature). Because of the similarity between LN2 temperature and LO2's temperature (flight temperature), cracking of the 1.75" ball lends credibility to the theory that the OV-103 ball might have had subsurface cracks which surfaced when subjected to cryogenic cycles. Note however that the test does not simulate the thermal mass and mechanical

loading seen on the flight vehicle during loading and flight. Secondly, the fact that a flight spares ball had subsurface defects which propagated to a surface crack tends to indict the acceptance criteria.

The concern of particle liberation upstream of an SSME has been fueled by the type of cracking detected on the severely cracked 2.24" balls. Coordination with the SSME Project on the engine's tolerance to FOD is being conducted in an attempt to clear this concern.

Thermal modeling indicates that LN2 is not a good test fluid for balls in LH2 service (1.25"). If liquid hydrogen is used to simulate these conditions, safety considerations will slow testing significantly. Other mediums, such as liquid helium and liquid neon, are being considered. Note that the thermal modeling so far has considered only the ball. Model development is in work on the inserts and adjoining hardware.

NDE of all flight spares is being conducted in an effort to find more balls with subsurface indications. These would then be put in test. Finding no indications in any of the flight spares might support the theory that OV-103's ball was an outlier, i.e., that it had subsurface cracks when installed in the line.

More to come.

Hugo

-----Original Message-----

From: HATAMLEH, OMAR (JSC-NC) (SAIC)

To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)

Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE); MARTINEZ, HUGO E. (JSC-NC) (GHG); TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)

Sent: 12/27/2002 6:10 PM

Subject: RE: BSTR A ball test status

Cryogenic load testing in Huntington Beach is continuing on three separate 2.24" BSTR A balls in order to help build flight rationale. Test 1, and 2a are still in progress with no crack indications so far. Test 2b has been completed with no crack indications. Test 2b indicates that a flight ball, when subjected to a single mission's worth of cryo and mechanical combined loading, does not crack.

In addition to the Huntington Beach testing, MSFC is working on a method of cracking a ball thermally to be used in the event that a crack cannot be initiated via the current Huntington Beach test procedure. MSFC was successful in cracking balls under severe conditions (300 F to -100 F in one case and 400 F to -100 F in another case). The crack extends about 280 degrees around on one ball, and a little less on another ball. Another interesting feature was the production of intersecting cracks, which could ultimately lead to FOD.

MSFC sectioned a 2.25" ball purchased from the Oregon vendor and found a large porosity site ("big enough to stick a pencil in") near the center. These Oregon balls were produced much later and have process improvements which should help eliminate porosity. This data tends to indicate that porosity is probably to be found in most cast balls. In addition, metallurgy shows a finer grain structure in the middle and coarser towards the surface.

Updates to the JSC activities will be provided in a separate email note. The next meeting is scheduled for Monday at a time to be disclosed later.

> -----Original Message-----

>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>Sent: Monday, December 23, 2002 1:44 PM
>To: BROWNE, DAVID M. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR
>(JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT)
>(JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); JOHNSON, M. S. (SCOTT)
>(JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); ALMASRI, WALEED;
>BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED;
>jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL
>Subject: BSTRA ball test status

>
>Execute summary: Cryogenic load testing in Huntington Beach began
>Friday, December 20th on three separate 2.24" BSTRA balls in order to
>help build flight rationale. These three tests, which are being run in
>parallel, attempt to prove the theory that cracks will develop and then
>arrest prior to going completely through a ball. Partly into the tests
>this morning, no cracks have conclusively been observed, although one
>faint indication is being inspected further. In addition, another
>ball, a flight spares of a smaller size, was eddy current inspected and
>found to have subsurface indications not detetable with dye pen and
>visual checks. Testing will continue today and will resume on the
>evening of the 26th.

>
>Test #1: 2.24" ball, notch in ball, instrumented. Purpose is to help
>validate computer model by assessing residual stresses and thermal
>response. Have completed first 5 thermal cycles from ambient to LN2
>(-320F), and there appears a faint line or shadow in the notch near one
>end being inspected further to confirm or deny a crack. Continued with
>6th thermal cycles (this second set of 5 cycles is from 200 F to LN2)
>until a crack is confirmed. If no cracks develop at the conclusion of
>these 10 cycles, a more severe method of creating a crack will be
>developed. If a crack develops, the same temperature cycle will be
>repeated until the ball fails or the crack arrests. The more severe
>method, which is under development as a contingency, could use boiling
>water and an alcohol/dry ice bath to produce a much higher temperature
>gradient.

>
>Test #2a: 2.24" ball in flight-like cups, notch in ball, not
>instrumented*, mechanical load cycling while in LN2 bath: Purpose of
>test is to show crack growth and subsequent arrest while under
>flight-like thermal and mechanical loads. Briefly, the test is
>scheduled to:

- >1. Simulate nominal loads seen during propellant loading (11,000 lbs
>applied and removed while in LN2 bath) for 5 cycles, then inspect.
- >2. Simulate nominal loads seen during flight (41,000 lbs applied and
>removed while in LN2 bath) for 30 cycles, then inspect.
- >3. Apply margin loads above nominal flight loads (49,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.
- >4. Apply margin loads above nominal flight loads (61,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.
- >5. Apply margin loads above nominal flight loads (71,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.

>
>Currently, test #2a is 3 cycles into the 41,000 lbs testing, with no
>cracks visible after the 11,000 testing was completed. As in test #1,
>testing will continue until a crack develops / arrests. Inspections
>are visual after every cycle, and eddy current after every 5th cycle.
>*Instrumentation removed.

>
>Test #2b: Same as #2a, but without notch in ball: Purpose of test is
>to show crack initiation, growth and subsequent crack arrest while
>under flight-like thermal and mechanical loads, but on a pristine ball
>which more closely resembles flight balls. The test sequence is the
>same as in Test #2a:

>
>The 35 nominal cycles are complete (5 cycles at 11,000 lbs plus 30
>cycles at 41,000 lbs), and margin testing has commenced for a total of

>43 cycles so far. There are no indications of a crack via visual or
>eddy current at this time.

>

>MSFC activity:

>In addition to the Huntington Beach testing, MSFC is working on
>metallography of balls of various sizes in order to rationalize
>extrapolating these results to the different size balls used in the
>Orbiter (2.24", 1.75", and 1.25"). In addition, MSFC is working on a
>method of cracking a ball thermally to be used in the event that a
>crack cannot be initiated via the current test procedure. Finally,
>MSFC reports finding an eddy current indication in a flight spares ball
>(of 1.25" diameter), an indication which is invisible via visual and
>dye pen. This "crack" must be subsurface and may be a cluster of
>porosity. Since this ball was extracted from flight spares and may
>have a crack, this tends to indict the acceptance screening process.
>MSFC personnel believe that there are large variations in
>microstructure between individual balls. However, even with
>variations, the testing being conducted at Huntington Beach will likely
>show crack arrest regardless of initial crack existence.

>

>JSC Activity: Mike Tipton has been working closely JSC Engineering and
>shop support in the development of tools for inspecting 100% of the
>ball surface in an installed line. Ideally, both crack location (via
>eddy current) and depth (with Ultrasonic techniques, perhaps) can be
>achieved on the fleet feedlines without requiring removal of the lines.

>

>Testing will continue throughout the day today and will resume shortly
>after Christmas (on the evening of the 26th). The next test status
>will be presented Friday, December 27th at 3:00 pm.

>

>Hugo E. Martinez, PE
>Shuttle SR&QA Propulsion & Power Lead Engineer
>JSC NC62
>Phone: 281 244-1974
>Pager: 281 434-5075
>Fax: 281 244-1849

>

>Providing for a safer tomorrow, today.

>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Thursday, January 02, 2003 8:16 PM
To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE); TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)
Subject: RE: BSTRA ball test status

Cracks have finally been observed in 2 of 3 balls at Huntington Beach using method developed at MSFC, but no conclusions can yet be drawn. FOD continues to be a serious discussion topic. At the meeting today with Ralph Roe, the Huntington Beach and MSFC test status was given, the status of the JSC remote tool development was presented, and thoughts on flight rationale were discussed.

Plans are for testing to conclude Jan 8th, although a PRCB will be held on the 6th to discuss preliminary FRR charts for STS-107. The team will not report to Ralph Roe until Monday the 6th at 9:00 am unless testing over the weekend fails (crack does not arrest or FOD is generated). In the meantime, the SSME Project will have an answer on FOD tolerance (not expected to be good). If a naturally cracked (vs. notched) ball generates FOD or does not arrest, we will have a problem necessitating the inspection of OV-102's balls. If any other ball generates FOD or does not arrest, the Test #2b ball with two in-line notches can be used to prove arrest and no FOD generation.

Huntington Beach test status:

Test #1 Update: Completed incremental thermal shock at 350 F without cracking. Abandoned this test (this is the test where they started at 200 F and quenched at -100 F, then incremented the initial temperature by 25 degrees each time and quenched again) and will crack with a wedge now.

Test #2a Update: During 275 F to -100 F incremental thermal shock, got multiple cracking about 320 degrees around. Will now subject it to flight-like thermal/mechanical per 4x testing. 4x testing repeats the nominal flight portion of test#2a three additional times in order to encompass 30 missions (OV-102 has seen 28 missions).

Test #2b Update: Had stopped testing and put in two series "thumbnail" notches and put into 212 F to 32 F rapid thermal cycles. Saw a crack between notches, detected via eddy current, not yet visible. Will then go into 4x testing.

MSFC Status:

Both cracked 2.24" balls at MSFC are undergoing testing per HB's test #2 plan and no crack growth has been seen. Both of these balls were initially cracked using a severe thermal gradient. Similarly, 1.75" and 1.25" balls are undergoing testing per test #2. One 1.75" ball had cracked without a notch and without a severe thermal environment (see below) and has opened up a new crack via testing. The maximum length of a crack is 0.4 inches but shallow and stable, it appears.

JSC Remote Tool Development Update:

Developers claim they have "tremendous control" of ball. Some technical issues, such as needing more articulation, cleaning the device for use on the fleet, and establishing the vehicle BSTRA joint configuration are being worked. They are building an articulating joint at the end effector to address the first issue. The device will be ready this coming Sunday.

Other:

SRQA got an action to perform a PRA on the potential for FOD generation. We will be working on the feasibility of this tomorrow (Jan 3rd). While we haven't coordinated with the PRA analysts yet, we feel that getting realistic numbers would not be possible with the available data.

Hugo

-----Original Message-----

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Wednesday, January 01, 2003 2:23 PM

To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
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Test #1 Update: Since dunking the notched 2.24" cabinet ball in LN2 created no cracks (nor did boiling water to ice water thermal shocks), the ball is now being heated to an incrementally higher temperature and quenched at -100°F dry ice/alcohol. This series of thermal shocks is in effort to "sneak up" on the critical conditions required to crack a ball. The first set of 5 thermal shock cycles began at 200°F, and subsequent sets beginning at 225°F and 250°F yielded no cracks. As of December 30th, the set beginning at 275°F was in work. Plans are to continue incrementing the initial temperature by 25°F, running 5 cycles. Inspections are run visually and with eddy current after the first and 5th cycles in each set.

Test #2a Update: Taking the notched 2.24" flight spares ball through a series of flight-like thermal mechanical cycles described below yielded no cracking. The same series of thermal shocks is being used on this ball as in test #1 above, that is, purely thermal cycles, in an effort to crack it. On 200°F cycles, saw an eddy current indication and again during 225°F cycles deep in the notch. It appears to be growing about an 1/8th of an inch on one edge of the notch but is not yet visible on the surface. Once it is seen on the surface, testing will proceed to Phase II, testing for crack arrest under flight-like thermal mechanical/loading. Eddy current and visual inspections are being conducted after every cycle at this time. Testing is now in the set of 5 cycles at 250°F, but so far no surface cracks have appeared.

Test #2b Update: Taking the second 2.24" flight spares ball (without a notch) through a series of flight-like thermal mechanical cycles described below yielded no cracking. In an effort to expedite the creation of a crack, two in-line notches are being EDM'd into the ball, approximately 0.050" between them. The ball will then be subjected to a total of 1000 rapid thermal cycles from boiling water to ice water in an effort to crack it before resuming flight-like thermal/mechanical cycling.

MSFC Status: Besides developing a technique for quicker quenching, MSFC personnel have cracked both notched and pristine 2.24" balls using severe thermal cycles. In addition, they have cracked a flight spares ball (one of 1.75" diameter, without a notch, that had pre-existing subsurface flaws) with nominal thermal cycles (from ambient to LN2 temperature). Because of the similarity between LN2 temperature and LO2's temperature (flight temperature), cracking of the 1.75" ball lends credibility to the theory that the OV-103 ball might have had subsurface cracks which surfaced when subjected to cryogenic cycles. Note however that the test does not simulate the thermal mass and mechanical loading seen on the flight vehicle during loading and flight. Secondly, the fact that a flight spares ball had subsurface defects which propagated to a surface crack tends to indict the acceptance criteria.

The concern of particle liberation upstream of an SSME has been fueled by the type of cracking detected on the severely cracked 2.24" balls. Coordination with the SSME Project on the engine's tolerance to FOD is being conducted in an attempt to clear this concern.

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More to come.

Hugo

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To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)

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>Sent: Monday, December 23, 2002 1:44 PM

>To: BROWNE, DAVID M. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR

>(JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT)

>(JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); JOHNSON, M. S. (SCOTT)

>(JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); ALMASRI, WALEED;

>BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED;

>jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL

>Subject: BSTRA ball test status

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>Execute summary: Cryogenic load testing in Huntington Beach began

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>arrest prior to going completely through a ball. Partly into the tests

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>faint indication is being inspected further. In addition, another
>ball, a flight spares of a smaller size, was eddy current inspected and
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>(-320F), and there appears a faint line or shadow in the notch near one
>end being inspected further to confirm or deny a crack. Continued with
>6th thermal cycles (this second set of 5 cycles is from 200 F to LN2)
>until a crack is confirmed. If no cracks develop at the conclusion of
>these 10 cycles, a more severe method of creating a crack will be
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>repeated until the ball fails or the crack arrests. The more severe
>method, which is under development as a contingency, could use boiling
>water and an alcohol/dry ice bath to produce a much higher temperature
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>test is to show crack growth and subsequent arrest while under
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>scheduled to:

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>applied and removed while in LN2 bath) for 5 cycles, then inspect.
- >2. Simulate nominal loads seen during flight (41,000 lbs applied and
>removed while in LN2 bath) for 30 cycles, then inspect.
- >3. Apply margin loads above nominal flight loads (49,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.
- >4. Apply margin loads above nominal flight loads (61,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.
- >5. Apply margin loads above nominal flight loads (71,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.

>
>Currently, test #2a is 3 cycles into the 41,000 lbs testing, with no
>cracks visible after the 11,000 testing was completed. As in test #1,
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>are visual after every cycle, and eddy current after every 5th cycle.
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>to show crack initiation, growth and subsequent crack arrest while
>under flight-like thermal and mechanical loads, but on a pristine ball
>which more closely resembles flight balls. The test sequence is the
>same as in Test #2a:

>
>The 35 nominal cycles are complete (5 cycles at 11,000 lbs plus 30
>cycles at 41,000 lbs), and margin testing has commenced for a total of
>43 cycles so far. There are no indications of a crack via visual or
>eddy current at this time.

>
>MSFC activity:
>In addition to the Huntington Beach testing, MSFC is working on
>metallography of balls of various sizes in order to rationalize
>extrapolating these results to the different size balls used in the
>Orbiter (2.24", 1.75", and 1.25"). In addition, MSFC is working on a
>method of cracking a ball thermally to be used in the event that a
>crack cannot be initiated via the current test procedure. Finally,
>MSFC reports finding an eddy current indication in a flight spares ball
>(of 1.25" diameter), an indication which is invisible via visual and
>dye pen. This "crack" must be subsurface and may be a cluster of

>porosity. Since this ball was extracted from flight spares and may
>have a crack, this tends to indict the acceptance screening process.
>MSFC personnel believe that there are large variations in
>microstructure between individual balls. However, even with
>variations, the testing being conducted at Huntington Beach will likely
>show crack arrest regardless of initial crack existence.
>
>JSC Activity: Mike Tipton has been working closely JSC Engineering and
>shop support in the development of tools for inspecting 100% of the
>ball surface in an installed line. Ideally, both crack location (via
>eddy current) and depth (with Ultrasonic techniques, perhaps) can be
>achieved on the fleet feedlines without requiring removal of the lines.
>
>Testing will continue throughout the day today and will resume shortly
>after Christmas (on the evening of the 26th). The next test status
>will be presented Friday, December 27th at 3:00 pm.
>
>Hugo E. Martinez, PE
>Shuttle SR&QA Propulsion & Power Lead Engineer
>JSC NC62
>Phone: 281 244-1974
>Pager: 281 434-5075
>Fax: 281 244-1849
>
>Providing for a safer tomorrow, today.
>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: boconnor [boconnor@hq.nasa.gov]
Sent: Friday, January 03, 2003 7:49 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Cc: JOHNSON, GARY W. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); 'H - Kowaleski Mark'; H - Bihner Bill (wbihner@mail.hq.nasa.gov); MARTINEZ, HUGO E. (JSC-NC) (GHG); Pete Rutledge; mstamate@mail.hq.nasa.gov; Amanda.Goodson@msfc.nasa.gov; Shannon.Bartell-1@ksc.nasa.gov
Subject: Re: FW: BSTRA ball test status

Mark,

With regard to Hugo's comment about performing a PRA on the potential for FOD generation, I know it is always fair to say that we don't have the data to produce a number, but we must be able to put this issue into at least some gross range of probabilities otherwise we are not doing a risk assessment, and it is unfair to ask the PM or the FRR Board to accept risk if we don't do the best we can with a risk assessment.

My guess is that the least you can do is get a range of probabilities for FOD generation from the metallurgists, and then applying what you think the chance of catastrophic failure would be if you did generate FOD from the SSME folks. Then you should look at what affect that resultant number (including uncertainty) has on the baseline PRA. If the baseline LOC median number is 1/245 for ascent/entry, what does it become with this new failure mode? And, looking at the uncertainties, what does the new 95th and 5th percentile number become? I think this is a legitimate question for the PM to ask if he is thinking about accepting the risk for 107. And if he doesn't I will in the delta PAR.

What do we do with the numbers? Let's say the new median becomes 1/200. That's the same as taking out the new fuel turbopump. And if it goes to 1/150, that's like taking out the MCC, the LOX turbopump, the new heat exchanger and going back to major black zones in the contingency aborts (like we had in the 1980s), etc. And, if it goes all the way to 1/50, it is like being back in the old SRM and 17 inch disconnect days pre Challenger. (Don't quote me with these numbers, because I am guessing with these analogies, but I use them to show what I would want to know in a risk assessment).

Best,
O'C

At 05:57 AM 1/3/2003 -0600, ERMINGER, MARK D. (JSC-NC) (NASA) wrote:

>-----Original Message-----

>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>Sent: Thursday, January 02, 2003 6:16 PM
>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);
>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)
>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.
>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC)
>(SAIC)
>Subject: RE: BSTRA ball test status
>

>Cracks have finally been observed in 2 of 3 balls at Huntington Beach
>using method developed at MSFC, but no conclusions can yet be drawn. FOD
>continues to be a serious discussion topic. At the meeting today with
>Ralph Roe, the Huntington Beach and MSFC test status was given, the status
>of the JSC remote tool development was presented, and thoughts on flight
>rationale were discussed.

>
>Plans are for testing to conclude Jan 8th, although a PRCB will be held on
>the 6th to discuss preliminary FRR charts for STS-107. The team will not
>report to Ralph Roe until Monday the 6th at 9:00 am unless testing over
>the weekend fails (crack does not arrest or FOD is generated). In the
>meantime, the SSME Project will have an answer on FOD tolerance (not
>expected to be good). If a naturally cracked (vs. notched) ball generates
>FOD or does not arrest, we will have a problem necessitating the
>inspection of OV-102's balls. If any other ball generates FOD or does not
>arrest, the Test #2b ball with two in-line notches can be used to prove
>arrest and no FOD generation.
>
>Huntington Beach test status:
>
>Test #1 Update: Completed incremental thermal shock at 350 F without
>cracking. Abandoned this test (this is the test where they started at 200
>F and quenched at -100 F, then incremented the initial temperature by 25
>degrees each time and quenched again) and will crack with a wedge now.
>
>Test #2a Update: During 275 F to -100 F incremental thermal shock, got
>multiple cracking about 320 degrees around. Will now subject it to
>flight-like thermal/mechanical per 4x testing. 4x testing repeats the
>nominal flight portion of test#2a three additional times in order to
>encompass 30 missions (OV-102 has seen 28 missions).
>
>Test #2b Update: Had stopped testing and put in two series "thumbnail"
>notches and put into 212 F to 32 F rapid thermal cycles. Saw a crack
>between notches, detected via eddy current, not yet visible. Will then go
>into 4x testing.
>
>MSFC Status:
>
>Both cracked 2.24" balls at MSFC are undergoing testing per HB's test #2
>plan and no crack growth has been seen. Both of these balls were
>initially cracked using a severe thermal gradient. Similarly, 1.75" and
>1.25" balls are undergoing testing per test #2. One 1.75" ball had
>cracked without a notch and without a severe thermal environment (see
>below) and has opened up a new crack via testing. The maximum length of a
>crack is 0.4 inches but shallow and stable, it appears.
>
>JSC Remote Tool Development Update:
>
>Developers claim they have "tremendous control" of ball. Some technical
>issues, such as needing more articulation, cleaning the device for use on
>the fleet, and establishing the vehicle BSTRA joint configuration are
>being worked. They are building an articulating joint at the end effector
>to address the first issue. The device will be ready this coming Sunday.
>
>Other:
>
>SRQA got an action to perform a PRA on the potential for FOD
>generation. We will be working on the feasibility of this tomorrow (Jan
>3rd). While we haven't coordinated with the PRA analysts yet, we feel
>that getting realistic numbers would not be possible with the available data.
>
>Hugo
>
>-----Original Message-----
>
>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>
>Sent: Wednesday, January 01, 2003 2:23 PM
>
>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);
>
>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)

>
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
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>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>
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>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.
>
>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A.
>
>(JSC-NC) (SAIC)
>
>Subject: RE: BSTRA ball test status
>
>Testing at Huntington Beach and MSFC continues, as does the development of
>thermal and stress models in an attempt to build flight rationale for
>STS-107. The generation of FOD has not at all been alleviated after
>branched cracking was detected on an MSFC ball subjected to extreme
>temperature gradients.
>
>Huntington Beach testing continues on the 3 balls in an effort to first
>create cracks and then to show arrest (no surface growth) under a repeated
>load profile. All testing described in the original email below is
>complete, but no cracks have been created. Huntington Beach is adding
>steps to their test procedure to incorporate crack initiation techniques
>developed at MSFC: the use of a dry ice/alcohol bath (-100°F) which allows
>for quicker quenching.
>
>Test #1 Update: Since dunking the notched 2.24" cabinet ball in LN2
>created no cracks (nor did boiling water to ice water thermal shocks), the
>ball is now being heated to an incrementally higher temperature and
>quenched at -100°F dry ice/alcohol. This series of thermal shocks is in
>effort to "sneak up" on the critical conditions required to crack a
>ball. The first set of 5 thermal shock cycles began at 200°F, and
>subsequent sets beginning at 225°F and 250°F yielded no cracks. As of
>December 30th, the set beginning at 275°F was in work. Plans are to
>continue incrementing the initial temperature by 25°F, running 5
>cycles. Inspections are run visually and with eddy current after the
>first and 5th cycles in each set.
>
>Test #2a Update: Taking the notched 2.24" flight spares ball through a
>series of flight-like thermal mechanical cycles described below yielded no
>cracking. The same series of thermal shocks is being used on this ball as
>in test #1 above, that is, purely thermal cycles, in an effort to crack
>it. On 200°F cycles, saw an eddy current indication and again during
>225°F cycles deep in the notch. It appears to be growing about an 1/8th
>of an inch on one edge of the notch but is not yet visible on the
>surface. Once it is seen on the surface, testing will proceed to Phase
>II, testing for crack arrest under flight-like thermal
>mechanical/loading. Eddy current and visual inspections are being
>conducted after every cycle at this time. Testing is now in the set of 5
>cycles at 250°F, but so far no surface cracks have appeared.
>
>Test #2b Update: Taking the second 2.24" flight spares ball (without a
>notch) through a series of flight-like thermal mechanical cycles described
>below yielded no cracking. In an effort to expedite the creation of a
>crack, two in-line notches are being EDM'd into the ball, approximately
>0.050" between them. The ball will then be subjected to a total of 1000
>rapid thermal cycles from boiling water to ice water in an effort to crack
>it before resuming flight-like thermal/mechanical cycling.
>
>MSFC Status: Besides developing a technique for quicker quenching, MSFC
>personnel have cracked both notched and pristine 2.24" balls using severe

>thermal cycles. In addition, they have cracked a flight spares ball (one
>of 1.75" diameter, without a notch, that had pre-existing subsurface
>flaws) with nominal thermal cycles (from ambient to LN2
>temperature). Because of the similarity between LN2 temperature and LO2's
>temperature (flight temperature), cracking of the 1.75" ball lends
>credibility to the theory that the OV-103 ball might have had subsurface
>cracks which surfaced when subjected to cryogenic cycles. Note however
>that the test does not simulate the thermal mass and mechanical loading
>seen on the flight vehicle during loading and flight. Secondly, the fact
>that a flight spares ball had subsurface defects which propagated to a
>surface crack tends to indict the acceptance criteria.

>
>The concern of particle liberation upstream of an SSME has been fueled by
>the type of cracking detected on the severely cracked 2.24"
>balls. Coordination with the SSME Project on the engine's tolerance to
>FOD is being conducted in an attempt to clear this concern.

>
>Thermal modeling indicates that LN2 is not a good test fluid for balls in
>LH2 service (1.25"). If liquid hydrogen is used to simulate these
>conditions, safety considerations will slow testing significantly. Other
>mediums, such as liquid helium and liquid neon, are being
>considered. Note that the thermal modeling so far has considered only the
>ball. Model development is in work on the inserts and adjoining hardware.

>
>NDE of all flight spares is being conducted in an effort to find more
>balls with subsurface indications. These would then be put in
>test. Finding no indications in any of the flight spares might support
>the theory that OV-103's ball was an outlier, i.e., that it had subsurface
>cracks when installed in the line.

>
>More to come.

>
>Hugo

>
>-----Original Message-----

>
>From: HATAMLEH, OMAR (JSC-NC) (SAIC)

>
>To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC)
>(NASA); BROWNE, DAVID M. (JSC-NC) (NASA)

>
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>MARTINEZ, HUGO E. (JSC-NC) (GHG); TIPTON, MICHAEL R. (JSC-NX) (SAIC);
>PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE)
>(JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED
>(JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)

>
>Sent: 12/27/2002 6:10 PM

>
>Subject: RE: BSTRA ball test status

>
>Cryogenic load testing in Huntington Beach is continuing on three
>
>separate 2.24" BSTRA balls in order to help build flight rationale. Test
>
>1, and 2a are still in progress with no crack indications so far. Test
>
>2b has been completed with no crack indications. Test 2b indicates that
>
>a flight ball, when subjected to a single mission's worth of cryo and
>
>mechanical combined loading, does not crack.

>
>In addition to the Huntington Beach testing, MSFC is working on a method

>
>of cracking a ball thermally to be used in the event that a crack cannot
>
>be initiated via the current Huntington Beach test procedure. MSFC was
>
>successful in cracking balls under severe conditions (300 F to -100 F in
>
>one case and 400 F to -100 F in another case). The crack extends about
>
>280 degrees around on one ball, and a little less on another ball.
>
>Another interesting feature was the production of intersecting cracks,
>
>which could ultimately lead to FOD.
>
>MSFC sectioned a 2.25" ball purchased from the Oregon vendor and found a
>
>large porosity site ("big enough to stick a pencil in") near the center.
>
>These Oregon balls were produced much later and have process
>
>improvements which should help eliminate porosity. This data tends to
>
>indicate that porosity is probably to be found in most cast balls. In
>
>addition, metallurgy shows a finer grain structure in the middle and
>
>coarser towards the surface.
>
>Updates to the JSC activities will be provided in a separate email note.
>
>The next meeting is scheduled for Monday at a time to be disclosed
>
>later.

>
> > -----Original Message-----

>
> >From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>
> >Sent: Monday, December 23, 2002 1:44 PM
>
> >To: BROWNE, DAVID M. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR
>
> >(JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT)
>
> >(JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); JOHNSON, M. S. (SCOTT)
>
> >(JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); ALMASRI, WALEED;
>
> >BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED;
>
> >jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL
>
> >Subject: BSTRA ball test status

>
>
>
> >Execute summary: Cryogenic load testing in Huntington Beach began
>
> >Friday, December 20th on three separate 2.24" BSTRA balls in order to
>
> >help build flight rationale. These three tests, which are being run in
>
> >parallel, attempt to prove the theory that cracks will develop and then
>
> >arrest prior to going completely through a ball. Partly into the tests

>
> >this morning, no cracks have conclusively been observed, although one
>
> >faint indication is being inspected further. In addition, another
>
> >ball, a flight spares of a smaller size, was eddy current inspected and
>
> >found to have subsurface indications not detetable with dye pen and
>
> >visual checks. Testing will continue today and will resume on the
>
> >evening of the 26th.

>
> >
>
> >Test #1: 2.24" ball, notch in ball, instrumented. Purpose is to help
>
> >validate computer model by assessing residual stresses and thermal
>
> >response. Have completed first 5 thermal cycles from ambient to LN2
>
> >(-320F), and there appears a faint line or shadow in the notch near one
>
> >end being inspected further to confirm or deny a crack. Continued with
>
> >6th thermal cycles (this second set of 5 cycles is from 200 F to LN2)
>
> >until a crack is confirmed. If no cracks develop at the conclusion of
>
> >these 10 cycles, a more severe method of creating a crack will be
>
> >developed. If a crack develops, the same temperature cycle will be
>
> >repeated until the ball fails or the crack arrests. The more severe
>
> >method, which is under development as a contingency, could use boiling
>
> >water and an alcohol/dry ice bath to produce a much higher temperature
>
> >gradient.

>
> >
>
> >Test #2a: 2.24" ball in flight-like cups, notch in ball, not
>
> >instrumented*, mechanical load cycling while in LN2 bath: Purpose of
>
> >test is to show crack growth and subsequent arrest while under
>
> >flight-like thermal and mechanical loads. Briefly, the test is
>
> >scheduled to:
>
> >1. Simulate nominal loads seen during propellant loading (11,000 lbs
>
> >applied and removed while in LN2 bath) for 5 cycles, then inspect.
>
> >2. Simulate nominal loads seen during flight (41,000 lbs applied and
>
> >removed while in LN2 bath) for 30 cycles, then inspect.
>
> >3. Apply margin loads above nominal flight loads (49,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >4. Apply margin loads above nominal flight loads (61,000 applied and

>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >5. Apply margin loads above nominal flight loads (71,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
>
>
> >Currently, test #2a is 3 cycles into the 41,000 lbs testing, with no
>
> >cracks visible after the 11,000 testing was completed. As in test #1,
>
> >testing will continue until a crack develops / arrests. Inspections
>
> >are visual after every cycle, and eddy current after every 5th cycle.
>
> >*Instrumentation removed.
>
>
>
> >Test #2b: Same as #2a, but without notch in ball: Purpose of test is
>
> >to show crack initiation, growth and subsequent crack arrest while
>
> >under flight-like thermal and mechanical loads, but on a pristine ball
>
> >which more closely resembles flight balls. The test sequence is the
>
> >same as in Test #2a:
>
>
>
> >The 35 nominal cycles are complete (5 cycles at 11,000 lbs plus 30
>
> >cycles at 41,000 lbs), and margin testing has commenced for a total of
>
> >43 cycles so far. There are no indications of a crack via visual or
>
> >eddy current at this time.
>
>
>
> >MSFC activity:
>
> >In addition to the Huntington Beach testing, MSFC is working on
>
> >metallography of balls of various sizes in order to rationalize
>
> >extrapolating these results to the different size balls used in the
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>
> >
>
> >JSC Activity: Mike Tipton has been working closely JSC Engineering and
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> >shop support in the development of tools for inspecting 100% of the
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> >eddy current) and depth (with Ultrasonic techniques, perhaps) can be
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>
> >
>
> >Testing will continue throughout the day today and will resume shortly
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> >will be presented Friday, December 27th at 3:00 pm.
>
> >
>
> >Hugo E. Martinez, PE
>
> >Shuttle SR&QA Propulsion & Power Lead Engineer
>
> >JSC NC62
>
> >Phone: 281 244-1974
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> >Pager: 281 434-5075
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> >Fax: 281 244-1849
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> >
>
> >Providing for a safer tomorrow, today.
>
> >

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Sent: Friday, January 03, 2003 8:51 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); BALU, BRIAN K. (JSC-NC) (SAIC); BOWER, BETTY L. (JSC-NA) (SAIC)
Subject: FW: FW: BSTRA ball test status

Please provide me a response to this note. Thanks.

-----Original Message-----

From: boconnor [mailto:boconnor@hq.nasa.gov]
Sent: Friday, January 03, 2003 7:49 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Cc: JOHNSON, GARY W. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); 'H - Kowaleski Mark'; H - Bihner Bill (wbihner@mail.hq.nasa.gov); MARTINEZ, HUGO E. (JSC-NC) (GHG); Pete Rutledge; mstamate@mail.hq.nasa.gov; Amanda.Goodson@msfc.nasa.gov; Shannon.Bartell-1@ksc.nasa.gov
Subject: Re: FW: BSTRA ball test status

Mark,

With regard to Hugo's comment about performing a PRA on the potential for FOD generation, I know it is always fair to say that we don't have the data to produce a number, but we must be able to put this issue into at least some gross range of probabilities otherwise we are not doing a risk assessment, and it is unfair to ask the PM or the FRR Board to accept risk if we don't do the best we can with a risk assessment.

My guess is that the least you can do is get a range of probabilities for FOD generation from the metallurgists, and then applying what you think the chance of catastrophic failure would be if you did generate FOD from the SSME folks. Then you should look at what affect that resultant number (including uncertainty) has on the baseline PRA. If the baseline LOC median number is 1/245 for ascent/entry, what does it become with this new failure mode? And, looking at the uncertainties, what does the new 95th and 5th percentile number become? I think this is a legitimate question for the PM to ask if he is thinking about accepting the risk for 107. And if he doesn't I will in the delta PAR.

What do we do with the numbers? Let's say the new median becomes 1/200. That's the same as taking out the new fuel turbopump. And if it goes to 1/150, that's like taking out the MCC, the LOX turbopump, the new heat exchanger and going back to major black zones in the contingency aborts (like we had in the 1980s), etc. And, if it goes all the way to 1/50, it is like being back in the old SRM and 17 inch disconnect days pre Challenger. (Don't quote me with these numbers, because I am guessing with these analogies, but I use them to show what I would want to know in a risk assessment).

