NASA

SECTION 11

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

Michele Lewis

om: DISLER, JONATHAN M. (JON) (JSC-SX) (LM)
ent: Friday, January 17, 2003 1:56 PM
To: Armando Oliu (E-mail); BAHR, PATRICIA A. (PAT) (JSC-SJ) (NASA); CONTE, BARBARA A. (JSC-DM) (NASA); Bill Lamkin; SWAN, BOBBIE G. (JSC-CA) (NASA); ELIASON, BRENDA J. (JSC-EA6) (NASA); BALU, BRIAN K. (JSC-NC) (SAIC); ORTIZ-LONGO, CARLOS R., PHD (JSC-EA4) (NASA); CLOUDT, CHRIS R. (JSC-SX) (HEI); HADFIELD, CHRIS (JSC-CB) (CSA); Chris Lessmann; BOYKIN, CHRISTINE M. (JSC-MS2) (NASA); LARSEN, CURTIS E. (JSC-MS2) (NASA); CLEMENTS, DANIEL L. (JSC-NC) (GHG); BROWN, DAVID M. (JSC-CB) (NASA); MOYER, DAVID S. (JSC-MV5) (NASA); BRETZ, DAVID R. (JSC-SX) (HEI); David Rigby / MPS SSM (E-mail); HAYNES, DENA S. (JSC-EV) (NASA); PREVETT, DONALD E. (DON) (JSC-EP) (NASA); MCCORMACK, DONALD L. (DON) (JSC-MV6) (NASA); Doug White; Douglas Powell (MAF); MAYER, FRED F. (JSC-NC) (SAIC); Gail Hargrove Boeing-Houston Imagery Scrn.; Greg Katnik; GALBREATH, GREGORY F. (GREG) (JSC-ES2) (NASA); BYRNE, GREGORY J., PHD (JSC-SX) (NASA); WALTERS, JAMES B. (BRITT) (JSC-SM) (NASA); 'James Feeley' (E-mail); WALTERS, JAMES B. (BRITT) (JSC-SM) (NASA); JIMENEZ, JAVIER J. (JSC-EB) (LM); Jeff Goodmark (E-mail); RICHART, JENE A. (JSC-MS2) (NASA); LIN, JILL D. (JSC-MV5) (NASA); Jim Harder; 'John McKee' (E-mail); John Ventimiglia; DISLER, JONATHAN M. (JON) (JSC-SX) (LM); Jorge Rivera; KRAMER, JULIE A. (JSC-EA4) (NASA); Karen Alfaro (E-mail); BROWN, KENNETH L. (JSC-MV6) (NASA); CROSBY, KEVIN L. (JSC-SX) (LM); 'L Lohrli' (E-mail); Malcolm Glenn; ERMINGER, MARK D. (JSC-NC) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA); HOLDERMAN, MARK L. (JSC-MS3) (NASA); IVINS, MARSHA S. (JSC-CB) (NASA); MARTINEZ, HUGO E. (JSC-NC) (GHG); ANDERSON, MICHAEL P. (JSC-CB) (NASA); SNYDER, MICHAEL W. (JSC-SX) (LM); Mike Cagle / Boeing Film Screen; Mike O'farrell; BERTSCH, P. J. (JEFF) (JSC-DM2) (NASA); Pam Madera (E-mail); DYE, PAUL F. (JSC-DA8) (NASA); PAYNE, ROBERT W. (JSC-SA13) (LM); 'Philip Kopfinger' (E-mail); Philip Peterson / Boeing Film Screen (E-mail); Philip Reid / Boeing Film Screen; SAGANTI, PREMKUMAR, PHD (JSC-SF) (LM); ADAMS, RANDALL W. (JSC-MA2) (NASA); SILVESTRI, RAYMOND T. (RAY) (JSC-DM4) (NASA); HUSBAND, RICK D. (JSC-CB) (NASA); Robbie Robbinson; Robert Page; SCHARF, ROBERT (JSC-SX) (LM); Robert Speece; FRICKE, ROBERT W., JR (JSC-MV) (LM); ROCHA, ALAN R. (RODNEY) (JSC-ES2) (NASA); WALLACE, RODNEY O. (ROD) (JSC-MS2) (NASA); Rohit Dhawan; CLAYTON, RONALD G. (RONNIE) (JSC-MS2) (NASA); GLANVILLE, ROY W. (JSC-NC) (NASA); Rudy Ramon; SA REP; Sara Brandenburg; Scott Otto; FRICK, STEPHEN N., CDR. (JSC-CB) (NASA); DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA); Tom Rieckhoff; Tom Wilson; 'Treith' (E-mail)
Subject: STS-107 Long Range Tracking Video Screening

