

X-Sender: sneyman@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 04 Feb 2003 08:27:14 -0500
To: boconnor@hq.nasa.gov
From: J Steven Newman <snewman@hq.nasa.gov>
Subject: External Tank:Critical Processes / CFC Replacements
Cc: jilloyd@hq.nasa.gov, prutledg@hq.nasa.gov, mkowales@hq.nasa.gov,
wbihner@mail.hq.nasa.gov, prichardson@hq.nasa.gov

Bryan:

Several notes and suggestions based on work experience as Chief Environmental Engineer in OSF leading the replacement of Ozone Depleting Substances (1990-1994)

1. External Tank Blowing Agents

Main ET acreage blowing agent CFC-11 replaced with HCFC-141B. Other blowing agents for close out items at Cape also replaced - I am researching / finding old files. Requalification of new materials and processes was obviously a critical concern. At some point the Materials branch of the Fault Tree will want to closely examine this issue.

2. External Tank Precision Cleaning Agents

Even more critical in both the ET and especially the SRM is surface preparation (precision cleaning) of metal pre-bonding. Any separation of material from a metallic substrate raises questions related to PROCESS branch of Fault Tree. In this case it is a process and a material question. The SSP, prior to the phase out used copiou amounts of Freon 113 (CFC-113) and a material called 1,1,1, TCA for precision cleaning prior to bonding operations. Need to investigate and identify the current surface preparation process for Orbiter bi-pod attach struts.

3. Method of Evaluation in Moving From the What to the Why

It may be useful to take a process failure perspective. For example if we identify the triggering event as foam breaking off the Orbiter bipod and hitting the Orbiter we will want to pursue:

A. Potential Process Failures:

- Bipod Foam Material Integrity
- Bipod Foam Application/surface prep process
- Bipod foam application process human error, etc.

B. In-Line Critical Process Controls

Critical importance to identify in-place control processes for each crit sub-process involved. Why did control fail?

C. External (independent assessment) controls over critical process

What external independent control processes were operative?
DCMA?, NASA QA?, USA second set of eyes?

D. Resource/Requirements Balance enabling the critical process

Critical process integrity, water pressure, staffing, time factors, etc.

4. Independent reviews of USAGO

Please note that we have three recent (in last four years) independent assesment reports on various aspects of SSP/USAGO processes, including a workfor5ce survey of 72 wrench turners. . These may become important later.

Continuing to wotk the Highly secure Work Group capability. Meanwhile I will dig into the files and try to work up more ET / foam / precision cleaning material immediately.

R/Steve

J Steven Newman, 08:27 AM 2/4/2003 -0500, External Tank:Critical Processes / CFC Replacement

Wayne R. Frazier, 09:20 AM 2/4/2003 -0500, STS 107 Investigation Organization Overview.ppt

X-Sender: wfrazier@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 04 Feb 2003 09:20:55 -0500
To: jlloyd@hq.nasa.gov, jlemke@hq.nasa.gov, fchandle@hq.nasa.gov,
prutledg@hq.nasa.gov
From: "Wayne R. Frazier" <wfrazier@hq.nasa.gov>
Subject: STS 107 Investigation Organization Overview.ppt

Fresh from Bill Hill



STS 107 Investigation Organization Overview1.ppt

~~~~~  
Wayne R. Frazier  
NASA Headquarters - Code QS  
Office of Safety and Mission Assurance  
Washington, DC 20546-0001  
Ph: 202 358-0588 Fax: 202 358-3104  
~~~~~

"Mission success starts with safety"

Independently assesses data and may conduct their own inquiries, tests, and actions.

Columbia Accident Investigation Board (CAIB)

Independent Board

NASA Led

Coordination

- FEMA
- Homeland Security
- EPA
- DDMS
- NTSB
- FBI
- FAA
- Texas National Guard
- Local Law Enforcement
- U. S. Forest Service
- Other agencies

Headquarters Contingency Action Team

Mishap Response Team
Membership: Mission Management Team (MMT)

- Flight Crew Operations
- Mission Operations Engineering
- System Integration
- Payloads & Cargo
- MSFC Projects
- Space & Life Sciences
- Prime Contractors

Mishap Investigation Team

Orbiter

Emergency Operations Center

Data & Record Handling Team

External Tank
Solid Rocket Booster
Reusable Solid Rocket Motor
Space Shuttle Main Engine