Best,
O'C

At 05:57 AM 1/3/2003 -0600, ERMINGER, MARK D. (JSC-NC) (NASA) wrote:

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>Sent: Thursday, January 02, 2003 6:16 PM
>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);
>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)

>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)
>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.
>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC)
>(SAIC)
>Subject: RE: BSTRA ball test status
>
>Cracks have finally been observed in 2 of 3 balls at Huntington Beach
>using method developed at MSFC, but no conclusions can yet be drawn. FOD
>continues to be a serious discussion topic. At the meeting today with
>Ralph Roe, the Huntington Beach and MSFC test status was given, the status
>of the JSC remote tool development was presented, and thoughts on flight
>rationale were discussed.
>
>Plans are for testing to conclude Jan 8th, although a PRCB will be held on
>the 6th to discuss preliminary FRR charts for STS-107. The team will not
>report to Ralph Roe until Monday the 6th at 9:00 am unless testing over
>the weekend fails (crack does not arrest or FOD is generated). In the
>meantime, the SSME Project will have an answer on FOD tolerance (not
>expected to be good). If a naturally cracked (vs. notched) ball generates
>FOD or does not arrest, we will have a problem necessitating the
>inspection of OV-102's balls. If any other ball generates FOD or does not
>arrest, the Test #2b ball with two in-line notches can be used to prove
>arrest and no FOD generation.
>
>Huntington Beach test status:
>
>Test #1 Update: Completed incremental thermal shock at 350 F without
>cracking. Abandoned this test (this is the test where they started at 200
>F and quenched at -100 F, then incremented the initial temperature by 25
>degrees each time and quenched again) and will crack with a wedge now.
>
>Test #2a Update: During 275 F to -100 F incremental thermal shock, got
>multiple cracking about 320 degrees around. Will now subject it to
>flight-like thermal/mechanical per 4x testing. 4x testing repeats the
>nominal flight portion of test#2a three additional times in order to
>encompass 30 missions (OV-102 has seen 28 missions).
>
>Test #2b Update: Had stopped testing and put in two series "thumbnail"
>notches and put into 212 F to 32 F rapid thermal cycles. Saw a crack
>between notches, detected via eddy current, not yet visible. Will then go
>into 4x testing.
>
>MSFC Status:
>
>Both cracked 2.24" balls at MSFC are undergoing testing per HB's test #2
>plan and no crack growth has been seen. Both of these balls were
>initially cracked using a severe thermal gradient. Similarly, 1.75" and
>1.25" balls are undergoing testing per test #2. One 1.75" ball had
>cracked without a notch and without a severe thermal environment (see
>below) and has opened up a new crack via testing. The maximum length of a
>crack is 0.4 inches but shallow and stable, it appears.
>
>JSC Remote Tool Development Update:
>
>Developers claim they have "tremendous control" of ball. Some technical
>issues, such as needing more articulation, cleaning the device for use on
>the fleet, and establishing the vehicle BSTRA joint configuration are
>being worked. They are building an articulating joint at the end effector
>to address the first issue. The device will be ready this coming Sunday.
>
>Other:
>
>SRQA got an action to perform a PRA on the potential for FOD
>generation. We will be working on the feasibility of this tomorrow (Jan

>3rd). While we haven't coordinated with the PRA analysts yet, we feel
>that getting realistic numbers would not be possible with the available data.
>
>Hugo
>
>-----Original Message-----
>
>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>
>Sent: Wednesday, January 01, 2003 2:23 PM
>
>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);
>
>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>
>TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)
>
>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.
>
>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A.
>
>(JSC-NC) (SAIC)
>
>Subject: RE: BSTRA ball test status
>
>Testing at Huntington Beach and MSFC continues, as does the development of
>thermal and stress models in an attempt to build flight rationale for
>STS-107. The generation of FOD has not at all been alleviated after
>branched cracking was detected on an MSFC ball subjected to extreme
>temperature gradients.
>
>Huntington Beach testing continues on the 3 balls in an effort to first
>create cracks and then to show arrest (no surface growth) under a repeated
>load profile. All testing described in the original email below is
>complete, but no cracks have been created. Huntington Beach is adding
>steps to their test procedure to incorporate crack initiation techniques
>developed at MSFC: the use of a dry ice/alcohol bath (-100°F) which allows
>for quicker quenching.
>
>Test #1 Update: Since dunking the notched 2.24" cabinet ball in LN2
>created no cracks (nor did boiling water to ice water thermal shocks), the
>ball is now being heated to an incrementally higher temperature and
>quenched at -100°F dry ice/alcohol. This series of thermal shocks is in
>effort to "sneak up" on the critical conditions required to crack a
>ball. The first set of 5 thermal shock cycles began at 200°F, and
>subsequent sets beginning at 225°F and 250°F yielded no cracks. As of
>December 30th, the set beginning at 275°F was in work. Plans are to
>continue incrementing the initial temperature by 25°F, running 5
>cycles. Inspections are run visually and with eddy current after the
>first and 5th cycles in each set.
>
>Test #2a Update: Taking the notched 2.24" flight spares ball through a
>series of flight-like thermal mechanical cycles described below yielded no
>cracking. The same series of thermal shocks is being used on this ball as
>in test #1 above, that is, purely thermal cycles, in an effort to crack
>it. On 200°F cycles, saw an eddy current indication and again during
>225°F cycles deep in the notch. It appears to be growing about an 1/8th
>of an inch on one edge of the notch but is not yet visible on the
>surface. Once it is seen on the surface, testing will proceed to Phase
>II, testing for crack arrest under flight-like thermal

>mechanical/loading. Eddy current and visual inspections are being
>conducted after every cycle at this time. Testing is now in the set of 5
>cycles at 250°F, but so far no surface cracks have appeared.
>
>Test #2b Update: Taking the second 2.24" flight spares ball (without a
>notch) through a series of flight-like thermal mechanical cycles described
>below yielded no cracking. In an effort to expedite the creation of a
>crack, two in-line notches are being EDM'd into the ball, approximately
>0.050" between them. The ball will then be subjected to a total of 1000
>rapid thermal cycles from boiling water to ice water in an effort to crack
>it before resuming flight-like thermal/mechanical cycling.
>
>MSFC Status: Besides developing a technique for quicker quenching, MSFC
>personnel have cracked both notched and pristine 2.24" balls using severe
>thermal cycles. In addition, they have cracked a flight spares ball (one
>of 1.75" diameter, without a notch, that had pre-existing subsurface
>flaws) with nominal thermal cycles (from ambient to LN2
>temperature). Because of the similarity between LN2 temperature and LO2's
>temperature (flight temperature), cracking of the 1.75" ball lends
>credibility to the theory that the OV-103 ball might have had subsurface
>cracks which surfaced when subjected to cryogenic cycles. Note however
>that the test does not simulate the thermal mass and mechanical loading
>seen on the flight vehicle during loading and flight. Secondly, the fact
>that a flight spares ball had subsurface defects which propagated to a
>surface crack tends to indict the acceptance criteria.
>
>The concern of particle liberation upstream of an SSME has been fueled by
>the type of cracking detected on the severely cracked 2.24"
>balls. Coordination with the SSME Project on the engine's tolerance to
>FOD is being conducted in an attempt to clear this concern.
>
>Thermal modeling indicates that LN2 is not a good test fluid for balls in
>LH2 service (1.25"). If liquid hydrogen is used to simulate these
>conditions, safety considerations will slow testing significantly. Other
>mediums, such as liquid helium and liquid neon, are being
>considered. Note that the thermal modeling so far has considered only the
>ball. Model development is in work on the inserts and adjoining hardware.
>
>NDE of all flight spares is being conducted in an effort to find more
>balls with subsurface indications. These would then be put in
>test. Finding no indications in any of the flight spares might support
>the theory that OV-103's ball was an outlier, i.e., that it had subsurface
>cracks when installed in the line.
>
>More to come.
>
>Hugo
>
>-----Original Message-----
>
>From: HATAMLEH, OMAR (JSC-NC) (SAIC)
>
>To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC)
>(NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>MARTINEZ, HUGO E. (JSC-NC) (GHG); TIPTON, MICHAEL R. (JSC-NX) (SAIC);
>PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE)
>(JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED
>(JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)
>
>Sent: 12/27/2002 6:10 PM
>
>Subject: RE: BSTRA ball test status

>
>Cryogenic load testing in Huntington Beach is continuing on three
>
>separate 2.24" BSTRA balls in order to help build flight rationale. Test
>
>1, and 2a are still in progress with no crack indications so far. Test
>
>2b has been completed with no crack indications. Test 2b indicates that
>
>a flight ball, when subjected to a single mission's worth of cryo and
>
>mechanical combined loading, does not crack.
>
>In addition to the Huntington Beach testing, MSFC is working on a method
>
>of cracking a ball thermally to be used in the event that a crack cannot
>
>be initiated via the current Huntington Beach test procedure. MSFC was
>
>successful in cracking balls under severe conditions (300 F to -100 F in
>
>one case and 400 F to -100 F in another case). The crack extends about
>
>280 degrees around on one ball, and a little less on another ball.
>
>Another interesting feature was the production of intersecting cracks,
>
>which could ultimately lead to FOD.
>
>MSFC sectioned a 2.25" ball purchased from the Oregon vendor and found a
>
>large porosity site ("big enough to stick a pencil in") near the center.
>
>These Oregon balls were produced much later and have process
>
>improvements which should help eliminate porosity. This data tends to
>
>indicate that porosity is probably to be found in most cast balls. In
>
>addition, metallurgy shows a finer grain structure in the middle and
>
>coarser towards the surface.
>
>Updates to the JSC activities will be provided in a separate email note.
>
>The next meeting is scheduled for Monday at a time to be disclosed
>
>later.
>
> > -----Original Message-----
>
> >From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>
> >Sent: Monday, December 23, 2002 1:44 PM
>
> >To: BROWNE, DAVID M. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR
>
> >(JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT; GARVIN T. (GT)
>
> >(JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); JOHNSON, M. S. (SCOTT)
>
> >(JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); ALMASRI, WALEED;
>
> >BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED;
>
> >jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL

>
> >Subject: BSTRA ball test status
>
> >
>
> >Execute summary: Cryogenic load testing in Huntington Beach began
>
> >Friday, December 20th on three separate 2.24" BSTRA balls in order to
>
> >help build flight rationale. These three tests, which are being run in
>
> >parallel, attempt to prove the theory that cracks will develop and then
>
> >arrest prior to going completely through a ball. Partly into the tests
>
> >this morning, no cracks have conclusively been observed, although one
>
> >faint indication is being inspected further. In addition, another
>
> >ball, a flight spares of a smaller size, was eddy current inspected and
>
> >found to have subsurface indications not detetable with dye pen and
>
> >visual checks. Testing will continue today and will resume on the
>
> >evening of the 26th.
>
> >
>
> >Test #1: 2.24" ball, notch in ball, instrumented. Purpose is to help
>
> >validate computer model by assessing residual stresses and thermal
>
> >response. Have completed first 5 thermal cycles from ambient to LN2
>
> >(-320F), and there appears a faint line or shadow in the notch near one
>
> >end being inspected further to confirm or deny a crack. Continued with
>
> >6th thermal cycles (this second set of 5 cycles is from 200 F to LN2)
>
> >until a crack is confirmed. If no cracks develop at the conclusion of
>
> >these 10 cycles, a more severe method of creating a crack will be
>
> >developed. If a crack develops, the same temperature cycle will be
>
> >repeated until the ball fails or the crack arrests. The more severe
>
> >method, which is under development as a contingency, could use boiling
>
> >water and an alcohol/dry ice bath to produce a much higher temperature
>
> >gradient.
>
> >
>
> >Test #2a: 2.24" ball in flight-like cups, notch in ball, not
>
> >instrumented*, mechanical load cycling while in LN2 bath: Purpose of
>
> >test is to show crack growth and subsequent arrest while under
>
> >flight-like thermal and mechanical loads. Briefly, the test is
>
> >scheduled to:

>
> >1. Simulate nominal loads seen during propellant loading (11,000 lbs
>
> >applied and removed while in LN2 bath) for 5 cycles, then inspect.
>
> >2. Simulate nominal loads seen during flight (41,000 lbs applied and
>
> >removed while in LN2 bath) for 30 cycles, then inspect.
>
> >3. Apply margin loads above nominal flight loads (49,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >4. Apply margin loads above nominal flight loads (61,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >5. Apply margin loads above nominal flight loads (71,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >
>
> >Currently, test #2a is 3 cycles into the 41,000 lbs testing, with no
>
> >cracks visible after the 11,000 testing was completed. As in test #1,
>
> >testing will continue until a crack develops / arrests. Inspections
>
> >are visual after every cycle, and eddy current after every 5th cycle.
>
> >*Instrumentation removed.
>
> >
>
> >Test #2b: Same as #2a, but without notch in ball: Purpose of test is
>
> >to show crack initiation, growth and subsequent crack arrest while
>
> >under flight-like thermal and mechanical loads, but on a pristine ball
>
> >which more closely resembles flight balls. The test sequence is the
>
> >same as in Test #2a:
>
> >
>
> >The 35 nominal cycles are complete (5 cycles at 11,000 lbs plus 30
>
> >cycles at 41,000 lbs), and margin testing has commenced for a total of
>
> >43 cycles so far. There are no indications of a crack via visual or
>
> >eddy current at this time.
>
> >
>
> >MSFC activity:
>
> >In addition to the Huntington Beach testing, MSFC is working on
>
> >metallography of balls of various sizes in order to rationalize
>
> >extrapolating these results to the different size balls used in the
>
> >Orbiter (2.24", 1.75", and 1.25"). In addition, MSFC is working on a

>
> >method of cracking a ball thermally to be used in the event that a
>
> >crack cannot be initiated via the current test procedure. Finally,
>
> >MSFC reports finding an eddy current indication in a flight spares ball
>
> >(of 1.25" diameter), an indication which is invisible via visual and
>
> >dye pen. This "crack" must be subsurface and may be a cluster of
>
> >porosity. Since this ball was extracted from flight spares and may
>
> >have a crack, this tends to indict the acceptance screening process.
>
> >MSFC personnel believe that there are large variations in
>
> >microstructure between individual balls. However, even with
>
> >variations, the testing being conducted at Huntington Beach will likely
>
> >show crack arrest regardless of initial crack existence.
>
> >
>
> >JSC Activity: Mike Tipton has been working closely JSC Engineering and
>
> >shop support in the development of tools for inspecting 100% of the
>
> >ball surface in an installed line. Ideally, both crack location (via
>
> >eddy current) and depth (with Ultrasonic techniques, perhaps) can be
>
> >achieved on the fleet feedlines without requiring removal of the lines.
>
> >
>
> >Testing will continue throughout the day today and will resume shortly
>
> >after Christmas (on the evening of the 26th). The next test status
>
> >will be presented Friday, December 27th at 3:00 pm.
>
> >
>
> >Hugo E. Martinez, PE
>
> >Shuttle SR&QA Propulsion & Power Lead Engineer
>
> >JSC NC62
>
> >Phone: 281 244-1974
>
> >Pager: 281 434-5075
>
> >Fax: 281 244-1849
>
> >
>
> >Providing for a safer tomorrow, today.
>
> >

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BOYER, ROGER L. (JSC-NC) (SAIC)
Sent: Friday, January 03, 2003 6:35 PM
To: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Cc: BALU, BRIAN K. (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); STEWART, MICHAEL A. (JSC-NC) (SAIC); 'Stewart, Mike'; BROWNE, DAVID M. (JSC-NC) (NASA); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG)
Subject: RE: FW: BSTRA ball test status

Today we were asked to initiate a PRA of the BSTRA cracks leading to Loss of Crew/Vehicle (LOCV). Both Tim Schick and myself have been working with Hugo Martinez and Bill Prince to determine the feasibility of this assessment. Mike Stewart was supporting the SRB BSM paint chip PRA request until it was determined earlier this afternoon to not be a threat via test results, thus no PRA needed. We've formulated the work into an Event Sequence Diagram with the initiating event being "Crack generated in a BSTRA ball" followed by the likelihood of a chip breaking off the ball, then traveling down the MPS piping to the SSMEs. According to Rocketdyne, these chips must be less than 400 microns to the LH2 pump and 800 microns to the LOX pump. Anything larger than this will be considered as LOCV.

We are currently waiting for Paul Munafo (MSFC Mass & Properties group) to send us the results of their recently completed ball tests. We expect these results later tonight or tomorrow.

We will be working this weekend to assess the expected MSFC data. This may help us answer the likelihood of generating a crack, but not answer the likelihood of a chip breaking off especially of any given size. That question may need more specialized material science help than we have seen so far here and will require several phone calls on Monday to folks, like Mike Packard at Glenn Research Center, to track down some probabilistic structural analysis help. No promises though...

I know everybody wants to see how they can help. By Monday, we should know the answer to that better. Right now, we're still collecting the new data from the current efforts.

This task represents the second task in the last six months (MPS flowliner cracks) concerning crack propagation and debris/contamination issues downstream. Hopefully, we can identify a systematic approach and proper resources for future assessments as more of these type of issues arise.

I understand that there are several meetings on Monday and the delta-PAR on Tuesday with Bryan O'Connor. At this point, I hope to have calculated the likelihood of a crack by Tuesday morning. I don't know how much luck we are going to have in calculating chips of a given size or larger breaking off and traveling down to the SSMEs by Tuesday. We're doing the best we can.

Roger

-----Original Message-----

From: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Sent: Friday, January 03, 2003 10:42 AM
To: BALU, BRIAN K. (JSC-NC) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC)
Subject: FW: FW: BSTRA ball test status

-----Original Message-----

From: BLANKENSHIP, JEANNE K. (JSC-NA) (SAIC)
Sent: Friday, January 03, 2003 10:28 AM
To: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)

(SAIC)
Subject: FW: FW: BSTRA ball test status

G. T.,
Per the voice mail I left for you, I am forwarding the following note on behalf of Frank. Please call me and confirm that the appropriate people are working on a response on this issue. If you have any questions please call Frank. You can reach him on cell.

Thank you,
Jeanne Blankenship
Science Applications International Corporation (SAIC)
Office of the SR&QA Program Manager
Telephone: 281-244-1630 Fax: 281-244-2257
Bldg. 45/rm 548, Mail Code: NA4

-----Original Message-----
From: BOWER, BETTY L. (JSC-NA) (SAIC)
Sent: Friday, January 03, 2003 8:53 AM
To: BLANKENSHIP, JEANNE K. (JSC-NA) (SAIC)
Subject: FW: FW: BSTRA ball test status

FYI.

-----Original Message-----
From: MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Sent: Friday, January 03, 2003 8:51 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); BALU, BRIAN K. (JSC-NC) (SAIC); BOWER, BETTY L. (JSC-NA) (SAIC)
Subject: FW: FW: BSTRA ball test status

Please provide me a response to this note. Thanks.

-----Original Message-----
From: boconnor [mailto:boconnor@hq.nasa.gov]
Sent: Friday, January 03, 2003 7:49 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Cc: JOHNSON, GARY W. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); 'H - Kowaleski Mark'; H - Bihner Bill (wbihner@mail.hq.nasa.gov); MARTINEZ, HUGO E. (JSC-NC) (GHG); Pete Rutledge; mstamate@mail.hq.nasa.gov; Amanda.Goodson@msfc.nasa.gov; Shannon.Bartell-1@ksc.nasa.gov
Subject: Re: FW: BSTRA ball test status

Mark,
With regard to Hugo's comment about performing a PRA on the potential for FOD generation, I know it is always fair to say that we don't have the data to produce a number, but we must be able to put this issue into at least some gross range of probabilities otherwise we are not doing a risk assessment, and it is unfair to ask the PM or the FRR Board to accept risk if we don't do the best we can with a risk assessment.

My guess is that the least you can do is get a range of probabilities for FOD generation from the metallurgists, and then applying what you think the chance of catastrophic failure would be if you did generate FOD from the SSME folks. Then you should look at what affect that resultant number (including uncertainty) has on the baseline PRA. If the baseline LOC median number is 1/245 for ascent/entry, what does it become

with this new failure mode? And, looking at the uncertainties, what does the new 95th and 5th percentile number become? I think this is a legitimate question for the PM to ask if he is thinking about accepting the risk for 107. And if he doesn't I will in the delta PAR.

What do we do with the numbers? Let's say the new median becomes 1/200. That's the same as taking out the new fuel turbopump. And if it goes to 1/150, that's like taking out the MCC, the LOX turbopump, the new heat exchanger and going back to major black zones in the contingency aborts (like we had in the 1980s), etc. And, if it goes all the way to 1/50, it is like being back in the old SRM and 17 inch disconnect days pre Challenger. (Don't quote me with these numbers, because I am guessing with these analogies, but I use them to show what I would want to know in a risk assessment).

Best,
O'C

At 05:57 AM 1/3/2003 -0600, ERMINGER, MARK D. (JSC-NC) (NASA) wrote:

>-----Original Message-----

>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>Sent: Thursday, January 02, 2003 6:16 PM
>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);
>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)
>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.
>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC)
>(SAIC)
>Subject: RE: BSTRA ball test status

>
>Cracks have finally been observed in 2 of 3 balls at Huntington Beach
>using method developed at MSFC, but no conclusions can yet be drawn. FOD
>continues to be a serious discussion topic. At the meeting today with
>Ralph Roe, the Huntington Beach and MSFC test status was given, the status
>of the JSC remote tool development was presented, and thoughts on flight
>rationale were discussed.

>
>Plans are for testing to conclude Jan 8th, although a PRCB will be held on
>the 6th to discuss preliminary FRR charts for STS-107. The team will not
>report to Ralph Roe until Monday the 6th at 9:00 am unless testing over
>the weekend fails (crack does not arrest or FOD is generated). In the
>meantime, the SSME Project will have an answer on FOD tolerance (not
>expected to be good). If a naturally cracked (vs. notched) ball generates
>FOD or does not arrest, we will have a problem necessitating the
>inspection of OV-102's balls. If any other ball generates FOD or does not
>arrest, the Test #2b ball with two in-line notches can be used to prove
>arrest and no FOD generation.

>Huntington Beach test status:

>
>Test #1 Update: Completed incremental thermal shock at 350 F without
>cracking. Abandoned this test (this is the test where they started at 200
>F and quenched at -100 F, then incremented the initial temperature by 25
>degrees each time and quenched again) and will crack with a wedge now.

>
>Test #2a Update: During 275 F to -100 F incremental thermal shock, got
>multiple cracking about 320 degrees around. Will now subject it to
>flight-like thermal/mechanical per 4x testing. 4x testing repeats the
>nominal flight portion of test#2a three additional times in order to
>encompass 30 missions (OV-102 has seen 28 missions).

>
>Test #2b Update: Had stopped testing and put in two series "thumbnail"
>notches and put into 212 F to 32 F rapid thermal cycles. Saw a crack

>between notches, detected via eddy current, not yet visible. Will then go
>into 4x testing.
>
>MSFC Status:
>
>Both cracked 2.24" balls at MSFC are undergoing testing per HB's test #2
>plan and no crack growth has been seen. Both of these balls were
>initially cracked using a severe thermal gradient. Similarly, 1.75" and
>1.25" balls are undergoing testing per test #2. One 1.75" ball had
>cracked without a notch and without a severe thermal environment (see
>below) and has opened up a new crack via testing. The maximum length of a
>crack is 0.4 inches but shallow and stable, it appears.
>
>JSC Remote Tool Development Update:
>
>Developers claim they have "tremendous control" of ball. Some technical
>issues, such as needing more articulation, cleaning the device for use on
>the fleet, and establishing the vehicle BSTRA joint configuration are
>being worked. They are building an articulating joint at the end effector
>to address the first issue. The device will be ready this coming Sunday.
>
>Other:
>
>SRQA got an action to perform a PRA on the potential for FOD
>generation. We will be working on the feasibility of this tomorrow (Jan
>3rd). While we haven't coordinated with the PRA analysts yet, we feel
>that getting realistic numbers would not be possible with the available data.
>
>Hugo
>
>-----Original Message-----
>
>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>
>Sent: Wednesday, January 01, 2003 2:23 PM
>
>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);
>
>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>
>TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)
>
>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.
>
>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A.
>
>(JSC-NC) (SAIC)
>
>Subject: RE: BSTRA ball test status
>
>Testing at Huntington Beach and MSFC continues, as does the development of
>thermal and stress models in an attempt to build flight rationale for
>STS-107. The generation of FOD has not at all been alleviated after
>branched cracking was detected on an MSFC ball subjected to extreme
>temperature gradients.
>
>Huntington Beach testing continues on the 3 balls in an effort to first
>create cracks and then to show arrest (no surface growth) under a repeated
>load profile. All testing described in the original email below is
>complete, but no cracks have been created. Huntington Beach is adding

>steps to their test procedure to incorporate crack initiation techniques
>developed at MSFC: the use of a dry ice/alcohol bath (-100°F) which allows
>for quicker quenching.

>
>Test #1 Update: Since dunking the notched 2.24" cabinet ball in LN2
>created no cracks (nor did boiling water to ice water thermal shocks), the
>ball is now being heated to an incrementally higher temperature and
>quenched at -100°F dry ice/alcohol. This series of thermal shocks is in
>effort to "sneak up" on the critical conditions required to crack a
>ball. The first set of 5 thermal shock cycles began at 200°F, and
>subsequent sets beginning at 225°F and 250°F yielded no cracks. As of
>December 30th, the set beginning at 275°F was in work. Plans are to
>continue incrementing the initial temperature by 25°F, running 5
>cycles. Inspections are run visually and with eddy current after the
>first and 5th cycles in each set.

>
>Test #2a Update: Taking the notched 2.24" flight spares ball through a
>series of flight-like thermal mechanical cycles described below yielded no
>cracking. The same series of thermal shocks is being used on this ball as
>in test #1 above, that is, purely thermal cycles, in an effort to crack
>it. On 200°F cycles, saw an eddy current indication and again during
>225°F cycles deep in the notch. It appears to be growing about an 1/8th
>of an inch on one edge of the notch but is not yet visible on the
>surface. Once it is seen on the surface, testing will proceed to Phase
>II, testing for crack arrest under flight-like thermal
>mechanical/loading. Eddy current and visual inspections are being
>conducted after every cycle at this time. Testing is now in the set of 5
>cycles at 250°F, but so far no surface cracks have appeared.

>
>Test #2b Update: Taking the second 2.24" flight spares ball (without a
>notch) through a series of flight-like thermal mechanical cycles described
>below yielded no cracking. In an effort to expedite the creation of a
>crack, two in-line notches are being EDM'd into the ball, approximately
>0.050" between them. The ball will then be subjected to a total of 1000
>rapid thermal cycles from boiling water to ice water in an effort to crack
>it before resuming flight-like thermal/mechanical cycling.

>
>MSFC Status: Besides developing a technique for quicker quenching, MSFC
>personnel have cracked both notched and pristine 2.24" balls using severe
>thermal cycles. In addition, they have cracked a flight spares ball (one
>of 1.75" diameter, without a notch, that had pre-existing subsurface
>flaws) with nominal thermal cycles (from ambient to LN2
>temperature). Because of the similarity between LN2 temperature and LO2's
>temperature (flight temperature), cracking of the 1.75" ball lends
>credibility to the theory that the OV-103 ball might have had subsurface
>cracks which surfaced when subjected to cryogenic cycles. Note however
>that the test does not simulate the thermal mass and mechanical loading
>seen on the flight vehicle during loading and flight. Secondly, the fact
>that a flight spares ball had subsurface defects which propagated to a
>surface crack tends to indict the acceptance criteria.

>
>The concern of particle liberation upstream of an SSME has been fueled by
>the type of cracking detected on the severely cracked 2.24"
>balls. Coordination with the SSME Project on the engine's tolerance to
>FOD is being conducted in an attempt to clear this concern.

>
>Thermal modeling indicates that LN2 is not a good test fluid for balls in
>LH2 service (1.25"). If liquid hydrogen is used to simulate these
>conditions, safety considerations will slow testing significantly. Other
>mediums, such as liquid helium and liquid neon, are being
>considered. Note that the thermal modeling so far has considered only the
>ball. Model development is in work on the inserts and adjoining hardware.

>
>NDE of all flight spares is being conducted in an effort to find more
>balls with subsurface indications. These would then be put in
>test. Finding no indications in any of the flight spares might support

>the theory that OV-103's ball was an outlier, i.e., that it had subsurface
>cracks when installed in the line.
>
>More to come.
>
>Hugo
>
>-----Original Message-----
>
>From: HATAMLEH, OMAR (JSC-NC) (SAIC)
>
>To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC)
>(NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>MARTINEZ, HUGO E. (JSC-NC) (GHG); TIPTON, MICHAEL R. (JSC-NX) (SAIC);
>PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE)
>(JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED
>(JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)
>
>Sent: 12/27/2002 6:10 PM
>
>Subject: RE: BSTRA ball test status
>
>Cryogenic load testing in Huntington Beach is continuing on three
>
>separate 2.24" BSTRA balls in order to help build flight rationale. Test
>
>1, and 2a are still in progress with no crack indications so far. Test
>
>2b has been completed with no crack indications. Test 2b indicates that
>
>a flight ball, when subjected to a single mission's worth of cryo and
>
>mechanical combined loading, does not crack.
>
>In addition to the Huntington Beach testing, MSFC is working on a method
>
>of cracking a ball thermally to be used in the event that a crack cannot
>
>be initiated via the current Huntington Beach test procedure. MSFC was
>
>successful in cracking balls under severe conditions (300 F to -100 F in
>
>one case and 400 F to -100 F in another case). The crack extends about
>
>280 degrees around on one ball, and a little less on another ball.
>
>Another interesting feature was the production of intersecting cracks,
>
>which could ultimately lead to FOD.
>
>MSFC sectioned a 2.25" ball purchased from the Oregon vendor and found a
>
>large porosity site ("big enough to stick a pencil in") near the center.
>
>These Oregon balls were produced much later and have process
>
>improvements which should help eliminate porosity. This data tends to
>
>indicate that porosity is probably to be found in most cast balls. In
>
>addition, metallurgy shows a finer grain structure in the middle and
>

>coarser towards the surface.
>
>Updates to the JSC activities will be provided in a separate email note.
>
>The next meeting is scheduled for Monday at a time to be disclosed
>
>later.
>
> > -----Original Message-----
>
> >From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>
> >Sent: Monday, December 23, 2002 1:44 PM
>
> >To: BROWNE, DAVID M. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR
>
> >(JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT)
>
> >(JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); JOHNSON, M. S. (SCOTT)
>
> >(JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); ALMASRI, WALEED;
>
> >BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED;
>
> >jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL
>
> >Subject: BSTRA ball test status
>
>
>
> >Execute summary: Cryogenic load testing in Huntington Beach began
>
> >Friday, December 20th on three separate 2.24" BSTRA balls in order to
>
> >help build flight rationale. These three tests, which are being run in
>
> >parallel, attempt to prove the theory that cracks will develop and then
>
> >arrest prior to going completely through a ball. Partly into the tests
>
> >this morning, no cracks have conclusively been observed, although one
>
> >faint indication is being inspected further. In addition, another
>
> >ball, a flight spares of a smaller size, was eddy current inspected and
>
> >found to have subsurface indications not detetable with dye pen and
>
> >visual checks. Testing will continue today and will resume on the
>
> >evening of the 26th.
>
>
>
> >Test #1: 2.24" ball, notch in ball, instrumented. Purpose is to help
>
> >validate computer model by assessing residual stresses and thermal
>
> >response. Have completed first 5 thermal cycles from ambient to LN2
>
> >(-320F), and there appears a faint line or shadow in the notch near one
>
> >end being inspected further to confirm or deny a crack. Continued with
>
> >6th thermal cycles (this second set of 5 cycles is from 200 F to LN2)
>

> >until a crack is confirmed. If no cracks develop at the conclusion of
>
> >these 10 cycles, a more severe method of creating a crack will be
>
> >developed. If a crack develops, the same temperature cycle will be
>
> >repeated until the ball fails or the crack arrests. The more severe
>
> >method, which is under development as a contingency, could use boiling
>
> >water and an alcohol/dry ice bath to produce a much higher temperature
>
> >gradient.

>
>
> >Test #2a: 2.24" ball in flight-like cups, notch in ball, not
>
> >instrumented*, mechanical load cycling while in LN2 bath: Purpose of
>
> >test is to show crack growth and subsequent arrest while under
>
> >flight-like thermal and mechanical loads. Briefly, the test is
>
> >scheduled to:

- > >1. Simulate nominal loads seen during propellant loading (11,000 lbs
>
> >applied and removed while in LN2 bath) for 5 cycles, then inspect.
- > >2. Simulate nominal loads seen during flight (41,000 lbs applied and
>
> >removed while in LN2 bath) for 30 cycles, then inspect.
- > >3. Apply margin loads above nominal flight loads (49,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
- > >4. Apply margin loads above nominal flight loads (61,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
- > >5. Apply margin loads above nominal flight loads (71,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.

>
>
> >Currently, test #2a is 3 cycles into the 41,000 lbs testing, with no
>
> >cracks visible after the 11,000 testing was completed. As in test #1,
>
> >testing will continue until a crack develops / arrests. Inspections
>
> >are visual after every cycle, and eddy current after every 5th cycle.
>
> >*Instrumentation removed.

>
>
> >Test #2b: Same as #2a, but without notch in ball: Purpose of test is
>
> >to show crack initiation, growth and subsequent crack arrest while
>
> >under flight-like thermal and mechanical loads, but on a pristine ball

> >which more closely resembles flight balls. The test sequence is the
>
> >same as in Test #2a:
>
> >
>
> >The 35 nominal cycles are complete (5 cycles at 11,000 lbs plus 30
>
> >cycles at 41,000 lbs), and margin testing has commenced for a total of
>
> >43 cycles so far. There are no indications of a crack via visual or
>
> >eddy current at this time.
>
> >
>
> >MSFC activity:
>
> >In addition to the Huntington Beach testing, MSFC is working on
>
> >metallography of balls of various sizes in order to rationalize
>
> >extrapolating these results to the different size balls used in the
>
> >Orbiter (2.24", 1.75", and 1.25"). In addition, MSFC is working on a
>
> >method of cracking a ball thermally to be used in the event that a
>
> >crack cannot be initiated via the current test procedure. Finally,
>
> >MSFC reports finding an eddy current indication in a flight spares ball
>
> >(of 1.25" diameter), an indication which is invisible via visual and
>
> >dye pen. This "crack" must be subsurface and may be a cluster of
>
> >porosity. Since this ball was extracted from flight spares and may
>
> >have a crack, this tends to indict the acceptance screening process.
>
> >MSFC personnel believe that there are large variations in
>
> >microstructure between individual balls. However, even with
>
> >variations, the testing being conducted at Huntington Beach will likely
>
> >show crack arrest regardless of initial crack existence.
>
> >
>
> >JSC Activity: Mike Tipton has been working closely JSC Engineering and
>
> >shop support in the development of tools for inspecting 100% of the
>
> >ball surface in an installed line. Ideally, both crack location (via
>
> >eddy current) and depth (with Ultrasonic techniques, perhaps) can be
>
> >achieved on the fleet feedlines without requiring removal of the lines.
>
> >
>
> >Testing will continue throughout the day today and will resume shortly
>
> >after Christmas (on the evening of the 26th). The next test status
>

> >will be presented Friday, December 27th at 3:00 pm.
>
> >
>
> >Hugo E. Martinez, PE
>
> >Shuttle SR&QA Propulsion & Power Lead Engineer
>
> >JSC NC62
>
> >Phone: 281 244-1974
>
> >Pager: 281 434-5075
>
> >Fax: 281 244-1849
>
> >
>
> >Providing for a safer tomorrow, today.
>
> >

ERMINGER, MARK D. (JSC-NC) (NASA)

From: CAZES, DAVID (JSC-NA) (SAIC)
Sent: Friday, January 03, 2003 7:30 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Cc: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Subject: FW: FW: BSTRA ball test status

Please note that Paul Munafo works MSFC M&P (MATERIALS and PROCESSES) not what Roger has below should this be forwarded. Also, I'm not sure that you need the following sentences included

This task represents the second task in the last six months (MPS flow liner cracks) concerning crack propagation and debris/contamination issues downstream. Hopefully, we can identify a systematic approach and proper resources for future assessments as more of these type of issues arise.

We do have budget challenges with PRA right now and it's going to get uglier later this year given the current overrun but we're trying to meet schedule. We have more than 10 EP working this now and it's supposed to come down to 6 on April 1 (original plan last year during the POP to baseline the PRA). For every month that you're over 10, there has to be a month that you're under 6 to make ends meet. I'm not trying to cry wolf but I'm concerned. Mac had a proposal for some additional funds but I understand that Dave W had some issues with it.

Brian doesn't need to see this stuff. He's focused on the commit to flight issue and the FRR next week and that's where our energy needs to be also. The budget thing is just a lingering problem that's not getting any healthier given schedule delays and more manpower than originally approved working on this to try to meet schedule.

Thanks for listening,
David

-----Original Message-----

From: BOYER, ROGER L. (JSC-NC) (SAIC)
Sent: Friday, January 03, 2003 6:35 PM
To: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Cc: BALU, BRIAN K. (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); STEWART, MICHAEL A. (JSC-NC) (SAIC); 'Stewart, Mike'; BROWNE, DAVID M. (JSC-NC) (NASA); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG)
Subject: RE: FW: BSTRA ball test status

Today we were asked to initiate a PRA of the BSTRA cracks leading to Loss of Crew/Vehicle (LOCV). Both Tim Schick and myself have been working with Hugo Martinez and Bill Prince to determine the feasibility of this assessment. Mike Stewart was supporting the SRB BSM paint chip PRA request until it was determined earlier this afternoon to not be a threat via test results, thus no PRA needed. We've formulated the work into an Event Sequence Diagram with the initiating event being "Crack generated in a BSTRA ball" followed by the likelihood of a chip breaking off the ball, then traveling down the MPS piping to the SSMEs. According to Rocketdyne, these chips must be less than 400 microns to the LH2 pump and 800 microns to the LOX pump. Anything larger than this will be considered as LOCV.

We are currently waiting for Paul Munafo (MSFC Mass & Properties group) to send us the results of their recently completed ball tests. We expect these results later tonight or tomorrow.

We will be working this weekend to assess the expected MSFC data. This may help us answer the likelihood of generating a crack, but not answer the likelihood of a chip breaking off especially of any given size. That question may need more specialized material science help than we have seen so far here and will require several phone calls on Monday to folks, like Mike Packard at Glenn Research Center, to track down some probabilistic structural analysis help. No promises though...

I know everybody wants to see how they can help. By Monday, we should know the answer to that better. Right now, we're still collecting the new data from the current efforts.

This task represents the second task in the last six months (MPS flowliner cracks) concerning crack propagation and debris/contamination issues downstream. Hopefully, we can identify a systematic approach and proper resources for

future assessments as more of these type of issues arise.

I understand that there are several meetings on Monday and the delta-PAR on Tuesday with Bryan O'Connor. At this point, I hope to have calculated the likelihood of a crack by Tuesday morning. I don't know how much luck we are going to have in calculating chips of a given size or larger breaking off and traveling down to the SSMEs by Tuesday. We're doing the best we can.

Roger

-----Original Message-----

From: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Sent: Friday, January 03, 2003 10:42 AM
To: BALU, BRIAN K. (JSC-NC) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC)
Subject: FW: FW: BSTRA ball test status

-----Original Message-----

From: BLANKENSHIP, JEANNE K. (JSC-NA) (SAIC)
Sent: Friday, January 03, 2003 10:28 AM
To: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC)
Subject: FW: FW: BSTRA ball test status

G. T.,

Per the voice mail I left for you, I am forwarding the following note on behalf of Frank. Please call me and confirm that the appropriate people are working on a response on this issue. If you have any questions please call Frank. You can reach him on cell.

Thank you,
Jeanne Blankenship
Science Applications International Corporation (SAIC)
Office of the SR&QA Program Manager
Telephone: 281-244-1630 Fax: 281-244-2257
Bldg. 45/rm 548, Mail Code: NA4

-----Original Message-----

From: BOWER, BETTY L. (JSC-NA) (SAIC)
Sent: Friday, January 03, 2003 8:53 AM
To: BLANKENSHIP, JEANNE K. (JSC-NA) (SAIC)
Subject: FW: FW: BSTRA ball test status

FYI.

-----Original Message-----

From: MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Sent: Friday, January 03, 2003 8:51 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); BALU, BRIAN K. (JSC-NC) (SAIC); BOWER, BETTY L. (JSC-NA) (SAIC)
Subject: FW: FW: BSTRA ball test status

Please provide me a response to this note. Thanks.

-----Original Message-----

From: boconnor [mailto:boconnor@hq.nasa.gov]
Sent: Friday, January 03, 2003 7:49 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Cc: JOHNSON, GARY W. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); 'H - Kowaleski Mark'; H - Bihner Bill (wbihner@mail.hq.nasa.gov); MARTINEZ, HUGO E. (JSC-NC) (GHG); Pete Rutledge; mstamate@mail.hq.nasa.gov; Amanda.Goodson@msfc.nasa.gov; Shannon.Bartell-1@ksc.nasa.gov
Subject: Re: FW: BSTRA ball test status

Mark,

With regard to Hugo's comment about performing a PRA on the potential for FOD generation, I know it is always fair to say that we don't have the data to produce a number, but we must be able to put this issue into at least some gross range of probabilities otherwise we are not doing a risk assessment, and it is unfair to ask the PM or the FRR Board to accept risk if we don't do the best we can with a risk assessment.

My guess is that the least you can do is get a range of probabilities for FOD generation from the metallurgists, and then applying what you think the chance of catastrophic failure would be if you did generate FOD from the SSME folks. Then you should look at what affect that resultant number (including uncertainty) has on the baseline PRA. If the baseline LOC median number is 1/245 for ascent/entry, what does it become with this new failure mode? And, looking at the uncertainties, what does the new 95th and 5th percentile number become? I think this is a legitimate question for the PM to ask if he is thinking about accepting the risk for 107. And if he doesn't I will in the delta PAR.

What do we do with the numbers? Let's say the new median becomes 1/200. That's the same as taking out the new fuel turbopump. And if it goes to 1/150, that's like taking out the MCC, the LOX turbopump, the new heat exchanger and going back to major black zones in the contingency aborts (like we had in the 1980s), etc. And, if it goes all the way to 1/50, it is like being back in the old SRM and 17 inch disconnect days pre Challenger. (Don't quote me with these numbers, because I am guessing with these analogies, but I use them to show what I would want to know in a risk assessment).

Best,
O'C

At 05:57 AM 1/3/2003 -0600, ERMINGER, MARK D. (JSC-NC) (NASA) wrote:

>-----Original Message-----

>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>Sent: Thursday, January 02, 2003 6:16 PM
>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);
>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)
>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.
>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC)
>(SAIC)
>Subject: RE: BSTRA ball test status

>

>Cracks have finally been observed in 2 of 3 balls at Huntington Beach
>using method developed at MSFC, but no conclusions can yet be drawn. FOD
>continues to be a serious discussion topic. At the meeting today with
>Ralph Roe, the Huntington Beach and MSFC test status was given, the status

>of the JSC remote tool development was presented, and thoughts on flight
>rationale were discussed.
>
>Plans are for testing to conclude Jan 8th, although a PRCB will be held on
>the 6th to discuss preliminary FRR charts for STS-107. The team will not
>report to Ralph Roe until Monday the 6th at 9:00 am unless testing over
>the weekend fails (crack does not arrest or FOD is generated). In the
>meantime, the SSME Project will have an answer on FOD tolerance (not
>expected to be good). If a naturally cracked (vs. notched) ball generates
>FOD or does not arrest, we will have a problem necessitating the
>inspection of OV-102's balls. If any other ball generates FOD or does not
>arrest, the Test #2b ball with two in-line notches can be used to prove
>arrest and no FOD generation.
>
>Huntington Beach test status:
>
>Test #1 Update: Completed incremental thermal shock at 350 F without
>cracking. Abandoned this test (this is the test where they started at 200
>F and quenched at -100 F, then incremented the initial temperature by 25
>degrees each time and quenched again) and will crack with a wedge now.
>
>Test #2a Update: During 275 F to -100 F incremental thermal shock, got
>multiple cracking about 320 degrees around. Will now subject it to
>flight-like thermal/mechanical per 4x testing. 4x testing repeats the
>nominal flight portion of test#2a three additional times in order to
>encompass 30 missions (OV-102 has seen 28 missions).
>
>Test #2b Update: Had stopped testing and put in two series "thumbnail"
>notches and put into 212 F to 32 F rapid thermal cycles. Saw a crack
>between notches, detected via eddy current, not yet visible. Will then go
>into 4x testing.
>
>MSFC Status:
>
>Both cracked 2.24" balls at MSFC are undergoing testing per HB's test #2
>plan and no crack growth has been seen. Both of these balls were
>initially cracked using a severe thermal gradient. Similarly, 1.75" and
>1.25" balls are undergoing testing per test #2. One 1.75" ball had
>cracked without a notch and without a severe thermal environment (see
>below) and has opened up a new crack via testing. The maximum length of a
>crack is 0.4 inches but shallow and stable, it appears.
>
>JSC Remote Tool Development Update:
>
>Developers claim they have "tremendous control" of ball. Some technical
>issues, such as needing more articulation, cleaning the device for use on
>the fleet, and establishing the vehicle BSTRA joint configuration are
>being worked. They are building an articulating joint at the end effector
>to address the first issue. The device will be ready this coming Sunday.
>
>Other:
>
>SRQA got an action to perform a PRA on the potential for FOD
>generation. We will be working on the feasibility of this tomorrow (Jan
>3rd). While we haven't coordinated with the PRA analysts yet, we feel
>that getting realistic numbers would not be possible with the available data.
>
>Hugo
>
>-----Original Message-----
>
>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>

>Sent: Wednesday, January 01, 2003 2:23 PM

>

>To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA);

>

>JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)

>

>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)

>

>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)

>

>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);

>

>TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)

>

>(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.

>

>(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A.

>

>(JSC-NC) (SAIC)

>

>Subject: RE: BSTRA ball test status

>

>Testing at Huntington Beach and MSFC continues, as does the development of
>thermal and stress models in an attempt to build flight rationale for
>STS-107. The generation of FOD has not at all been alleviated after
>branched cracking was detected on an MSFC ball subjected to extreme
>temperature gradients.

>

>Huntington Beach testing continues on the 3 balls in an effort to first
>create cracks and then to show arrest (no surface growth) under a repeated
>load profile. All testing described in the original email below is
>complete, but no cracks have been created. Huntington Beach is adding
>steps to their test procedure to incorporate crack initiation techniques
>developed at MSFC: the use of a dry ice/alcohol bath (-100°F) which allows
>for quicker quenching.