Follow Up Flag: Follow up
Flag Status: Flagged

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 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

Michele Lewis

'om: Oliu-1, Armando [Armando.Oliu-1@nasa.gov]
Sent: Friday, January 17, 2003 7:08 PM
To: Abner, Charlie; 'Adams, Randall'; 'Ayotte, William'; Blue, John B; 'Brown Kenneth'; 'Buckingham, Bruce'; Bulloch-1, Steve; Bursian, Henry; BYRNE, GREGORY J., PHD (JSC-SX) (NASA); Chitko, Pete J.; 'cookjh@thiokol.com'; DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA); DISLER, JONATHAN M. (JON) (JSC-SX) (LM); DISLER, JONATHAN M. (JON) (JSC-SX) (LM); 'Eastwood Martin'; Estrada-1, Carlos; FRICKE, ROBERT W., JR (JSC-MV) (LM); GAETJENS, WILLIAM M. (JSC-CB) (USA); Glenn-1, Malcolm; 'Gomez Reynaldo'; 'GRP DOC Mission Support Room'; Guidi-1, John; Hawkins, Tyrell; Herman, Robert S; Herst, Terri; Holloway, Darrell L; 'Holmes Steve'; Huff, Joy N.; 'Jay.Sambamurthi@msfc.nasa.gov'; Jones-1, Frank; Kelley-1, David; 'Khodadoust, Abdollah'; Kienitz, Fred; 'Kinder Gerald'; 'Koenig Lisa'; 'Kopfinger, Philip A'; Lafleur, Tom C; Leggett, Kenneth D; Leinbach-1, Mike; 'Linda Ham'; 'Mango, Ed'; 'McClymonds, Jack'; 'MCCORMACK, DONALD L. (DON) (JSC-MV)'; Mosteller-1, Ted; Mulligan-1, Melanie; Nguyen-1, Bao; 'O'Farrell Mike'; 'Ortiz Carlos'; 'Otte Neil'; 'Otto, Scott'; 'Page, Robert'; Payne-1, Michael; 'Ramirez, Juan'; Revay, Kenneth P; 'Rieckhoff, Tom - PC'; 'Rieckhoff, Tom - UNIX'; 'Roe Ralph'; 'Schomburg Calvin'; 'Schricker, B.'; 'snichols@hq.nasa.gov'; Sofge, Al (NASA HQ); 'Speece, Robert'; Stevenson-1, Charlie; 'Stone, Jeff'; Tenbusch-1, Ken; Wells-1, Joel; Wilson, Thomas F.; Rivera, Jorge; Greenwell-1, Shawn; Oliu-1, Armando; Crisafulli, Anthony; Brewer, Raymond J; Marren, Tom; Thompson-1, Becky J.; Key, John; Lorick, Vicky K; Champagne, Lorraine C; Kent, William T. "Tim"; Spaulding-1, Jeff; Altemus-1, Steve; Mullins, Michael B; Powell, Doug; Cross, Donald G; Hammel-1, Donald; Stoner-1, Michael D; Greby, Mark J
Subject: STS-107 Post-Launch Film Review - Day 1


07film1.pdf E212.mpg

Attached is the Day 1 report and an MPG of Anomaly #1.