Rapid Response Team

KSC Ground Operations

Michael Stamatelatos, 08:59 AM 2/3/2003 -0500, Re: Supporting Bryan on the Columbia Accident I

X-Sender: mstamate@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 08:59:50 -0500
To: Pete Rutledge <prutledg@hq.nasa.gov>
From: Michael Stamatelatos <mstamate@hq.nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)

Pete:

Attached is a short description of a scenario that may be important for STS-107. I have a telecon with the shuttle PRA group at 11:30 AM today. Can I share this with them?
Michael

At 07:49 PM 2/2/2003 -0500, you wrote:
Code Q staff members,

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One of our main jobs in the immediate future will be to support him. We can support him in at least three ways: 1. We can respond to his requests. 2. We can collect, on our own initiative, data that could be of use to him (but we need to proceed most carefully on this one). 3. We can suggest questions or avenues of investigation that he might be able to inject into the work of the board.

Attached is a rough list we prepared today of investigative areas--for the most part these are areas in which the SMA community has some special expertise. For each area we have tentatively named an OSMA lead (and in some cases more than one person to work together). If you can think of other areas that we have not captured, and should, let me know. If we've associated you with the wrong area(s) or failed to associate you with the right area(s), let me know. We don't want to disrupt the investigation--we want to be prudent; we want to help Bryan. Think about whether and how you might be able to be helpful in these areas; then, before you take any action, write down your plan in a clear, concise manner, and send it to me--state what you might be able to do and how you would propose to do it. Then wait for a go-ahead from Jim or me. Keep in mind that we have asked the SMA directors at JSC, MSFC, KSC, LaRC, ARC, and SSC to work with us as needed, so this can be part of your plan, if appropriate.

We have also asked all 10 SMA directors to think of questions or issues that Bryan might pursue with the CAIB. I will be collecting these inputs. Your questions and issues are solicited, as well. Put your investigator hat on, think about this, do your own personal fault trees and hazard analyses, send me your ideas. I'll collect them up, as well, to send to Bryan.

Let's do a great job for Bryan on this important matter.

Thanks,

Pete

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX: 202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

Michael Stamatelatos, 08:59 AM 2/3/2003 -0500, Re: Supporting Bryan on the Columbia Accident I



Scenario.doc

Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

"Mission success starts with safety"

Potential Scenario for STS-107

1. A piece of insulation from ET debonding detaches and impacts the orbiter
2. The impact causes removal or partial detachment of tile(s)
3. Alternately, the impact causes an indentation of significant size
4. Damage progresses due to air loads and thermal heating loads during ascent but without significant consequences because of decreasing atmosphere density
5. During reentry, the mechanical and thermal loads from aerodynamic heating continue the damage to the orbiter; The orbiter condition from #4 above is used as input to this analysis
6. The aerodynamic heating and mechanical loads are exacerbated by the presence of local hot spots that are generated in the areas of damage
7. Heating increases and propagates into the orbiter due to contact to metal surfaces
8. Fuel lines or cells become exposed to excessive heating and explosion occurs.

This scenario can be analyzed with a combination of system PRA programs (e.g., QRAS), thermal analysis and structural programs (e.g., NASTRAN). An event tree can be developed and the success criteria, probabilities, and uncertainties can be calculated by thermal and structural programs.

Known input information:

- Time and size of the detached piece of insulation
- Time of the explosion during reentry

From these, the shuttle velocity and associated cumulative heating and mechanical loads can be calculated with associated uncertainties.

Vernon W Wessel, 08:00 AM 2/4/2003 -0500, Re: Supporting Bryan on the Columbia Accident Inve

X-Info: ODIN / NASA Glenn Research Center
X-Sender: rowess@popserve.grc.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 5.1.1
Date: Tue, 04 Feb 2003 08:00:32 -0500
To: pruffedg@hq.nasa.gov
From: Vernon W Wessel <Vernon.W.Wessel@nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)

Good Morning Pete,

I sent a request to our entire OSAT staff yesterday as to questions they might ask. I'll compile them and send to you in the next couple of days. Sometimes there are a few gems in lists like this. My question would be the construct on the event mishap sequence timeline probably only looking a reentry to vehicle loss initially. Probably has been accomplished but can lead to real insight when placed against the 100 plus data points of successful vehicle return. Then of course the tougher issue is the finalization of the set of failure events for the fault trees and MORT diagrams. Assume Bryan is on top of this and with no more information than I have I cannot do much more than think process.