>

>Test #1 Update: Since dunking the notched 2.24" cabinet ball in LN2
>created no cracks (nor did boiling water to ice water thermal shocks), the
>ball is now being heated to an incrementally higher temperature and
>quenched at -100°F dry ice/alcohol. This series of thermal shocks is in
>effort to "sneak up" on the critical conditions required to crack a
>ball. The first set of 5 thermal shock cycles began at 200°F, and
>subsequent sets beginning at 225°F and 250°F yielded no cracks. As of
>December 30th, the set beginning at 275°F was in work. Plans are to
>continue incrementing the initial temperature by 25°F, running 5
>cycles. Inspections are run visually and with eddy current after the
>first and 5th cycles in each set.

>

>Test #2a Update: Taking the notched 2.24" flight spares ball through a
>series of flight-like thermal mechanical cycles described below yielded no
>cracking. The same series of thermal shocks is being used on this ball as
>in test #1 above, that is, purely thermal cycles, in an effort to crack
>it. On 200°F cycles, saw an eddy current indication and again during
>225°F cycles deep in the notch. It appears to be growing about an 1/8th
>of an inch on one edge of the notch but is not yet visible on the
>surface. Once it is seen on the surface, testing will proceed to Phase
>II, testing for crack arrest under flight-like thermal
>mechanical/loading. Eddy current and visual inspections are being
>conducted after every cycle at this time. Testing is now in the set of 5
>cycles at 250°F, but so far no surface cracks have appeared.

>

>Test #2b Update: Taking the second 2.24" flight spares ball (without a
>notch) through a series of flight-like thermal mechanical cycles described

>below yielded no cracking. In an effort to expedite the creation of a
>crack, two in-line notches are being EDM'd into the ball, approximately
>0.050" between them. The ball will then be subjected to a total of 1000
>rapid thermal cycles from boiling water to ice water in an effort to crack
>it before resuming flight-like thermal/mechanical cycling.

>
>MSFC Status: Besides developing a technique for quicker quenching, MSFC
>personnel have cracked both notched and pristine 2.24" balls using severe
>thermal cycles. In addition, they have cracked a flight spares ball (one
>of 1.75" diameter, without a notch, that had pre-existing subsurface
>flaws) with nominal thermal cycles (from ambient to LN2
>temperature). Because of the similarity between LN2 temperature and LO2's
>temperature (flight temperature), cracking of the 1.75" ball lends
>credibility to the theory that the OV-103 ball might have had subsurface
>cracks which surfaced when subjected to cryogenic cycles. Note however
>that the test does not simulate the thermal mass and mechanical loading
>seen on the flight vehicle during loading and flight. Secondly, the fact
>that a flight spares ball had subsurface defects which propagated to a
>surface crack tends to indict the acceptance criteria.

>
>The concern of particle liberation upstream of an SSME has been fueled by
>the type of cracking detected on the severely cracked 2.24"
>balls. Coordination with the SSME Project on the engine's tolerance to
>FOD is being conducted in an attempt to clear this concern.

>
>Thermal modeling indicates that LN2 is not a good test fluid for balls in
>LH2 service (1.25"). If liquid hydrogen is used to simulate these
>conditions, safety considerations will slow testing significantly. Other
>mediums, such as liquid helium and liquid neon, are being
>considered. Note that the thermal modeling so far has considered only the
>ball. Model development is in work on the inserts and adjoining hardware.

>
>NDE of all flight spares is being conducted in an effort to find more
>balls with subsurface indications. These would then be put in
>test. Finding no indications in any of the flight spares might support
>the theory that OV-103's ball was an outlier, i.e., that it had subsurface
>cracks when installed in the line.

>
>More to come.

>
>Hugo

>
>-----Original Message-----

>
>From: HATAMLEH, OMAR (JSC-NC) (SAIC)

>
>To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC)
>(NASA); BROWNE, DAVID M. (JSC-NC) (NASA)

>
>Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)
>(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)
>(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);
>MARTINEZ, HUGO E. (JSC-NC) (GHG); TIPTON, MICHAEL R. (JSC-NX) (SAIC);
>PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE)
>(JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED
>(JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)

>
>Sent: 12/27/2002 6:10 PM

>
>Subject: RE: BSTRA ball test status

>
>Cryogenic load testing in Huntington Beach is continuing on three

>separate 2.24" BSTRA balls in order to help build flight rationale. Test
>
>1, and 2a are still in progress with no crack indications so far. Test
>
>2b has been completed with no crack indications. Test 2b indicates that
>
>a flight ball, when subjected to a single mission's worth of cryo and
>
>mechanical combined loading, does not crack.
>
>In addition to the Huntington Beach testing, MSFC is working on a method
>
>of cracking a ball thermally to be used in the event that a crack cannot
>
>be initiated via the current Huntington Beach test procedure. MSFC was
>
>successful in cracking balls under severe conditions (300 F to -100 F in
>
>one case and 400 F to -100 F in another case). The crack extends about
>
>280 degrees around on one ball, and a little less on another ball.
>
>Another interesting feature was the production of intersecting cracks,
>
>which could ultimately lead to FOD.
>
>MSFC sectioned a 2.25" ball purchased from the Oregon vendor and found a
>
>large porosity site ("big enough to stick a pencil in") near the center.
>
>These Oregon balls were produced much later and have process
>
>improvements which should help eliminate porosity. This data tends to
>
>indicate that porosity is probably to be found in most cast balls. In
>
>addition, metallurgy shows a finer grain structure in the middle and
>
>coarser towards the surface.
>
>Updates to the JSC activities will be provided in a separate email note.
>
>The next meeting is scheduled for Monday at a time to be disclosed
>
>later.
>
>> -----Original Message-----
>
>>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>
>>Sent: Monday, December 23, 2002 1:44 PM
>
>>To: BROWNE, DAVID M. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR
>
>>(JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT)
>
>>(JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); JOHNSON, M. S. (SCOTT)
>
>>(JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); ALMASRI, WALEED;
>
>>BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED;
>
>>jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL

>
> >Subject: BSTRA ball test status
>
> >
>
> >Execute summary: Cryogenic load testing in Huntington Beach began
>
> >Friday, December 20th on three separate 2.24" BSTRA balls in order to
>
> >help build flight rationale. These three tests, which are being run in
>
> >parallel, attempt to prove the theory that cracks will develop and then
>
> >arrest prior to going completely through a ball. Partly into the tests
>
> >this morning, no cracks have conclusively been observed, although one
>
> >faint indication is being inspected further. In addition, another
>
> >ball, a flight spares of a smaller size, was eddy current inspected and
>
> >found to have subsurface indications not detetable with dye pen and
>
> >visual checks. Testing will continue today and will resume on the
>
> >evening of the 26th.

>
> >
>
> >Test #1: 2.24" ball, notch in ball, instrumented. Purpose is to help
>
> >validate computer model by assessing residual stresses and thermal
>
> >response. Have completed first 5 thermal cycles from ambient to LN2
>
> >(-320F), and there appears a faint line or shadow in the notch near one
>
> >end being inspected further to confirm or deny a crack. Continued with
>
> >6th thermal cycles (this second set of 5 cycles is from 200 F to LN2)
>
> >until a crack is confirmed. If no cracks develop at the conclusion of
>
> >these 10 cycles, a more severe method of creating a crack will be
>
> >developed. If a crack develops, the same temperature cycle will be
>
> >repeated until the ball fails or the crack arrests. The more severe
>
> >method, which is under development as a contingency, could use boiling
>
> >water and an alcohol/dry ice bath to produce a much higher temperature
>
> >gradient.

>
> >
>
> >Test #2a: 2.24" ball in flight-like cups, notch in ball, not
>
> >instrumented*, mechanical load cycling while in LN2 bath: Purpose of
>
> >test is to show crack growth and subsequent arrest while under

> >flight-like thermal and mechanical loads. Briefly, the test is
>
> >scheduled to:
>
> >1. Simulate nominal loads seen during propellant loading (11,000 lbs
>
> >applied and removed while in LN2 bath) for 5 cycles, then inspect.
>
> >2. Simulate nominal loads seen during flight (41,000 lbs applied and
>
> >removed while in LN2 bath) for 30 cycles, then inspect.
>
> >3. Apply margin loads above nominal flight loads (49,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >4. Apply margin loads above nominal flight loads (61,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >5. Apply margin loads above nominal flight loads (71,000 applied and
>
> >removed while in LN2 bath) for 5 cycles, then inspect.
>
> >
>
> >Currently, test #2a is 3 cycles into the 41,000 lbs testing, with no
>
> >cracks visible after the 11,000 testing was completed. As in test #1,
>
> >testing will continue until a crack develops / arrests. Inspections
>
> >are visual after every cycle, and eddy current after every 5th cycle.
>
> >*Instrumentation removed.
>
> >
>
> >Test #2b: Same as #2a, but without notch in ball: Purpose of test is
>
> >to show crack initiation, growth and subsequent crack arrest while
>
> >under flight-like thermal and mechanical loads, but on a pristine ball
>
> >which more closely resembles flight balls. The test sequence is the
>
> >same as in Test #2a:
>
> >
>
> >The 35 nominal cycles are complete (5 cycles at 11,000 lbs plus 30
>
> >cycles at 41,000 lbs), and margin testing has commenced for a total of
>
> >43 cycles so far. There are no indications of a crack via visual or
>
> >eddy current at this time.
>
> >
>
> >MSFC activity:
>
> >In addition to the Huntington Beach testing, MSFC is working on

>
> >metallography of balls of various sizes in order to rationalize
>
> >extrapolating these results to the different size balls used in the
>
> >Orbiter (2.24", 1.75", and 1.25"). In addition, MSFC is working on a
>
> >method of cracking a ball thermally to be used in the event that a
>
> >crack cannot be initiated via the current test procedure. Finally,
>
> >MSFC reports finding an eddy current indication in a flight spares ball
>
> >(of 1.25" diameter), an indication which is invisible via visual and
>
> >dye pen. This "crack" must be subsurface and may be a cluster of
>
> >porosity. Since this ball was extracted from flight spares and may
>
> >have a crack, this tends to indict the acceptance screening process.
>
> >MSFC personnel believe that there are large variations in
>
> >microstructure between individual balls. However, even with
>
> >variations, the testing being conducted at Huntington Beach will likely
>
> >show crack arrest regardless of initial crack existence.
>
> >
>
> >JSC Activity: Mike Tipton has been working closely JSC Engineering and
>
> >shop support in the development of tools for inspecting 100% of the
>
> >ball surface in an installed line. Ideally, both crack location (via
>
> >eddy current) and depth (with Ultrasonic techniques, perhaps) can be
>
> >achieved on the fleet feedlines without requiring removal of the lines.
>
> >
>
> >Testing will continue throughout the day today and will resume shortly
>
> >after Christmas (on the evening of the 26th). The next test status
>
> >will be presented Friday, December 27th at 3:00 pm.
>
> >
>
> >Hugo E. Martinez, PE
>
> >Shuttle SR&QA Propulsion & Power Lead Engineer
>
> >JSC NC62
>
> >Phone: 281 244-1974
>
> >Pager: 281 434-5075
>
> >Fax: 281 244-1849
>

>>
>
>>Providing for a safer tomorrow, today.
>
>>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Sunday, January 05, 2003 10:42 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); HATAMLEH, OMAR (JSC-NC) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE); TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)
Subject: RE: BSTR A ball test status

4x testing continued throughout the weekend without any failures. Both cracked HB 2.24" balls (that went through Test 2a and 2b and then through incremental thermal shock testing in order to "pre-crack" them), are undergoing flight-like thermal / mechanical cycling per the new 4x testing protocol. As of this evening, both balls have undergone roughly 15 missions worth of testing without failure (a total of an equivalent of 30 missions are planned). Meanwhile, two MSFC 2.24" balls (that were cracked by severe thermal gradients) are undergoing 2a-type testing and no increase in crack size has been noted. In addition, MSFC is testing two 1.75" balls (the unnotched one was cracked by dunking several times in LN2) per 2a protocol. The notched 1.75" MSFC ball was precracked to obtain a 180 degree crack with an "island" (a branched area in the crack that could produce FOD) on Saturday and is now undergoing 4x testing since this ball may have a crack similar to that on OV-103. A MSFC 1.25" ball will begin hydrogen testing (with either hydrogen or some similar fluid) no sooner than Monday. Finally, KSC eddy current inspections of 9 spare 1.25" balls revealed two balls had a total of 3 rejectable indications and EC inspections of 6 spare 1.75" balls found 1 ball with a rejectable indication. Spare balls will continue to be inspected via EC and may be considered candidates for further testing.

HB testing is expected to be complete on January 11th and MSFC testing to be complete on January 7th (with the exception of the 1.25" hydrogen ball, for which testing is now being developed).

Hugo

-----Original Message-----

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Thursday, January 02, 2003 8:16 PM
To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE); TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)
Subject: RE: BSTR A ball test status

Cracks have finally been observed in 2 of 3 balls at Huntington Beach using method developed at MSFC, but no conclusions can yet be drawn. FOD continues to be a serious discussion topic. At the meeting today with Ralph Roe, the Huntington Beach and MSFC test status was given, the status of the JSC remote tool development was presented, and thoughts on flight rationale were discussed.

Plans are for testing to conclude Jan 8th, although a PRCB will be held on the 6th to discuss preliminary FRR charts for STS-107. The team will not report to Ralph Roe until Monday the 6th at 9:00 am unless testing over the weekend fails (crack does not arrest or FOD is generated). In the meantime, the SSME Project will have an answer on FOD tolerance (not expected to be good). If a naturally cracked (vs. notched) ball generates FOD or does not arrest, we will have a problem necessitating the inspection of OV-102's balls. If any other ball generates FOD or does not arrest, the Test #2b ball with two in-line notches can be used to prove arrest and no FOD generation.

Huntington Beach test status:

Test #1 Update: Completed incremental thermal shock at 350 F without cracking. Abandoned this test (this is the test where they started at 200 F and quenched at -100 F, then incremented the initial temperature by 25 degrees each time and quenched again) and will crack with a wedge now.

Test #2a Update: During 275 F to -100 F incremental thermal shock, got multiple cracking about 320 degrees around.

Will now subject it to flight-like thermal/mechanical per 4x testing. 4x testing repeats the nominal flight portion of test# 2a three additional times in order to encompass 30 missions (OV-102 has seen 28 missions).

Test #2b Update: Had stopped testing and put in two series "thumbnail" notches and put into 212 F to 32 F rapid thermal cycles. Saw a crack between notches, detected via eddy current, not yet visible. Will then go into 4x testing.

MSFC Status:

Both cracked 2.24" balls at MSFC are undergoing testing per HB's test #2 plan and no crack growth has been seen. Both of these balls were initially cracked using a severe thermal gradient. Similarly, 1.75" and 1.25" balls are undergoing testing per test #2. One 1.75" ball had cracked without a notch and without a severe thermal environment (see below) and has opened up a new crack via testing. The maximum length of a crack is 0.4 inches but shallow and stable, it appears.

JSC Remote Tool Development Update:

Developers claim they have "tremendous control" of ball. Some technical issues, such as needing more articulation, cleaning the device for use on the fleet, and establishing the vehicle BSTRA joint configuration are being worked. They are building an articulating joint at the end effector to address the first issue. The device will be ready this coming Sunday.

Other:

SRQA got an action to perform a PRA on the potential for FOD generation. We will be working on the feasibility of this tomorrow (Jan 3rd). While we haven't coordinated with the PRA analysts yet, we feel that getting realistic numbers would not be possible with the available data.

Hugo

-----Original Message-----

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)

Sent: Wednesday, January 01, 2003 2:23 PM

To: HATAMLEH, OMAR (JSC-NC) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)

Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA)

(SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC)

(SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE);

TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC)

(GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L.

(JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A.

(JSC-NC) (SAIC)

Subject: RE: BSTRA ball test status

Testing at Huntington Beach and MSFC continues, as does the development of thermal and stress models in an attempt to build flight rationale for STS-107. The generation of FOD has not at all been alleviated after branched cracking was detected on an MSFC ball subjected to extreme temperature gradients.

Huntington Beach testing continues on the 3 balls in an effort to first create cracks and then to show arrest (no surface growth) under a repeated load profile. All testing described in the original email below is complete, but no cracks have been created. Huntington Beach is adding steps to their test procedure to incorporate crack initiation techniques developed at MSFC: the use of a dry ice/alcohol bath (-100°F) which allows for quicker quenching.

Test #1 Update: Since dunking the notched 2.24" cabinet ball in LN2 created no cracks (nor did boiling water to ice water thermal shocks), the ball is now being heated to an incrementally higher temperature and quenched at -100°F dry ice/alcohol. This series of thermal shocks is in effort to "sneak up" on the critical conditions required to crack a ball. The first set of 5 thermal shock cycles began at 200°F, and subsequent sets beginning at 225°F and 250°F yielded no cracks. As of December 30th, the set beginning at 275°F was in work. Plans are to continue incrementing the initial temperature by 25°F, running 5 cycles. Inspections are run visually and with eddy current after the first and 5th cycles in each set.

Test #2a Update: Taking the notched 2.24" flight spares ball through a series of flight-like thermal mechanical cycles described below yielded no cracking. The same series of thermal shocks is being used on this ball as in test #1 above, that is, purely thermal cycles, in an effort to crack it. On 200°F cycles, saw an eddy current indication and again during 225°F cycles deep in the notch. It appears to be growing about an 1/8th of an inch on one edge of the notch but is not yet visible on the surface. Once it is seen on the surface, testing will proceed to Phase II, testing for crack arrest under flight-like thermal mechanical/loading. Eddy current and visual inspections are being conducted

after every cycle at this time. Testing is now in the set of 5 cycles at 250°F, but so far no surface cracks have appeared.

Test #2b Update: Taking the second 2.24" flight spares ball (without a notch) through a series of flight-like thermal mechanical cycles described below yielded no cracking. In an effort to expedite the creation of a crack, two in-line notches are being EDM'd into the ball, approximately 0.050" between them. The ball will then be subjected to a total of 1000 rapid thermal cycles from boiling water to ice water in an effort to crack it before resuming flight-like thermal/mechanical cycling.

MSFC Status: Besides developing a technique for quicker quenching, MSFC personnel have cracked both notched and pristine 2.24" balls using severe thermal cycles. In addition, they have cracked a flight spares ball (one of 1.75" diameter, without a notch, that had pre-existing subsurface flaws) with nominal thermal cycles (from ambient to LN2 temperature). Because of the similarity between LN2 temperature and LO2's temperature (flight temperature), cracking of the 1.75" ball lends credibility to the theory that the OV-103 ball might have had subsurface cracks which surfaced when subjected to cryogenic cycles. Note however that the test does not simulate the thermal mass and mechanical loading seen on the flight vehicle during loading and flight. Secondly, the fact that a flight spares ball had subsurface defects which propagated to a surface crack tends to indict the acceptance criteria.

The concern of particle liberation upstream of an SSME has been fueled by the type of cracking detected on the severely cracked 2.24" balls. Coordination with the SSME Project on the engine's tolerance to FOD is being conducted in an attempt to clear this concern.

Thermal modeling indicates that LN2 is not a good test fluid for balls in LH2 service (1.25"). If liquid hydrogen is used to simulate these conditions, safety considerations will slow testing significantly. Other mediums, such as liquid helium and liquid neon, are being considered. Note that the thermal modeling so far has considered only the ball. Model development is in work on the inserts and adjoining hardware.

NDE of all flight spares is being conducted in an effort to find more balls with subsurface indications. These would then be put in test. Finding no indications in any of the flight spares might support the theory that OV-103's ball was an outlier, i.e., that it had subsurface cracks when installed in the line.

More to come.

Hugo

-----Original Message-----

From: HATAMLEH, OMAR (JSC-NC) (SAIC)
To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA)
Cc: CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE); MARTINEZ, HUGO E. (JSC-NC) (GHG); TIPTON, MICHAEL R. (JSC-NX) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ALMASRI, WALEED (JSC-REMOTE); AL-HAYEK, FAREED A. (JSC-NC) (SAIC)
Sent: 12/27/2002 6:10 PM
Subject: RE: BSTR A ball test status

Cryogenic load testing in Huntington Beach is continuing on three separate 2.24" BSTR A balls in order to help build flight rationale. Test 1, and 2a are still in progress with no crack indications so far. Test 2b has been completed with no crack indications. Test 2b indicates that a flight ball, when subjected to a single mission's worth of cryo and mechanical combined loading, does not crack.

In addition to the Huntington Beach testing, MSFC is working on a method of cracking a ball thermally to be used in the event that a crack cannot be initiated via the current Huntington Beach test procedure. MSFC was successful in cracking balls under severe conditions (300 F to -100 F in one case and 400 F to -100 F in another case). The crack extends about 280 degrees around on one ball, and a little less on another ball. Another interesting feature was the production of intersecting cracks, which could ultimately lead to FOD.

MSFC sectioned a 2.25" ball purchased from the Oregon vendor and found a large porosity site ("big enough to stick a pencil in") near the center. These Oregon balls were produced much later and have process improvements which should help eliminate porosity. This data tends to indicate that porosity is probably to be found in most cast balls. In addition, metallurgy shows a finer grain structure in the middle and coarser towards the surface.

Updates to the JSC activities will be provided in a separate email note. The next meeting is scheduled for Monday at a time to be disclosed later.

> -----Original Message-----

>From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
>Sent: Monday, December 23, 2002 1:44 PM
>To: BROWNE, DAVID M. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR
>(JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT)
>(JSC-NC) (SAIC); DYER, KEITH W. (JSC-NC) (SAIC); JOHNSON, M. S. (SCOTT)
>(JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); ALMASRI, WALEED;
>BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED;
>jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL
>Subject: BSTRA ball test status

>
>Execute summary: Cryogenic load testing in Huntington Beach began
>Friday, December 20th on three separate 2.24" BSTRA balls in order to
>help build flight rationale. These three tests, which are being run in
>parallel, attempt to prove the theory that cracks will develop and then
>arrest prior to going completely through a ball. Partly into the tests
>this morning, no cracks have conclusively been observed, although one
>faint indication is being inspected further. In addition, another
>ball, a flight spares of a smaller size, was eddy current inspected and
>found to have subsurface indications not detetable with dye pen and
>visual checks. Testing will continue today and will resume on the
>evening of the 26th.

>
>Test #1: 2.24" ball, notch in ball, instrumented. Purpose is to help
>validate computer model by assessing residual stresses and thermal
>response. Have completed first 5 thermal cycles from ambient to LN2
>(-320F), and there appears a faint line or shadow in the notch near one
>end being inspected further to confirm or deny a crack. Continued with
>6th thermal cycles (this second set of 5 cycles is from 200 F to LN2)
>until a crack is confirmed. If no cracks develop at the conclusion of
>these 10 cycles, a more severe method of creating a crack will be
>developed. If a crack develops, the same temperature cycle will be
>repeated until the ball fails or the crack arrests. The more severe
>method, which is under development as a contingency, could use boiling
>water and an alcohol/dry ice bath to produce a much higher temperature
>gradient.

>
>Test #2a: 2.24" ball in flight-like cups, notch in ball, not
>instrumented*, mechanical load cycling while in LN2 bath: Purpose of
>test is to show crack growth and subsequent arrest while under
>flight-like thermal and mechanical loads. Briefly, the test is
>scheduled to:
>1. Simulate nominal loads seen during propellant loading (11,000 lbs
>applied and removed while in LN2 bath) for 5 cycles, then inspect.
>2. Simulate nominal loads seen during flight (41,000 lbs applied and
>removed while in LN2 bath) for 30 cycles, then inspect.
>3. Apply margin loads above nominal flight loads (49,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.
>4. Apply margin loads above nominal flight loads (61,000 applied and
>removed while in LN2 bath) for 5 cycles, then inspect.

>5. Apply margin loads above nominal flight loads (71,000 applied and removed while in LN2 bath) for 5 cycles, then inspect.

>
>Currently, test #2a is 3 cycles into the 41,000 lbs testing, with no cracks visible after the 11,000 testing was completed. As in test #1, testing will continue until a crack develops / arrests. Inspections are visual after every cycle, and eddy current after every 5th cycle.
>*Instrumentation removed.

>
>Test #2b: Same as #2a, but without notch in ball: Purpose of test is to show crack initiation, growth and subsequent crack arrest while under flight-like thermal and mechanical loads, but on a pristine ball which more closely resembles flight balls. The test sequence is the same as in Test #2a:

>
>The 35 nominal cycles are complete (5 cycles at 11,000 lbs plus 30 cycles at 41,000 lbs), and margin testing has commenced for a total of 43 cycles so far. There are no indications of a crack via visual or eddy current at this time.

>
>MSFC activity:

>In addition to the Huntington Beach testing, MSFC is working on metallography of balls of various sizes in order to rationalize extrapolating these results to the different size balls used in the Orbiter (2.24", 1.75", and 1.25"). In addition, MSFC is working on a method of cracking a ball thermally to be used in the event that a crack cannot be initiated via the current test procedure. Finally, MSFC reports finding an eddy current indication in a flight spares ball (of 1.25" diameter), an indication which is invisible via visual and dye pen. This "crack" must be subsurface and may be a cluster of porosity. Since this ball was extracted from flight spares and may have a crack, this tends to indict the acceptance screening process. MSFC personnel believe that there are large variations in microstructure between individual balls. However, even with variations, the testing being conducted at Huntington Beach will likely show crack arrest regardless of initial crack existence.

>
>JSC Activity: Mike Tipton has been working closely JSC Engineering and shop support in the development of tools for inspecting 100% of the ball surface in an installed line. Ideally, both crack location (via eddy current) and depth (with Ultrasonic techniques, perhaps) can be achieved on the fleet feedlines without requiring removal of the lines.

>
>Testing will continue throughout the day today and will resume shortly after Christmas (on the evening of the 26th). The next test status will be presented Friday, December 27th at 3:00 pm.

>
>Hugo E. Martinez, PE
>Shuttle SR&QA Propulsion & Power Lead Engineer
>JSC NC62
>Phone: 281 244-1974
>Pager: 281 434-5075
>Fax: 281 244-1849

>
>Providing for a safer tomorrow, today.

>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Sent: Monday, January 06, 2003 9:47 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA)
Cc: BOYER, ROGER L. (JSC-NC) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC)
Subject: BSTRA Balls - status

Mark - Here's where we stand as of 0900.

Crack Probability - We did not receive the expected data from MSFC over the weekend. Hugo is trying to get it this morning. Assuming the data arrives soon and it is what we expect, we will have a number by this afternoon.

FOD Probability - We need materials data. Tim Schick is attempting to obtain this data from GRC. We are trying but we anticipate that we will not be able to get the data in time to complete an assessment today.

We will provide an updated status later today. GT

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BALU, BRIAN K. (JSC-NC) (SAIC)
Sent: Monday, January 06, 2003 11:49 AM
To: BROWNE, DAVID M. (JSC-NC) (NASA); BOYER, ROGER L. (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); HATAMLEH, OMAR (JSC-NC) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG)
Cc: MARSHALL, YOLANDA Y. (JSC-NA) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Subject: BSTRA Pre-PAR Tagup Today @ 1:30 PM

All:

Scott Johnson would like us to meet at his office in Building 45, Room 514L to discuss our approach for addressing the BSTRA issue, including the PRA effort regarding ball cracking and subsequent debris generation. We will also use the time to finalize our charts for tomorrow's PAR. Please plan to attend. Thanks.

Brian

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Monday, January 06, 2003 1:19 PM
To: EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); BALU, BRIAN K. (JSC-NC) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC)
Cc: ALMASRI, WALEED; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED; jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL
Subject: FW: Shuttle Standup Notes 1/6/03

I'm not sure what WSTF confirmed this is not an ignition concern in a LOX environment means. Do not take this at face value. It probably means that spec (800 micron metal) particles are ok from an ignition standpoint. Obviously, a particle of big enough size is an ignition concern in a LO2 environment.

Hugo

-----Original Message-----

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Monday, January 06, 2003 8:18 AM
Subject: Shuttle Standup Notes 1/6/03

BSTRA Status

- Labs worked over the holidays
- It took longer to crack BSTRA balls than we expected
- One ball cracked with near flight conditions
 - We suspect it had a manufacturing flaw that wasn't screened
- Are testing balls with cracks under flight conditions with a factor of 4
- WSTF confirmed this is not an ignition concern in a LOX environment
- Hope to have testing done early this week
- Have developed a technique for inspecting on the ship
- Are inspecting all the spare balls with Eddy Current and CAT Scan
 - Have found some rejectable indications

STS-107 (OV-102) 1/16/03

- Orbiter aft close-outs
- Preps for EMU installation

STS-114 (OV-104) 3/6/03

- Thruster backfills
- MPS leak checks
- CEIT complete

STS-115 (OV-105) 5/23/03

- FRCS removal
- Cavity inspection
- OMS pod checkout
- MEC PIC checkout
- 12" BSTRA inspections

OV-103

- OMM

VAB

- STS-114 preps for ET/SRB Mate tomorrow

Stennis

- Installing Pratt 11 on engine 0526
- Installing flowliner test article on the test stand

USA Booster

- Brought the connector and paint FOD issues to closure
- Connector
 - Isolated to two particular contacts
 - Inspected STS-107 contacts and none were bad
 - Cleaned up the inventory and the process problem

USA Orbiter

- Body flap corrosion
 - Found minor corrosion in another actuator
 - It is not a short term issue
 - No flight concern

Upgrades

- Lee Norbraten is in DC planning the summit for ~ 3/18-20
- Planned a kickoff meeting on 1/13

Halsell

- STS-114 ET/SRB Mate Review today

Dittemore

- We will have a Standup Thursday morning

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Tuesday, January 07, 2003 6:38 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC); ALMASRI, WALEED; BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED; jaugust0; PRINCE, GORMAN; TIPTON, MICHAEL
Subject: FW: Update on BSTRAs, 1/7/03

Here's a summary, thanks to MOD. Big news in the FOD area (and crack arrest, in my mind): we got branching cracks to the original crack in the virgin 1.75" ball at MSFC (the one that had subsurface defects prior to testing and was then cracked with about 12 thermal cycles in LN2). Worse yet, the cracks have islands in them. CT scan and mag visuals are in work to quantify and qualify. As J.C. mentions in his note below, Ralph took a second look at flight rationale today in this noon brainstorming session. We agreed there's not much to go on and PRA became second in importance only to the lab work at MSFC starting tomorrow afternoon. Roger Boyer, Tim Schick and I will be at MSFC tomorrow-Friday (at least) for the metallurgical evaluation, which will be used in our PRA. I don't agree with the statement J.C. makes that "crack arrest is still looking favorable" since these extra cracks occurred long after we thought arrest had occurred.

Hugo

-----Original Message-----

From: MELCHER, JOHN C. (JSC-DF55) (NASA)
Sent: Tuesday, January 07, 2003 3:39 PM
To: MELCHER, JOHN C. (JSC-DF55) (NASA); DL DF Shuttle Management; DL DF Station Management; ANTONELLI, DOMINIC A. (JSC-CB) (NASA); HARPOLD, JON C. (JSC-DA) (NASA); JACKSON, KAREN E. (JSC-DA) (NASA); CASTLE, ROBERT E. (BOB) (JSC-DA8) (NASA); HEFLIN, JAMES M., JR (MILT) (JSC-DA8) (NASA); KNIGHT, NORMAN D. (JSC-DA8) (NASA); SHANNON, JOHN P. (JSC-DA8) (NASA); BRISCOE, ALAN L. (LEE) (JSC-DA) (NASA); HEFLIN, JAMES M., JR (MILT) (JSC-DA8) (NASA); HALE, N. W., JR (WAYNE) (JSC-DA8) (NASA); MAYER, FRED F. (JSC-NC) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); STICH, J. S. (STEVE) (JSC-DA8) (NASA); CAIN, LEROY E. (JSC-DA8) (NASA); KOERNER, CATHERINE A. (CATHY) (JSC-DA8) (NASA); BECK, KELLY B. (JSC-DA8) (NASA); SCHNEIDER, GAIL A. (JSC-DA8) (NASA); LEGLER, ROBERT D. (JSC-DA8) (USA); DAVIS, PATRICIA L. (JSC-DA8) (USA); ENGELAUF, PHILIP L. (JSC-DA8) (NASA)
Cc: 'gregory.s.holden@boeing.com'; ARNOLD, THOMAS M. (JSC-DF511) (USA); EYRE, ANTHONY J. (JSC-DF55) (USA); LANE, WILLIAM F. (JSC-DF) (NASA); LEMAN, CHRISTOPHER L. (JSC-DF511) (USA); MOREHEAD, ROBERT L. (JSC-DF55) (USA); MUSLER, JEFFREY L. (JSC-DF55) (NASA); PATEL, MUNISH P. (JSC-DF55) (NASA); REDING, JON D. (JSC-DF511) (USA)
Subject: Update on BSTRAs, 1/7/03

Good afternoon.

The BSTRAs status / plan of action has changed since last evening's PRCB. At the meeting this afternoon with Ralph Roe, it was reported that another test ball has cracked under nominal flight-like thermal/mechanical loads. This new crack with islands (FOD potential) and branching has essentially eliminated the notion that we could envelope the flight conditions with the balls that cracked and generated FOD in more severe conditions. The good news is that demonstrating crack arrest is still looking favorable.

NEW FLIGHT RATIONALE FOR FOD:

In addition to demonstrating crack-arrest, flight rationale will now have to assume FOD and then work around a size probability distribution as follows:

- 1) The cracked balls can generate FOD.
- 2) STILL NEEDS TO BE PROVEN: The FOD releases in small pieces that are an order of magnitude smaller than the max limit determined by the SSME project.
AND/OR
- 3) The Probability Risk Assessment (PRA) says _____ is the probability of a crack forming, branching with islands, and releasing FOD larger than the max allowable size.

FUTURE TEST PLAN:

- 1) After the balls at MSFC are complete with the "2a + 90" nominal load profile and the surface traction study, the plan is to cut open the balls and study the roots of the material islands before they generate FOD. The FOD appears to release in small pieces possibly due to the sub-surface carbide structure breaking up the islands under loading.
- 2) There are three additional balls at MSFC that have subsurface flaws found by CT scan / eddy current. These balls are going to get put into an LN2 dunking program in order to generate cracks with islands.
- 3) The balls with crack islands that are not cut open for evaluation will be run through mechanical cycling until FOD is generated. The mechanical-only cycles can be accomplished faster and will allow the capture of released material.

J.C. Melcher
Booster Systems Group, DF55
office: 281-244-6427
mobile: 281-844-2174

-----Original Message-----

From: MELCHER, JOHN C. (JSC-DF55) (NASA)
Sent: Monday, January 06, 2003 3:31 PM
Subject: BSTRA Charts for 1/6/03 PRCB

Attached here are the charts for this afternoon's PRCB at 4pm to discuss the BSTRA ball cracks. Sorry for any duplicates.

The big news from the weekend is that a second 1.75" diameter test ball has cracked under less severe temperature gradients. This is the second test ball that appears to have cracked due to sub-surface porosity, and it raises questions about how the temperature gradients and material porosity play into the cracking mechanism. This kind of sub-surface defect would have been undetectable during 1970's orbiter acceptance testing without CT Scanning or eddy-current inspections. The good news for today is that the cracks do not seem to grow in any of the test balls after the initial rounds of load cycling, which means that testing may eventually demonstrate crack arrest. However, the FOD generation and probability issue still needs a lot more work since it is the unknown crack mechanism that drives the FOD issue.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Wednesday, January 08, 2003 8:46 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: FW: Results of Noon Meeting with Roe today

FYI

-----Original Message-----

From: ROE, RALPH R. (JSC-MV) (NASA)
Sent: Wednesday, January 08, 2003 8:03 AM
To: 'Rigby, David A'; Reith, Timothy W; Burghardt, Michael J;
Christensen, Scott V; 'Curtis, Cris'; Dunham, Michael J; ALBRIGHT, JOHN
D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); APPLEWHITE,
JOHN (JSC-EP) (NASA); BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BROWNE,
DAVID M. (JSC-NC) (NASA); GRUSH, GENE R. (JSC-EP111) (NASA); JACOBS,
JEREMY B. (JSC-ES4) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA);
EXT-Madera, Pamela L; OUELLETTE, FRED A. (JSC-MV6) (NASA); TEMPLIN,
KEVIN C. (JSC-MV6) (NASA); WAGNER, HOWARD A., PHD (JSC-EP) (NASA);
EXT-White, Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve;
Martingano, Trina A; Mulholland, John P; Peller, Mark E; Pickens, Mark
S; 'Saluter, Brett'; 'Snyder, Mike'; 'Stefanovic, Mike'; 'Young, Mike';
'Paul Munafo (E-mail)'; 'alison.dinsel-1@ksc.nasa.gov';
'myoung10@cfl.rr.com'; RINGO, LESLIE A. (JSC-CB) (USA); ANTONELLI,
DOMINIC A. (JSC-CB) (NASA); MELCHER, JOHN C. (JSC-DF55) (NASA); Collins,
Thomas E; BENNETT, JAY E. (JSC-ES4) (NASA); 'Rick Russell (E-mail)';
MAYEAUX, BRIAN M. (JSC-ES4) (NASA); Lubas, Dave L; Solomon, Marcella;
PREVETT, DONALD E. (DON) (JSC-EP) (NASA); MARTINEZ, HUGO E. (JSC-NC)
(GHG); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E.
(JSC-EA42) (NASA); LANE, WILLIAM F. (JSC-DF) (NASA); 'pelbg@ghg.net';
'Don Blank (E-mail)'; 'Cris Curtis (E-mail)'; HERNANDEZ, JOSE M.
(JSC-ES4) (NASA); 'Steven J. Gentz (E-mail)'; DINSEL, ALISON J.
(JSC-ES5) (NASA); 'Lagart99@aol.com'; Hirakawa, Earl M; ROCHA, ALAN R.
(RODNEY) (JSC-ES2) (NASA); 'Rick Russell (E-mail)'; 'Charlie Abner
(E-mail)'; Stenger-Nguyen, Polly; 'Linda Combs (E-mail)'; 'Don Blank
(E-mail)'; REDING, JON D. (JSC-DF511) (USA)
Cc: EXT-White, Doug; 'James Wilder (E-mail)'; Mulholland, John P; 'Mike
Leinbach (E-mail)'; EXT-Lang, J Robert
Subject: RE: Results of Noon Meeting with Roe today

Team,

First, as I reviewed our brainstorming session yesterday I keep coming back to the facts: 1) we have not generated FOD on a less severe or naturally cracked ball, we do have features, islands and branching, that concern us. 2) Paul's description of how his team was able to watch cracks gradually grow from subsurface flaws, sounds much different than the mechanism that we think will generate FOD, high energy crack propagation on the surface. Question #1: Do I have these facts wrong or is there anything we can build on here, providing we get through our cycles with no FOD generation on the naturally cracked balls?? Let's talk about this today at 5:00.

Second, you all know I like to have back-up plans so Let's work with the KSC folks and lay out plans and schedules, assuming we don't get comfortable with FOD, for inspection of OV104 and OV105. I don't think the engines are in OV105 yet and it is critical path to Core Complete so let's assume we inspect it first. John and Dave we would also need someone to lay out the rationale why we could fly 1 time after a complete successful inspection, if that holds true. Let's talk more about this today too. Remember this is a back-up plan, let's not default to inspection let's eliminate our FOD concerns.

Thanks

Ralph

-----Original Message-----

From: Rigby, David A [mailto:David.A.Rigby2@boeing.com]
Sent: Tuesday, January 07, 2003 7:37 PM
To: Rigby, David A; Reith, Timothy W; Burghardt, Michael J; Christensen, Scott V; 'Curtis, Cris'; Dunham, Michael J; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); APPLEWHITE, JOHN (JSC-EP) (NASA); BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); GRUSH, GENE R. (JSC-EP111) (NASA); JACOBS, JEREMY B. (JSC-ES4) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); EXT-Madera, Pamela L; OUELLETTE, FRED A. (JSC-MV6) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); WAGNER, HOWARD A., PHD (JSC-EP) (NASA); EXT-White, Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve; Martingano, Trina A; Mulholland, John P; Peller, Mark E; Pickens, Mark S; 'Saluter, Brett'; 'Snyder, Mike'; 'Stefanovic, Mike'; 'Young, Mike'; 'Paul Munafo (E-mail)'; 'alison.dinsel-1@ksc.nasa.gov'; 'myoung10@cfl.rr.com'; RINGO, LESLIE A. (JSC-CB) (USA); ANTONELLI, DOMINIC A. (JSC-CB) (NASA); MELCHER, JOHN C. (JSC-DF55) (NASA); Collins, Thomas E; BENNETT, JAY E. (JSC-ES4) (NASA); 'Rick Russell (E-mail)'; MAYEAUX, BRIAN M. (JSC-ES4) (NASA); Lubas, Dave L; Solomon, Marcella; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); MARTINEZ, HUGO E. (JSC-NC) (GHG); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); LANE, WILLIAM F. (JSC-DF) (NASA); 'pelbg@ghg.net'; 'Don Blank (E-mail)'; 'Cris Curtis (E-mail)'; HERNANDEZ, JOSE M. (JSC-ES4) (NASA); 'Steven J. Gentz (E-mail)'; DINSEL, ALISON J. (JSC-ES5) (NASA); 'Lagart99@aol.com'; Hirakawa, Earl M; ROCHA, ALAN R. (RODNEY) (JSC-ES2) (NASA); 'Rick Russell (E-mail)'; 'Charlie Abner (E-mail)'; Stenger-Nguyen, Polly; 'Linda Combs (E-mail)'; 'Don Blank (E-mail)'; REDING, JON D. (JSC-DF511) (USA)
Cc: ROE, RALPH R. (JSC-MV) (NASA); EXT-White, Doug; 'James Wilder (E-mail)'; Mulholland, John P; 'Mike Leinbach (E-mail)'; EXT-Lang, J Robert
Subject: Results of Noon Meeting with Roe today

Based on today's tagup, the following actions are in work to supplement the FOD testing:

1. As balls complete testing, we need to section them to help understand FOD generation potential. Specifically this is focused on the material islands and branching crack locations that might be more susceptible to FOD.
2. Complete EC and CT scans on all remaining spare balls. We will select additional samples to put into testing based on that data.
3. M&P community needs to brainstorm any other rationale that might help support the FOD rationale. This will be done as a group on-site at MSFC ASAP.
4. Consider the use of additional Thermal and / or Mechanical Stress cycle testing to understand the potential for FOD generation.
5. Complete the PRA. This will be done as a group on-site at MSFC ASAP.
6. Stress and Loads community needs to brainstorm any potential ideas that could help support the FOD generation rationale.