<<107film1.pdf>> <<E212.mpg>>

Michele Lewis

From: Oliu-1, Armando [Armando.Oliu-1@nasa.gov]
Sent: Saturday, January 18, 2003 4:37 PM
To: Abner, Charlie; 'Adams, Randall'; 'Ayotte, William'; Blue, John B; 'Brown Kenneth'; 'Buckingham, Bruce'; Bulloch-1, Steve; Bursian, Henry; BYRNE, GREGORY J., PHD (JSC-SX) (NASA); Chitko, Pete J.; 'cookjh@thiokol.com'; DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA); DISLER, JONATHAN M. (JON) (JSC-SX) (LM); DISLER, JONATHAN M. (JON) (JSC-SX) (LM); 'Eastwood Martin'; Estrada-1, Carlos; FRICKE, ROBERT W., JR (JSC-MV) (LM); GAETJENS, WILLIAM M. (JSC-CB) (USA); Glenn-1, Malcolm; 'Gomez Reynaldo'; 'GRP DOC Mission Support Room'; Guidi-1, John; Hawkins, Tyrell; Herman, Robert S; Herst, Terri; Holloway, Darrell L; 'Holmes Steve'; Huff, Joy N.; 'Jay.Sambamurthi@msfc.nasa.gov'; Jones-1, Frank; Kelley-1, David; 'Khodadoust, Abdollah'; Kienitz, Fred; 'Kinder Gerald'; 'Koenig Lisa'; 'Kopfinger, Philip A'; Lafleur, Tom C; Leggett, Kenneth D; Leinbach-1, Mike; 'Linda Ham'; 'Mango, Ed'; 'McClymonds, Jack'; 'MCCORMACK, DONALD L. (DON) (JSC-MV)'; Mosteller-1, Ted; Mulligan-1, Melanie; Nguyen-1, Bao; 'O'Farrell Mike'; 'Ortiz Carlos'; 'Otte Neil'; 'Otto, Scott'; 'Page, Robert'; Payne-1, Michael; 'Ramirez, Juan'; Revay, Kenneth P; 'Rieckhoff, Tom - PC'; 'Rieckhoff, Tom - UNIX'; 'Roe Ralph'; 'Schomburg Calvin'; 'Schricker, B.'; 'snichols@hq.nasa.gov'; Sofge, Al (NASA HQ); 'Speece, Robert'; Stevenson-1, Charlie; 'Stone, Jeff'; Tenbusch-1, Ken; Wells-1, Joel; Wilson, Thomas F.; Rivera, Jorge; Greenwell-1, Shawn; Oliu-1, Armando; Crisafulli, Anthony; Brewer, Raymond J; Marren, Tom; Thompson-1, Becky J.; Key, John; Lorick, Vicky K; Champagne, Lorraine C; Kent, William T. "Tim"; Spaulding-1, Jeff; Altemus-1, Steve; Mullins, Michael B; Powell, Doug; Cross, Donald G; Hammel-1, Donald; Stoner-1, Michael D; Greby, Mark J
Subject: STS-107 Post-Launch Film Review - Day 2



107film2.pdf ET208.mpg ET208Mag.mpg

<<107film2.pdf>> <<ET208.mpg>> <<ET208Mag.mpg>>

Michele Lewis

om: Madera, Pamela L [pam.l.madera@usahq.unitedspacealliance.com]
Sent: Friday, June 21, 2002 7:36 PM
To: DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA)
Subject: FW: /s/S164080ab - Dcument Deviations from NSTS 08934 SODB, Vol. V for STS-107

S164080AB.doc

Pam Madera
Orbiter Subsystem Area Manager
Vehicle and Systems Analysis

pam.l.madera@usahq.unitedspacealliance.com
phone: 281-282-4453
fax: 281-282-4438

-----Original Message-----
From: HEARNE, VANESSA D. (JSC-MG) (USA)
[mailto:vanessa.d.hearne1@jsc.nasa.gov]
Sent: Friday, June 14, 2002 8:40 AM
To: 'Madera, Pam'
Subject: FW: /s/S164080ab - Dcument Deviations from NSTS 08934 SODB, Vol. V for STS-107