Here Lois has been working the PBMA element of the investigation with Steve, and Frank is looking into a Payload Hazard Summary. I'll get the listing of possible questions to you ASAP. If nothing else it will let you know the things in the mind of a somewhat educated public.

Thank You,
Bill

At 07:40 AM 2/3/2003 -0500, you wrote:

Pete,
Just to let you know, I have requested from Yolanda's folks the ET TPS hazards (received this AM) and the PRA scenarios that lead to early entry LOV. Soon, all our requests will be focused through a single point of contact called the NASA Task Force Action Center. But for now, it's a bit of a flail. It will be easy, if we are not careful, to overwhelm the system, so once that system is up and running, all our ins and outs will be run through that entity.
By the way, I'm very impressed with our Board and especially its chairman. We are up and running a full 4 weeks at least ahead of schedule compared to the Challenger BRP. Having said that, the board has a lot of work to do before they are smart enough to begin to digest...but I am optimistic.
Best,

At 07:49 PM 2/2/2003 -0500, you wrote:
Code Q staff members,

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Vernon W Wessel, 08:00 AM 2/4/2003 -0500, Re: Supporting Bryan on the Columbia Accident Inve

JSC, MSFC, KSC, LaRC, ARC, and SSC to work with us as needed, so this can be part of your plan, if appropriate.

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Let's do a great job for Bryan on this important matter.

Thanks,

Pete

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579

FAX: 202-358-2778

e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

O'C

Bryan O'Connor
Associate Administrator
Office of Safety and Mission Assurance

Vernon W. (Bill) Wessel
Director, Safety and Assurance Technologies Directorate

National Aeronautics and Space Administration
John H. Glenn Research Center
Mail Stop: 3-6
21000 Brookpark Road
Cleveland, Ohio 44135

Phone: (216) 433-2350

FAX: (216) 977-7005

E-Mail: Vernon.W.Wessel@grc.nasa.gov

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Michael Stamatelatos, 03:48 PM 2/4/2003 -0500, Fwd: Scenario

X-Sender: mstamate@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 04 Feb 2003 15:48:04 -0500
To: prutledg@hq.nasa.gov
From: Michael Stamatelatos <mstamate@hq.nasa.gov>
Subject: Fwd: Scenario

Pete:
Sorry. I forgot to copy you to this.
Michael

Date: Tue, 04 Feb 2003 15:43:07 -0500
To: prichard@hq.nasa.gov
From: Michael Stamatelatos <mstamate@hq.nasa.gov>
Subject: Scenario

Pam:
I gave this scenario to Pete yesterday morning.
He asked me today to send it to you to put into the material to be sent to Bryan.
Thanks,
Michael