Next meeting is Wednesday, January 8 at 5:00 central. 877 987 0469 pc 692086.

> Regards,
>
> David Rigby
> Boeing MPS
> (281) 282-6118
>

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Wednesday, January 08, 2003 11:41 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); BROWNE, DAVID M. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); ENGLE, ROSS K. (JSC-NC) (SAIC); ALMASRI, WALEED; BALU, BRIAN; CLEMENTS, DANIEL; HATAMLEH, OMAR; ISHMAEL, MOHAMED; jaugust0; MAYER, FRED; Patrick, Roz (MSFC); PRINCE, GORMAN; TIPTON, MICHAEL
Cc: BOYER, ROGER L. (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC)
Subject: BSTRA Status for 1/8/02

At the 5:00 pm telecon with Ralph Roe, it was reported that the 1.75-2 MSFC ball (unnotched ball that cracked originally at 12 cycles in LN2 then again just yesterday at about 105 thermal-mechanical cycles) finished all 120 cycles, completing 4x testing. More cycles will be put on it to see if FOD is liberated at the islands. Engineering has drafted a Chit to perform OV-103 inspections with the JSC remote inspection tool, although it is hoped by Ralph that this inspection is not part of the flight rationale (i.e., Ralph wants to prove that FOD is not a concern regardless of crack existence).

We are involved in getting the inspection tool approved for use in the vehicle. In addition, the PRA team met with JSC Engineering briefly today to share ideas on PRA developments and assumptions. The team arrived at MSFC this evening and will be meeting with the MSFC S&MA folks that have been gathering test data in the morning. This will be followed by a visit to the lab where sectioning of the 1.75-2 ball will be performed.

HB emailed a status of their CT scans of a spare 2.24" ball showing areas of "micro-shrinkage" just below the surface of the ball (about 0.030" below). Micro-shrinkage was described in the email as a an area of reduced density. A second ball will be in work tomorrow. These are part of the balls drawn from spares that are being scanned to determine their suitability for potential use as test articles.

Hugo

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BALU, BRIAN K. (JSC-NC) (SAIC)
Sent: Thursday, January 09, 2003 6:22 PM
To: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Cc: ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); DYER, KEITH W. (JSC-NC) (SAIC); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); HATAMLEH, OMAR (JSC-NC) (SAIC); FOSTER, ANDY (JSC-NC) (GHG)
Subject: BSTRA Pitch For STS-107 PMMT Tagup

H:

Here is the presentation for tomorrow. Bill Prince and I got ahold of Mike Tipton, who provided us with the updates on the OV-103 inspection tools and plans for that activity. Apparently a final decision on OV-103 inspections won't be made until tomorrow's Noon Board, but according to Mike, Ralph Roe is very much in favor of borescope inspections. It sounded like there was more work to be done before eddy current is ready. As of now the plan is to press forward and inspect OV-103 prior to STS-107, at least borescope. The tools flew down on the NASA jet today.

When we talked earlier you asked me to send you some questions to research. Looking over the presentation I came up with a few things that I can anticipate being asked, so any help from you is of course welcome. Here goes:

- 1) Any length/direction info on the "ten small, disjointed cracks" that originally showed up on the 1.75" ball? (ref second bullet on Chart 102)
- 2) Any length info on the "long crack" detected after 110th combined cycle? (ref fourth bullet on Chart 102)
- 3) How many islands are present on the "long crack", and what are their respective sizes? (ref sixth bullet on Chart 102)
- 4) How many total combined cycles have now been applied to the 1.75" ball? (ref eighth bullet on Chart 102)
- 5) According to Bill there has been some discussion about "small islands" present all along -- do you know anything about that?

You probably don't have the time to research answers to all these questions, so whatever you can come up with is good. Call me tomorrow if you want to talk before the meeting. Otherwise I'll talk to you over the net. Remember to make sure Roger is there to answer PRA questions. Thanks for all your help.

B

work = (281) 244-1981

Cell = (832) 868-1981



j-tdc.ppt

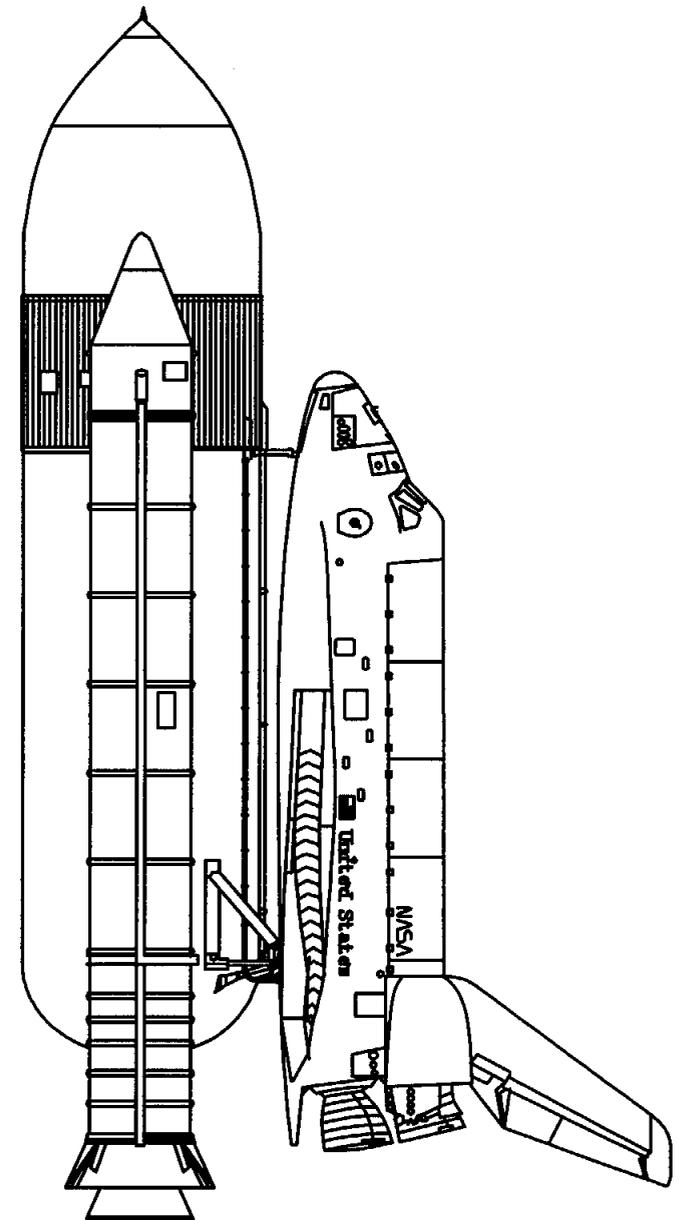
STS-107 PMMT Tagup

JSC - SHUTTLE

**SAFETY & MISSION
ASSURANCE**

**TECHNICAL DISCUSSION
&
ISSUES/CONCERNS**

JANUARY 10, 2003



JSC SIGNIFICANT EVALUATION ACTIVITIES
STS-107 (OV-102) PMMT TAGUP

DISCUSSION ITEMS

OV-103 BSTRA CRACK

BY: HUGO MARTINEZ / BRIAN BALU

ONE PAGE SUMMARIES

**OV-103 BSTRA CRACK
STS-107 PMMT TAGUP**

AS OF 01/09/03

HUGO MARTINEZ / BRIAN BALU

SPECIAL TOPIC-J-0100

OV-103 BSTRA CRACK STS-107 (OV-102) PMMT TAGUP

SUMMARY:

- At the STS-107 FRR Tagup SR&QA's recommendation was that the OV-103 Ball Strut Tie Rod Assembly (BSTRA) ball crack is a constraint to STS-107 (OV-102) pending successful completion of:
 - Huntington Beach (HB) testing on the 1.75" BSTRA ball that cracked during ambient-to-LN₂ testing.
 - Crack arrests prior to the ball cracking in half.
 - Cracking does not result in unacceptable step at crack location.
 - No FOD generation beyond acceptable level (FOD criteria TBD).
 - 100% surface inspection of cracked OV-103 BSTRA ball.
 - No evidence of particle liberation.
 - No surprises (i.e. crack is consistent with most probable cause).
 - Most probable cause is currently attributed to the brittle properties of the BSTRA ball material combined with thermal cycling, possibly initiated by an undetected flaw in the ball.
- The following charts provide status on these activities as of 01/09/03.
- This issue remains a constraint to STS-107.

OV-103 BSTRA CRACK STS-107 (OV-102) PMMT TAGUP

STATUS:

- HB testing on the 1.75” ball that cracked during ambient-to-LN₂ testing.
 - Ten small, disjointed cracks appeared between thermal cycles 10 & 15.
 - The ball was then subjected to combined thermal and mechanical cycles.
 - A long crack was detected at the 110th out of 120 combined (thermal and mechanical) cycles.
 - The long crack has a “jog”, i.e. it turns to the right ~90 degrees, then turns back to the left ~90 degrees.
 - The long crack has islands on each side of the jog.
 - The long crack did not grow in length after the 120th combined cycle.
 - An additional 10 - 20 combined cycles are planned to establish that the long crack has arrested.
 - The ball will then be NDE inspected, followed by sectioning.
 - Determine depth of cracks.
 - Particular emphasis on cracks surrounding islands.
 - What is the maximum size of any FOD which may be generated?

OV-103 BSTRA CRACK STS-107 (OV-102) PMMT TAGUP

STATUS (cont'd):

- 100% surface inspection of cracked OV-103 ball.
 - Inspection tools to remotely rotate and inspect the BSTRA balls on the vehicles were shipped to KSC on 01/09/03.
 - Decompression tool to compress struts, allowing ball to rotate.
 - Rotation tool to rotate ball.
 - Inspection tool to carry borescope to BSTRA in order to visually inspect 100% of ball surface.
 - Inspection tool to carry eddy current probe to BSTRA in order to perform additional inspections of the ball.
 - Allows surface and slight subsurface (.025”-.040” depth) inspections.
 - More modifications to this device required before it can be used.

OV-103 BSTRA CRACK STS-107 (OV-102) PMMT TAGUP

STATUS (cont'd):

- 100% surface inspection of cracked OV-103 ball.
 - Data to obtain from inspections:
 - Crack length?
 - Branch cracks?
 - Islands?
 - Missing material?
 - JSC SR&QA (NX) personnel enroute to KSC to continue development and implementation of tools and inspection methods.
- Analysis is in work to:
 - Determine the probability of crack initiation in flight-like environment.
 - Determine the probability of generating a piece of debris large enough to cause particle ignition or other catastrophic SSME failure.
 - JSC SR&QA (NC) personnel at MSFC in support of this effort.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BOYER, ROGER L. (JSC-NC) (SAIC)
Sent: Saturday, January 11, 2003 3:55 PM
To: MARSHALL, YOLANDA Y. (JSC-NA) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); 'boconnor@hq.nasa.gov'; JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BROWNE, DAVID M. (JSC-NC) (NASA); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG)
Subject: Preliminary BSTR A PRA charts for today's discussion



BSTR A-PRA-Charts
-11.ppt



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 1

BSTRA Probabilistic Risk Assessment (PRA)

STS-107



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 2

Approach

- **Assume that porosity is uniform, thus not accounting for variability between different balls**
- **Stoody-2 material has uniform hardness according to Glen Research Center.**
- **Use MSFC Mass & Process Group data to calculate crack probability**
- **Assume ~20% of the ball surface area available to release “rafts” or chips**
- **Assume ignition probability is very low based on WSTF and Rocketdyne**
- **A raft of greater than 400 microns will produce**

LOCV



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 3

Success Criteria

- SSME Project Office accepts FOD based on size and mass for each set of fluid lines
 - LOX critical dimensions (based on cleanliness):
 - 800 μ particle or larger can clog xxx
 - 0.0023 gm particle or larger can damage
 - LH2 critical dimensions (based on cleanliness):
 - 400 μ particle or larger can clog injectors
 - 0.0003 (gm) particle or larger can damage



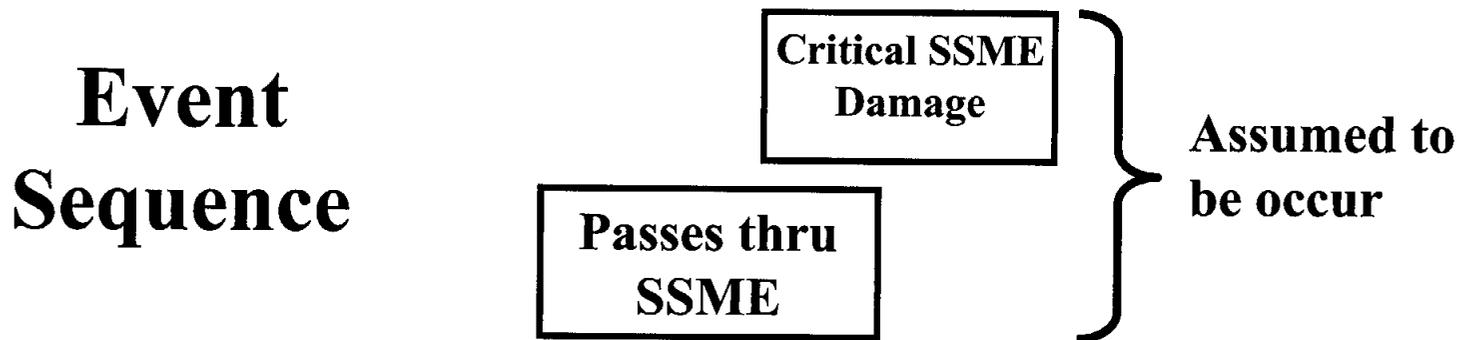
BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 4

Assumptions

- MRTB = Mission Relevant Test Ball (1.75" Ball, S/N 7, no notch)
- Assume ~20% of the ball surface area available to release "rafts" or chips to the flow field
- Assume ignition probability is $<10^{-6}$ and not considered in this assessment
- A raft of greater than 400 microns may not successfully pass through the SSME and will result in LOCV



BSTRA PRA Approach	Presenter Roger Boyer	
	Date 1/6/03	Page 5



>400 μ FOD **What is the likelihood that a raft of 400 μ or larger is released?**

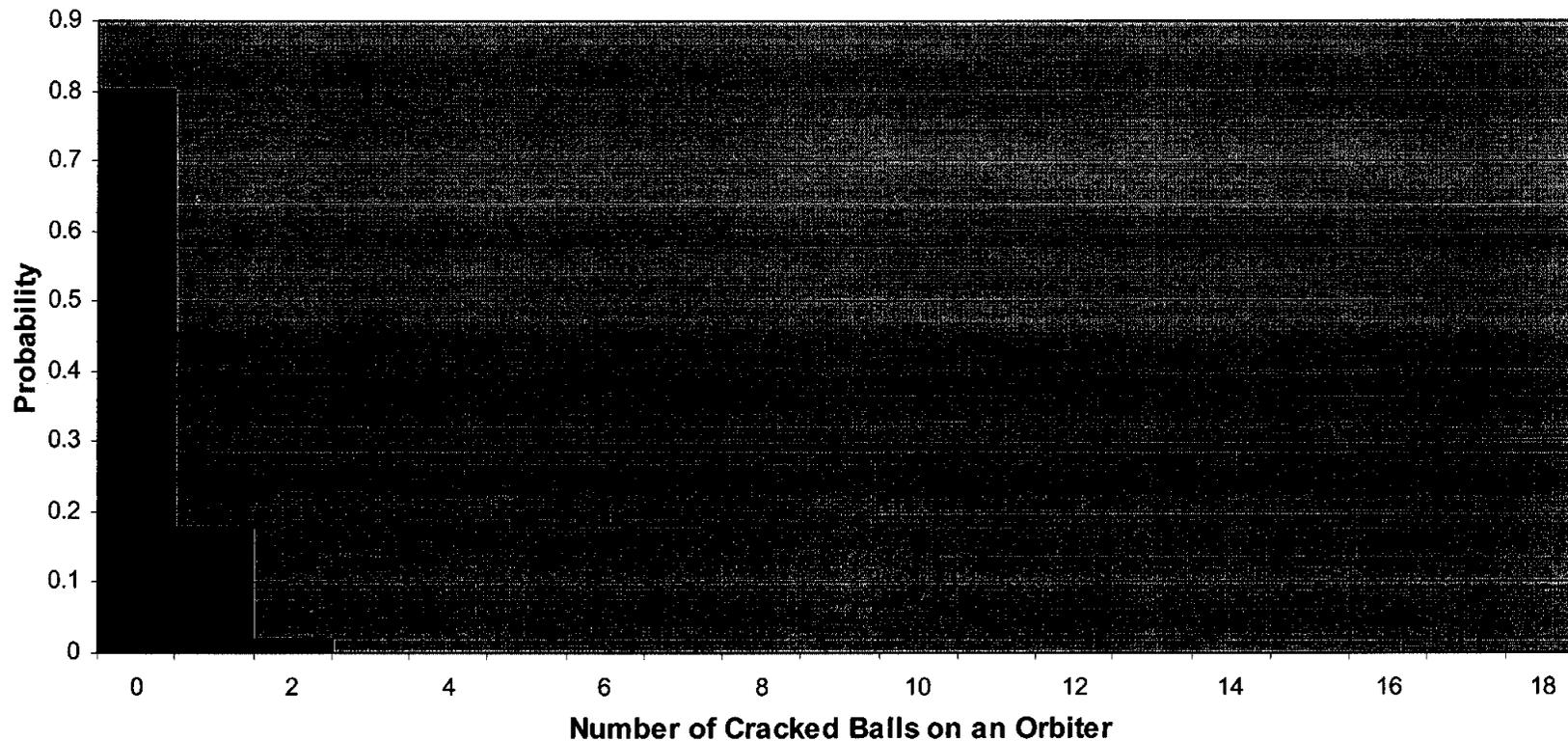
Exposed Raft **What is the likelihood that a raft is exposed to the flow?**

Crack Frequency **What is the likelihood of having a crack per mission?**



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 6

Binomial Distribution for Crack Occurrence in a Ball



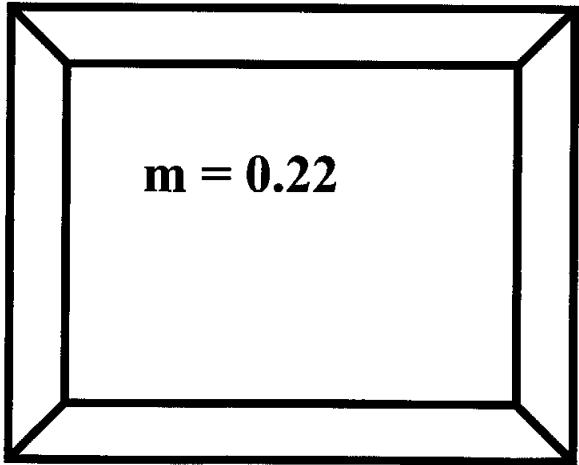
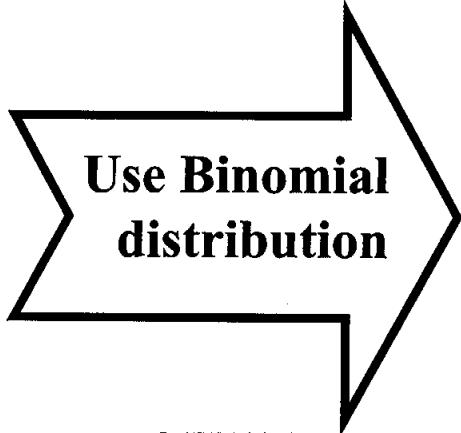


BSTRA PRA Approach	Presenter Roger Boyer	
	Date 1/6/03	Page 7

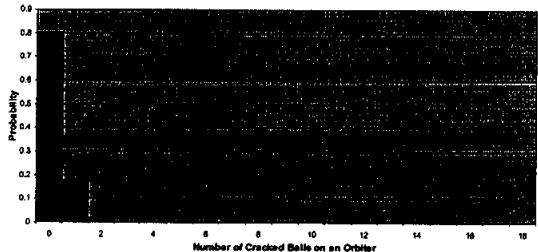
**Crack
Frequency**

What is the likelihood of having a crack per mission?

- **1 out of 54 on Vehicle balls has a crack.**
- **7 out 27 spares has subsurface indications.**
- **First crack on 1.75" -7 test ball occurred after 145 thermal cycles.**
- **128 thermal cycles to date on OV-103, -104, & -105.**
- **OV-102 has 50 thermal cycles to date.**

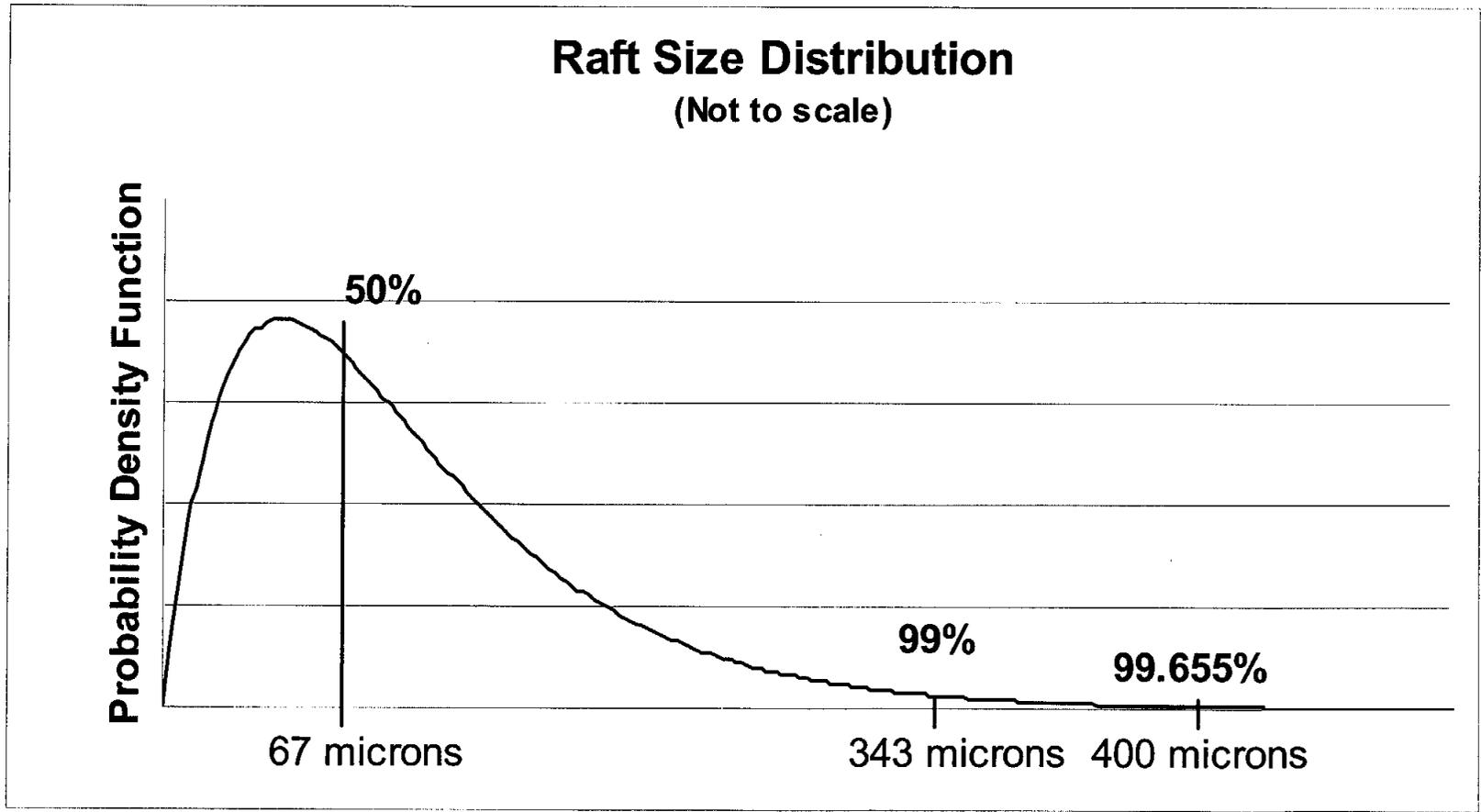


Binomial Distribution for Crack Occurrence in a Ball





BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 8



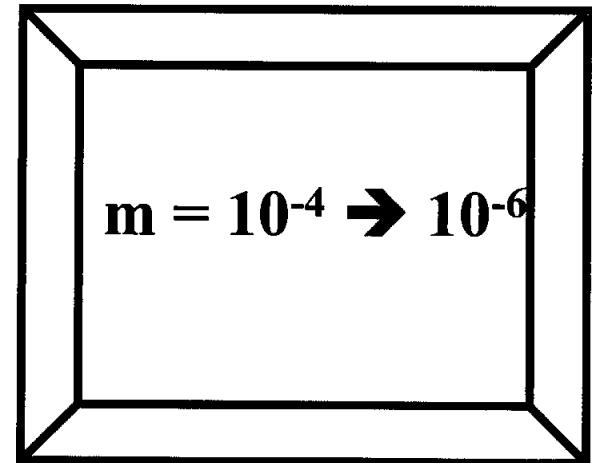
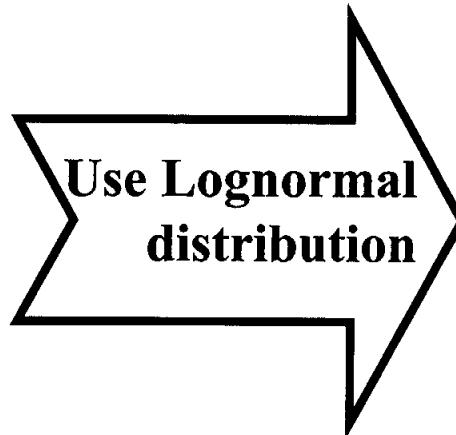


BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 9

**>400 μ
FOD**

**What is the likelihood that a raft of
400 μ or larger is released?**

- No known rafts from Vehicle balls.
- 26 rafts out of 125 islands released from test balls.
- 2 Rafts liberated on MRTB after >145 thermal cycles were < 99 percentile .





BSTRA PRA Approach	Presenter Roger Boyer	
	Date 1/6/03	Page 10

Results

**Critical SSME
Damage**

**Passes thru
SSME**

1.0

**>400μ
FOD**

**$m = 10^{-4} \rightarrow 10^{-6}$
-Preliminary -**

**Exposed
Raft**

Uniform Distribution between 0.2 to 0.3

**Crack
Frequency**

Mean = 0.22 with an Error Factor of 8



BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 11

Mission Risk Comparison

Nominal Mission Risk (Based on QRAS 1998)

- Ascent ~ 1 in 550 missions
 - Mean
 - Median
 - 5th
 - 95th
- Total ~ 1 in 265 missions

BSTRA Raft Mission Risk (Based on ?)

- Mean ~ 1 in 5×10^{-5} missions
- Median ~ 1 in $? \times 10^{-5}$ missions
- 5th ~ 1 in $? \times 10^{-5}$ missions
- 95th ~ 1 in $? \times 10^{-5}$ missions



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 12

Mission Risk Comparison

A chart comparing the uncertainty distributions between the QRAS 98 results and the BSTRA Raft Mission Risk showing both sets of

- Mean
- Median
- 5th
- 95th

ERMINGER, MARK D. (JSC-NC) (NASA)

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Sunday, January 12, 2003 6:30 PM
To: Brown Mark (E-mail); Dever Lea (E-mail); DL SR&QA Standup Notes; Greenfield Michael (E-mail); H - Bihner Bill (E-mail); H - Gregory Fred (E-mail); H - Hill Bill (E-mail); H - Kowaleski Mark (E-mail); H - O'Connor Bryan (E-mail); K - Abbott Robert (E-mail); K - Barnette Jack (E-mail); K - Bartell, Shannon (E-mail); K - Branard John (E-mail); K - Colloredo Lisa (E-mail); K - Delgado Hector (E-mail); K - Fairey, Chris (E-mail); K - Franca Chuck (E-mail); K - Gawronski Anne (Logistics) (E-mail); K - Glenn Malcolm (E-mail); K - Gross Sue (E-mail); K - Higgins, Bill (E-mail); K - Kinnan Mike (E-mail); K - Kleinschmidt Jane (Roy Bridges) (E-mail); K - McCombs John (E-mail); K - Myers Penny (Shriver) (E-mail); K - Pinch Sue (E-mail); K - Ridgway Leslie (MK) (E-mail); K - Scaltsas Dick (E-mail); K - Stagman, Jenny (E-mail); K - Stevens Alfred (USA) (E-mail); K - Tilley Randy (E-mail); K - Wetmore Mike (E-mail); K - Willingham, Terry (E-mail); M - Adams Alex (E-mail); M - Balko Laura (E-mail); M - Cianciola Chris (E-mail); M - Cowart Chris (E-mail); M - Grant Regina; M - Hartline Tom (E-mail); M - Hill Chris (E-mail); M - Kennedy Mike (E-mail); M - King Dave (E-mail); M - Martin Leigh (E-mail); M - McMullins Margaret; M - Metts Linder (E-mail); M - Moorhead James (E-mail); M - Mullane Dan (E-mail); M - Smiles, Mike (E-mail); M - Spacek David (E-mail); M - Teehan Paul (E-mail); M - Walker Angelia (E-mail); M - Weathers Shelby (E-mail); M - Yell Dena (E-mail); R - Hashimoto Rick (E-mail); Searcy Sam (E-mail); SR&QA MER Console; Trahan Melanie (E-mail); U - Gedies Robert (E-mail)
Subject: Special PRCB on BSTR A Ball Cracks Results

We will proceed toward L-2 on Tuesday 1/14. This will provide some additional shelf life on what we have so far.

There is some additional testing in work and those results will be reported at L-2

The PRA shows this is a low risk but Ron would like additional review on the PRA prior to L-2

ERMINGER, MARK D. (JSC-NC) (NASA)

From: Fred Gregory [fgregory@hq.nasa.gov]
Sent: Sunday, January 12, 2003 6:35 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: Re: Special PRCB on BSTR A Ball Cracks Results

Marcus....you all fully on board? Fred

At 06:30 PM 1/12/2003 -0600, you wrote:

>We will proceed toward L-2 on Tuesday 1/14. This will provide some
>additional shelf life on what we have so far.

>

>There is some additional testing in work and those results will be reported
>at L-2

>

>The PRA shows this is a low risk but Ron would like additional review on the
>PRA prior to L-2

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Sunday, January 12, 2003 7:43 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); REISTLE, BRUCE C. (JSC-NC) (SAIC); REDING, JON D. (JSC-DF511) (USA); ALMASRI, WALEED; BALU, BRIAN; CLEMENTS, DANIEL; ENGLE, ROSS; HATAMLEH, OMAR; ISHMAEL, MOHAMED; jaugust0; MAYER, FRED; Patrick, Roz (MSFC); PRINCE, GORMAN; TIPTON, MICHAEL
Subject: OV-103 BSTRA Ball Crack Inspection (preliminary)

In addition to the status provided by Mark below, some interesting findings came in from KSC following the PRCB this evening. After some problems encountered yesterday due to sideloads imparted on the ball by the retracted umbilical, the JSC remote inspection tool was successfully used to rotate the cracked ball on OV-103. It was reported that "almost 100%" inspection was completed. Results so far indicate that the crack runs under the insert and has a length of approximately 180 degrees around but has no apparent branching. The crack does, however, have 3 islands that have been noted, two of which are larger. One of the larger ones (on the order of 1000 microns in length or so) has approximately 30%-50% of the island material missing, it appears. If the cracks, islands, and "rafts" are as reported, they are not out of family with what has been generated in the lab. Further characterization will be done tomorrow by allowing the MSFC M&P group (as well as members of the JSC M&P group on TDY at MSFC) to look at it for consistency in documenting the features. In addition, an attempt will be made to view the other two BSTRA balls in the LO2 17-inch line.

Hugo

-----Original Message-----

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Sunday, January 12, 2003 6:30 PM
To: Brown Mark (E-mail); Dever Lea (E-mail); DL SR&QA Standup Notes; Greenfield Michael (E-mail); H - Bihner Bill (E-mail); H - Gregory Fred (E-mail); H - Hill Bill (E-mail); H - Kowaleski Mark (E-mail); H - O'Connor Bryan (E-mail); K - Abbott Robert (E-mail); K - Barnette Jack (E-mail); K - Bartell, Shannon (E-mail); K - Branard John (E-mail); K - Colloredo Lisa (E-mail); K - Delgado Hector (E-mail); K - Fairey, Chris (E-mail); K - Franca Chuck (E-mail); K - Gawronski Anne (Logistics) (E-mail); K - Glenn Malcolm (E-mail); K - Gross Sue (E-mail); K - Higgins, Bill (E-mail); K - Kinnan Mike (E-mail); K - Kleinschmidt Jane (Roy Bridges) (E-mail); K - McCombs John (E-mail); K - Myers Penny (Shriver) (E-mail); K - Pinch Sue (E-mail); K - Ridgway Leslie (MK) (E-mail); K - Scaltsas Dick (E-mail); K - Stagman, Jenny (E-mail); K - Stevens Alfred (USA) (E-mail); K - Tilley Randy (E-mail); K - Wetmore Mike (E-mail); K - Willingham, Terry (E-mail); M - Adams Alex (E-mail); M - Balko Laura (E-mail); M - Cianciola Chris (E-mail); M - Cowart Chris (E-mail); M - Grant Regina; M - Hartline Tom (E-mail); M - Hill Chris (E-mail); M - Kennedy Mike (E-mail); M - King Dave (E-mail); M - Martin Leigh (E-mail); M - McMullins Margaret; M - Metts Linder (E-mail); M - Moorhead James (E-mail); M - Mullane Dan (E-mail); M - Smiles, Mike (E-mail); M - Spacek David (E-mail); M - Teehan Paul (E-mail); M - Walker Angelia (E-mail); M - Weathers Shelby (E-mail); M - Yell Dena (E-mail); R - Hashimoto Rick (E-mail); Searcy Sam (E-mail); SR&QA MER Console; Trahan Melanie (E-mail); U - Gedies Robert (E-mail)
Subject: Special PRCB on BSTRA Ball Cracks Results

We will proceed toward L-2 on Tuesday 1/14. This will provide some additional shelf life on what we have so far.

There is some additional testing in work and those results will be reported at L-2

The PRA shows this is a low risk but Ron would like additional review on the PRA prior to L-2

ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Sent: Monday, January 13, 2003 1:14 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC)
Subject: FW: FW: BSTRA Probabilistic Risk Assessment (PRA)



BSTRA-PRA-Charts
-111.ppt

-----Original Message-----

From: boconnor [mailto:boconnor@hq.nasa.gov]
Sent: Monday, January 13, 2003 7:55 AM
To: Michael Stamatelatos
Cc: Pete Rutledge; Mark Kowaleski; wbihner@hq.nasa.gov; BROWNE, DAVID M. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Subject: Fwd: FW: BSTRA Probabilistic Risk Assessment (PRA)

Michael,

I pass this presentation to you with a request that you look at it for process and presentation approach. This is a quick quantitative look at the BSTRA ball bearing problem developed by Dave Browne and Roger Boyer for the shuttle PM. The PM (and I) want to be sure that it is properly assessing the risk...proper assumptions, use of statistical data and presentation of uncertainty and confidence levels. Please give Roger a call and let him know you are reviewing it. This needs to be right by tomorrow PM if it is not already.

I will compare notes with you later today.

Thanks,
O'C

>From: "BROWNE, DAVID M. (JSC-NC) (NASA)" <david.m.browne@nasa.gov>
>To: "'boconnor@mail.hq.nasa.gov'" <boconnor@mail.hq.nasa.gov>
>Subject: FW: BSTRA Probabilistic Risk Assessment (PRA)
>Date: Sun, 12 Jan 2003 15:46:30 -0600
>Importance: high
>X-Mailer: Internet Mail Service (5.5.2653.19)

>
>

>-----Original Message-----

>From: REISTER, LEAH L. (JSC-NC) (SAIC)
>Sent: Sunday, January 12, 2003 1:36 PM
>To: MARTINEZ, HUGO E. (JSC-NC) (GHG); 'White, Doug'; 'Rigby, David A';
>'Reith, Timothy W'; 'Martingano, Trina A'; 'Burghardt, Michael J';
>'Christensen, Scott V'; 'Curtis, Cris E'; 'Dunham, Michael J'; ALBRIGHT,
>JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); APPLEWHITE,
>JOHN (JSC-EP) (NASA); BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BROWNE, DAVID
>M. (JSC-NC) (NASA); GRUSH, GENE R. (JSC-EP111) (NASA); JACOBS, JEREMY B.
>(JSC-ES4) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); 'Madera, Pamela L';
>OUELLETTE, FRED A. (JSC-MV6) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA);
>WAGNER, HOWARD A., PHD (JSC-EP) (NASA); 'Fineberg, Laurence H.'; 'Frazer,
>John W.'; 'Harrison, Steve'; 'Mulholland, John P'; 'Peller, Mark E';
>'Pickens, Mark S'; 'Saluter, Brett D'; 'Snyder, Michael J'; 'Stefanovic,
>Mike'; 'Young, Michael L'; 'Paul Munafa (E-mail)';
>'alison.dinsel-1@ksc.nasa.gov'; 'srigby@houston.rr.com';
>'myoung10@cfl.rr.com'; RINGO, LESLIE A. (JSC-CB) (USA); ANTONELLI, DOMINIC
>A. (JSC-CB) (NASA); MELCHER, JOHN C. (JSC-DF55) (NASA); 'Collins, Thomas
>E'; BENNETT, JAY E. (JSC-ES4) (NASA); 'Russell, Richard W'; MAYEAUX, BRIAN

>M. (JSC-ES4) (NASA); 'Lubas, Dave L.'; 'Solomon, Marcella'; 'Wagner,
>Howard E'; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); SERIALE-GRUSH, JOYCE
>M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); LANE, WILLIAM F.
>(JSC-DF) (NASA); 'pelbg@ghg.net'; 'Don Blank (E-mail)'; 'Curtis, Cris E';
>HERNANDEZ, JOSE M. (JSC-ES4) (NASA); 'Steven J. Gentz (E-mail)'; DINSEL,
>ALISON J. (JSC-ES5) (NASA); 'Lagart99@aol.com';
>'linda.combs@usahq.unitedspacealliance.com'; 'Hirakawa, Earl M'; ROCHA,
>ALAN R. (RODNEY) (JSC-ES2) (NASA); 'Russell, Richard W'; 'Charlie Abner
>(E-mail)'; 'Stenger-Nguyen, Polly'; 'Combs, Linda A'; 'Blank, Donald E';
>'Beil, Bob'; BROWNE, DAVID M. (JSC-NC) (NASA); BOYER, ROGER L. (JSC-NC)
>(SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); REISTLE, BRUCE C. (JSC-NC)
>(SAIC); CAZES, DAVID (JSC-NA) (SAIC)
>Cc: ROE, RALPH R. (JSC-MV) (NASA); 'Wilder, James'; 'Mulholland, John P';
>'Mike Leinbach (E-mail)'
>Subject: BSTR Probabilistic Risk Assessment (PRA)
>Importance: High
>
>



BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 1

BSTRA Probabilistic Risk Assessment (PRA)

STS-107

JSC SR&QA

Roger Boyer

Hugo Martinez

Tim Schick

MSFC S&MA

Jim Rogers

Ken Johnson



BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 2

Success Criteria

- SSME Project Office accepts FOD based on size and mass for each set of fluid lines
 - LOX critical dimensions (based on cleanliness):
 - 800 μ particle or larger can clog xxx
 - 0.0023 gm particle or larger can damage
 - LH2 critical dimensions (based on cleanliness):
 - 400 μ particle or larger can clog injectors
 - 0.0003 (gm) particle or larger can damage



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 3

Assumptions

- Mission Relevant Test Ball (MRTB) is 1.75" Ball, S/N 7, no notch
- Assume ~20% of the ball surface area available to release "rafts" or chips to the flow field
- More likely that large islands break into smaller rafts
- Large rafts released under the cup are more likely to be broken up
- Rafts are generated from islands



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 4

Assumptions

- Ignition is not considered in this assessment
- A raft of greater than 400 microns may not successfully pass through the SSME and will conservatively result in LOCV



BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 5

Approach

- **Determine probability of having a crack prior to a mission**
- **Determine probability for a raft of a given size breaking away**
- **Determine probability of large raft getting into flow stream**
- **Take no credit for reduced probability of raft actually imposing damage on the SSMEs**



BSTRA PRA Approach	Presenter Roger Boyer	
	Date 1/6/03	Page 6

Event Sequence

**Critical SSME
Damage**

**Passes thru
SSME**

} **Assumed to
be occur**

**Exposed
Raft**

What is the likelihood that a raft is exposed to the flow?