Vanessa D. Hearne
(281)483-1410 (desk)
(281)483-3360 (fax)
vhearne@ems.jsc.nasa.gov

> -----Original Message-----
> From: HEARNE, VANESSA D. (JSC-MG) (USA)
> Sent: Friday, June 14, 2002 8:39 AM
> To: Alan Simon; Bailey, Carol; Barido, Cathy; Birdow, Brenda L. USA;
> BROWNE, DAVID; CERNA, NANETTE; Elizabeth Sunderman; Finneman, Glen; Jose
> Rodriguez; Judith Beck; KAINER, JENNIFER; KINCAID, MARY; Leverich, Bill;
> Loraine Liscano; Lozano, Anselmo; Marcine Blake; MCCLUNG, STUART;
> Robinson, Bobby R. USA; SCHOMBURG, CALVIN; SERIALE-GRUSH, JOYCE;
> Underkircher, Georgene K; Williams, Debbie
> Subject: /s/S164080ab - Dcument Deviations from NSTS 08934 SODB, Vol.
> V for STS-107
>
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>
<<S164080AB.doc>>

>
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>
>

> Vanessa D. Hearne
> (281)483-1410 (desk)
> (281)483-3360 (fax)
vhearne@ems.jsc.nasa.gov

>

CCBD NUMBERS	MCR NUMBERS	LYNDON B. JOHNSON SPACE CENTER ORBITER PROJECT OFFICE	DATE:
PCIN 164080AB			5/20/02
PCINs 164080AB		CONFIGURATION CONTROL BOARD DIRECTIVE	PAGE: 1 OF: 1
		TITLE:	
		Document Deviations from NSTS 08934 SODB, Vol V for STS-107	

DISPOSITION AND DIRECTED ACTION:
Contract NAS 9-20000, WBS 1.4.1.1

Description of Change: Rationale for the acceptability of exceeding SODB, Vol. V capability limits (Section 4.2.4.1 Thermal Structural Envelope - Table 4.2.4.1-2 Thermal Models) for STS-107 TAL, AOA, and ATO is approved as documented in Orbiter Change Request S164080AB.

Cost ($M): N/A

Effectivity: STS-107

Reason for change: Need to determine acceptability of exceeding SODB limits for STS-107 commit-to-flight.

Background: STS-107 TSEP violations were analyzed using standard thermal and stress analysis tools and processes. Positive margins of safety are maintained. Submitted for out-of-board approval by P. Madera.

Copies: JSC-MG/V. Hearne, JSC-ES/A. R. Rocha, USA/P. Madera

ENDORSEMENTS:		ENDORSEMENTS:	
MV REP	DATE	Concur: P. Madera USA SAM	5/20/02 DATE
E:mail concur: J. Kainer ORBITER ACQUISITION MGMT OFFICE	05/20/02 DATE	USA VEHICLE MANAGER	DATE
E:mail concur: M. Kincaid JSC PROJECTS BUSINESS MGMT OFFICE	05/21/02 DATE	USA TECHNICAL LIAISON MANAGER	DATE
FLIGHT ENGNG & VEHICLE MGMT OFFICE	DATE	BRSS PROJECT ENGINEER	DATE
Concur: P. Shack SHUTTLE ENGINEERING OFFICE	06/07/02 DATE	E:mail concur: A. Rocha ES DIVISION CHIEF ENGINEER	06/06/02 DATE
ORBITER ASSISTANT MANAGER	DATE		
SR&QA	DATE	/s/P. Petete CHAIRMAN CONFIG. CONTROL BOARD	06/13/02 DATE

Michele Lewis

om: LEVY, VINCENT M. (JSC-EG) (NASA)
Sent: Monday, April 30, 2001 1:33 PM
To: DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA)
Cc: BARTON, RICHARD L. (RICK) (JSC-EG3) (NASA)
Subject: FW: FYI Entry Aeroheating issue

fyi

Vincent M. Levy
EG/Aeroscience & Flight Mechanics
Shuttle Division Chief Engineer
281-483-0874 (w)

281-483-1245 (fax)