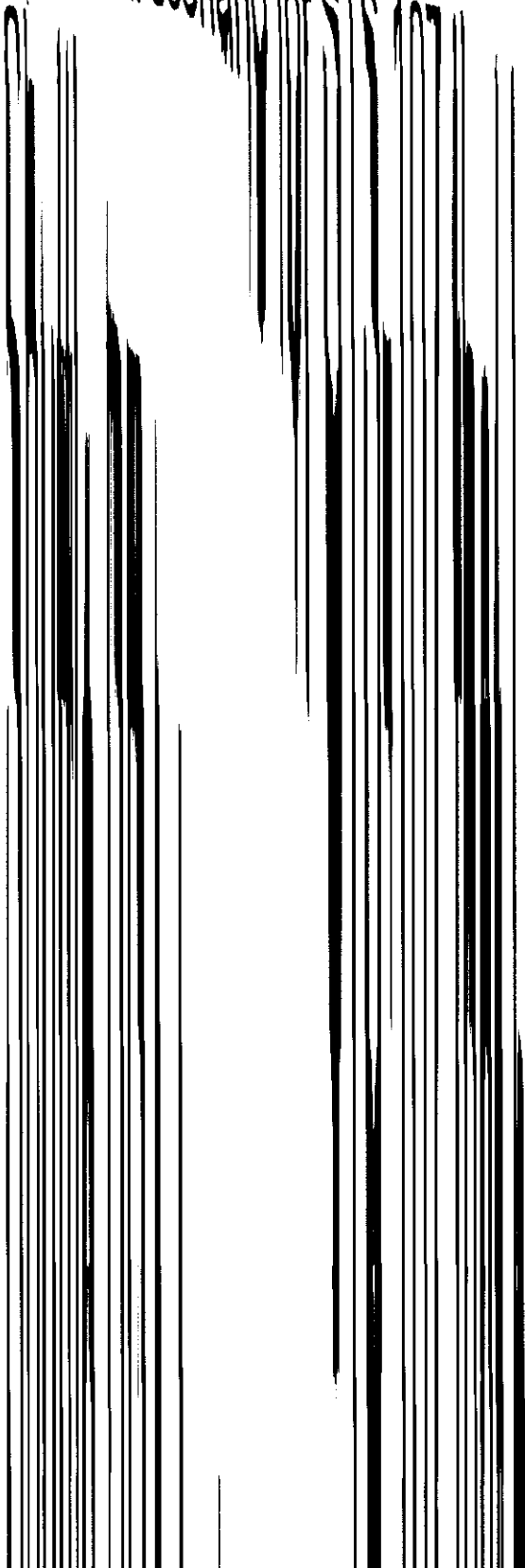
Scenario1.doc

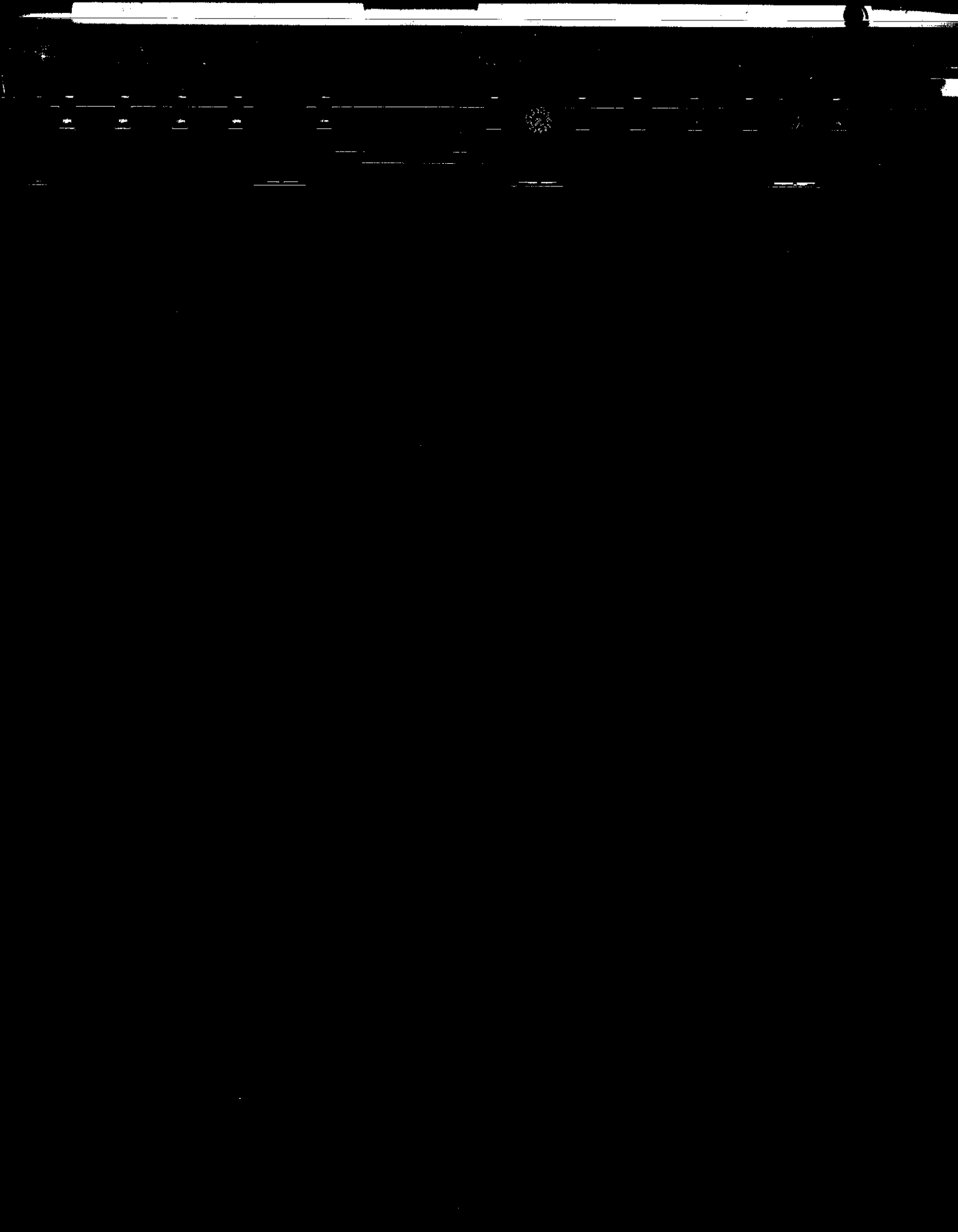
Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