**>400μ
FOD**

What is the likelihood that a raft of 400μ or larger is released?

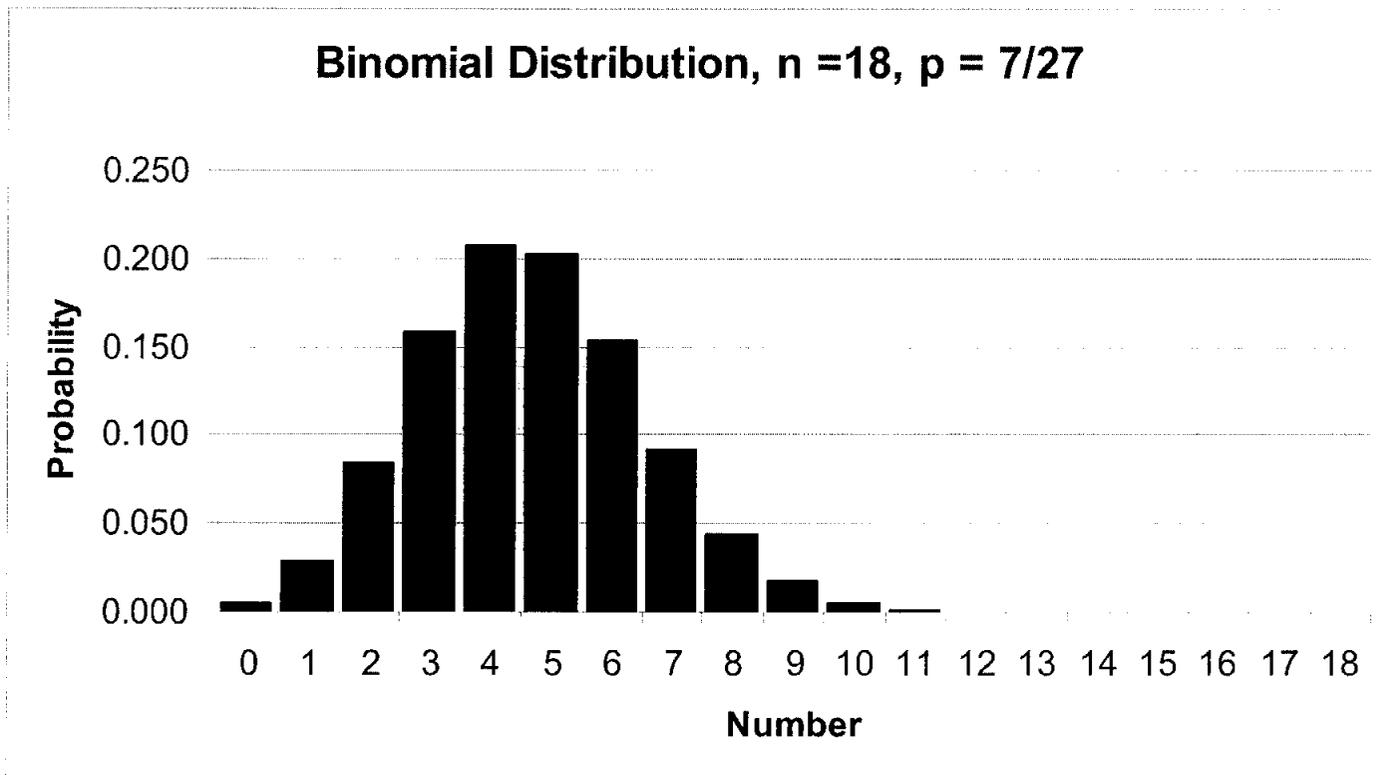
**Crack
Frequency**

What is the likelihood of having a crack per mission?



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 7

Binomial Distribution for Crack Occurrence on a Vehicle (based on initial subsurface indications)



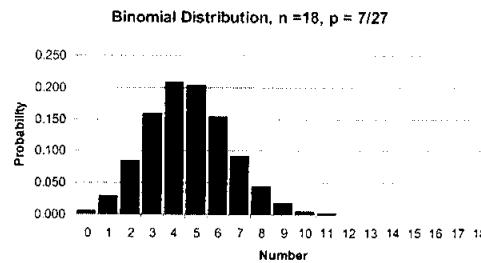
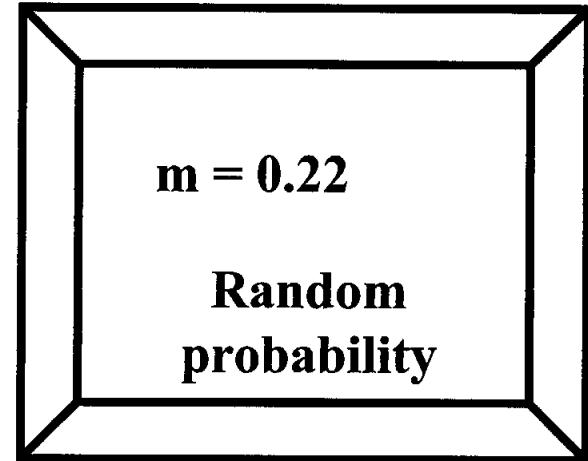
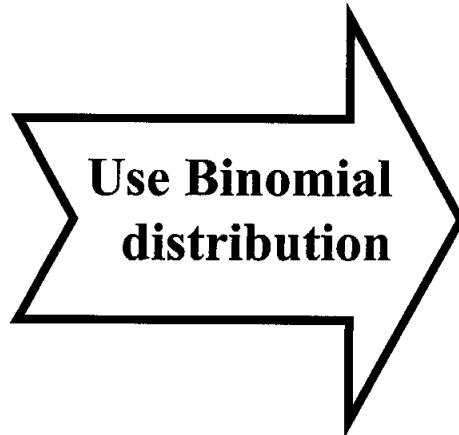


BSTRA PRA Approach	Presenter Roger Boyer	
	Date 1/6/03	Page 8

**Crack
Frequency**

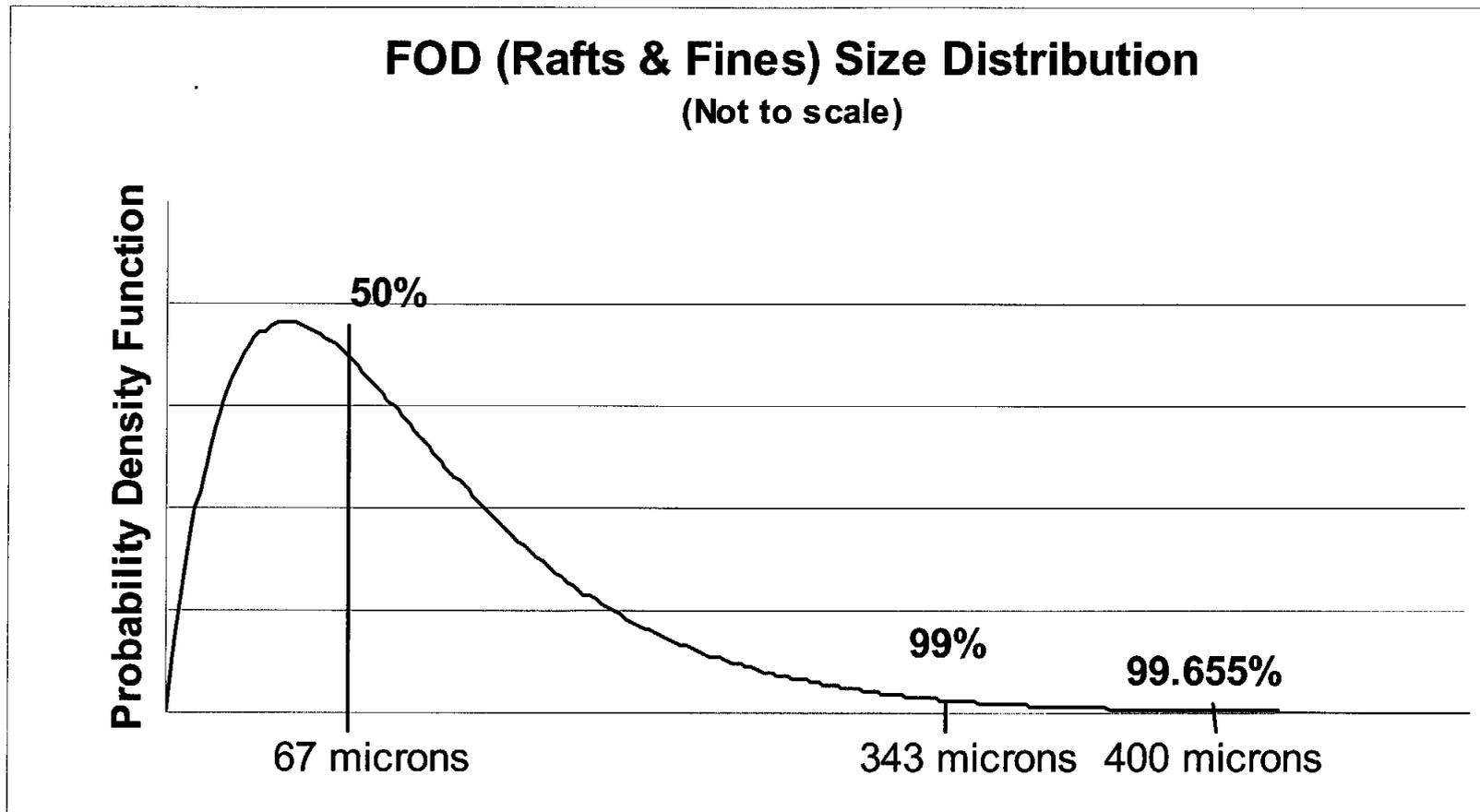
What is the likelihood of having a crack per mission?

- 1 out of 54 on Vehicle balls has a visible crack.
- **7 out 27 spares has subsurface indications.**
- First crack on 1.75" -7 test ball occurred after 145 thermal cycles.
- 128 thermal cycles to date on OV-103, -104, & -105.
- OV-102 has 50 thermal cycles to date.





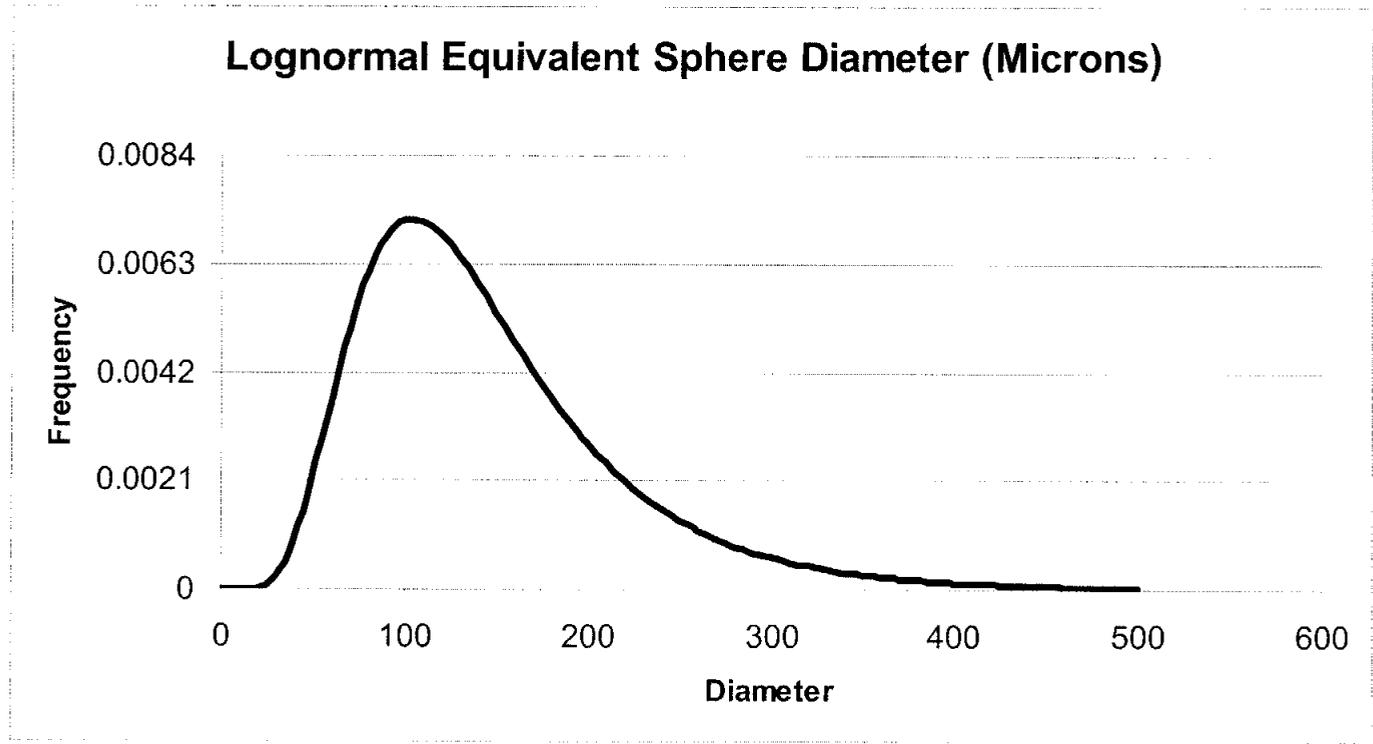
BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 9





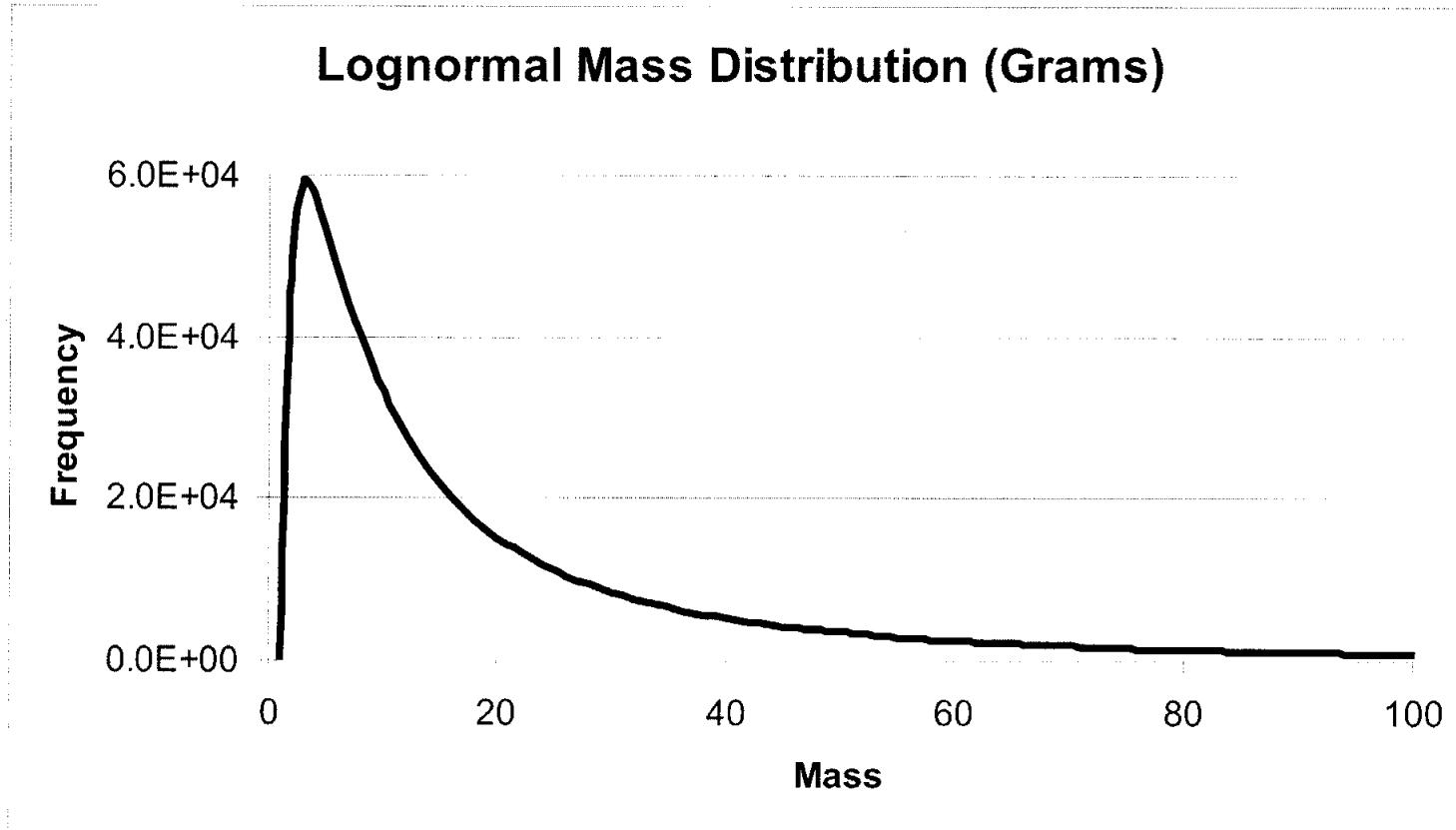
BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 10

FOD (Rafts Only) Size Distribution





BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 11



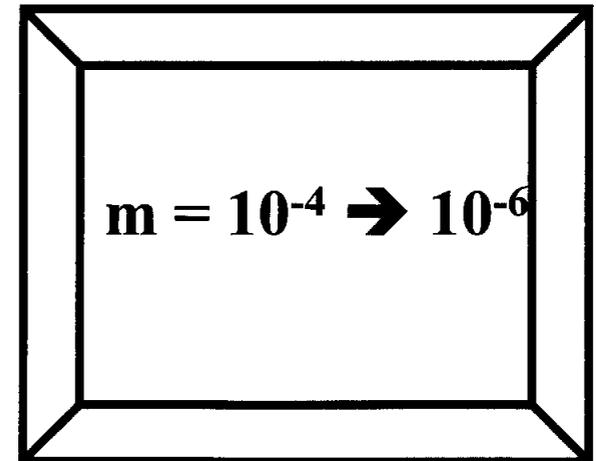
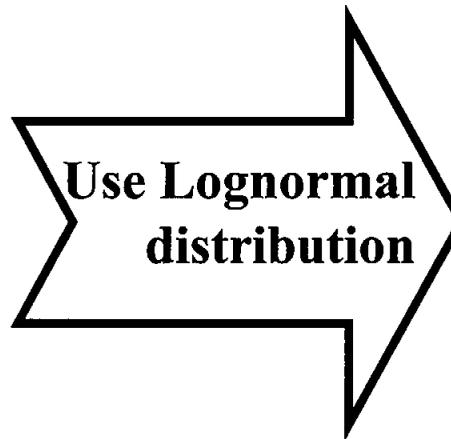


BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 12

**>400 μ
FOD**

**What is the likelihood that a raft of
400 μ or larger is released?**

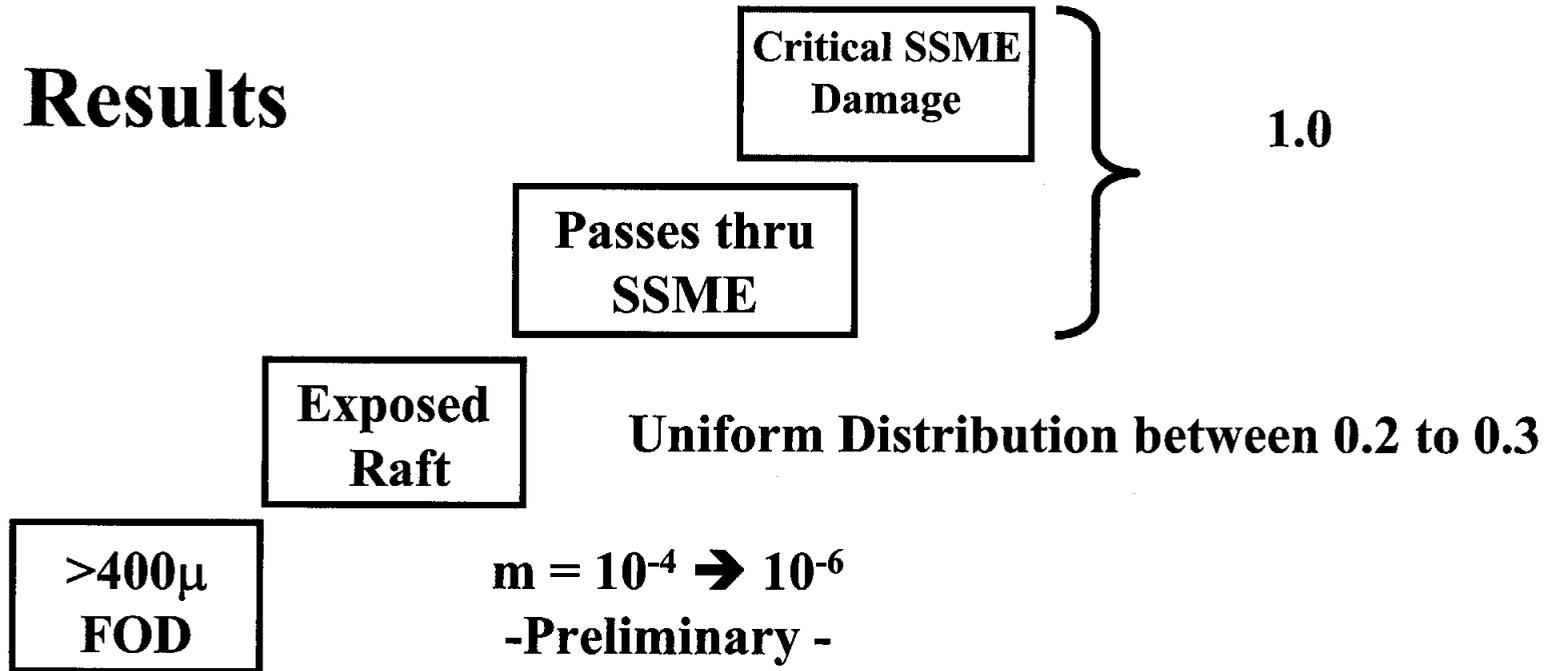
- No known rafts from Vehicle balls.
- 26 rafts out of 125 islands released from test balls.
- 2 Rafts liberated on MRTB after >145 thermal cycles were < 99 percentile.





BSTRA PRA Approach	Presenter Roger Boyer	
	Date 1/6/03	Page 13

Results



Crack Frequency

Mean = 0.22 with an Error Factor of 8



BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 14

Event Sequence Uncertainty

**A chart showing the uncertainty distributions of the
BSTRA Raft Mission Risk showing:**

- Mean
- Median
- 5th
- 95th



BSTRA PRA Approach	Presenter	Roger Boyer
	Date	1/6/03	Page 15

Mission Risk Comparison

Nominal Shuttle Mission Risk (Based on QRAS 2000)

- Ascent
 - Mean ~ 1 in 517 missions
 - Median ~ 1 in 557 missions
 - 5th ~ 1 in 900 missions
 - 95th ~ 1 in 310 missions
- Total Mission Mean ~ 1 in 265 missions

BSTRA Raft Mission Risk

- Mean < 1 in ? missions
- Median < 1 in 200,000 missions
- 5th < 1 in ? missions
- 95th < 1 in 20,000 missions



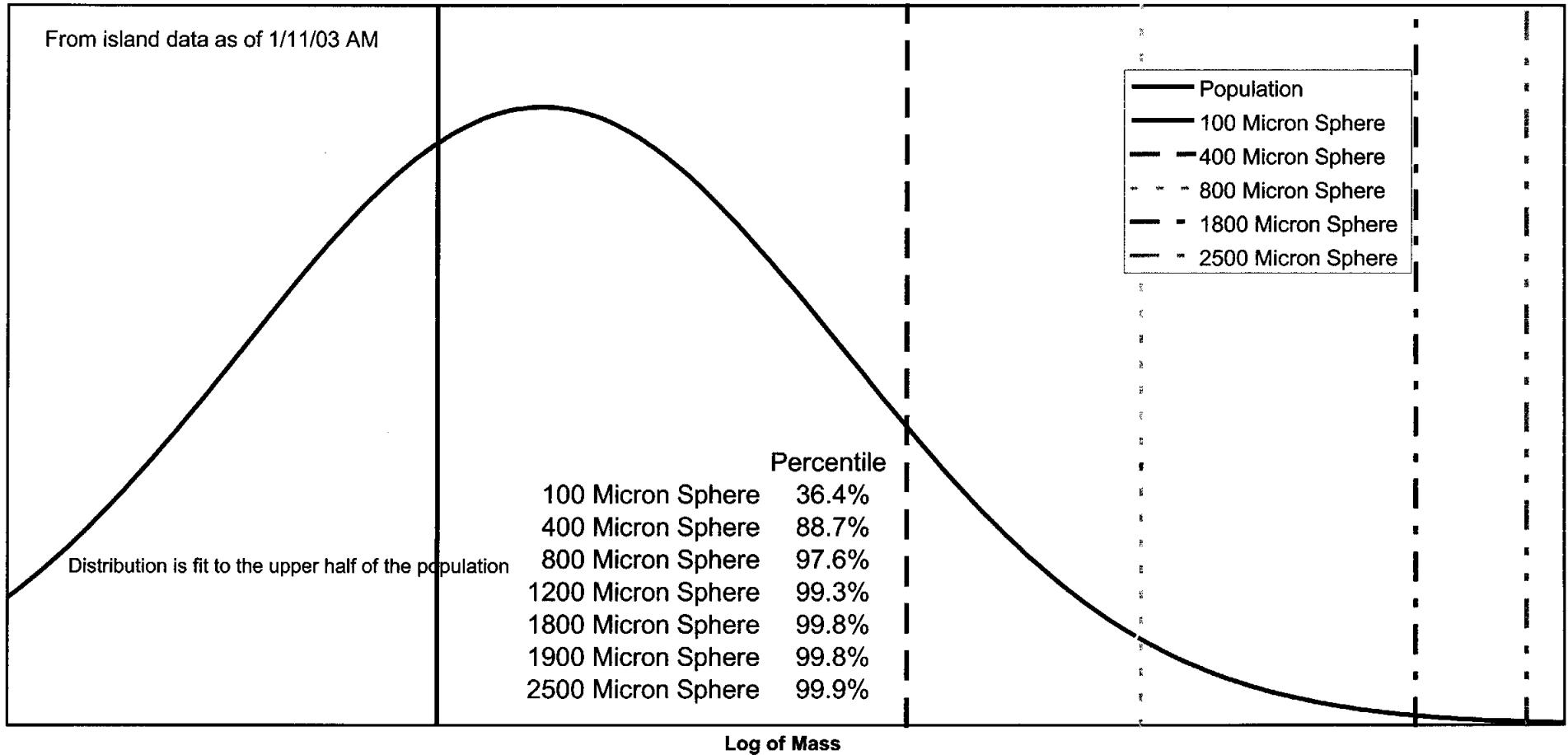
BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/6/03	Page 16

Backup Charts

Test Ball	L (μm)	W (μm)	Raft Data		
			Raft Volume (μm^3)	Area (μm^2)	Mass ($\text{g}\mu\text{m}^3$)
2.24-2	343	86	29,498	2,536,828	2.220E-05
	372	114	42,408	4,834,512	4.232E-05
	143	29	4,147	120,263	1.053E-06
	143	86	12,298	1,057,628	9.257E-06
	143	29	4,147	120,263	1.053E-06
	286	72	20,592	1,482,624	1.298E-05
2.24-1	515	286	147,290	42,124,940	3.687E-04
	143	114	16,302	1,858,428	1.627E-05
	143	114	16,302	1,858,428	1.627E-05
	229	57	13,053	744,021	6.512E-06
	229	114	26,106	2,976,084	2.605E-05
	172	143	24,596	3,517,228	3.079E-05
	257	57	14,649	834,993	7.309E-06
	143	29	4,147	120,263	1.053E-06
	229	143	32,747	4,682,821	4.099E-05
	200	57	11,400	649,800	5.688E-06
	229	114	26,106	2,976,084	2.605E-05
	114	57	6,498	370,386	3.242E-06
	114	57	6,498	370,386	3.242E-06
	429	172	73,788	12,691,536	1.111E-04
	229	72	16,488	1,187,136	1.039E-05
	229	29	6,641	192,589	1.686E-06
	343	86	29,498	2,536,828	2.220E-05
	143	86	12,298	1,057,628	9.257E-06

Test Ball	L (μm)	W (μm)	Raft Data		
			Raft Volume (μm^3)	Area (μm^2)	Mass ($\text{g}\mu\text{m}^3$)
1.75-7	200	143	28,600	4,089,800	3.580E-05
	343	200	68,600	13,720,000	1.201E-04
	200	86	17,200	1,479,200	1.295E-05
	143	57	8,151	464,607	4.067E-06
	114	86	9,804	843,144	7.380E-06
	343	29	9,947	288,463	2.525E-06
	114	86	9,804	843,144	7.380E-06
1.75-2	114	29	3,306	95,874	8.392E-07
	229	86	19,694	1,693,684	1.482E-05
	143	57	8,151	464,607	4.067E-06
	200	57	11,400	649,800	5.688E-06
	200	57	11,400	649,800	5.688E-06
	172	29	4,988	144,652	1.266E-06
	400	172	68,800	11,833,600	1.036E-04
	343	71	24,353	1,729,063	1.513E-05
	200	100	20,000	2,000,000	1.751E-05
	286	100	28,600	2,860,000	2.503E-05
	257	114	29,298	3,339,972	2.923E-05
	257	50	12,850	642,500	5.624E-06

Lognormal Fit of Original Island Estimated Mass



ERMINGER, MARK D. (JSC-NC) (NASA)

From: TIPTON, MICHAEL R. (JSC-NX) (SAIC)
Sent: Monday, January 13, 2003 3:48 PM
To: MARTINEZ, HUGO E. (JSC-NC) (GHG); ERMINGER, MARK D. (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); REISTLE, BRUCE C. (JSC-NC) (SAIC); REDING, JON D. (JSC-DF511) (USA); ALMASRI, WALEED (JSC-REMOTE); BALU, BRIAN K. (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); ENGLE, ROSS K. (JSC-NC) (SAIC); HATAMLEH, OMAR (JSC-NC) (SAIC); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); AUGUSTYN, JOSEPH (JSC-REMOTE); MAYER, FRED F. (JSC-NC) (SAIC); 'Patrick, Roz (MSFC)'; PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); POMPA, EDDIE C. (JSC-NX) (WGI); CUMMINGS, RICHARD A. (JSC-NT) (WGI); GRUSH, GENE R. (JSC-EP111) (NASA)
Subject: FW: OV-103 BSTR A Ball Crack Inspection (preliminary)

The visual borescope of BSTR A 1 and 2 is complete. Number 2 revealed some scratches and marring however no cracks were revealed in either #1 or #2. The 2.25" eddy current and ultrasonic standard made at JSC is being overnigh ted to KSC today. We will receive and check out the standard tomorrow with eddy current. At this time we are awaiting to hear whether or not to proceed with further preparation for remote eddy current inspection.

Thanks
Michael Tipton

-----Original Message-----

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Sunday, January 12, 2003 7:43 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); REISTLE, BRUCE C. (JSC-NC) (SAIC); REDING, JON D. (JSC-DF511) (USA); ALMASRI, WALEED; BALU, BRIAN; CLEMENTS, DANIEL; ENGLE, ROSS; HATAMLEH, OMAR; ISHMAEL, MOHAMED; jaugust0; MAYER, FRED; Patrick, Roz (MSFC); PRINCE, GORMAN; TIPTON, MICHAEL
Subject: OV-103 BSTR A Ball Crack Inspection (preliminary)

In addition to the status provided by Mark below, some interesting findings came in from KSC following the PRCB this evening. After some problems encountered yesterday due to sideloads imparted on the ball by the retracted umbilical, the JSC remote inspection tool was successfully used to rotate the cracked ball on OV-103. It was reported that "almost 100%" inspection was completed. Results so far indicate that the crack runs under the insert and has a length of approximately 180 degrees around but has no apparent branching. The crack does, however, have 3 islands that have been noted, two of which are larger. One of the larger ones (on the order of 1000 microns in length or so) has approximately 30%-50% of the island material missing, it appears. *If* the cracks, islands, and "rafts" are as reported, they are not out of family with what has been generated in the lab. Further characterization will be done tomorrow by allowing the MSFC M&P group (as well as members of the JSC M&P group on TDY at MSFC) to look at it for consistency in documenting the features. In addition, an attempt will be made to view the other two BSTR A balls in the LO2 17-inch line.

Hugo

-----Original Message-----

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Sunday, January 12, 2003 6:30 PM
To: Brown Mark (E-mail); Dever Lea (E-mail); DL SR&QA Standup Notes; Greenfield Michael (E-mail); H - Bihner Bill (E-mail); H - Gregory Fred (E-mail); H - Hill Bill (E-mail); H - Kowaleski Mark (E-mail); H - O'Connor Bryan (E-mail); K - Abbott Robert (E-mail); K - Barnette Jack (E-mail); K - Bartell, Shannon (E-mail); K - Branard John (E-mail); K - Colloredo Lisa (E-mail); K - Delgado Hector (E-mail); K - Fairey, Chris (E-mail); K - Franca Chuck (E-mail); K - Gawronski Anne (Logistics) (E-mail); K - Glenn Malcolm (E-mail); K - Gross Sue (E-mail); K - Higgins, Bill (E-mail); K - Kinnan Mike (E-mail); K - Kleinschmidt Jane (Roy Bridges) (E-mail); K - McCombs John (E-mail); K - Myers Penny (Shriver) (E-mail); K - Pinch Sue (E-mail); K - Ridgway Leslie (MK) (E-mail); K - Scaltsas Dick (E-mail); K - Stagman, Jenny (E-mail); K - Stevens Alfred (USA) (E-mail); K - Tilley Randy (E-mail); K - Wetmore Mike (E-mail); K - Willingham, Terry (E-mail); M - Adams Alex (E-mail); M - Balko Laura (E-mail); M - Cianciola Chris (E-mail); M - Cowart Chris (E-mail); M - Grant Regina; M - Hartline Tom (E-mail); M - Hill Chris (E-mail); M - Kennedy Mike (E-mail); M - King Dave (E-mail); M - Martin Leigh (E-mail); M - McMullins Margaret; M - Metts Linder (E-mail); M - Moorhead James (E-mail); M - Mullane Dan (E-mail); M - Smiles, Mike (E-mail); M - Spacek David (E-mail); M - Teehan Paul (E-mail); M - Walker Angelia (E-mail); M - Weathers Shelby (E-mail); M - Yell Dena (E-mail); R - Hashimoto Rick (E-mail); Searcy Sam (E-mail); SR&QA MER Console; Trahan Melanie (E-mail);

Subject: U - Gedies Robert (E-mail)
Special PRCB on BSTR A Ball Cracks Results

We will proceed toward L-2 on Tuesday 1/14. This will provide some additional shelf life on what we have so far.

There is some additional testing in work and those results will be reported at L-2

The PRA shows this is a low risk but Ron would like additional review on the PRA prior to L-2

ERMINGER, MARK D. (JSC-NC) (NASA)

From: JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Sent: Tuesday, January 14, 2003 9:01 AM
To: MARSHALL, YOLANDA Y. (JSC-NA) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: FW: PRA Charts

I will be participating in a telecon at 9:00 am with Dr. Stamatelatos to discuss his final assessment of the PRA analysis. We don't anticipate any major surprises. I called over to the SSP integration office this morning, and they are in agreement with Rogers numbers.

-----Original Message-----

From: BOYER, ROGER L. (JSC-NC) (SAIC)
Sent: Tuesday, January 14, 2003 8:48 AM
To: 'David.A.Rigby2@boeing.com'
Cc: JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); STEWART, MICHAEL A. (JSC-NC) (SAIC); 'Rogers, Jim'
Subject: PRA Charts

David,

The SR&QA PRA team met with Engineering yesterday and performed our own internal review of our assessment over the weekend. We couldn't duplicate and justify one of our calculations supporting our weekend assessment. We've revised the analysis with what both Engineering and SR&QA can support. In a nutshell, it looks like the calculated risk mean value will rise from 1 in 70,000 to about 1 in 15,000. Please note that we both believe these numbers to be conservative based on no credit taken for the SSME design. For example, this assessment is based on only one 400 μ particle reaching the SSMEs and resulting in LOCV versus the 100 400 μ particles accumulating on a single injector to block the flow.

Please let me know if you have any questions. I will be attending the 10:00 with Fred this morning to answer any questions you or the board may have.

Also note that the Shuttle Integration Office and HQ's PRA Agency Manager (Dr. Michael Stamatelatos) are reviewing this work in parallel.

Roger Boyer
Manager, Shuttle Analysis
JSC Safety, Reliability, & Quality Assurance
(281) 483-6070
rlboyer@ems.nasa.jsc.gov

ERMINGER, MARK D. (JSC-NC) (NASA)

From: JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Sent: Tuesday, January 14, 2003 10:02 AM
To: MARSHALL, YOLANDA Y. (JSC-NA) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: FW: PRA Charts

In case you can't open these charts, here's the latest and greatest numbers that Roger will be submitting to Ralph. Again, keep in mind this is based on one particle greater than 400 microns causing catastrophic failure (does not take any credit for engine design capability).

Mean: ~ 1 in 14,000
Median: ~ 1 in 30,000
5th: ~ 1 in 262,000
95th: ~ 1 in 4000

as compared to what was presented Sunday:

Mean: ~ 1 in 70,000
Median: ~ 1 in 200,000
5th: not presented
95th: ~ 1 in 20,000

-----Original Message-----

From: BOYER, ROGER L. (JSC-NC) (SAIC)
Sent: Tuesday, January 14, 2003 9:37 AM
To: 'David.A.Rigby2@boeing.com'
Cc: JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); STEWART, MICHAEL A. (JSC-NC) (SAIC); 'Rogers, Jim'
Subject: RE: PRA Charts

David,

Here are the revised charts as promised.



BSTRA-PRA-PRCB
Charts-13.ppt

Roger

-----Original Message-----

From: BOYER, ROGER L. (JSC-NC) (SAIC)
Sent: Tuesday, January 14, 2003 8:48 AM
To: 'David.A.Rigby2@boeing.com'
Cc: JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC); BALU, BRIAN K. (JSC-NC) (SAIC); CAZES, DAVID (JSC-NA) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); STEWART, MICHAEL A. (JSC-NC) (SAIC); 'Rogers, Jim'
Subject: PRA Charts

David,

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numbers to be conservative based on no credit taken for the SSME design. For example, this assessment is based on only one 400 μ particle reaching the SSMEs and resulting in LOCV versus the 100 400 μ particles accumulating on a single injector to block the flow.

Please let me know if you have any questions. I will be attending the 10:00 with Fred this morning to answer any questions you or the board may have.

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Roger Boyer
Manager, Shuttle Analysis
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(281) 483-6070
rlboyer@ems.nasa.jsc.gov



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/13/03	Page 1

BSTRA Probabilistic Risk Assessment (PRA) STS-107

JSC SR&QA

**Roger Boyer
Hugo Martinez
Tim Schick**

MSFC S&MA

**Jim Rogers
Ken Johnson**



BSTRA PRA Approach	Presenter Roger Boyer	
	Date 1/13/03	Page 2

**Event
Sequence**

**Passes thru
SSME**

**Critical SSME
Damage**

} **Assumed to
occur**

**Exposed
Raft**

**What is the likelihood that a raft is
exposed to the flow?**

**>400 μ
FOD**

**What is the likelihood that a raft
of 400 μ or larger is released?**

**Raft
Generated**

**What is the likelihood that a raft
can be generated?**

**Crack
Frequency**

What is the likelihood of having a crack per mission?