-----Original Message-----
From: Kinder, Gerald R [mailto:Gerald.Kinder@West.Boeing.com]
Sent: Monday, April 30, 2001 11:41 AM
To: EXT-Madera, Pamela L; LEVY, VINCENT M. (JSC-EG) (NASA)
Cc: Sharifzadeh, Habib
Subject: FYI Entry Aeroheating issue

We have an entry aeroheating driven issue on OV-102 that you should be ware
of. When the final fit check was made following the OMM the interface etween the nose cap and the chin panel changed to the point were it xceeds
both the design value (Keq=0.110 inch) and our MR back off value (the first
being what we want the roughness to be, the other is the larger roughness
that the specific missions are built to). The crew at KSC will attempt to
fix the problem by removing and shimming the components in the area (chin
panel, nose cap, etc.) which may is a big issue, especially if they can't
figure out why the values changed. They are looking into the torque values
and sequences but because of the criticality of the installation there were
lots of eyes watching when the thing went together. So you can bet
everything is right where it should be. The data indicates that the nose is
setting about 100 mils of so further forward than before relative to the
chin panel (and I would like to get them to take care of a few bad step
locations, but there is not much chance of that - two very hard parts-
).

You may be wandering why is this Palmdale work being done at the cape. On
OMM's the chin panel and nose cap fit is one of the last things to be
performed due to the long lead times required to install the parts. On this
M the final fit check was performed at KSC because scheduling issues c
Palmdale (lot of stumble on tasks with a fixed due date). We got the data
about two weeks ago (or so) and that started the additional work.

If they can't get the parts to fit, then we will have to try and accommodate the situation through analysis. One back off position is to redesign the missions for the larger roughness (additional USA work). Another will be to perform an aero/thermal/structural CTF analysis as required to clear the missions. The amount of work will depend on the planned missions and the resultant roughness induced heating. If the entries are low inclination and low weight then we have some margin, but if they are heavy weight entries, then it may require more analysis to prove a positive margin. Because this is a vehicle issue, it will cover all entry cases (EOM, AOA, ATO and TAL).
STS-109 (heavy entry) is the next scheduled mission for 102 and is currently scheduled for Jan 17 (but I understand that this is a very soft date) followed by STS-107 (very heavy).

Talk to you Tuesday if I don't hear from you earlier.

Gerald Kinder
SSM Entry Aeroheating
714-372-0266

Michele Lewis

From: Madera, Pamela L [pam.l.madera@usahq.unitedspacealliance.com]
Sent: Friday, June 21, 2002 7:25 PM
To: DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA)
Subject: FW: STS-107 ocfr1 OCR 164080AB


OCR107.doc

STS-107.ppt

This supporting information will probably be more interesting reading...

Pam Madera
Orbiter Subsystem Area Manager
Vehicle and Systems Analysis

pam.l.madera@usahq.unitedspacealliance.com
phone: 281-282-4453
fax: 281-282-4438

-----Original Message-----
From: Okino, David H [mailto:david.h.okino@boeing.com]
Sent: Friday, May 17, 2002 3:19 PM
To: EXT-Madera, Pamela L
Subject: RE: STS-107 ocfr1 OCR 164080AB

Pam,

The STS-107 OCR is currently in signature cycle. I will shoot a copy of the
signed off version early next week. Attached is the e-version.

Thank you...You also have a good, relaxing weekend.

David Okino
714-372-2785

-----Original Message-----
From: Madera, Pamela L
[mailto:pam.l.madera@usahq.unitedspacealliance.com]
Sent: 17 May, 2002 12:56 PM
To: OKINO, DAVID H
Subject: FW: STS-107 ocfr1 OCR 164080AB

Dave,
I could not remember if I had sent this to you or not and what your schedule
looked like for the STS-107 TSEP violations (I must be getting old or
something). I am forwarding the OCR in case I haven't sent it to you already.

Thanks - have a great weekend!