"Mission success starts with safety"

02/03/03 8:00 AM Michael Stamatelatos, Code QE

A potential scenario for STS





02/03/03 8:00 AM Michael Stamatelatos, Code QE

A potential scenario for STS-107 that has not been considered in the Space Shuttle PRA is the following one:

- A piece of insulation from ET debonding detaches and impacts the orbiter
- The impact causes removal or partial detachment of tile(s)
- Alternately, the impact causes an indentation of significant size
- Damage progresses due to air loads and thermal heating during ascent but without great consequences due to decreasing atmosphere density
- During reentry, the mechanical and thermal loads from aerodynamic heating continue the damage to the orbiter that began during launch
- The aerodynamic heating and mechanical loads are exacerbated by the presence of local hot spots generated in the areas of damage
- Heating increases and propagates to the orbiter through conducting surfaces
- Fuel lines or cells become exposed to excessive heating and explosion occurs.

Important points of this scenario that were not considered in the Shuttle PRA are

- damage incurred in the ascent phase continues in the reentry phase, and
- heating in damaged area causes hot spots, i.e., higher thermal and structural loads than heating of smooth surfaces.

Jonathan B. Mullin, 10:57 AM 2/3/2003 -0500, OSMA Support to Bryan O'Connor as

X-Sender: jmullin@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 10:57:26 -0500
To: prutledg@hq.nasa.gov
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: OSMA Support to Bryan O'Connor as
Ex-Officio member of Space Shuttle Mishap Investigation Board (SSMIB)
Cc: Matthew Gaier <mgaier@hq.nasa.gov>, wharkins@hq.nasa.gov,
eraynor@hq.nasa.gov, jlemke@hq.nasa.gov

Pete, some recommendations in to the assignments are indicated in Yellow. I think we need to add some Flight (Aviation Safety) into the tasked areas. I would recommend that we do a priority listing of the enclosed topics. Perhaps there is a need to coordinate some of our areas with Code AM as they may overlap, such as Human Factors.

Regards, Jon

Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"



OSMA Support to Bryan O1.doc

As of February 2, 2003

SMA Support to Bryan O'Connor as Ex-Officio member of Space Shuttle Mishap Investigation Board (SSMIB)

SMA-Related Investigative Area	Remarks	OSMA Lead
Hazard reports, Fault Trees, FMEA	Relates to work of Space Shuttle System Safety Review Panel (SSRP); especially pertaining to ET foam; e.g., impact on Orbiter	Mark K., Bill B.
Risk	Accepted risks for this mission?	Mark K., Bill B.
Payload safety (as cause of mishap)	Relates to work of Payload Safety Review Panel (PSRP). Interest includes potential for hazardous payloads to have caused catastrophe..	Mike Card, John Castellano
Payload safety (safety of recovery)	Includes: radiological and other hazardous payload contents	John Lyver/Gil White
Problem trends (HW/SW)	Relates to Problem Reporting and Corrective Action (PRACA); initially PRs dealing with ET foam problems may be of most interest?	Paul Boldon (SW PRs), Mark K., Bill B. (HW PRs)
Quality	Material Review Board actions, repairs, etc., initially especially in regard to foam and tile installation and repair; contractor/supplier surveillance	Tom Whitmeyer
Probabilistic Risk Assessment (PRA)	Initial interest includes 1990 Pate-Cornell PRA of Shuttle tile installation process, as well as current Shuttle PRA	Michael Stamatelatos
Pre-launch reviews	Includes Pre-launch Assessment Reviews, Mission Safety Evaluations, waivers, deviations, rules changes, limited life items, etc.	Mark K., Bill B.
Expected casualty, Ec (post-mishap)	Includes collecting/using data from this mishap to calculate Ec for Shuttle re-entry	Pat Martin (with Maria Tobin)