BSTRA PRA Approach	Presenter	Roger Boyer	
	Date	1/13/03	Page 3

Mission Risk Comparison

Nominal Shuttle Mission Risk (Based on QRAS 2000)

•Ascent

- Mean ~ 1 in 517 missions
- Median ~ 1 in 556 missions
- 5th ~ 1 in 900 missions
- 95th ~ 1 in 310 missions

•Total Mission

Mean ~ 1 in 265 missions

BSTRA Raft Mission Risk (assumes no credit for SSME design)

- Mean ~ 1 in 14,000 missions
- Median ~ 1 in 30,000 missions
- 5th ~ 1 in 262,000 missions
- 95th ~ 1 in 4000 missions

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Tuesday, January 14, 2003 12:20 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Subject: BSTRA Status

Results from our latest BSTRA meeting with Ralph:

- New data still all in family
- Reviewed additional stress assessments and found acceptable
- Updated some testing numbers in the presentation
- Revised the charts for export control
- Consolidated the MSFC charts
- Reviewed and agreed upon Roger's new PRA numbers which are now:
 - Mean = 1 in 14K missions
 - Median = 1 30 K
 - 5th = 1 in 262K
 - 95th = 1 in 4K
- We're OK

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Tuesday, January 14, 2003 7:00 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: BSTRA Ball Offset Crack

The team has discussed the offset crack issue that was brought up in the L-2 meeting. One side of the crack in one of the test balls at MSFC is offset by about 1 mil. There is a minimum of 0.5 mil of Vitrolube on the ball and on the cups. After much discussion, it was concluded that the 1 mil step that we have seen is probably the upper bound of a step since the ball was cracked by thermocycles without being constrained by cups; i.e., unlike the flight vehicles. Contact by the raised side of the crack on one cup would be relieved by the freedom of the other cup. Even though the balls are known to be extremely hard, the metalurgists believe that there is enough elasticity that the cups would squeeze the raised side of the crack to where there would be minimal, if any, gouging. The vitrolube is very brittle and will turn to powder when scraped.

The folks are off writing the story down on charts which we will review with Ralph at 6:30 AM CST tomorrow morning in preparation for the 8:00 AM CST L-1.

This story doesn't have much "shelf life". I hope the metalurgists are right, and I hope we have thought of all the scenerios.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Wednesday, January 15, 2003 6:27 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: RE: BSTRA Ball Offset Crack

Not really. I think there was an HB ball that had a 0.5 mil step that was tested with cups and didn't show any signs of witness marks, but it didn't have any Vitrolube, and was a smaller step.

If you'd like to listen this morning, you can call 877 987 0469 pc 692086.

-----Original Message-----

From: ERMINGER, MARK D. (JSC-NC) (NASA)
Sent: Tuesday, January 14, 2003 8:38 PM
To: BROWNE, DAVID M. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: RE: BSTRA Ball Offset Crack

Have they verified the relief by any kind of test?

-----Original Message-----

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Tuesday, January 14, 2003 5:00 PM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: BSTRA Ball Offset Crack

The team has discussed the offset crack issue that was brought up in the L-2 meeting. One side of the crack in one of the test balls at MSFC is offset by about 1 mil. There is a minimum of 0.5 mil of Vitrolube on the ball and on the cups. After much discussion, it was concluded that the 1 mil step that we have seen is probably the upper bound of a step since the ball was cracked by thermocycles without being constrained by cups; i.e., unlike the flight vehicles. Contact by the raised side of the crack on one cup would be relieved by the freedom of the other cup. Even though the balls are known to be extremely hard, the metalurgists believe that there is enough elasticity that the cups would squeeze the raised side of the crack to where there would be minimal, if any, gouging. The vitrolube is very brittle and will turn to powder when scraped.

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ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Wednesday, January 15, 2003 6:28 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: FW: Charts for BSTRA "Step" Assessment



BSTRA_Large_Ste
p_21.ppt

-----Original Message-----

From: Mulholland, John P [mailto:john.p.mulholland@boeing.com]
Sent: Wednesday, January 15, 2003 6:18 AM
To: Dunham, Michael J; Rigby, David A; ROE, RALPH R. (JSC-MV) (NASA); Reith, Timothy W; Martingano, Trina A; Burghardt, Michael J; Christensen, Scott V; Curtis, Cris; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); APPLEWHITE, JOHN (JSC-EP) (NASA); BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); GRUSH, GENE R. (JSC-EP111) (NASA); JACOBS, JEREMY B. (JSC-ES4) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); EXT-Madera, Pamela L; OUELLETTE, FRED A. (JSC-MV6) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); EXT-White, Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve; Peller, Mark E; Pickens, Mark S; Saluter, Brett; Snyder, Mike; Stefanovic, Mike; Young, Mike; Paul Munafa (E-mail); alison.dinsel-1@ksc.nasa.gov; srigby@houston.rr.com; myoung10@cfl.rr.com; RINGO, LESLIE A. (JSC-CB) (USA); ANTONELLI, DOMINIC A. (JSC-CB) (NASA); MELCHER, JOHN C. (JSC-DF55) (NASA); Collins, Thomas E; BENNETT, JAY E. (JSC-ES4) (NASA); Rick Russell (E-mail); MAYEAUX, BRIAN M. (JSC-ES4) (NASA); Lubas, Dave L; Solomon, Marcella; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); MARTINEZ, HUGO E. (JSC-NC) (GHG); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); LANE, WILLIAM F. (JSC-DF) (NASA); pelbg@ghg.net; Don Blank (E-mail); Cris Curtis (E-mail); HERNANDEZ, JOSE M. (JSC-ES4) (NASA); Steven J. Gentz (E-mail); DINSEL, ALISON J. (JSC-ES5) (NASA); Lagart99@aol.com; linda.combs@usahq.unitedspacealliance.com; Hirakawa, Earl M; ROCHA, ALAN R. (RODNEY) (JSC-ES2) (NASA); Rick Russell (E-mail); Charlie Abner (E-mail); Stenger-Nguyen, Polly; Linda Combs (E-mail); Don Blank (E-mail); Beil, Bob; Joh Cowart (E-mail)
Cc: EXT-White, Doug; James Wilder (E-mail)
Subject: RE: Charts for BSTRA "Step" Assessment

Couple of typos fixed

-----Original Message-----

From: Dunham, Michael J
Sent: Tuesday, January 14, 2003 8:32 PM
To: Rigby, David A; 'ROE, RALPH R. (JSC-MV) (NASA)'; Reith, Timothy W; Martingano, Trina A; Burghardt, Michael J; Christensen, Scott V; 'Curtis, Cris'; 'ALBRIGHT, JOHN D. (JSC-EP4) (NASA)'; 'ALLISON, RONALD L. (JSC-MV6) (NASA)'; 'APPLEWHITE, JOHN (JSC-EP) (NASA)'; 'BAIRD, R. S. (SCOTT) (JSC-EP) (NASA)'; 'BROWNE, DAVID M. (JSC-NC) (NASA)'; 'GRUSH, GENE R. (JSC-EP111) (NASA)'; 'JACOBS, JEREMY B. (JSC-ES4) (NASA)'; 'KRAMER, JULIE A. (JSC-EA4) (NASA)'; EXT-Madera, Pamela L; 'OUELLETTE, FRED A. (JSC-MV6) (NASA)'; 'TEMPLIN, KEVIN C. (JSC-MV6) (NASA)'; EXT-White, Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve; Mulholland, John P; Peller, Mark E; Pickens, Mark S; 'Saluter, Brett'; 'Snyder, Mike'; 'Stefanovic, Mike'; 'Young, Mike'; 'Paul Munafa (E-mail)'; 'alison.dinsel-1@ksc.nasa.gov'; 'srigby@houston.rr.com';

'myoung10@cfl.rr.com'; 'RINGO, LESLIE A. (JSC-CB) (USA)'; 'ANTONELLI,
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Abner (E-mail)'; Stenger-Nguyen, Polly; 'Linda Combs (E-mail)'; 'Don
Blank (E-mail)'; 'Beil, Bob'
Cc: EXT-White, Doug; 'James Wilder (E-mail)'; Mulholland, John P; 'Mike
Leinbach (E-mail)'
Subject: Charts for BSTR "Step" Assessment

Michael J. Dunham
Boeing/Orbiter SSM - Stress, Loads and Dynamics
(281)-853-1697
(281)-853-1525 (Fax)
(281)-621-1924 (Pager)

-----Original Message-----

From: Rigby, David A
Sent: Tuesday, January 14, 2003 4:32 PM
To: Rigby, David A; 'ROE, RALPH R. (JSC-MV) (NASA)'; Reith, Timothy W;
Martingano, Trina A; Burghardt, Michael J; Christensen, Scott V;
'Curtis, Cris'; Dunham, Michael J; 'ALBRIGHT, JOHN D. (JSC-EP4) (NASA)';
'ALLISON, RONALD L. (JSC-MV6) (NASA)'; 'APPLEWHITE, JOHN (JSC-EP)
(NASA)'; 'BAIRD, R. S. (SCOTT) (JSC-EP) (NASA)'; 'BROWNE, DAVID M.
(JSC-NC) (NASA)'; 'GRUSH, GENE R. (JSC-EP111) (NASA)'; 'JACOBS, JEREMY
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Pamela L; 'OUELLETTE, FRED A. (JSC-MV6) (NASA)'; 'TEMPLIN, KEVIN C.
(JSC-MV6) (NASA)'; 'WAGNER, HOWARD A., PHD (JSC-EP) (NASA)'; EXT-White,
Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve; Mulholland,
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Blank (E-mail)'; 'Beil, Bob'
Cc: EXT-White, Doug; 'James Wilder (E-mail)'; Mulholland, John P; 'Mike
Leinbach (E-mail)'
Subject: RE: 4:30 central telecon for STS-107 flight rationale.

charts attached.

dr

-----Original Message-----

From: Rigby, David A

Sent: Tuesday, January 14, 2003 3:40 PM

To: 'ROE, RALPH R. (JSC-MV) (NASA)'; Reith, Timothy W; Martingano, Trina A; Burghardt, Michael J; Christensen, Scott V; 'Curtis, Cris'; Dunham, Michael J; 'ALBRIGHT, JOHN D. (JSC-EP4) (NASA)'; 'ALLISON, RONALD L. (JSC-MV6) (NASA)'; 'APPLEWHITE, JOHN (JSC-EP) (NASA)'; 'BAIRD, R. S. (SCOTT) (JSC-EP) (NASA)'; 'BROWNE, DAVID M. (JSC-NC) (NASA)'; 'GRUSH, GENE R. (JSC-EP111) (NASA)'; 'JACOBS, JEREMY B. (JSC-ES4) (NASA)'; 'KRAMER, JULIE A. (JSC-EA4) (NASA)'; EXT-Madera, Pamela L; 'OUELLETTE, FRED A. (JSC-MV6) (NASA)'; 'TEMPLIN, KEVIN C. (JSC-MV6) (NASA)'; 'WAGNER, HOWARD A., PHD (JSC-EP) (NASA)'; EXT-White, Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve; Mulholland, John P; Peller, Mark E; Pickens, Mark S; 'Saluter, Brett'; 'Snyder, Mike'; 'Stefanovic, Mike'; 'Young, Mike'; 'Paul Munafo (E-mail)'; 'alison.dinsel-1@ksc.nasa.gov'; 'srigby@houston.rr.com'; 'myoung10@cfl.rr.com'; 'RINGO, LESLIE A. (JSC-CB) (USA)'; 'ANTONELLI, DOMINIC A. (JSC-CB) (NASA)'; 'MELCHER, JOHN C. (JSC-DF55) (NASA)'; Collins, Thomas E; 'BENNETT, JAY E. (JSC-ES4) (NASA)'; 'Rick Russell (E-mail)'; 'MAYEAUX, BRIAN M. (JSC-ES4) (NASA)'; Lubas, Dave L; Solomon, Marcella; 'PREVETT, DONALD E. (DON) (JSC-EP) (NASA)'; EXT-Martinez, Hugo E; 'SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA)'; 'SHACK, PAUL E. (JSC-EA42) (NASA)'; 'LANE, WILLIAM F. (JSC-DF) (NASA)'; 'pelbg@ghg.net'; 'Don Blank (E-mail)'; 'Cris Curtis (E-mail)'; 'HERNANDEZ, JOSE M. (JSC-ES4) (NASA)'; 'Steven J. Gentz (E-mail)'; 'DINSEL, ALISON J. (JSC-ES5) (NASA)'; 'Lagart99@aol.com'; 'linda.combs@usahq.unitedspacealliance.com'; Hirakawa, Earl M; 'ROCHA, ALAN R. (RODNEY) (JSC-ES2) (NASA)'; 'Rick Russell (E-mail)'; 'Charlie Abner (E-mail)'; Stenger-Nguyen, Polly; 'Linda Combs (E-mail)'; 'Don Blank (E-mail)'; 'Beil, Bob'

Cc: EXT-White, Doug; 'James Wilder (E-mail)'; Mulholland, John P; 'Mike Leinbach (E-mail)'

Subject: 4:30 central telecon for STS-107 flight rationale.

We will get together at 4:30 central today to talk about the crack vertical offset data and flight rationale.

877 987 0469 pc 692086

dr

Regards,

David Rigby
Boeing MPS
(281) 282-6118

**BSTRA Ball -
Assessment of Crack Offset/Step**

Jan 14, 2003

M. Dunham

Background

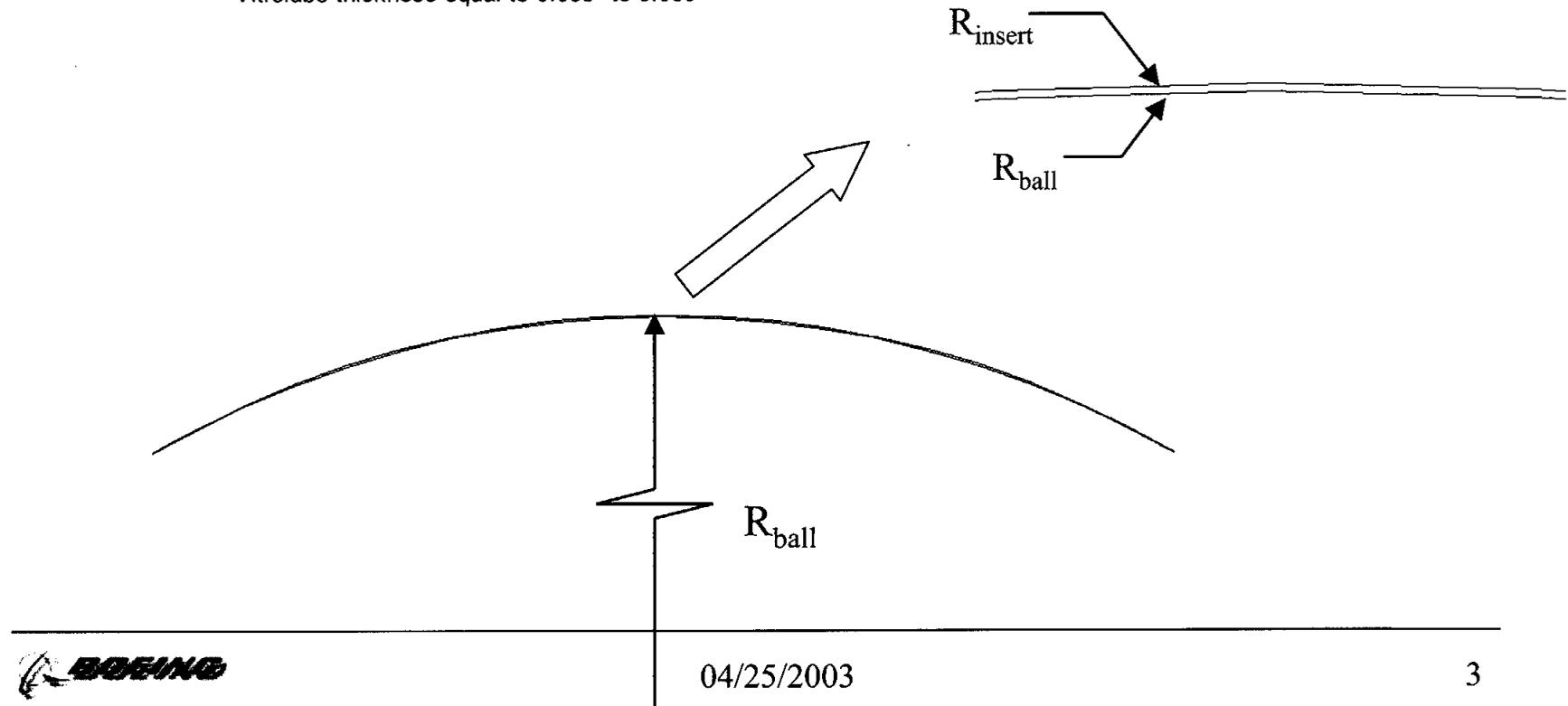
- **Traction test was run on 2.24” severely cracked ball (HB#2a) with 0.450mil “step” with no increase in friction compared to uncracked ball**
 - Within the original criteria of 0.500mil
- **Subsequently, a 1.75” severely cracked ball was identified as having 0.970mil step**
 - Ball cannot be tested as it was destructively sectioned
- **BSTRA ball and insert (aka cup) are both treated with a baked-on coating of Vitrolube for lubrication**
 - Each side has 0.5 to 0.9mil of Vitrolube
- **Ball and insert have closely matched diameters with gap almost completely filled with Vitrolube**
 - Edge of cup has a minimum of 10mil radius
- **BSTRA team looked at range of expected step values**
 - Increasing criteria from .5mil to 2mil considered sufficient to cover maximum step

Ball/Insert Dimensioning Provides Very Tight Fit

System	Line Type	Ball Diameter	Insert Diameter	Max Gap w/o Vitrolube	Min Gap w/o Vitrolube	Max Gap w/ Vitrolube	Min Gap w/ Vitrolube
LOX	I	2.2400	2.2435	0.0037	0.0032	0.0017	-0.0004
		2.2398	2.2432				
LOX	II, III, IV	1.7500	1.7535	0.0037	0.0032	0.0017	-0.0004
		1.7498	1.7532				
LH2	I, II, III, IV	1.2500	1.2535	0.0037	0.0032	0.0017	-0.0004
		1.2498	1.2532				

Note

Vitrolube thickness equal to 0.005" to 0.009"



Kinematics of BSTRA Joint

- **Rotation of joint can be achieved by sliding on either cup side**
 - Slip will occur normally on side with lower friction
 - Increasing friction on one surface only should not interfere with function
- **Angulation of joint occurs only along “longitude” lines**
 - Torsional motion is restrained by bellows
 - Cracks (with steps) that are aligned with longitude should provide minimal erosion or friction
- **Crack step must be oriented UNDER the cup to affect friction**
- **Or, step must bear against edge of cup**
 - Minimum edge radius should prevent step in open “equator” from hanging up cup

Crack Considerations

- **Maximum offset or step height is expected away from crack tips – not a constant height**
 - Between tips, especially near initiation point, is where crack is deepest, widest
 - Tips have continuity of material just beyond tip to minimize step
- **Test crack steps are considered reasonable upper bound**
 - Severe, deep cracking performed outside of cups
 - ◆ Cups produce smaller, shallower cracks and provide constraint against excessive step height
- **Compressive forces normally found between tight fit cup and ball will be concentrated on higher side of step at a discontinuity**
 - Elastic deformation will tend to close the crack and move toward smooth surface

Material Considerations

- **FOD Liberation**

- Reason we are seeing fines at the crack face may be due to this offset.
- Mechanism for FOD generation does not change

- **Material properties of Vitrolube**

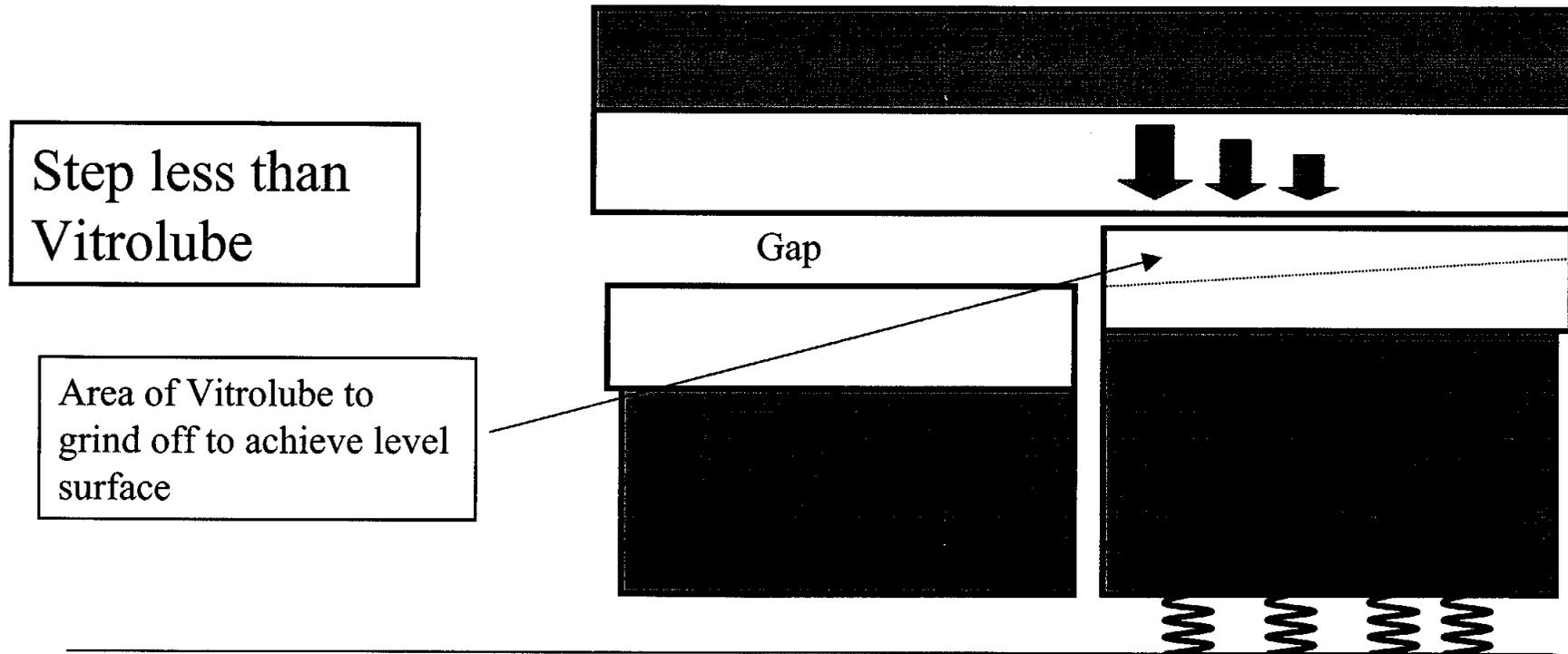
- Glass material applied at high temperature
 - ◆ Cracks with the ball
- May grind off in very small pieces (no flaking), does not flow like plastic
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ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Wednesday, January 15, 2003 7:23 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: Step Discussion

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I can't argue with the story, so our recommendation will be to proceed at the L-1 this morning.

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Wednesday, January 15, 2003 7:25 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
Subject: RE: Step Discussion

Slightly revised charts for L-1



BSTRA_Large_Ste
p_21.ppt

-----Original Message-----

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Sent: Wednesday, January 15, 2003 7:23 AM
To: ERMINGER, MARK D. (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA)
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**BSTRA Ball -
Assessment of Crack Offset/Step**

Jan 14, 2003

M. Dunham

Background

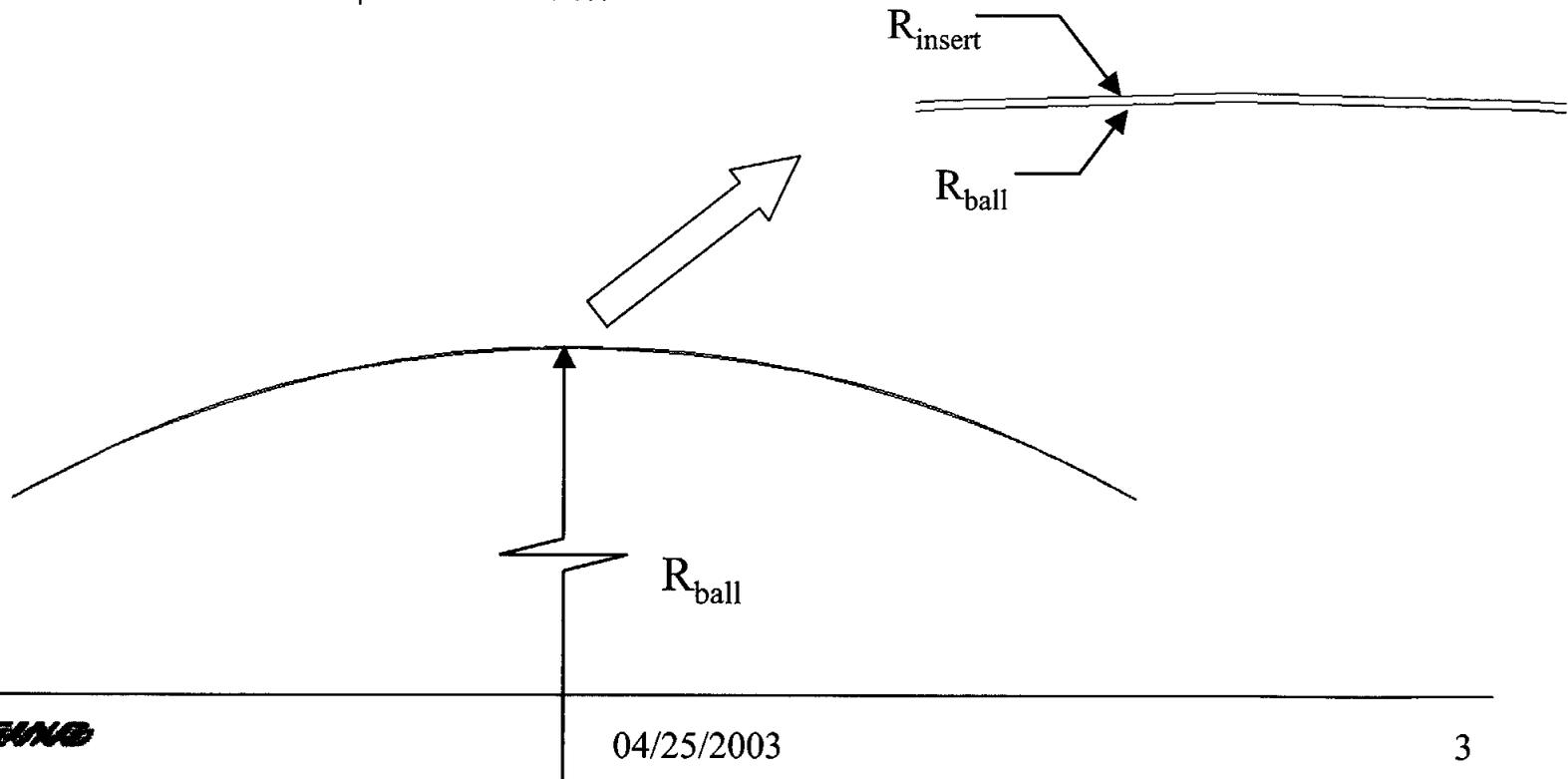
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 - Each side has 0.5 to 0.9mil of Vitrolube
- **Ball and insert have closely matched diameters with gap almost completely filled with Vitrolube**
 - Edge of cup has a minimum of 10mil radius
- **BSTRA team looked at range of expected step values**
 - Increasing criteria from .5mil to 2mil considered sufficient to cover maximum step

Ball/Insert Dimensioning Provides Very Tight Fit

System	Line Type	Ball Diameter	Insert Diameter	Max Gap w/o Vitrolube	Min Gap w/o Vitrolube	Max Gap w/ Vitrolube	Min Gap w/ Vitrolube
LOX	I	2.2400 2.2398	2.2435 2.2432	0.0037	0.0032	0.0017	-0.0004
	II, III, IV	1.7500 1.7498	1.7535 1.7532	0.0037	0.0032	0.0017	-0.0004
LH2	I, II, III, IV	1.2500 1.2498	1.2535 1.2532	0.0037	0.0032	0.0017	-0.0004

Note

Vitrolube thickness equal to 0.005" to 0.009"



Kinematics of BSTRA Joint

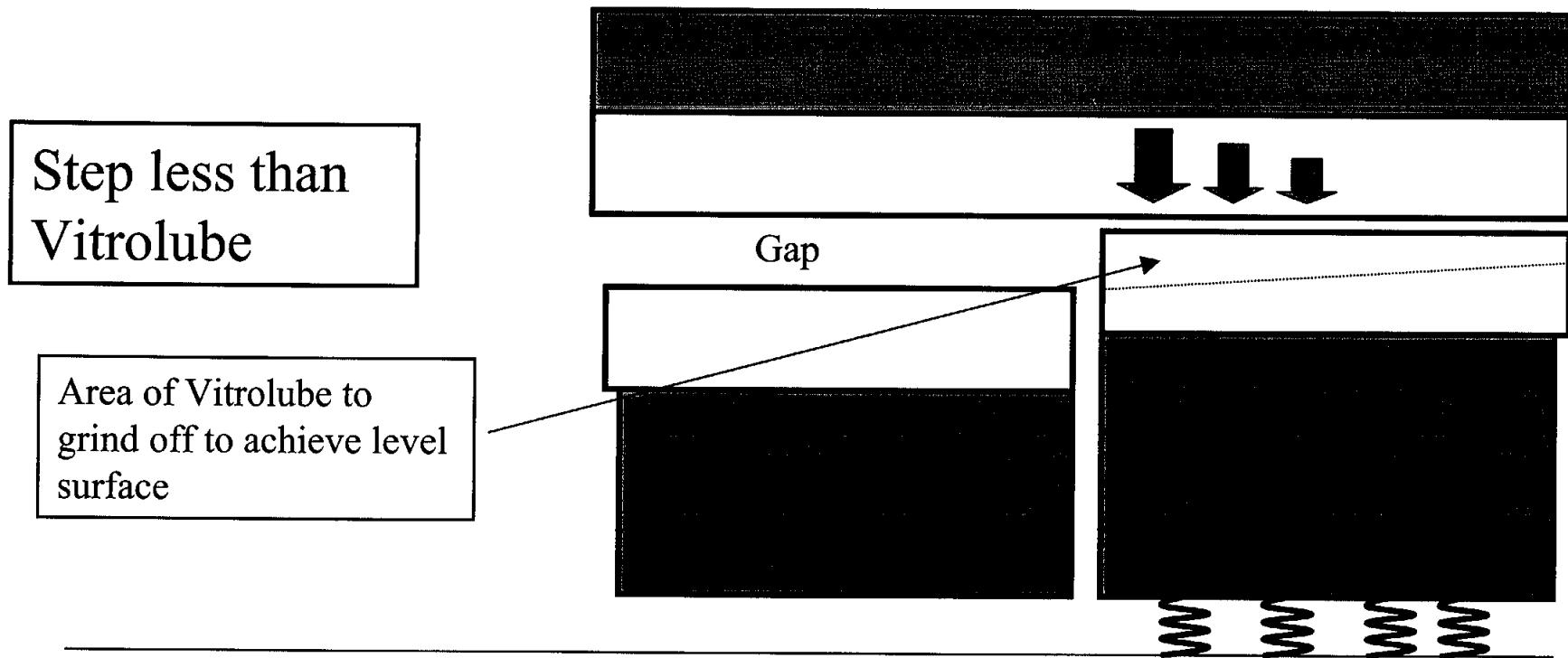
- **Rotation of joint can be achieved by sliding on either cup side**
 - Slip will occur normally on side with lower friction
 - Increasing friction on one surface only will not interfere with function
- **Angulation of joint occurs only along “longitude” lines**
 - Torsional motion is restrained by bellows
 - Cracks (with steps) that are aligned with longitude will provide minimal erosion or friction
- **Crack step must be oriented UNDER the cup to affect friction**
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 - Minimum edge radius should prevent step in open “equator” from hanging up cup

Crack Considerations

- **Maximum offset or step height is expected away from crack tips – not a constant height**
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- **Test crack steps are considered reasonable upper bound**
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 - ◆ **Cups produce smaller, shallower cracks and provide constraint against excessive step height**
- **Compressive forces normally found between tight fit cup and ball will be concentrated on higher side of step at a discontinuity**
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Material Considerations

- **FOD Liberation**

- Reason we are seeing fines at the crack face may be due to this offset.
- Mechanism for FOD generation does not change

- **Material properties of Vitrolube**

- Glass material applied at high temperature
 - ◆ Cracks with the ball
- May grind off in very small pieces (no flaking), does not flow like plastic
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ERMINGER, MARK D. (JSC-NC) (NASA)

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Wednesday, January 15, 2003 7:47 AM
To: HATAMLEH, OMAR (JSC-NC) (SAIC); ALMASRI, WALEED (JSC-REMOTE); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); CLEMENTS, DANIEL L. (JSC-NC) (GHG); BALU, BRIAN K. (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Subject: L-1 Charts for BSTR A "Step" Assessment



BSTR A_Large_Ste
p_21.ppt

Yet another issue came up yesterday: that of a step on a test ball that exceeded the Vitrolube thickness. Earlier in the MSFC ball test program, a step of .180 mils had been assessed as acceptable because it was much thinner than the minimum Vitrolube thickness of 1.0 mil. Rationale includes the fact that the test ball was cracked by a more severe thermal gradient, that the ball was unrestrained when it cracked, and that friction forces are expected to be too low to bind the joint for a step of up to 2 mils. SRQA voiced their concerns in a meeting this morning with Ralph Roe that the problem has had very little shelf life to work and that it was mostly a qualitative assessment (i.e., no friction forces for the known loads were calculated). SRQA concurred that it is an acceptable worst-case condition if it exists on OV-102, STS-107. Some additional tests are in work at MSFC that may further support flight rationale, although these are not considered a constraint.

-----Original Message-----

From: Mulholland, John P [mailto:john.p.mulholland@boeing.com]
Sent: Wednesday, January 15, 2003 7:15 AM
To: Mulholland, John P; Dunham, Michael J; Rigby, David A; ROE, RALPH R. (JSC-MV) (NASA); Reith, Timothy W; Martingano, Trina A; Burghardt, Michael J; Christensen, Scott V; 'Curtis, Cris'; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); APPLEWHITE, JOHN (JSC-EP) (NASA); BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); GRUSH, GENE R. (JSC-EP111) (NASA); JACOBS, JEREMY B. (JSC-ES4) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); EXT-Madera, Pamela L; OUELLETTE, FRED A. (JSC-MV6) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); EXT-White, Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve; Peller, Mark E; Pickens, Mark S; 'Saluter, Brett'; 'Snyder, Mike'; 'Stefanovic, Mike'; 'Young, Mike'; 'Paul Munafo (E-mail)'; 'alison.dinsel-1@ksc.nasa.gov'; 'srigby@houston.rr.com'; 'myoung10@cfl.rr.com'; RINGO, LESLIE A. (JSC-CB) (USA); ANTONELLI, DOMINIC A. (JSC-CB) (NASA); MELCHER, JOHN C. (JSC-DF55) (NASA); Collins, Thomas E; BENNETT, JAY E. (JSC-ES4) (NASA); 'Rick Russell (E-mail)'; MAYEAUX, BRIAN M. (JSC-ES4) (NASA); Lubas, Dave L; Solomon, Marcella; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); MARTINEZ, HUGO E. (JSC-NC) (GHG); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); LANE, WILLIAM F. (JSC-DF) (NASA); 'pelbg@ghg.net'; 'Don Blank (E-mail)'; 'Cris Curtis (E-mail)'; HERNANDEZ, JOSE M. (JSC-ES4) (NASA); 'Steven J. Gentz (E-mail)'; DINSEL, ALISON J. (JSC-ES5) (NASA); 'Lagart99@aol.com'; 'linda.combs@usahq.unitedspacealliance.com'; Hirakawa, Earl M; ROCHA, ALAN R. (RODNEY) (JSC-ES2) (NASA); 'Rick Russell (E-mail)'; 'Charlie Abner (E-mail)'; Stenger-Nguyen, Polly; 'Linda Combs (E-mail)'; 'Don Blank (E-mail)'; 'Beil, Bob'; 'Joh Cowart (E-mail)'; Joh Cowart (E-mail)
Cc: EXT-White, Doug; 'James Wilder (E-mail)'; 'launch-int@usago.ksc.nasa.gov'
Subject: RE: Charts for BSTR A "Step" Assessment

Orbiter L-1 Charts

**BSTRA Ball -
Assessment of Crack Offset/Step**

Jan 14, 2003

M. Dunham

Background

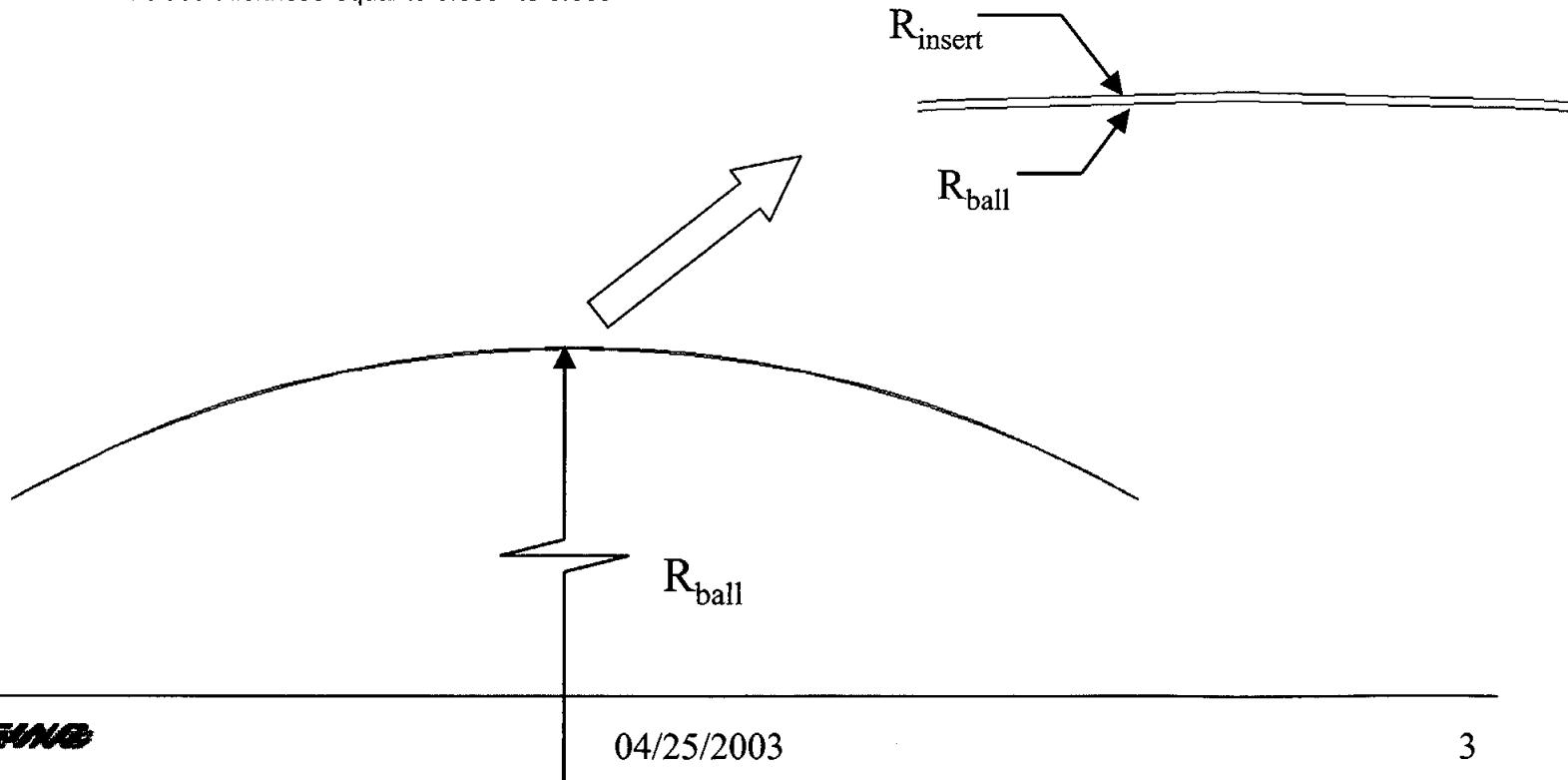
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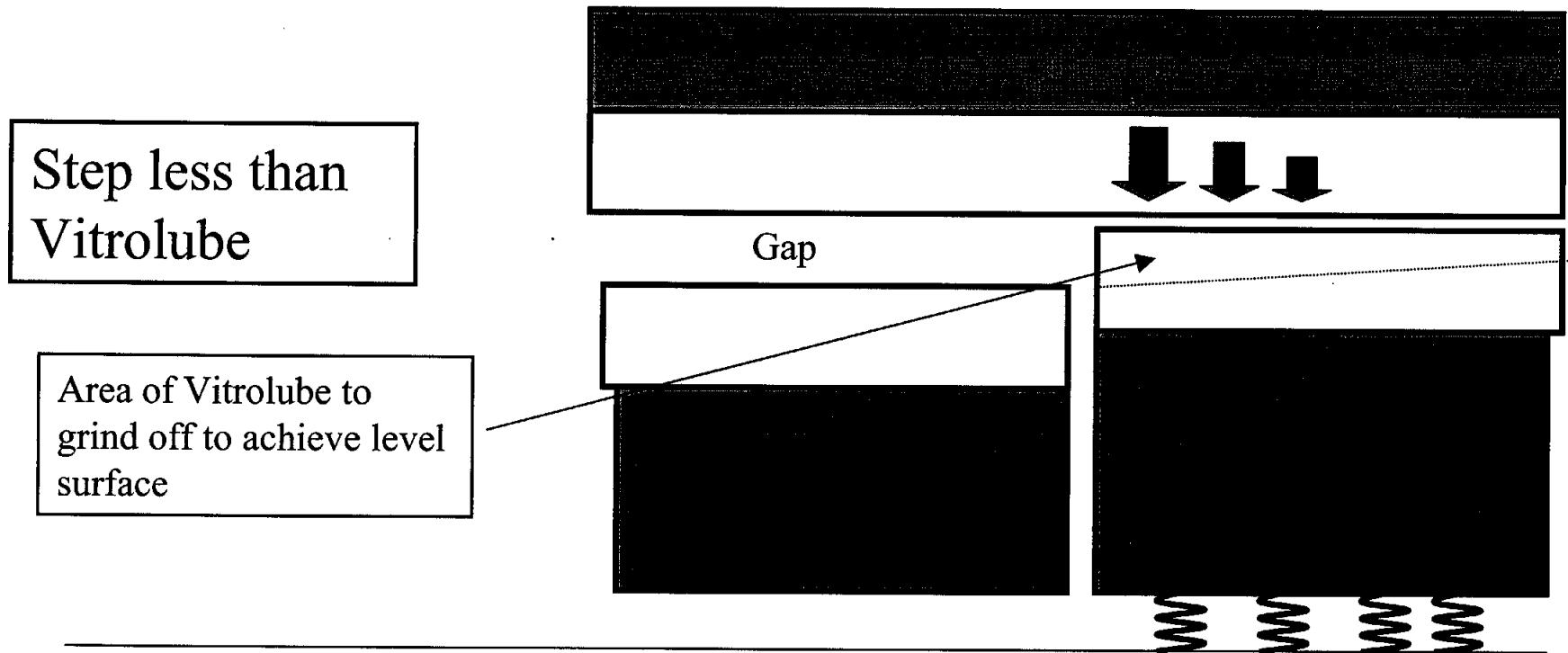
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Sent: Wednesday, January 15, 2003 8:04 AM
To: MARTINEZ, HUGO E. (JSC-NC) (GHG); HATAMLEH, OMAR (JSC-NC) (SAIC); ALMASRI, WALEED (JSC-REMOTE); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); CLEMENTS, DANIEL L. (JSC-NC) (GHG); BALU, BRIAN K. (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
Subject: RE: L-1 Charts for BSTRA "Step" Assessment

The effect of this step could be joint binding under pressure and angulation loads, leading to bellows overstress and rupture / LO2 (or LH2) leakage.