Pam Madera
Orbiter Subsystem Area Manager
Vehicle and Systems Analysis

pam.l.madera@usahq.unitedspacealliance.com

phone: 281-282-4453
fax: 281-282-4438

-----Original Message-----
> From: Kyle, David A
> Sent: Monday, January 14, 2002 10:42 AM
> To: Madera, Pamela L; SHARIFZADEH, HABIB
> Cc: Harder, James R; Jacobs, William A; Ghahyasi, Fred A;
> 'gerald.kinder@west.boeing.com'
> Subject: STS-107 ocfr1 OCR 164080AB
>
> <<107ocfr1_OCR.doc>>
> Attached is the OCR for STS-107 ocfr1 cycle. A closure date before
May
> 10, 2002 would be greatly appreciated.
>
> Thanks,
> David Kyle

PCIN: 164080AB	ORBITER CHANGE REQUEST	PAGE 1 OF 3	DATE: 01/14/02
:R NO.: S164080AB		INITIATED BY: David Kyle	
MCR/UCN:		PHONE: 281.282.4936	

CHANGE TITLE:
Document Deviations from SODB Vol V for STS-107 OCFR1

FLIGHT SUBSYSTEM CODES AFFECTED:
07 - Thermal / Aerodynamics
08 - Structural Dynamics / Structures

INITIATING REFERENCES:

DOCUMENTS AFFECTED:
NSTS-08934 Volume V

DESCRIPTION OF CHANGE: ☐ MCR ☐ UCN ☐ EDCP ☐ RHFA ☐ SCN ☐ DCN ☐ TYPE III MSR

The following violations of Orbiter flight capability limits from the SODB, Volume V were observed during the design of STS-107 OCFR1:
Section 4.2.4.1 Thermal Structural Envelope - Table 4.2.4.1-2 Thermal Models,
1. 3.97% violation of the TAL Nose Cap Max Temp Gradient
2. 3.59% violation of the TAL Nose Cap Surface Temp at the Max Temp Gradient
3. 1.15% violation of the Chin Panel Max Temp
4. 5.25% violation of the Chin Panel Max Temp Gradient
5. 1.62% violation of the Chin Panel Surface Temp at the Max Temp Gradient
6. 10.44% violation of the ATO Chin Panel Surface Temp at the Max Temp Gradient
7. 2.31% violation of the AOA Chin Panel Surface Temp at the Max Temp Gradient

hese violations were identified using TSEP 3.5, June atmosphere for AOA/ATO and July atmosphere for TAL, and OCFR1 cycle mass properties.

REASON FOR CHANGE:
Cannot design STS-107 ATO, AOA, and TAL trajectories within existing SODB limits and still meet Level B design constraints.

LOGISTICS EFFECT:
None

IMPACT DESCRIPTION (OTHER THAN LOGISTICS):
Requires mission specific evaluation of limit exceedances.

IMPACT OF NONINCORPORATION:
TO, AOA, and TAL designs would be outside the existing certification database as depicted by the limits defined in the SODB.

PCIN: 164080AB	ORBITER CHANGE REQUEST	PAGE 2 OF 3	DATE: 01/14/02
? NO.: S164080AB		INITIATED BY: David Kyle	
MCR/UCN:		PHONE: 281.282.4936	

ORBITER ELEMENT(S) AFFECTED:

Effectivity (Flight # or Data): STS-107

- [x] OV-102
- [ ] OV-103
- [ ] OV-104
- [ ] OV-105
- [ ] SPARES
- [ ] STRUCTUAL SPARES
- [ ] SPACEHAB
- [ ] ISS
- [ ] GFE/FLIGHT CREW EQUIPMENT
- [ ] OTHER
- [ ] SAIL/GTS
- [ ] AVIONICS
- [ ] PAYLOADS
- [x] OPERATIONS
- [ ] BFS
- [ ] FLIGHT SOFTWARE
- [ ] KSC LOGISTICS
- [x] CERTIFICATION
- DATABASE/ANALYSIS

SAFETY

CRITICALITY

1 [ ] 1R [ ] 1S [ ]

2 [ ] 2R [ ]

NONE [x]