Software hazards	Includes software changes, software hazard analysis	Paul Boldon, Sharyl Butler (JSC), Martha Wetherholt, IV&V Ctr
SMA Policy	Emergency Preparedness, system safety, R&M, mishap investigation, etc.	Wil Harkins, Jon Mullin, [REDACTED]
Contingency Planning	A post-mishap look at correctness/effectiveness of our contingency plans; do we need updates/changes?	Gill White, [REDACTED]
NASA Safety Reporting System (NSRS), Alerts	Includes any NSRS reports or alerts pertaining to foam, tile, ingredients, etc., as well as any current Shuttle-related reports	Eric Raynor
Lessons Learned	Are there any pertinent LL in the database? Ensuring that these new lessons get into the LLIS in the long run.	Eric Raynor
SMA Reviews and Assessments	OEP, PV, FMR spot checks, staff assistance visits, other periodic center visits (including MAF)	Steve Newman, Art Lee, John Lyver, [REDACTED]
Aerospace Advisory Panel Training	Includes any pertinent findings Of workers on the floor—certification and training for insulation application, repair, etc.	Len Sirota Eric Raynor ([REDACTED])
Life extension program	We were about to benchmark what USAF does for aging aircraft. Any implications for what NASA does?	Tom Whitmeyer, SLEEP Panel (Obs.& Sustainment), Bill Bihner, John Castellano, [REDACTED]
Mishap Investigation protocol and methodology	Supporting with info on NPDs, NPGs, root cause methods, training for MIB members, briefing packages, etc.	Wayne Frazier, Faith Chandler, [REDACTED]
Human Factors	What opportunities were there for human factors	Faith Chandler, [REDACTED]

	to contribute to the mishap?	
Post-mishap implications for ISS	Keeping up-to-date information on affect of this mishap on ISS supportability, etc.	Rich Patrican, Gil White
MIB Web-based work group area	PBMA work group to support information and communication needs of the MIB, including IT security of the posted/transmitted information	Steve Newman, Steve Wander
DoD data	Data that DoD might have that could be useful	Mike Card
Space Shuttle Manufacture	Background and details of the manufacturing process.	Len Sirota

John P Castellano, 01:18 PM 2/3/2003 -0500, Re: Supporting Bryan on the Columbia Accident Inve

X-Sender: jcastell@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 13:18:44 -0500
To: Pete Rutledge <prutledg@hq.nasa.gov>
From: John P Castellano <jcastell@hq.nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)
Cc: snewman@hq.nasa.gov

Pete, a possible area of review and assessment could be in the performance of the two ET configurations (LWT and SLWT). Specifically looking at post flight orbiter tile damage vs the ET used for the flight. Further an evaluation of ambient atmospheric conditions (temp, dew point) at time of launch plotted against tile damage..and ET might also be informative. This sort of assessment was extremely useful in the Challenger investigation which showed a definitive relationship of O ring blow by and temperature...with greater blow by as the temperature was lower...

At 07:49 PM 2/2/2003 -0500, you wrote:
Code Q staff members,

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Let's do a great job for Bryan on this important matter.

Thanks,

Pete

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

John P Castellano, 01:18 PM 2/3/2003 -0500, Re: Supporting Bryan on the Columbia Accident Inve

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Pamela Richardson, 06:44 AM 2/4/2003 -0500, Re: Fwd: Re: Supporting Bryan on the Columbia Ac

X-Sender: prichard@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 04 Feb 2003 06:44:03 -0500
To: Pete Rutledge <prutledg@hq.nasa.gov>
From: Pamela Richardson <prichard@hq.nasa.gov>
Subject: Re: Fwd: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)

Pete --

Today I will be starting a list of actions and a list of questions/issues for Bryan. Both will be posted daily on the QMIC door.

Pam

At 05:44 PM 2/3/2003 -0500, you wrote:
Pam,

Here's one for the suggested question/issue list for Bryan. Are you keeping such a list. I forget if this was one of the lists we talked about. It's one that needs to be collected.