Hugo

-----Original Message-----

From: MARTINEZ, HUGO E. (JSC-NC) (GHG)
Sent: Wednesday, January 15, 2003 7:47 AM
To: HATAMLEH, OMAR (JSC-NC) (SAIC); ALMASRI, WALEED (JSC-REMOTE); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); CLEMENTS, DANIEL L. (JSC-NC) (GHG); BALU, BRIAN K. (JSC-NC) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); CAZES, DAVID (JSC-NA) (SAIC); EVATT, GARVIN T. (GT) (JSC-NC) (SAIC)
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(JSC-ES4) (NASA); 'Steven J. Gentz (E-mail)'; DINSEL, ALISON J.
(JSC-ES5) (NASA); 'Lagart99@aol.com';
'linda.combs@usahq.unitedspacealliance.com'; HIRAKAWA, EARL M; ROCHA,
ALAN R. (RODNEY) (JSC-ES2) (NASA); 'Rick Russell (E-mail)'; 'Charlie
Abner (E-mail)'; Stenger-Nguyen, Polly; 'Linda Combs (E-mail)'; 'Don
Blank (E-mail)'; 'Beil, Bob'; 'Joh Cowart (E-mail)'; Joh Cowart (E-mail)
Cc: EXT-White, Doug; 'James Wilder (E-mail)';
'launch-int@usago.ksc.nasa.gov'
Subject: RE: Charts for BSTRA "Step" Assessment

Orbiter L-1 Charts

ERMINGER, MARK D. (JSC-NC) (NASA)

From: BROWNE, DAVID M. (JSC-NC) (NASA)
Sent: Wednesday, January 22, 2003 9:57 AM
To: REISTLE, BRUCE C. (JSC-NC) (SAIC); PRINCE, GORMAN W. (BILLY) (JSC-NC) (GHG); AL-HAYEK, FAREED A. (JSC-NC) (SAIC); ARNOLD, C. A. (AL) (JSC-NC) (GHG); BALU, BRIAN K. (JSC-NC) (SAIC); CLEMENTS, DANIEL L. (JSC-NC) (GHG); HATAMLEH, OMAR (JSC-NC) (SAIC); ISHMAEL, MOHAMED I. (GEORGE) (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); BOYER, ROGER L. (JSC-NC) (SAIC); MARTINEZ, HUGO E. (JSC-NC) (GHG); BASS, ERICH L. (JSC-NC) (SAIC); SNELL, JAMES G. (GREG) (JSC-NC) (SAIC); MELENDEZ, DAVID T. (JSC-NC) (GHG)
Cc: CAZES, DAVID (JSC-NA) (SAIC); CULBERTSON, FRANK L., JR (JSC-NA) (SAIC); ERMINGER, MARK D. (JSC-NC) (NASA); JOHNSON, M. S. (SCOTT) (JSC-NC) (NASA); MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Subject: FW: BSTRA Team Thank you!

I realize some received the note below directly, but most of you did not. So, I'm passing it along, because you all deserve a big THANK YOU for your effort in the BSTRA activity. It's obvious by looking at the large number of addressees that this was a difficult problem requiring many areas of expertise. I hope I have included all that contributed. You did a great job! You played a major roll in resolving the problem, and I really appreciate the great support you provided!

-----Original Message-----

From: Rigby, David A [mailto:David.A.Rigby2@boeing.com]
Sent: Wednesday, January 22, 2003 9:08 AM
To: Rigby, David A; Reith, Timothy W; Martingano, Trina A; Burghardt, Michael J; Christensen, Scott V; Curtis, Cris; Dunham, Michael J; ALBRIGHT, JOHN D. (JSC-EP4) (NASA); ALLISON, RONALD L. (JSC-MV6) (NASA); APPLEWHITE, JOHN (JSC-EP) (NASA); BAIRD, R. S. (SCOTT) (JSC-EP) (NASA); BROWNE, DAVID M. (JSC-NC) (NASA); GRUSH, GENE R. (JSC-EP111) (NASA); JACOBS, JEREMY B. (JSC-ES4) (NASA); KRAMER, JULIE A. (JSC-EA4) (NASA); EXT-Madera, Pamela L; OUELLETTE, FRED A. (JSC-MV6) (NASA); TEMPLIN, KEVIN C. (JSC-MV6) (NASA); WAGNER, HOWARD A., PHD (JSC-EP) (NASA); EXT-White, Doug; Fineberg, Laurence H; Frazer, John W; Harrison, Steve; Mulholland, John P; Peller, Mark E; Pickens, Mark S; Saluter, Brett; Snyder, Mike; Stefanovic, Mike; Young, Mike; Paul Munafo (E-mail); alison.dinsel-1@ksc.nasa.gov; RINGO, LESLIE A. (JSC-CB) (USA); ANTONELLI, DOMINIC A. (JSC-CB) (NASA); MELCHER, JOHN C. (JSC-DF55) (NASA); Collins, Thomas E; BENNETT, JAY E. (JSC-ES4) (NASA); Rick Russell (E-mail); MAYEAUX, BRIAN M. (JSC-ES4) (NASA); Lubas, Dave L; Solomon, Marcella; PREVETT, DONALD E. (DON) (JSC-EP) (NASA); MARTINEZ, HUGO E. (JSC-NC) (GHG); SERIALE-GRUSH, JOYCE M. (JSC-EA) (NASA); SHACK, PAUL E. (JSC-EA42) (NASA); LANE, WILLIAM F. (JSC-DF) (NASA); pelbg@ghg.net; Cris Curtis (E-mail); HERNANDEZ, JOSE M. (JSC-ES4) (NASA); Steven J. Gentz (E-mail); DINSEL, ALISON J. (JSC-ES5) (NASA); Lagart99@aol.com; Hirakawa, Earl M; ROCHA, ALAN R. (RODNEY) (JSC-ES2) (NASA); Rick Russell (E-mail); Charlie Abner (E-mail); Stenger-Nguyen, Polly; Linda Combs (E-mail); Don Blank (E-mail); Beil, Bob; Mark Femminineo (E-mail); Bunting, Alan K; ROSENBAUM, BERNARD J. (JSC-EP) (NASA); STUDAK, JOSEPH W. (JSC-EP4) (NASA); George Atkins (E-mail); BOYER, ROGER L. (JSC-NC) (SAIC); SCHICK, TIMOTHY D. (JSC-NC) (SAIC); Chan, John A; Stewart, Bruce D; Stinnett, Jeffrey F; Scheier, Rusty L; Peller, Mark E
Cc: EXT-White, Doug; James Wilder (E-mail); Mulholland, John P; Mike Leinbach (E-mail); ROE, RALPH R. (JSC-MV) (NASA)
Subject: FW: BSTRA Team Thank you!

I also want to echo Ralph's comments. I thought it would be hard to top the flowliner teams' productivity during the four months between finding the flowliner crack and flying. But from the point we discovered this crack, we solved this problem and flew within 1

month! Many thanks to everyone who worked so hard to make this possible.

dr

If there's someone I missed, please pass along.

-----Original Message-----

From: ROE, RALPH R. (JSC-MV) (NASA) [mailto:ralph.r.roe@nasa.gov]
Sent: Tuesday, January 21, 2003 4:56 PM
To: Rigby, David A
Cc: James Wilder (E-mail); Bejmuk, Bo; EXT-DeCastro, Howard L;
DITTEMORE, RONALD D. (JSC-MA) (NASA)
Subject: BSTRA Team Thank you!

Team,

With Columbia successfully on-orbit, I wanted to take this opportunity to thank each of you for your outstanding efforts over the past month and especially over the Christmas holidays. This was a particularly difficult challenge and because of your hard work and dedication we were able to understand it and developed flight rationale without impact to the manifest. Your team has set the standard for each problem resolution team to follow, from outstanding cooperation and coordination between Centers and Companies to successfully managing complex technical issues in real-time. You all should be extremely proud of your efforts, as I am, and recognize how significant your role is in insuring safe flights. Thank you again and keep up the great work as we work the long-term plan for BSTRA.

Ralph Roe

Dave, Please forward this to your entire team!

MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 16, 2003 10:34 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Launch Report

STS-107 Launch Report
GMT 16:16:30

Shift Lead: Andy Foster
Ascent Ops Specialist: Andy Foster
Tanking/MPS Specialists: Bill Prince, Dan Clements
Mission Engineer: Megan Bell (OJT)

STS-107 was successfully launched on January 16, 2003 at GMT 16:15:39 (09:30 CST). While some IPR's were worked, there were no LCC violations during the prelaunch countdown. Weather was never a concern during the launch for KSC or at the TAL sites.

Performance during powered flight was nominal. MECO occurred on time and inserted the vehicle into an initial 156 x 43 nm orbit. ET sep and all subsequent events were nominal. OMS 2 occurred at 16:16:20 GMT. The 186.1 fps burn boosted the vehicle into a 156 x 146 nm orbit.

There are no vehicle anomalies at this time.

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<http://wwwsrqa.jsc.nasa.gov/bbs/default.htm>

If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 17, 2003 8:59 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD01 Report

STS-107 Flight Day 01 Report
GMT 017:14:30

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally. Payload bay door opening was nominal and the port radiator was deployed. Spacehab activation also was nominal though a bit late. Spacehab activities are progressing nominally at this time. Orbiter consumables are above the levels required for the planned mission. Twenty-two hours of margin were reported at the Engineering meeting this morning.

Two items are being carried as MER anomalies at this time.

AC2 Phase B exhibited sluggish performance during the prelaunch and post-insertion timeframes. Sluggish performance was first noted at T-31 seconds in the launch countdown and then twice during post-insertion activities. During the operation of three motors, AC2 phases A and C would increase to expected values while phase B would rise to only half of what was expected but recover to nominal values within one second. Motor operation was nominal. The affected motors are: vent doors 8 and 9, Ku-band deploy motor 2, and port payload door open motor 2. There are no common circuits or motor control assemblies for these motors though they are all controlled via circuit breakers found on panel MA73C. However, other motors controlled by those circuit breakers are showing nominal operating signatures. Engineering is continuing to examine data, but there is no in-flight troubleshooting planned at this time. This anomaly holds no mission impact since all motors will operate nominally even if there were a complete failure of phase B. At this time, we believe the mission is at no additional risk. We are continuing to monitor and evaluate this anomaly.

During Spacehab activation, the crew reported they could not communicate to Spacehab from the Orbiter over the intercommunications (ICOM) B loop. ICOM A is working nominally, and this is considered to be a loss of redundancy impact. No mission impact is expected, and currently no in flight troubleshooting is planned.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab

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If you need additional information about this mailing list, please contact
michael.j.penney1@jsc.nasa.gov

MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Saturday, January 18, 2003 7:23 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 2 Report

STS-107 Flight Day 02 Report
GMT 18:13:08

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT), Mike Penney

STS-107 mission is progressing nominally. The orbiter is currently in a 156X146 nm orbit. SpaceHab operations are progressing nominally at this time. Orbiter consumables are above the levels required by the mission plan. In fact, cryo margins are being monitored closely due to anticipated impacts to end of mission downweight and center of gravity. (SpaceHab is not drawing as much power as anticipated.)

There is one new MER anomaly. During performance of the O2 tank current level detector checkout, it was noted that the O2 tank 7 heater A1 and A2 ON discrete did not come on. Main bus current verified O2 tank 7 heater A did not come on. The B heaters functioned nominally and provided sufficient energy to the tank so there was no concern about being able to use it. The heaters had not yet been used in the AUTO mode; when the BLUE Crew switched the heater to the AUTO position on MCC call, the EGIL console observed nominal heater cycles. The tank heater is operating nominally.

While SpaceHab operations are progressing nominally, the SpaceHab Water Loop is showing some degradation. The Payload Heat Exchanger and total flow rates for the SpaceHab water loop have been steadily decreasing. Also, the Subsystem Water Pump outlet pressure is also decreasing. These signatures indicate pump filter blockage or pump degradation. Currently, the system is being run on Pump 2 and operation on Pump 2 will continue as long as possible. MCC plans to swap to Water Pump 1 at GMT 018:13:29 and remain on Pump 1 for the remainder of the mission. No mission impact is expected.

At the time of this report, the Crew is on Flight Day 3 performing blood draws and infusions, ARMS activities, and MEIDEX operations.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Friday, January 31, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #159

NASA HSF News Digest Friday, January 31 2003 Volume 01 : Number 159

In this issue:

STS-107 MCC Status Report #17

All NASA HSF News Releases and Mission Status Reports are available online at
<<http://spaceflight.nasa.gov/spacenews/>>.

Date: Fri, 31 Jan 2003 16:15:32 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #17

STS-107
Report #17
Friday, January 31, 2003 - 5:00 p.m. CST
Mission Control Center, Houston, Texas

Columbia crewmembers deactivated experiments and began stowing gear to prepare for their scheduled Saturday landing at the Kennedy Space Center.

Commander Rick Husband, Pilot Willie McCool, Mission Specialists Dave Brown, Kalpana Chawla, Michael Anderson and Laurel Clark, and Israeli Payload Specialist Ilan Ramon wrapped up final experiment runs, taking a final look at electrical activity above thunderstorms with the Mediterranean Israeli Dust Experiment (MEIDEX). They also shut down the Bioreactor Demonstration System where prostate cancer and bone cells were grown during much of the mission. Tonight the crew will deactivate the Spacehab Research Double Module in the cargo bay. The SPACEHAB will be closed for the final time early Saturday.

This morning, Husband, McCool and Chawla checked out the flight control surfaces of Columbia after activating one of the orbiter's three auxiliary power units in a routine pre-landing test of the Shuttle's systems. A little later, the crew test-fired the reaction control system jets that will regulate Columbia's attitude as it begins its fiery re-entry through the Earth's atmosphere. Opposing jets were fired simultaneously to avoid affecting the spacecraft's orientation.

Two Kennedy Space Center landing opportunities are available to Columbia on Saturday. The first, on orbit 255, would see a deorbit burn at 7:15 a.m. CST and a landing at KSC at 8:16 a.m. to wrap up a flight of 6,649,757 statute miles. A second landing opportunity is available at KSC on the subsequent orbit. That would see the deorbit burn beginning at 8:50 a.m. and a landing at 9:50 a.m.

Florida weather is forecast to be excellent on Saturday. Columbia has enough consumables to remain aloft for several additional days, if necessary.

Aboard the International Space Station, Expedition 6 crewmembers, Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit, completed loading the Russian Progress supply vehicle for a planned undocking from the Zvezda Service Module Saturday at 9:59 a.m. Central time (1559 GMT). A new Progress bringing fuel, equipment and supplies to the station will be launched from Kazakhstan Sunday and will dock with the station on Tuesday.

The next STS-107 status report will be issued after landing, or as events warrant.

###

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 31, 2003 9:08 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 15 Report

STS-107 Flight Day 15 Report
GMT 031:14:50, MET 14:23:10

Shift Leads: David Witwer, James Gardner, David Melendez
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission continues nominally with two issues reported over the previous 24 hours. The Orbiter consumables are above the levels required for completion of the planned mission. Weather forecasts for the two Saturday landing opportunities at KSC are well within flight rule limits; specifically scattered clouds at 3500 ft and 25,000 ft, visibility 7 sm, and crosswinds less than 10 knots.

Flight Control System (FCS) checkout is complete with FCS, APU and hydraulic system performance as expected. Following FCS checkout, the RCS hot-fire occurred satisfactorily. All thrusters fired at least once. The Orbiter is prepared for tomorrow's deorbit and landing.

However, two anomalies have been added to our MER Anomaly list. The first anomaly added is MER-09: SPACEHAB Water Loop Flow Degradation. Earlier in the flight (MET 01:21:21), the flight control team decided to use only SPACEHAB water pump 1. Recent data shows pump 1 is degrading, however the degradation is at a rate that will allow the flow to stay above nominal limits until the end of mission. SPACEHAB water pump 1 degradation does not currently have an impact to the mission. Post landing, a team at KSC will troubleshoot the Orbiter side of the interface to determine if Orbiter hardware either caused or impacted the problem.

The second anomaly added in the past 24 hours is MER-10: Forward DAP Auto A Contact Deselected. A review of the data indicates that the switch performed nominally until MET 13:04:49 and 13:05:53. At these two moments when the crew used the forward Digital Auto Pilot (DAP) auto push button switch, contact A did not close. Redundancy Management (RM) subsequently deselected contact A of the forward DAP. A switch tease, observed in the

past on this type of switch, is the suspected cause. Although there is a loss of redundancy, no mission impact is expected and workarounds are in place for the next worst failure.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in SPACEHAB
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)
MER-09 SPACEHAB Water Loop Flow Degradation (ORB or PLD)
MER-10 Forward DAP Auto A Contact Deselected (ORB)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 30, 2003 9:06 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD14 Report

STS-107 Flight Day 14 Report
GMT 030:14:50

Shift Leads: David Witwer, Brandon Dick, Mike Etchells
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally with no issues being reported over the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

The MER manager reported in reference to the intercommunications (ICOM) B problem discussed in the First Daily Report that, "the crew was asked to troubleshoot the problem by reconfiguring the ICOM system to ICOM B and

performing a communications check. The crew reported that ICOM B worked satisfactorily and that the earlier problem was probably caused by a configuration error."

The weather for both landing opportunities at KSC looks good for Saturday with few to scattered clouds at 3500 ft, visibility 7 sm, and winds 10 knots or less.

Previous flight day reports discuss the nine MER anomalies listed below.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Wednesday, January 29, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #157

NASA HSF News Digest Wednesday, January 29 2003 Volume 01 : Number 157

In this issue:

STS-107 MCC Status Report #15

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Date: Wed, 29 Jan 2003 17:13:12 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #15

STS-107
Report #15
Wednesday, January 29, 2003 -- 5 p.m. CST
Mission Control Center, Houston, Texas

Columbia's seven astronauts took a break from their around-the-clock scientific research today to answer reporters' questions in the traditional on-orbit crew news conference.

Commander Rick Husband, Pilot Willie McCool, Mission Specialists Dave Brown, Kalpana Chawla, Michael Anderson and Laurel Clark, and Israel Space Agency Payload Specialist Ilan Ramon fielded questions about how their shuttle was performing as a research laboratory, their work in support of the STS-107 mission's 80 different experiments and preparations for Saturday's planned landing.

"The science we're doing here is great and it's fantastic," said Anderson, the payload commander, "it's leading edge. But I think once we get a seven-member crew on board the space station you're really going to see some outstanding science in space. A lot of experiments that we have are really just being demonstrated and developed. Once they're fully developed they'll reside on board the space station and the scientists ... will have years to conduct the experiments that we're trying to do here in a relatively short period of time."

Ramon reported that dust storms off the east coast of Africa were scarce for the first week of the flight, but that a giant dust storm kicked up over the Atlantic and lasted three days, providing ample observations for the Mediterranean Israeli Dust Experiment. He voiced wishes for peace in his area of the world from 180 miles above.

"The world looks marvelous from up here, so peaceful, so wonderful and so fragile," Ramon said. "The atmosphere is so thin and fragile, and I think all of us have to keep it clean and good. It saves our life and gives our life."

After a 2:39 p.m. CST Blue Team wake-up to the sounds of John Lennon singing "Imagine," McCool and Ramon said their observations from orbit reveal no borders on the Earth below and reiterated in both English and Hebrew their hopes for peace in the world.

Initial tests in the Combustion Module Facility with the newly revitalized Water Mist Fire Suppression Experiment took center stage today, with 14 sample runs completed after Chawla fixed a balky seal in the combustion module yesterday. Another 20 runs are planned before the end of the mission on tests designed to learn exactly how the water interacts with flames as it is extinguishing them.

The next STS-107 status report will be issued Thursday, or as events warrant.

###

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: NASANews@hq.nasa.gov
Sent: Wednesday, January 29, 2003 1:51 PM
To: undisclosed-recipients
Subject: NEW CARGO SHIP DOCKS WITH INTERNATIONAL SPACE STATION

Rob Navias
Johnson Space Center, Houston January 29, 2003
(Phone: 281/483-5111)

Allard Beutel
Headquarters, Washington
(Phone: 202/358-0951)

NOTE TO EDITORS: N03-009

NEW CARGO SHIP DOCKS WITH INTERNATIONAL SPACE STATION

The tenth Russian Progress resupply vehicle to the International Space Station is scheduled to dock at approximately 9:55 a.m. EST, Tuesday, Feb. 4.

Commentary and coverage, originating from the Space Station Flight Control Room at the Johnson Space Center, Houston, will be carried live on NASA Television beginning at 9 a.m. EST. NASA TV is on GE-2, Transponder 9C, vertical polarization at 85 degrees West longitude, 3880 MHz, with audio at 6.8 MHz.

The Progress Nine ship that arrived at the Station in September is scheduled to undock from the aft port of the Zvezda Service Module on Feb. 1. The new Progress launches from the Baikonur Cosmodrome in Kazakhstan on Feb. 2 for its two-day trip to the Station. Neither the Progress Nine undocking nor the Progress 10 launch will be televised.

Progress 10 will carry supplies for the Expedition Seven crew, which arrives at the Space Station in March. It will also carry repaired components for the Destiny laboratory Microgravity Science Glovebox that experienced a power failure last November.

Expedition Six Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA Station Science Officer Don Pettit are in the third month of their four-month mission on board the Space Station. The crew will unload the Progress shortly after docking. Pettit will immediately begin work on the Microgravity Science Glovebox, so it can be reactivated to support all planned science investigations before the end of the Expedition 6 mission.

-end-

* * *

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Wednesday, January 29, 2003 9:37 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD13 Report

STS-107 Flight Day 13 Report
GMT 029:15:30

Shift Leads: David Witwer, Brandon Dick, Mike Etchells
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission continues nominally in a 151 x 140 nm orbit with all Orbiter subsystems performing satisfactorily. No new Orbiter issues or anomalies have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

Previous flight day reports discuss the eight MER anomalies listed below.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Tuesday, January 28, 2003 9:39 AM
To: 'srqa-mer listserv'
Subject: STS-107 Flight Day 12 Report

STS-107 Flight Day 12 Report
GMT 028:15:30

Shift Leads: David Witwer, Brandon Dick, Mike Etchells
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission continues nominally in a 154 x 140 nm orbit with all Orbiter subsystems performing satisfactorily. No new Orbiter issues or anomalies have been reported in the previous 24 hours.

Our MER Manager released the following update on the debris hit on the left wing last during ascent. "Systems integration personnel performed a debris trajectory analysis to estimate the debris impact conditions and locations. This analysis was performed utilizing the reported observations from the ascent video and film. It was assumed that the debris was foam from the external tank. Based on the results of the trajectory analysis, an impact analysis was performed to assess the potential damage to the tile and reinforced carbon carbon (RCC). The impact analysis indicates the potential for a large damage area to the tile. Damage to the RCC should be limited to coating only and have no mission impact. Additionally, thermal analyses were performed for different locations and damage conditions. The damage conditions included one tile missing down to the densified layer of the tile and multiple tiles missing over an area of about 7 in by 30 in. These thermal analyses indicate possible localized structural damage but no burn-through, and no safety of flight issue."

Previous flight day reports discuss the eight MER anomalies listed below.

MER Anomalies:

MER-01	AC2 Phase B Sluggish Current Signature
MER-02	No ICOM B in Spacehab
MER-03	O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04	70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05	Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06	Loss of DR20 Tape Recording and Playback (GFE)
MER-07	LH2 Prevalve Open B Indicator Failed Off
MER-07A	MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08	70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Monday, January 27, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #155

NASA HSF News Digest Monday, January 27 2003 Volume 01 : Number 155

In this issue:

STS-107 MCC Status Report #13

All NASA HSF News Releases and Mission Status Reports are available online at
<<http://spaceflight.nasa.gov/spacenews/>>.

Date: Mon, 27 Jan 2003 17:21:57 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #13

STS-107
Report #13
Monday, January 27, 2003 -- 5:30 P.M. CST
Mission Control Center, Houston, Texas

Some experiments have run their course aboard the Space Shuttle Columbia, but there is more in store as STS-107 science continues around the clock in the Spacehab Research Double Module.

The Structures of Flame Balls experiment, looking at ways of improving engine combustion efficiency, was shut down after a total of 39 tests using 15 different fuel mixtures. A total of 55 flame balls were ignited, including the weakest and leanest flames ever burned. The longest-lived flame burned in space for 81 minutes, part of a total burn time for all flames of 6 1/4 hours. Oscillating (shrinking and growing) flame balls, which had been predicted theoretically, were observed for the first time.

The Mechanics of Granular Materials test, looking for ways to better understand and deal with soil movement associated with earthquakes, completed its 10th and final run. The Microbial Physiology Flight Experiment expended its eighth and final set of samples looking at yeast and bacteria growth in microgravity. The Canadian-developed Osteoporosis in Orbit also completed its operations.

The Red team, or day shift - Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark and Israel Space Agency Payload Specialist Ilan Ramon - took time out from microgravity experimentation about 11:30 a.m. CST to chat with the other three spacefarers on orbit - Commander Ken Bowersox, NASA ISS Science Officer Don Pettit and Flight Engineer Nikolai Budarin. At the time, the space station was some 240 miles above Southern Russia while the shuttle was over northern Brazil.

The Expedition Six crew aboard the station concentrated on loading new software on the EXPRESS experiment racks, working with Russian and American experiments and preparing the old Progress for its undocking this week to make room for a new supply craft, scheduled to launch Feb. 2 from the Baikonour Cosmodrome in Khazakstan and dock with the station Feb. 4.

After a 2:39 p.m. CST wake-up to the sounds of "Slow Boat to Rio" by Earl Klugh, the Blue team of astronauts - Payload Commander Michael Anderson, Mission Specialist Dave Brown and Pilot Willie McCool was scheduled to enjoy half a day of rest before resuming research activities concentrating on the Mediterranean Israeli Dust Experiment, which yesterday

captured its first observations of dust over the Atlantic. Scientists with the Israel Space Agency reported that preliminary data looks promising.

The next STS-107 status report will be issued Tuesday afternoon, or as events warrant.

###

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Monday, January 27, 2003 8:08 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 11 Report

STS-107 Flight Day 11 Report
GMT 027:14:00

Shift Leads: Jim Pendergast, Brandon Dick, Mike Etchells
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. Science continues and the ground has been very happy with the performance of the experiments.

There are eight vehicle anomalies at this time. (no new anomalies)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Sunday, January 26, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #154

NASA HSF News Digest Sunday, January 26 2003 Volume 01 : Number 154

In this issue:

STS-107 MCC Status Report #12

All NASA HSF News Releases and Mission Status Reports are available online at <http://spaceflight.nasa.gov/spacenews/>.

Date: Sun, 26 Jan 2003 15:17:25 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #12

STS-107
Report #12
Sunday, January 26, 2003 - 5:00 p.m. CST
Mission Control Center, Houston, Texas

Scientific research continued aboard the Space Shuttle Columbia today as the STS-107 mission headed into the homestretch with a variety of experiments in multiple disciplines.

The Red team of astronauts, working by day, and the Blue team, working by night, maintained a round-the-clock presence in the SPACEHAB Double Research Module, tending to dozens of experiments as scientists reported excellent results. Temperatures in SPACEHAB were maintained at a comfortable 73 degrees, despite the loss of two dehumidifiers earlier in the mission. All of the animals involved in life science experiments were reported to be in good shape along with SPACEHAB hardware.

Red team crewmembers Rick Husband, who is Columbia's Commander, Mission Specialists Kalpana Chawla and Laurel Clark and Israeli Payload Specialist Ilan Ramon conducted more experiments involving the study of flames in space in a special Combustion Module in the SPACEHAB.

More investigations were conducted into the effect of dust storms on the atmosphere with

multispectral cameras in Columbia's cargo bay. The MEIDEX experiment focused on plumes of dust in the Mediterranean region and in the Middle East as well as sprites in the targeted areas of interest. Science controllers reported the first successful digital downlink of imagery from the experiment as well as the observance of significant amounts of dust in the observed regions.

A suite of student experiments called STARS yielded the hatching of a fish in an aquatic facility and the successful emergence of a silk moth from its cocoon. STARS contains a half dozen student developed experiments ranging from the study of Australian spiders to the analysis of spaceflight's effects on carpenter bees from Liechtenstein.

The Biopack experiment involving the study of weightlessness on biological samples continued to produce what was described as excellent data for its team of researchers despite the loss of freezer and incubator capability for the storage of samples.

Blue team crewmembers Willie McCool, who is Columbia's Pilot, Payload Commander Mike Anderson and Mission Specialist Dave Brown were awakened for their night shift shortly after 2:30 p.m. Central time. They planned to conduct final combustion studies with the SOFBALL experiment tonight after which the Combustion Module will be reconfigured for the Water Mist experiment, studying fire suppression techniques in spaceflight.

The Blue team will spend some time refreshing water for 13 rodents in the Animal Enclosure Module in SPACEHAB. Data is being acquired on the effect of microgravity on the rodents' neurovestibular system. Now that SPACEHAB temperatures have cooled again, sound mufflers were reinstalled on the animal enclosure compartments.

More data will also be received tonight from the SOLSE experiment, which uses imaging devices in the shuttle's cargo bay to study the Earth's ozone layer. Earlier today, the crew downlinked digital video of the Middle East with breathtaking views of Israel, the Red Sea and the Sinai Peninsula. The video also contained scenes of life and work on orbit involving the seven astronauts.

Columbia's systems continue to function perfectly as the shuttle orbits at an altitude of about 180 statute miles.

Flying slightly higher, the Expedition 6 crew aboard the International Space Station is now in its 10th week in space. Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit spent a quiet Sunday, enjoying the views of Earth from orbit while conducting a minor maintenance procedure involving a hatch window in the Unity module. Station systems are also functioning normally.

The space travelers aboard Columbia and the ISS will have a chance to talk to one another Monday in a brief ship-to-ship hookup scheduled at 11:34 a.m. Central time. At the time of the ship-to-ship call, Columbia will be orbiting over northern Brazil, while the ISS sails over southern Russia.

The next STS-107 status report will be issued Monday afternoon, or earlier, if events warrant.

###

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Sunday, January 26, 2003 6:54 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 10 Report

STS-107 Flight Day 10 Report
GMT 026:13:00

Shift Leads: Jim Pendergast, Jim Gardner, Mike Etchells
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remain well above the levels required for completion of the planned mission. The SpaceHab is performing well and science continues to be conducted 24 hours a day.

There are eight vehicle anomalies at this time. (no new anomalies)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Saturday, January 25, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #153

NASA HSF News Digest Saturday, January 25 2003 Volume 01 : Number 153

In this issue:

STS-107 MCC Status Report #11

All NASA HSF News Releases and Mission Status Reports are available online at
<<http://spaceflight.nasa.gov/spacenews/>>.

Date: Sat, 25 Jan 2003 17:00:52 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #11

STS-107
Report #11
Saturday, January 25, 2003 - 5:00 p.m. CST
Mission Control Center, Houston, Texas

Space shuttle Columbia's astronauts completed an experiment studying the activity of bone cells in microgravity and began final tests with a technology demonstration designed to investigate the behavior of capillary-pumped loops in space as the 16-day international science mission completed Flight Day 10.

Toward the end of their workday at 1 a.m. CST this morning, Pilot Willie McCool and Mission Specialists Dave Brown and Michael Anderson of the Blue Team took time out from their experiment schedule for interviews with reporters from Black Entertainment TV, WTKR-TV in Norfolk, Va., and KNSD-TV in San Diego. Following handover talks, Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark, and Payload Specialist Ilan Ramon of the Red Team began their workday.

Clark completed operations with the OSTEO (Osteoporosis Experiment in Orbit) investigation for STS-107. The experiment studied the activity of bone cells in microgravity by looking at normal activity and activity under the influence of various drugs. Clark also continued work on the Bioreactor Demonstration System, which is using the NASA-developed bioreactor to grow prostate cancer tissues. The objective is to learn how the cancer spreads into bones and aid in the development of future treatment methods. She also worked on a study of how bacteria and yeast develop in space and how microgravity affects their response to antibiotics.

Investigations with the Combined Two-Phase Loop Experiment were begun using a third cooling loop. Testing of this loop will continue for about 48 hours. The testing is performed to learn about the behavior of the loop in microgravity. The investigation examines three different two-phase thermal loops by transporting different amounts of heat from an evaporator to a condenser and then radiating the heat into space.

The Facility for Adsorption and Surface Tension, known as FAST, has completed the last pre-planned sequence of experiments. It is designed to measure the response of surface tension to carefully controlled changes in the surface areas of bubbles or droplets.

Ramon continued investigations with the SOFBALL (Structures of Flame Balls) experiment. The experiment studies lean combustion to help engineers design engines with better fuel efficiency and reduced emissions of pollution.

Television from the crew, narrated by Ramon, was downlinked around 11:30 a.m. showing various aspects of experiment operations conducted by both teams. Husband maneuvered Columbia today as required for any scientific activities.

McCool, Brown and Anderson were awakened at 2:39 p.m. to the sounds of "I Say a Little Prayer for You" sung by Dionne Warwick. The song was played for Anderson from his wife.

Husband ended his 10th day in space by calibrating two Israeli cameras that will be used to continue photographing dust particles, sprites and other electrical phenomena in the upper atmosphere. The crew hope to use the camera to observe a substantial plume of dust and smoke that extends from the Nigerian coast westward toward the Atlantic and an additional plume off the coast of Mauritania and Mali. Sprites in storms over Western Australia near Perth also will be observed. Sprites are electrical discharges that shoot up from the tops of thunderstorms into the Earth's ionosphere.

All of Columbia's systems continue to operate in excellent shape.

It was a quiet day on board the International Space Station, meanwhile, as Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and ISS Science Officer Don Pettit enjoyed a light workday. They will also partake in an off-duty day tomorrow before resuming normal scientific research and routine station maintenance activities on Monday.

The next STS-107 status report will be issued Sunday afternoon, or earlier, if events warrant.

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Saturday, January 25, 2003 7:05 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 09 Report

STS-107 Flight Day 09 Report
GMT 025:13:00

Shift Leads: Jim Pendergast, Brandon Dick, Mike Etchells
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission. The SpaceHab is performing well and science continues to be conducted 24 hours a day.

There are eight vehicle anomalies at this time. (one new anomaly)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)
MER-08 70 mm Hasselblad Camera S/N 1012 Motor Drive Binds/Jams (GFE)

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If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Friday, January 24, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #152

NASA HSF News Digest Friday, January 24 2003 Volume 01 : Number 152

In this issue:

STS-107 MCC Status Report #10

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<<http://spaceflight.nasa.gov/spaceneeds/>>.

Date: Fri, 24 Jan 2003 16:50:06 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #10

STS-107
Report #10
Friday, January 24, 2003 -- 5 p.m.
Mission Control Center, Houston, Texas

Research continued aboard the Space Shuttle Columbia today as the seven astronauts aboard continued to work in shifts, coordinating work with investigators on the ground.

Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark, and Payload Specialist Ilan Ramon of the Red Team began their workday about 5 a.m. CST, focusing again on work with the SOFBALL (Structures of Flame Balls) experiment and the ARMS (Advanced Respiratory Monitoring System) human physiology experiment. Husband maneuvered Columbia into the proper positions for the various experiments.

The two teams have completed seven SOFBALL runs so far, including the first of several using methane as a fuel, which is visible to the naked eye as a faint blue flame. This evening, the Blue Team will attempt the longest planned test, lasting 2 hours, 47 minutes, while the shuttle is placed in a "free drift" configuration to eliminate thruster firings that could affect the test.

Pilot Willie McCool and Mission Specialists Dave Brown and Michael Anderson of the Blue Team were awakened about 2:30 p.m. to the sounds of "Hotel California" performed by members of McCool's family. Their duty shift was scheduled to begin about 5 p.m. after a pre-bedtime handover from the Red Team.

The Blue Team also will resume work with the Mechanics of Granular Materials experiment, looking at how sandy soil full of water behaves under pressure. Three compressions are planned over the next two days, with a final run set for later in the mission.

The study of spiral moss growth in space completed a set of time-critical fixations on several sets of moss plants, so that their growth rates can be established after the flight. Four more fixations are planned. The Astroculture experiment harvested the last of its six samples of essential oils from rose and rice flowers, which could eventually result in new perfume fragrances. Checks of all of the insects, spiders and animals aboard Columbia showed that all are healthy in their enclosures.

Flight controllers and the crew continue to manage temperatures in the Spacehab Research Double Module by periodically adjusting cooling loop settings. Columbia is in good shape, orbiting at an altitude of 180 statute miles.

The next STS-107 status report will be issued Saturday afternoon, or earlier, if events warrant.

###

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Friday, January 24, 2003 7:20 AM
To: 'SRQA-MER@listserver.jsc.nasa.gov'
Subject: STS-107 FD8 Report

STS-107 Flight Day 08 Report
GMT 024:13:00

Shift Leads: Doug McMullen, Richard Gardner, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The orbiter is currently in a 154 x 142 nm orbit. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

MER anomaly # 7 has been changed from MPS to DPS (MDM), it is labeled #7A.

There are seven vehicle anomalies at this time. (no new anomalies)

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off
MER-07A MDM FA4 CD-08 CH-00 Has Intermittent Data Hits (ORB)

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following internet address:
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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Thursday, January 23, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #151

NASA HSF News Digest Thursday, January 23 2003 Volume 01 : Number 151

In this issue:

STS-107 MCC Status Report #08
STS-107 MCC Status Report #09

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<<http://spaceflight.nasa.gov/spacenews/>>.

Date: Wed, 22 Jan 2003 18:16:41 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #08

STS-107
Report #08
Wednesday, January 22, 2003 -- 6 p.m. CDT
Mission Control Center, Houston, Texas

The seven astronauts aboard Columbia beamed down television views of their smallest companions in orbit today, including insects, spiders, fish, bees and silk worms that are part of the Space Technology and Research Students package of experiments designed and developed by students in six countries.