MODIFICATION CATEGORY

- [ ] ATTRITION
- [x] MANDATORY
- [ ] OTHER

CHANGE IMPACT:

- [x] SAFETY
- [x] PERFORMANCE
- [ ] RELIABILITY
- [ ] MAINTAINABILITY
- [ ] SPARES
- [ ] GFE
- [ ] SECURITY
- [ ] GSE
  - MODEL #:
  - DELIVERY DATE
- [ ] MOD/MISSION KIT
  - MODEL #:
  - DELIVERY DATE
- [ ] WEIGHT
- [ ] SCHEDULE
- [ ] FMEA/CIL
- [x] FLIGHT OPERATIONS
- [ ] GROUND OPERATIONS
- [ ] ICD
- [ ] REPAIRS
- [ ] CCC DRAWINGS
  - PART #:
- [x] SODB
- [ ] SAIL
- [ ] LCC
- [ ] FLIGHT MANIFEST
- [ ] PAYLOADS
- [ ] SIMULATORS/TRAINERS
- [ ] SOFTWARE
- [ ] OMRSD
- [ ] MMDB
- [ ] TURNAROUND
- [ ] FACILITIES
- [ ] PROCUREMENT SPECIFICATION
- [ ] IDMRD
- [ ] MASTER VERIFICATION PLAN (MVP)
- [ ] ATP
- [ ] OTHER _____

OCR FOR EDCP [ ] YES [x] NO

- [ ] CRITICAL PROCESS CHANGE
- [ ] MATERIALS CHANGE

ONE OF THE FOLLOWING MUST BE CHECKED:

- [ ] NEW DESIGNED HARDWARE
- [ ] NON-TRANSITIONED HARDWARE
- [ ] IN-FAMILY MOD TO EXISTING HARDWARE
- [ ] OUT-OF-FAMILY MOD TO EXISTING HARDWARE
- [x] N/A

COST IMPACT:	FY ____	FY ____	FY ____	FY ____	FY ____	TOTAL
CONTRACT NO./WBS:						

This estimate is for budgetary and planning purposes only and does not constitute a firm commitment.

RECOMMENDATIONS/REMARKS:

RECOMMENDED HANDLING:

- [x] Routine
- [ ] Expedite to: _____

FORWARDING AUTHORIZATION

SIGNATURE (VECB MEMBER):	DATE

PCIN: 164080AB	ORBITER CHANGE REQUEST	PAGE 3 OF 3	DATE: 01/14/02
CR NO.: S164080AB		INITIATED BY: David Kyle	
MCR/UCN:	Certification Evaluation Sheet	PHONE: 281.282.4936	

CHANGE TITLE:
Document Deviations from SODB Vol V for STS-107 OCFR1

EDCP/SCN/RHFA/DCN #:	SUBCONTRACTOR: USA
PART NO.:	PART NAME:
CURRENT CR/CAR NO.:	AMENDED CR/CAR NO.:

DOCUMENTATION REQUIRED NEW CR/CAR: YES* ☐ NO** ☐ (COMPLETE AMENDED CERTIFICATION)

***IF YES:**

METHODOLOGY
- TEST ☐
- ANALYSIS ☐
- SIMILARITY ☐

CR PLAN REQUIRED:
CR PLAN ATTACHED: YES ☐ NO ☐
IF NO: PLAN WILL BE SUBMITTED BY: _____

****IF NO:**

AMENDED CERTIFICATION STATEMENT

TECHNICAL RATIONALE:

. The TAL Nosecap exceedance (Max Delta T) has been analyzed resulting in positive MS
2. The TAL Nosecap exceedance (T@Max Delta T) has been analyzed resulting in positive MS
3,4 & 5. The TAL Chin Panel exceedances Max T, Max Delta T and T @ Max Delta T have been analyzed resulting in positive Margins of Safety
6 & 7. The Chin Panel for ATO and AOA exceedances (T @ Max Delta T) have been analyzed resulting in positive margins of safety (see Explain section below)

Exceedances calculated using 3-D TMM temperatures

THIS CONSTITUTES AN AMENDMENT TO THE APPROVED CERTIFICATION (CAR) PACKAGE AND IT WILL BE ADDED TO THAT PACKAGE.