Pete

X-Sender: jcastell@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 13:18:44 -0500
To: Pete Rutledge <prutledg@hq.nasa.gov>
From: John P Castellano <jcastell@hq.nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)
Cc: sneman@hq.nasa.gov

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Pamela Richardson, 06:44 AM 2/4/2003 -0500, Re: Fwd: Re: Supporting Bryan on the Columbia Ac

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Let's do a great job for Bryan on this important matter.

Thanks,

Pete

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

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ph: 202-358-0579
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e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

Pamela F. Richardson
Aerospace Technology Mission Assurance Manager
Enterprise Safety and Mission Assurance Division, Code QE
Office of Safety and Mission Assurance, NASA Headquarters
300 E. Street, S. W., Washington, DC 20546
phone: 202-358-4631, fax: 202-358-2778

"The meek can *have* the Earth. The rest of us are going to the stars." --- Robert Heinlein

"We have to learn to manage information and its flow. If we don't, it will all end up in turbulence." --- RADM Grace Hopper

John P Castellano, 01:18 PM 2/3/2003 -0500, Re: Supporting Bryan on the Columbia Accident Inve

X-Sender: jcastell@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 13:18:44 -0500
To: Pete Rutledge <prutledg@hq.nasa.gov>
From: John P Castellano <jcastell@hq.nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)
Cc: snewman@hq.nasa.gov

Pete, a possible area of review and assessment could be in the performance of the two ET configurations (LWT and SLWT). Specifically looking at post flight orbiter tile damage vs the ET used for the flight. Further an evaluation of ambient atmospheric conditions (temp, dew point) at time of launch plotted against tile damage..and ET might also be informative. This sort of assessment was extremely useful in the Challenger investigation which showed a definitive relationship of O ring blow by and temperature...with greater blow by as the temperature was lower....

At 07:49 PM 2/2/2003 -0500, you wrote:
Code Q staff members,

As you may know Bryan is the ex-officio member of the Columbia Accident Investigation Board. He left for Barksdale AFB this afternoon around noon time. That is where he will meet up with the other CAIB members.

One of our main jobs in the immediate future will be to support him. We can support him in at least three ways: 1. We can respond to his requests. 2. We can collect, on our own initiative, data that could be of use to him (but we need to proceed most carefully on this one). 3. We can suggest questions or avenues of investigation that he might be able to inject into the work of the board.

Attached is a rough list we prepared today of investigative areas--for the most part these are areas in which the SMA community has some special expertise. For each area we have tentatively named an OSMA lead (and in some cases more than one person to work together). If you can think of other areas that we have not captured, and should, let me know. If we've associated you with the wrong area(s) or failed to associate you with the right area(s), let me know. We don't want to disrupt the investigation--we want to be prudent; we want to help Bryan. Think about whether and how you might be able to be helpful in these areas; then, before you take any action, write down your plan in a clear, concise manner, and send it to me--state what you might be able to do and how you would propose to do it. Then wait for a go-ahead from Jim or me. Keep in mind that we have asked the SMA directors at JSC, MSFC, KSC, LaRC, ARC, and SSC to work with us as needed, so this can be part of your plan, if appropriate.

We have also asked all 10 SMA directors to think of questions or issues that Bryan might pursue with the CAIB. I will be collecting these inputs. Your questions and issues are solicited, as well. Put your investigator hat on, think about this, do your own personal fault trees and hazard analyses, send me your ideas. I'll collect them up, as well, to send to Bryan.

Let's do a great job for Bryan on this important matter.

Thanks,

Pete

Peter J. Rutledge, Ph.D.
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Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

John P Castellano, 01:18 PM 2/3/2003 -0500, Re: Supporting Bryan on the Columbia Accident Inve

Mission Success Starts with Safety!

Jonathan B. Mullin, 10:57 AM 2/3/2003 -0500, OSMA Support to Bryan O'Connor as

X-Sender: jmullin@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 10:57:26 -0500
To: prutledg@hq.nasa.gov
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: OSMA Support to Bryan O'Connor as
Ex-Officio member of Space Shuttle Mishap Investigation Board (SSMIB)
Cc: Matthew Gaier <mgaier@hq.nasa.gov>, wharkins@hq.nasa.gov,
eraynor@hq.nasa.gov, jlemke@hq.nasa.gov

Pete, some recommendations in to the assignments are indicated in Yellow. I think we need to add some Flight (Aviation Safety) into the tasked areas. I would recommend that we do a priority listing of the enclosed topics. Perhaps there is a need to coordinate some of our areas with Code AM as they may overlap, such as Human Factors.