The television pictures showed ants busily creating and moving about tunnels in an ant farm developed by students from Fowler High School in Syracuse, N.Y.; Garden Orb Weaver spiders beginning to construct webs in an enclosure designed by students at Glen Waverly Secondary College of Melbourne, Australia; silkworm larvae beginning to develop in an experiment designed by students at Jingshan School, Beijing, China; Medaka fish embryos developing in a tank designed by students at the Tokyo Institute of Technology in Tokyo; and carpenter bees beginning to construct nests by boring tunnels in wood.

The experiments are being monitored by both teams of astronauts as they work in shifts to

support the 80 different experiments aboard the space shuttle and the Spacehab Research Double Module. The Red Team -- Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark and Israel Space Agency Payload Specialist Ilan Ramon - enjoyed a half-day off before resuming work with a variety of other experiments.

The Red Team worked with the growth of prostate cancer cells in the Bioreactor Demonstration System, shutdown of the Laminar Soot Processes experiment, which completed 14 runs in an effort to better understand the nature of soot created by combustion in microgravity, and bacteria and yeast growth as part of the Microbial Physiology Flight Experiment. They also checked on the growth of plants in the Astroculture experiment that includes miniature roses being grown in space to produce new fragrances for perfumes.

The Red Team handed over to the Blue Team - Pilot Willie McCool, Payload Commander Michael Anderson and Mission Specialist Dave Brown - at 5 p.m. CST, and prepared for a sleep shift beginning at 7:09 p.m. The Blue Team awoke at 3:09 p.m. to the song "Hakuna Matata" by the Baja Men for Anderson from his two kids.

The Blue Team began its day with work on the SOFBALL, or Structures of Flame Balls at Low Lewis-number experiment, which scientists hope will improve their understanding of lean (low fuel) burning combustion and lead to improvements in engine efficiency, reduced emissions, and fire safety.

The overnight team also worked with the Advanced Respiratory Monitoring System, a European Space Agency experiment looking at how the human body adapts to weightlessness.

After lunch, the team was to calibrate the Mediterranean Israeli Dust Experiment (MEIDEX) and resume observations after adjusting the shuttle orientation in orbit to facilitate measurement of small particles in the atmosphere over the Mediterranean Sea and Atlantic Ocean off the coast of the Sahara desert.

Cooling and humidity control of the Spacehab module is being effectively managed through minor adjustments to systems aboard Columbia and the science module.

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Date: Thu, 23 Jan 2003 17:26:18 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #09

STS-107
Report #09
Thursday, January 23, 2003 - 5:00 p.m. CST
Mission Control Center, Houston, Texas

The STS-107 scientific research mission aboard Columbia passed the halfway mark today as the 80 microgravity investigations continue on schedule.

Highlighting the investigations today for both the Blue and Red Teams were the SOFBALL (Structures of Flame Balls) and ARMS (Advanced Respiratory Monitoring System) experiments, although both teams continued to support other experiments with a variety of activities.

Mission Specialists Michael Anderson of the Blue Team and Kalpana Chawla of the Red Team initiated runs with the SOFBALL experiment, which is creating tiny ball-shaped flames using hydrogen as the fuel. The tiny flames, which are approaching some of the leanest and longest-lasting ever, are invisible to the human eye but visible to the crew and investigators on the ground through special video equipment. Dr. Paul Ronney of the University of Southern California and his team hope to discover new properties about combustion to improve engine efficiency and fire safety, as well as reduce emissions.

Mission Specialist Dave Brown of the Blue Team and Israeli Payload Specialist Ilan Ramon of the Red Team concentrated on the Advanced Respiratory Monitoring System. The European Space Agency experiment alternated experiments targeting the human lung and circulatory system and the human muscular system as it looked at changes brought on by weightlessness.

Commander Rick Husband, leader of the Red Team, and Pilot Willie McCool, leader of the Blue Team, adjusted Columbia's attitude relative to the Earth to support the different requirements of the experiments. They continued to manage the temperature inside the Spacehab Research Double Module in the wake of problems incurred with cooling systems. No experiments have or are expected to be affected by the cooling issue.

Red Team Mission Specialist Laurel Clark, a medical doctor, worked with the Bioreactor Demonstration System, which is growing tissue samples as part of a prostate cancer study. She also beamed down data from the Astroculture experiment growing roses and rice flowers for commercial fragrance development. Clark also worked with bacteria and yeast cultures being grown as part of a Microbial Physiology Flight Experiment that looks at the effect of microgravity on antibiotics.

In honor of the combustion experiments on this flight, the Blue Team's wake-up call this afternoon was "Burning Down the House," by the Talking Heads.

Aboard the International Space Station, Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and ISS Science Officer Don Pettit spent their 61st day in space and their 59th day on the station practicing techniques with the Canadarm2 robot arm. This activity was in preparation for the March mission of Atlantis to the ISS that will involve a variety of uses for the space crane.

Columbia and the ISS are both operating in normal fashion, with the Shuttle orbiting at an altitude of 180 statute miles in an orbit inclined 39 degrees to either side of the equator and the station orbiting at an altitude of 240 statute miles in an orbit inclined 51.6 degrees to either side of the equator.

The next STS-107 status report will be issued Friday afternoon, or earlier, if events warrant.

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 23, 2003 7:24 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD7 Report

STS-107 Flight Day 07 Report
GMT 023:13:00

Shift Leads: Doug McMullen, Richard Gardner, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

There is one new MER anomaly

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off

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If you need additional information about this mailing list, please contact michael.j.penney1@jsc.nasa.gov

MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Wednesday, January 22, 2003 8:40 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD06 Report

STS-107 Flight Day 06 Report
GMT 022:12:00

Shift Leads: Doug McMullen, Richard Foster, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

One item currently under investigation is the Space Shuttle Main Engine (SSME) 3 liquid hydrogen (LH2) pre valve (PV6) open indicator "A" that initially failed to the off state at 016:17:25 GMT (00:01:46 MET). Four additional data dropouts of this same measurement have been observed in the last five days. The measurement in question is provided to the general purpose computer (GPC) via multiplexer/demultiplexer (MDM) flight aft (FA) 4 Card 08 Channel 00. Review of all measurements routed through the same MDM card and channel revealed four liquid oxygen (LO2) Pogo Valve Open indications that had also failed to the off state. Of the nine measurements that indicated a failed off state, only one LO2 and one LH2 indication occurred at the exact same time. The investigation of the cause of these indications is underway.

Shuttle held two meetings to address the SpaceHab Humidity/Water Separator Assembly (WSA) problems. Shuttle and Payload safety attended. There were two issues that the flight director wanted to address, (1) water loop valve modulation to reduce the temperature/humidity, and (2) an IFM to remove water and possible debris from RS#1, and an electrical troubleshooting. After the Valve Modulation didn't yield expected results the Program has decided to go ahead with the WSA IFM, which will repair one of the failed water separators, it is currently being modified to suit the current situation. A copy of the most current rev is at the console. The crew will continue to try and attain better results using the Valve Modulation, but the program will probably look more to trying to recover one of the water separators if possible. The IFM will require MT approval before proceeding. Execution of the IFM at this time is TBD.

There is one new MER anomaly

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)
MER-07 LH2 Prevalve Open B Indicator Failed Off

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Tuesday, January 21, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #150

NASA HSF News Digest Tuesday, January 21 2003 Volume 01 : Number 150

In this issue:

STS-107 MCC Status Report #07

All NASA HSF News Releases and Mission Status Reports are available online at
<<http://spaceflight.nasa.gov/spaceneeds/>>.

Date: Tue, 21 Jan 2003 17:52:48 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #07

STS-107
Report #07
Tuesday, January 21, 2003 - 6 p.m. CST
Mission Control Center, Houston, Texas

The seven astronauts aboard Columbia continued to conduct scientific studies 24-7 today, concentrating their efforts on combustion in weightlessness, the growth of cell cultures, and measurements of the ozone layer.

The Blue Team was awakened at 3:39 p.m. CDT to the sounds of "The Wedding Song" by Paul Stookey, uplinked from Mission Control especially for Pilot Willie McCool. McCool and Blue Team Astronauts Dave Brown and Michael Anderson will begin work after a handover at 5:24 p.m. The Red Team of Rick Husband, Kalpana Chawla, Laurel Clark and Ilan Ramon begins its sleep shift at 7:39 p.m.

Israel Space Agency Payload Specialist Ilan Ramon took a break from observations of thunderstorms today to speak with Israeli Prime Minister Ariel Sharon and other dignitaries in Jerusalem. Ramon captured never-before-photographed lightning phenomena, known as "sprites" and "elves," in the extreme upper atmosphere using Middle Eastern Dust Experiment (MEIDEX) cameras. The experiment's primary objective is to study dust storms in the Middle East, but clouds in the region have delayed those observations thus far.

Work continued with a study of combustion in space, focusing on understanding the nature

of soot. The Laminar Soot Processes experiment was operated by Ramon to burn various fuels in weightlessness and study production of soot. Weightlessness allows the process to be studied without the interference caused by gravity-induced convection.

Other experiments run today included continued growth of prostate cancer cells in the Bioreactor Demonstration System (BDS), a device that has been shown on previous flights to grow cultures of much greater fidelity than can be produced in ground labs. The space-grown cultures may help scientists unlock lethal secrets of prostate cancer that allow it to spread through the bones and other body tissues. Mission Specialist Laurel Clark, a medical doctor, worked with the culture device today, checking its operation and photographing the tissues that have grown.

For other experiments, Commander Rick Husband steered Columbia to aim payload-bay mounted instruments to study ozone in the upper atmosphere and another experiment that studies the solar constant. The Shuttle Ozone Limb Sounding Experiment-2 (SOLSE-2) uses observations of sunlight scattering by the atmosphere to measure ozone. The Solar Constant Experiment (SOLCON) measures solar irradiance above the atmosphere.

The Blue Team will continue observations of "sprites" with the MEIDEX cameras, studies of soot with the Laminar Soot Process apparatus and examinations of bone cell activity in microgravity using the Osteoporosis Experiment in Orbit. The second half of its day will include off-duty time to help stay fresh for the extended-duration mission.

Cooling and humidity control of the Spacehab module is being managed through minor adjustments to systems aboard Columbia and the science module. The Spacehab's dehumidifiers remain off due to problems experienced in the last few days. The cooling glitch is not expected to interrupt any of the mission's ongoing research. Flight controllers are continuing to investigate options for reactivating the dehumidifiers.

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Tuesday, January 21, 2003 9:03 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS 107 FD05 report

STS-107 Flight Day 05 Report
GMT 021:14:00

Shift Leads: Doug McMullen, Andy Foster, Denise Londrigran
Mission Engineer: Dan Zalit (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. The Orbiter consumables remaining are above the levels required for completion of the planned mission.

The crew reported that the DSR20 video tape recorder (VTR) tapes were not incrementing. The crew worked the photo/television (TV) malfunction procedure for the VTR error. This ejected the micro-tape that was in the VTR. Power cycles of VTR and digital television (DTV) system were performed with no effect. A visual inspection and cleaning of the VTR was performed; however, the VTR would not accept tapes and place the tapes into the correct configuration inside the VTR. Standard-sized tapes were also rejected. Ground testing has been able to recreate this problem by failing parts of the tape transport. The workaround will be to use a V10 recorder to record the payload video and a Camcorder for playback.

There is one new MER anomaly

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)
MER-06 Loss of DR20 Tape Recording and Playback (GFE)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Monday, January 20, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #149

NASA HSF News Digest Monday, January 20 2003 Volume 01 : Number 149

In this issue:

STS-107 MCC Status Report #06

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<<http://spaceflight.nasa.gov/spaceneeds/>>.

Date: Mon, 20 Jan 2003 17:46:47 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #06

STS-107
Report #06
Monday, January 20, 2003 - 6:00 p.m. CST
Mission Control Center, Houston, Texas

Columbia's astronauts conducted scientific studies ranging from the behavior of granular materials in weightlessness to the effects of microgravity on fungi, and filmed the sprites associated with thunderstorms across the globe as their scientific research flight continued in its fifth day.

Red team members Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark and Israeli Payload Specialist Ilan Ramon conducted additional data takes with the Mechanics of Granular Materials experiment located in the Spacehab Research Module in Columbia's cargo bay. The MGM experiment is providing information on the behavior of saturated sand when exposed to confining pressures in microgravity. The experiment could provide engineers valuable data for strengthening buildings against earthquakes.

The Red team is working what amounts to the day shift on orbit, while the Blue team --- Pilot Willie McCool, Mission Specialist Dave Brown and Payload Commander Mike Anderson --- is working the overnight shift. The division of the two teams into 12-hour shifts assures that scientific research is conducted round-the-clock.

One of the host of experiments in the Spacehab science lab --- the Microbial Physiology Flight Experiment --- was monitored by Clark as she studied how specific fungi react to the absence of gravity for long periods of time.

Additional data was acquired by Anderson and Ramon with an experiment in the Combustion Module in the Spacehab --- the study of Laminar Soot Processes (LSP) --- designed to gain a better understanding of soot formation, oxidation and radiative properties within flames. Two other experiments studying flame properties in space in the large Spacehab furnace are to be conducted throughout the course of the flight.

Work was also accomplished with a series of biomedical experiments studying the human body's response to weightlessness --- particularly dealing with protein manufacturing in the absence of a gravity environment, bone and calcium production, the formation of chemicals associated with renal stones and how saliva and urine change in space relative to any exposure to viruses. The crewmembers also continued periodic blood draws to study how their bodies are adapting to the microgravity environment.

Experiments continued with the MEIDEX cameras in the cargo bay observing thunderstorms to capture images of sprites, which are associated with discharges from the tops of thunderclouds into the Earth's upper atmosphere, and with the SOLSE experiment, studying the amount of ozone in the Earth's upper atmosphere by using a special imaging spectrometer in the payload bay to look across the limb of the Earth during specifically scheduled orbits.

Having been awakened just after 4 p.m. Central time, McCool, Brown and Anderson planned to continue the more than 80 experiments on board Columbia. The Red team will begin its eight-hour sleep period just after 8 p.m. Central time.

This afternoon, flight controllers observed a minor electrical current spike in one of two systems designed to collect and distribute water produced from condensation buildup caused by the operation of the cooling system in the Spacehab Research Module in the cargo bay.

An identical system sprung a leak under the floorboards of Spacehab last night and was shut down. The secondary system had been operating normally until the electrical spike was observed at around 1:15 p.m. A plan was implemented to reconfigure a valve in Columbia, allowing cool air from the shuttle to flow into the science module, thus enabling the module's temperatures to remain at a level that will not require the use of Spacehab's cooling system, while preventing any further buildup of condensation. Later, an air duct was routed from Columbia to the Spacehab to increase the flow of cool air into the science facility.

Flight controllers plan to continue their analysis of the Spacehab cooling issue throughout the night, with no impact expected to science operations.

Aboard the International Space Station, Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and ISS Science Officer Don Pettit entered their third month in orbit today with a full complement of scientific research activities, exercise and routine ISS maintenance work.

The three ISS crewmembers conducted a number of cardiovascular tests, unloaded samples from a Zeolite Crystal Growth experiment in the Destiny laboratory that has completed its work for this Expedition. The Russian Vozdukh carbon dioxide removal system in the Zvezda Module, which shut down last week, is now operating normally following the weekend replacement of a valve. The U.S. segment CO2 removal system, which has been operating in place of Vozdukh, was powered down as a result of the Vozdukh revival.

All other station systems are operating normally as are all the systems aboard the shuttle Columbia, which, like the ISS, is orbiting the Earth every 90 minutes.

The next STS-107 mission status report will be issued Tuesday afternoon, or earlier, if events warrant.

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From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Monday, January 20, 2003 8:02 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 04 Report

STS-107 Flight Day 04 Report
GMT 019:13:30

Shift Leads: Andy Foster, Ross Engle, Denise Londrigan
Mission Engineer: Megaqn Bell (OJT)

The STS-107 mission is progressing nominally and all Orbiter subsystems are performing satisfactorily. No Orbiter issues have been reported in the previous 24 hours. The Orbiter consumables continue to remain above the levels required for completion of the planned mission.

With respect to the debris hit on the left wing leading edge discussed in the Second Daily Report, JSC image analysis personnel have completed their review of the high-speed and high-resolution long-range tracking films. Comparison views of what can be seen of the strike area immediately before and after the event were examined for indications of damage to the wing. The resolution on the films and videos is insufficient to see individual tiles. However, no indications of larger scale damage were noted as indicated by the lack of changes in the brightness of the port lower wing surface.

There are no new MER anomalies

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Sunday, January 19, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #148

NASA HSF News Digest Sunday, January 19 2003 Volume 01 : Number 148

In this issue:

STS-107 MCC Status Report #05

All NASA HSF News Releases and Mission Status Reports are available online at <http://spaceflight.nasa.gov/spacenews/>.

Date: Sun, 19 Jan 2003 15:26:39 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #05

STS-107
Report #05
Sunday, January 19, 2003 - 4:00 p.m. CST
Mission Control Center, Houston, Texas

Columbia's astronauts studied combustion properties and the response of their own bodies in weightlessness and the behavior of soot in space one-quarter of the way through their marathon scientific research mission.

Red Team members Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark and Israeli Payload Specialist Ilan Ramon completed the first data collection sessions with the Combustion Module in the Spacehab research module housed in Columbia's cargo bay. One of three experiments housed in the Combustion Module --- the study of Laminar Soot Processes (LSP) --- is designed to gain a better understanding of soot formation, oxidation and radiative properties within flames.

Additional data was gleaned from the Mechanics of Granular Materials experiment (MGM) in the Spacehab module, which is providing information on the behavior of saturated sand when exposed to confining pressures in microgravity. The experiment could provide engineers with valuable data for strengthening buildings against earthquakes.

Work was also accomplished with a series of biomedical experiments studying the human body's response to weightlessness --- particularly dealing with protein manufacturing in the absence of a gravity environment, bone and calcium production, the formation of chemicals associated with renal stones and how saliva and urine change in space relative to any exposure to viruses.

Experiments continued with the MEIDEX cameras in the cargo bay observing dust storms in the Mediterranean region and with the SOLSE experiment, geared to studying the amount of ozone in the Earth's atmosphere by using a special imaging spectrometer in the payload bay to look across the limb of the Earth during specifically scheduled orbits.

Columbia's Blue Team science cadre --- Pilot Willie McCool and Mission Specialists Dave Brown and Mike Anderson --- planned to continue the more than 80 experiments on board Columbia following their wakeup call this afternoon. The Red team will begin its eight-

hour sleep period just before 9 p.m. Central time.

Earlier today, TV cameras in the Spacehab research module captured Ramon conducting work with the Combustion Module. He reported that the materials science facility was operating perfectly as are all of the other experiment facilities aboard Columbia.

Aboard the International Space Station, Commander Ken Bowersox, Flight Engineer Nikolai Budarin and ISS Science Officer Don Pettit completed their second month in space by enjoying an off-duty day. The crew will return to a full complement of scientific research activities, exercise and routine ISS maintenance work on Monday. The ISS crew is working a schedule, which calls for them to be awakened every morning at 12:00 a.m. Central time and for their 8 ½ hour sleep period to begin at 3:30 p.m. CST.

The ISS crew was informed that replacement parts for the Microgravity Science Glovebox will be ready for launch on the next Progress resupply vehicle to the ISS on February 2. With docking of that cargo ship to the ISS planned for Feb. 4, virtually all of the science planned for the facility during Expedition 6 will be accomplished as initially planned.

All systems aboard Columbia and the ISS continue to function well.

The next STS-107 mission status report will be issued Monday afternoon, or earlier if events warrant.

- -end-

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Sunday, January 19, 2003 8:22 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 3 Report

STS-107 Flight Day 03 Report
GMT 019:13:30

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT)

STS-107 is continuing with its investigation of various scientific activities in a micro-g environment. The mission is progressing nominally with only minor problems. The Orbiter is still in a 156 x 146nm orbit. Consumables are still above mission requirements.

At this time, there are no impacts associated with the Spacehab water loop degradation. We continue to run on pump 1.

One item came to our attention yesterday after we sent out the daily report. High-speed film analysis from ascent showed a large, light-colored piece of debris break off the Orbiter/ET forward attach bipod at MET 81 seconds. The piece struck the wing leading edge of the left wing on or near the wing glove and broke into a spray of white colored particles that streamed under the left wing and was last seen near the left SRB exhaust plume. Analysis of high speed and high resolution tracking films are being conducted to get more detail of this event. See the following URL:
http://sn-isag.jsc.nasa.gov/shuttleweb/mission_support/sts-107/index107.shtml

There are two new MER anomalies, both minor GFE impacts.

The motor drive on one of the 70mm Hasselblad cameras (serial number 1036) jammed after 3 shots. The crew swapped out camera body batteries, motor drive batteries, and the film magazine; but the camera continued to jam. The crew is using the remaining 70mm camera.

The crew was attempting to use a PGSC for a data take utilizing the Fuel Cell Monitoring System (FCMS) but got error messages. After verifying the PGSC configuration, the crew replaced the FCMS cable with a backup and got good results.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)
MER-04 70MM Hasselblad Camera Motor Drive Binds/Jams (GFE)
MER-05 Suspect Fuel Cell Monitoring System (FCMS) Data Cable (GFE)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Saturday, January 18, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #147

NASA HSF News Digest Saturday, January 18 2003 Volume 01 : Number 147

In this issue:

STS-107 MCC Status Report #04

All NASA HSF News Releases and Mission Status Reports are available online at <http://spaceflight.nasa.gov/spaceneews/>.

Date: Sat, 18 Jan 2003 16:59:24 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #04

STS-107
Report #04
Saturday, January 18, 2003 - 5:00 p.m. CST
Mission Control Center, Houston, Texas

Space shuttle Columbia's astronauts pointed two Israeli cameras over the Atlantic and the Mediterranean today in search of small dust particles that might impact the weather and began experiments in human life sciences in the third day of the STS-107 scientific research flight.

Red Team members Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark and Israeli Payload Specialist Ilan Ramon were awakened at 4:39 a.m. CST. Following a handover with their Blue Team counterparts, they took over for Pilot Willie McCool and Mission Specialists Dave Brown and Mike Anderson, who began an eight-hour sleep period at 9:39 a.m. CST.

Specific experiment highlights today included:

· A radiometric camera and a video camera were aimed at the Atlantic and the Mediterranean as part of the Mediterranean Israeli Dust Experiment. Although no dust was detected due to heavy cloud coverage, initial analysis showed that the two cameras are working well, supplying high-quality images. The cloud patterns imaged by the cameras showed remarkable details. The intent of the experiment is to help researchers better understand how dust particles in the atmosphere affect climate.

· An experiment that looks at the movement of calcium through the body to further understanding of bone loss in space began. Astronauts took oral calcium tracers that will be monitored over the course of the mission to examine how calcium metabolism changes in

an astronaut's body during spaceflight.

In the physical sciences, the second run of the Mechanics of Granular Materials was completed. The objective of the experiment is to improve and enhance science and technology in many disciplines including earthquake engineering and soil mechanics. Results may lead to answers concerning the consequences of earthquakes, such as damage to soils and foundations.

Shortly after 2 p.m. CST, Red Team members took time out from their experiment schedule to talk with reporters from CNN, CBS News and Fox News Channel. Asked about the importance of the flight to Israel, Ramon commented that he views the mission as an "opening for great science for our nation."

- more-

The Blue Team will be awakened at 5:39 p.m. CST to continue work on the more than 80 experiments aboard Columbia. Scheduled activities include initiation of experiments in the Combustion Module. It will be used to conduct three experiments that examine soot formation, lean combustion and fire suppression.

All systems aboard Columbia continue to function well.

Aboard the International Space Station, Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit observed a milestone today as they presided over the final run of the Zeolite Crystal Growth experiment in the Destiny Lab. Experiment results may contribute to the technology used to make gasoline, products for the chemical industry and commercial film products.

The Expedition crew conducted a weekly planning conference with flight controllers in Houston and downlinked video of maintenance work performed this past week. Crewmembers have a light schedule of duties this weekend before resuming their full schedule of activities on Monday.

The next STS-107 mission status report will be issued Sunday afternoon, or earlier if events warrant.

- end-

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Saturday, January 18, 2003 7:23 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Flight Day 2 Report

STS-107 Flight Day 02 Report
GMT 18:13:08

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT), Mike Penney

STS-107 mission is progressing nominally. The orbiter is currently in a 156X146 nm orbit. SpaceHab operations are progressing nominally at this time. Orbiter consumables are above the levels required by the mission plan. In fact, cryo margins are being monitored closely due to anticipated impacts to end of mission downweight and center of gravity. (SpaceHab is not drawing as much power as anticipated.)

There is one new MER anomaly. During performance of the O2 tank current level detector checkout, it was noted that the O2 tank 7 heater A1 and A2 ON discrete did not come on. Main bus current verified O2 tank 7 heater A did not come on. The B heaters functioned nominally and provided sufficient energy to the tank so there was no concern about being able to use it. The heaters had not yet been used in the AUTO mode; when the BLUE Crew switched the heater to the AUTO position on MCC call, the EGIL console observed nominal heater cycles. The tank heater is operating nominally.

While SpaceHab operations are progressing nominally, the SpaceHab Water Loop is showing some degradation. The Payload Heat Exchanger and total flow rates for the SpaceHab water loop have been steadily decreasing. Also, the Subsystem Water Pump outlet pressure is also decreasing. These signatures indicate pump filter blockage or pump degradation. Currently, the system is being run on Pump 2 and operation on Pump 2 will continue as long as possible. MCC plans to swap to Water Pump 1 at GMT 018:13:29 and remain on Pump 1 for the remainder of the mission. No mission impact is expected.

At the time of this report, the Crew is on Flight Day 3 performing blood draws and infusions, ARMS activities, and MEIDEX operations.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab
MER-03 O2 Tank 7 Heater A Failed Off in Manual Mode (ORB)

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Friday, January 17, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #146

NASA HSF News Digest Friday, January 17 2003 Volume 01 : Number 146

In this issue:

STS-107 MCC Status Report #03

All NASA HSF News Releases and Mission Status Reports are available online at <http://spaceflight.nasa.gov/spaceneeds/>.

Date: Fri, 17 Jan 2003 17:37:53 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #03

STS-107
Report #03
Friday, Jan. 17, 2003 - 5 p.m. CST
Mission Control Center, Houston, Texas

In their first full day in orbit, Columbia's seven crewmembers completed activation of the SPACEHAB Research Double Module in the shuttle's cargo bay and all of its scientific experiments.

Red Team members Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark and Israeli Payload Specialist Ilan Ramon were awakened at 4:39 a.m. CST. Following a handover with their Blue Team counterparts, they took over for Pilot Willie McCool and Mission Specialists Dave Brown and Mike Anderson, who began an eight-hour sleep period at 10:39 a.m. CST.

All SPACEHAB payloads are performing well and research activities continue on schedule. Specific experiment highlights so far include:

All Fast Reaction Experiments Enabling Science Technology Applications and Research, or FREESTAR, payloads have been activated and are performing well. One FREESTAR experiment that measures the amount of energy coming from the sun completed an initial observation, with the best sun pointing ever seen on any shuttle flight. Another experiment that will perform measurements of the Earth's ozone layer is operating nominally. The Mediterranean Israeli Dust Experiment, or MEIDEX, which will measure small particles called aerosols in the atmosphere over the Mediterranean Sea and the Atlantic Ocean off the coast of the Sahara desert, has been readied for initial observations.

The Bioreactor Demonstration System made its initial run. The NASA-developed bioreactor is being used to grow prostate cancer tissues to help scientists better understand how the cancer spreads into bones and to aid in the development of future treatment methods. In the first 20 hours of experiment operations, a significant aggregate of tumor tissue was grown.

The Critical Viscosity of Xenon-2 experiment has been working nominally. The instrument is cooling the xenon sample to begin calibration. A preliminary analysis of the flight data compares favorably with ground-based data. This research in fluid physics may be important to the production of paints, plastics, drugs, food and cosmetics.

The Blue Team will be awakened at 6:39 p.m. CST to continue work on the more than 80 experiments aboard Columbia. Scheduled activities include using MEIDEX, consisting of a radiometric camera and a video camera, to measure a Mediterranean dust plume north of the Gulf of Sidra. Human life sciences experiments also are scheduled to begin.

All systems aboard Columbia continue to function well.

Aboard the International Space Station, Expedition 6 Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit completed their eighth week in space. Today, they unstowed a rendezvous system from the Russian Progress 9 resupply ship in preparation for the Progress' undocking Feb. 1. That will clear the aft port of the Zvezda Service Module for the arrival of a new Progress cargo craft Feb. 4.

The Expedition 6 crew also conducted metabolic science experiments, exercised and prepared for a quiet weekend in orbit.

The next STS-107 mission status report will be issued Saturday afternoon, or earlier if events warrant.

- -END-

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Sent: Friday, January 17, 2003 8:59 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 FD01 Report

STS-107 Flight Day 01 Report
GMT 017:14:30

Shift Leads: Andy Foster, Ross Engle, Jeff Peters
Mission Engineer: Megan Bell (OJT)

The STS-107 mission is progressing nominally. Payload bay door opening was nominal and the port radiator was deployed. Spacehab activation also was nominal though a bit late. Spacehab activities are progressing nominally at this time. Orbiter consumables are above the levels required for the planned mission. Twenty-two hours of margin were reported at the Engineering meeting this morning.

Two items are being carried as MER anomalies at this time.

AC2 Phase B exhibited sluggish performance during the prelaunch and post-insertion timeframes. Sluggish performance was first noted at T-31 seconds in the launch countdown and then twice during post-insertion activities. During the operation of three motors, AC2 phases A and C would increase to expected values while phase B would rise to only half of what was expected but recover to nominal values within one second. Motor operation was nominal. The affected motors are: vent doors 8 and 9, Ku-band deploy motor 2, and port payload door open motor 2. There are no common circuits or motor control assemblies for these motors though they are all controlled via circuit breakers found on panel MA73C. However, other motors controlled by those circuit breakers are showing nominal operating signatures. Engineering is continuing to examine data, but there is no in-flight troubleshooting planned at this time. This anomaly holds no mission impact since all motors will operate nominally even if there were a complete failure of phase B. At this time, we believe the mission is at no additional risk. We are continuing to monitor and evaluate this anomaly.

During Spacehab activation, the crew reported they could not communicate to Spacehab from the Orbiter over the intercommunications (ICOM) B loop. ICOM A is working nominally, and this is considered to be a loss of redundancy impact. No mission impact is expected, and currently no in flight troubleshooting is planned.

MER Anomalies:

MER-01 AC2 Phase B Sluggish Current Signature
MER-02 No ICOM B in Spacehab

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Thursday, January 16, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #145

NASA HSF News Digest Thursday, January 16 2003 Volume 01 : Number 145

In this issue:

STS-107 MCC Status Report #01
STS-107 MCC Status Report #02

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<<http://spaceflight.nasa.gov/spacenews/>>.

Date: Thu, 16 Jan 2003 10:01:04 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #01

STS-107
Report #01
Thursday, Jan. 16, 2003 - 10 a.m. CST
Mission Control Center, Houston, Texas

Columbia lifted off from the Kennedy Space Center this morning on the first shuttle mission of the year, carrying the first Israeli astronaut into orbit along with six crewmates on a marathon international scientific research flight.

Commander Rick Husband, Pilot Willie McCool, Mission Specialists Dave Brown, Kalpana Chawla and Laurel Clark, Payload Commander Mike Anderson and Payload Specialist Ilan Ramon of the Israel Space Agency blasted off at 9:39 a.m. CST from Launch Pad 39-A. Less than nine minutes later, Columbia settled into an orbit inclined 39 degrees to the equator.

The seven astronauts will divide their duties into two teams working 12-hour shifts to conduct round-the-clock science. Aboard Columbia more than 80 experiments dealing with astronaut health and safety, advanced technology development and Earth and space sciences.

Husband, Chawla, Clark and Ramon comprise the Red team which will work in the pre-dawn and daytime hours, while McCool, Brown and Anderson make up the Blue team, working the evening and overnight hours.

Once in orbit, the crewmembers will begin to unstow gear and prepared for the opening of Columbia's payload bay doors, before activating hardware and experiments in a double Spacehab research module housed in the shuttle's cargo bay, which contains the lion's share of the mission's science. Other experiments housed in the cargo bay also will be activated, along with a special pallet of cryogenic fuel tanks at the rear of the cargo bay which will provide Columbia and its experiments sufficient electrical power for the duration of the flight.

Having shifted their sleep schedule to accommodate the dual-shift operations, McCool, Brown and Anderson will begin an abbreviated six-hour sleep period at 1:39 p.m. CST and will be awakened at 7:39 p.m. while Red team counterparts continue the early stages of experiment activation. Husband, Chawla, Clark and Ramon will begin an eight-hour sleep period at 8:39 p.m. and will be awakened Friday at 4:39 a.m. to handover work from the Blue team which will be continuing the initial phase of scientific studies overnight.

As Columbia was launched, the Expedition 6 crew aboard the International Space Station was orbiting over the northern Pacific Ocean south of the Aleutian island chain. Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit are in their 54th day in space, their 52nd day on board the station.

The next STS-107 mission status report will be issued this evening, or earlier if events warrant.

- --end--

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Date: Thu, 16 Jan 2003 16:22:05 -0600 (CST)
From: info@jsc.nasa.gov
Subject: STS-107 MCC Status Report #02

STS-107
Report #02
Thursday, Jan. 16, 2003 – 4:30 p.m. CST
Mission Control Center, Houston, Texas

Columbia's crewmembers unstowed equipment and began activation of the Spacehab Research Double Module in the shuttle's cargo bay, setting the stage for 24-hour-a-day science during the shuttle's 16-day research mission.

Columbia lifted off at 9:39 a.m. CST from the Kennedy Space Center in near-perfect weather after a flawless countdown. The crew opened the spacecraft's payload bay doors about 11:35 a.m. and then were given the go-ahead for on-orbit operations.

The seven-member crew is divided into two teams, each working 12 hours per day during most of the flight. Members of the blue team, Pilot Willie McCool and Mission Specialists Dave Brown and Mike Anderson, began a six-hour sleep period at 2:47 p.m. CST and will be awakened at 8:49 p.m. Red team members, Commander Rick Husband, Mission Specialists Kalpana Chawla and Laurel Clark, and Israeli Payload Specialist Ilan Ramon, begin a 7-hour sleep period at 9:39 p.m.

Spacehab is a pressurized research module 20 feet long, 14 feet wide and 11 feet high. It houses equipment for 59 experiments, three of them mounted on its roof. Its activation marks the beginning of the major science activities of Columbia's mission.

All systems aboard Columbia continue to function flawlessly.

The shuttle is at an altitude of about 178 statute miles, in an orbit inclined 39 degrees to the equator. Aboard the International Space Station, Expedition 6 crewmembers, Commander Ken Bowersox, Flight Engineer Nikolai Budarin and NASA ISS Science Officer Don Pettit, received a live video uplink of the launch through the ISS Flight Control Room in the Mission Control Center at Johnson Space Center in Houston.

The next STS-107 mission status report will be issued Friday afternoon, or earlier if events warrant.

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: SR&QA MER Console [srqamer1@jsc.nasa.gov]
Sent: Thursday, January 16, 2003 10:34 AM
To: 'srqa-mer@listserver.jsc.nasa.gov'
Subject: STS-107 Launch Report

STS-107 Launch Report
GMT 16:16:30

Shift Lead: Andy Foster
Ascent Ops Specialist: Andy Foster
Tanking/MPS Specialists: Bill Prince, Dan Clements
Mission Engineer: Megan Bell (OJT)

STS-107 was successfully launched on January 16, 2003 at GMT 16:15:39 (09:30 CST). While some IPR's were worked, there were no LCC violations during the prelaunch countdown. Weather was never a concern during the launch for KSC or at the TAL sites.

Performance during powered flight was nominal. MECO occurred on time and inserted the vehicle into an initial 156 x 43 nm orbit. ET sep and all subsequent events were nominal. OMS 2 occurred at 16:16:20 GMT. The 186.1 fps burn boosted the vehicle into a 156 x 146 nm orbit.

There are no vehicle anomalies at this time.

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MARSHALL, YOLANDA Y. (JSC-NA) (NASA)

From: info@VESUVIUS.jsc.nasa.gov
Sent: Wednesday, January 15, 2003 6:00 PM
To: hsfnews@VESUVIUS.jsc.nasa.gov
Subject: NASA HSF News Digest V1 #144

NASA HSF News Digest Wednesday, January 15 2003 Volume 01 : Number 144

In this issue:

International Space Station Status Report #3

All NASA HSF News Releases and Mission Status Reports are available online at <http://spaceflight.nasa.gov/spacenews/>.

Date: Wed, 15 Jan 2003 13:53:14 -0600 (CST)
From: info@jsc.nasa.gov
Subject: International Space Station Status Report #3

2003
Report #3
2 p.m. CST, Wednesday, January 15, 2003
Mission Control Center, Houston, Texas

Expedition 6 Commander Ken Bowersox and NASA Science Officer Don Pettit continued the assembly of the International Space Station today and set the stage for a series of complex shuttle construction flights to the complex later this year during a 6-hour, 51-minute spacewalk staged out of the Quest Airlock.

The spacewalk, which was the first for both Bowersox and Pettit, was the 50th excursion in support of the assembly and maintenance of the ISS, the 25th originated from the Station itself and the 16th conducted from Quest. Russian cosmonaut Nikolai Budarin supported the spacewalk from inside the ISS, acting as the spacewalk choreographer while operating television cameras on the Canadarm2 robotic arm.

After encountering some difficulty opening the airlock hatch due to a strap on the inside of the thermal hatch cover, the hatch finally swung open and Bowersox and Pettit began their spacewalk at 6:50 a.m. Central time by placing their suits on internal battery power. As he did, Bowersox reported a loss of digital data for his suit systems, requiring him to recycle his suit power that cleared up the momentary glitch. Once outside, Bowersox and Pettit quickly set up tools and gear, then moved to the recently installed Port One (P1) Truss segment, where they released ten remaining launch restraints from the truss' radiator system. Eight others had been released when the truss was delivered to the ISS last November on the STS-113 mission.

Flight controllers then sent commands to unfurl the P1's center radiator, enabling it to extend to its fully deployed length of 75 feet, preparing the system for its activation

later this year to provide cooling for station systems. The deployment took only 9 minutes to complete.

After inspecting some hardware on the P1 Truss for engineers on the ground, the two spacewalkers made their way to the Unity connecting node, where Pettit used Kapton tape to dab away small amounts of grit from a sealing ring on the nadir Common Berthing Mechanism, leaving the CBM in a pristine condition for the attachment of the Raffaello Multi-Purpose Logistics Module during the next shuttle flight to the station in March.

Bowersox and Pettit were unable to complete one minor task, the installation of a stanchion and a light fixture on one of two handcarts located on the Starboard One (S1) Truss which future spacewalkers will use to transport themselves up and down the station's truss system. The stanchion would not release from its stowed position on the truss, apparently because of a pin interfering with its movement, and the task, considered a low priority for today's spacewalk, was deferred to a future Expedition excursion.

As they neared the end of their spacewalk, Bowersox and Pettit returned to the center of the station, as Pettit retrieved tools from a storage box on the Z1 Truss and conducted a health check on an ammonia reservoir that was delivered to the P6 solar array truss structure in 2001. That ammonia system will be used to partially fill the cooling loops of the P1 Truss on an intricate shuttle assembly flight later this year that will occur in the midst of the reconfiguration of station power systems.

As they reentered the Quest Airlock, Bowersox and Pettit used a scissors to cut away the strap on the hatch cover which interfered with the rotation of the hatch handle at the start of the spacewalk. The hatch closed normally with no further problems expected in the future.

With their work completed, Bowersox and Pettit completed their spacewalk at 1:41p.m. Central time, raising the total spacewalk time for ISS assembly and maintenance to 312 hours and 11 minutes.

Before the spacewalk began, robotic engineers in Mission Control sent commands to move the station's Mobile Transporter from the far end of the P1 Truss to its normal parking place at the centermost S0 Truss segment to protect its umbilical cable from any potential damage from orbital debris. The Transporter began its move from the P1 Truss to the S0 Truss at 1:53 a.m. Central time, latching itself in place about 20 minutes later.

The transporter is used to maneuver the Canadarm2 space crane up and down the length of the station's trusses for assembly work. It had been parked on the P1 Truss during the STS-113 mission when it ran into a communication antenna on the truss, delaying its use for one of that flight's spacewalks. Today, it moved back to its normal parking place uneventfully.

Bowersox, Budarin and Pettit will enjoy an off-duty day Thursday in the wake of today's spacewalk before resuming their normal complement of scientific experiments and ISS housekeeping on Friday.

Information on the crew's activities aboard the space station, future launch dates, as well as station sighting opportunities from anywhere on the Earth, is available on the Internet at:

<http://spaceflight.nasa.gov/>

Details on station science operations can be found on an Internet site administered by the Payload Operations Center at NASA's Marshall Space Flight Center in Huntsville, Ala., at:

<http://www.scipoc.msfc.nasa.gov/>

The next station status reports will be included as part of the STS-107 Shuttle mission status reports, unless other developments warrant.

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