PRODUCT ASSURANCE	DATE	APPROVED AT VECB ON DATE:
MATERIALS & PROCESSES	DATE	REASON FOR DISAPPROVAL CHANGE DISAPPROVED ☐ INSUFFICIENT RATIONALE ☐ NEW CERT REQUIRED ☐
RESPONSIBLE SSM	DATE	OTHER ☐
PROGRAM MANAGER	DATE	

XPLAIN:
Chin Panel ATO & AOA exceedances have been analyzed using their respective ATO & AOA temperature distributions on the Chin Panel NASTRAN math model resulting in positive margins of safety

EXCEEDANCE OF CERT DATABASE

Structure	Trajectory	Type	Cert	Exceed-ance (%) TSEP v3.5	Worst to Date* (for OV-102)	STS-107	Exceed-ance (%) 3D TMM	MS_{28}
Nose Cap	TAL	Max ΔT	2441	3.97	2496***	2496	2.25	.07***
Nose Cap	TAL	T @ Max ΔT	2622	3.59	2675***	2675	2.02	.07***
Chin Panel	TAL	Max T	2706	1.15	2741	2741	1.29	‡
Chin Panel	TAL	Max ΔT	1218	5.25	1300	1300	6.73	‡
Chin Panel	TAL	T @ Max ΔT	2289	1.62	2293	2293	0.17	‡
Chin Panel	ATO	T @ Max ΔT	1647	10.44	1873	1873	13.72	.10**
Chin Panel	AOA	T @ Max ΔT	1647	2.31	1907	1907	15.78	.04**

All temps generated by 3-D TMM's

* STS-107 temperatures are the worst to date (for OV-102) for all exceedances

** STS-107 was analyzed with flight specific temperatures for Chin Panel AOA and ATO trajectories which resulted in positive margins of safety for the 17th flight of this chin panel / 28th flight of OV-102

*** RCC Nosecap Analysis – Nosecap TAL MS modified to reflect mass loss for 28 flights

‡ Chin Panel TAL Failsafe analysis results in positive margins of safety

Michele Lewis

From: Fasheh, John I [john.i.fasheh@boeing.com]
Sent: Friday, June 21, 2002 4:40 PM
To: DERRY, STEPHEN M. (STEVE) (JSC-EG3) (NASA)
Subject: FW: STS-111 Ablative Issue

STS-107 Exec
FRR Charts.ppt

Steve,
The powerpoint file below is the briefing that was presented in the Chief Eengineer's telecon on Monday by Chad from the SSME nozzle team. Stated below is also the UCR number that was just started and has only the problem description.
Hope that helps.

John Fasheh

> -----Original Message-----
> From: Schepel, Chad M
> Sent: Friday, June 21, 2002 12:53 PM
> To: Fasheh, John I
> Subject: STS-111 Ablative Issue
>
> John,
>
> The UCR number is A034479 and the problem description is similar to the issue listed in the FRR charts below.

> > <<STS-107 Exec FRR Charts.ppt>>
>
> Chad Schepel
> Development Engineer
> Space Shuttle Main Engine - Nozzle Team
> The Boeing Company - Rocketdyne Division
> Phone: 818-586-6480
>
>

STS-111 Nozzle Ablative

Debonding During Launch Ascent

- **Issue**
  - Photograph taken from ISS of space shuttle Endeavor shows evidence of partially debonded aft manifold ablative panels
- **Background**
  - Ablative consists of pre-molded panels that are attached to the aft manifold using a silicone RTV adhesive
  - Added as a precautionary measure to protect nozzle aft manifold
    - Addressed concern that ISS flights may result in out of family reentry heating
  - Ablative first flown on STS-95 on 10-29-98
    - Areas of missing ablative identified post-flight on both nozzles
      - Lack of charring on torn surfaces of ablative indicated that it had come off after the high heat load phase of reentry
        - Protected the manifold during the critical phase of reentry