Regards, Jon

Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"



OSMA Support to Bryan O1.doc

As of: February 2, 2003

SMA Support to Bryan O'Connor as Ex-Officio member of Space Shuttle Mishap Investigation Board (SSMIB)

SMA-Related Investigative Area	Remarks	OSMA Lead
Hazard reports, Fault Trees, FMEA	Relates to work of Space Shuttle System Safety Review Panel (SSRP); especially pertaining to ET foam; e.g., impact on Orbiter	Mark K., Bill B.
Risk	Accepted risks for this mission?	Mark K., Bill B.
Payload safety (as cause of mishap)	Relates to work of Payload Safety Review Panel (PSRP). Interest includes potential for hazardous payloads to have caused catastrophe.	Mike Card, John Castellano
Payload safety (safety of recovery)	Includes radiological and other hazardous payload contents	John Lyver/Gil White
Problem trends (HW/SW)	Relates to Problem Reporting and Corrective Action (PRACA); initially PRs dealing with ET foam problems may be of most interest?	Paul Boldon (SW PRs), Mark K., Bill B. (HW PRs)
Quality	Material Review Board actions, repairs, etc., initially especially in regard to foam and tile installation and repair; contractor/supplier surveillance	Tom Whitmeyer
Probabilistic Risk Assessment (PRA)	Initial interest includes 1990 Pate-Cornell PRA of Shuttle tile installation process, as well as current Shuttle PRA	Michael Stamatelatos
Pre-launch reviews	Includes Pre-launch Assessment Reviews, Mission Safety Evaluations, waivers, deviations, rules changes, limited life items, etc.	Mark K., Bill B.
Expected casualty, Ec (post-mishap)	Includes collecting/using data from this mishap to calculate Ec for Shuttle re-entry	Pat Martin (with Maria Tobin)

Software hazards	Includes software changes, software hazard analysis	Paul Boldon, Sharyl Butler (JSC), Martha Wetherholt, IV & V Ctr
SMA Policy	Emergency Preparedness, system safety, R&M, mishap investigation, etc.	Wil Harkins, Jon Mullin, [REDACTED]
Contingency Planning	A post-mishap look-at correctness/effectiveness of our contingency plans; do we need updates/changes?	Gill White, [REDACTED]
NASA Safety Reporting System (NSRS), Alerts	Includes any NSRS reports or alerts pertaining to foam, tile, ingredients, etc., as well as any current Shuttle-related reports	Eric Raynor
Lessons Learned	Are there any pertinent LL in the database? Ensuring that these new lessons get into the LLIS in the long run.	Eric Raynor
SMA Reviews and Assessments	OEP, PV, FMR spot checks, staff assistance. visits, other periodic center visits (including MAF)	Steve Newman, Art Lee, John Lyver, [REDACTED]
Aerospace Advisory Panel Training	Includes any pertinent findings Of workers on the floor—certification and training for insulation application, repair, etc.	Len Sirota Eric Raynor [REDACTED]
Life extension program	We were about to benchmark what USAF does for aging aircraft. Any implications for what NASA does?	Tom Whitmeyer, SLEP Panel (Obs. & Sustainment), Bill Bilmer, John Castellano, [REDACTED]
Mishap Investigation protocol and methodology	Supporting with info on NPDs, NPGs, root cause methods, training for MIB members, briefing packages, etc.	Wayne Frazier, Faith Chandler, [REDACTED]
Human Factors	What opportunities were there for human factors	Faith Chandler, [REDACTED]

	to contribute to the mishap?	
Post-mishap implications for ISS	Keeping up-to-date information on affect of this mishap on ISS supportability, etc.	Rich Patrican, Gil White
MIB Web-based work group area	PBMA work group to support information and communication needs of the MIB, including IT security of the posted/transmitted information	Steve Newman, Steve Wander
DoD data	Data that DoD might have that could be useful	Mike Card
Space Shuttle Manufacture	Background and details of the manufacturing process.	Len Sirota

Michael Stamatelatos, 08:59 AM 2/3/2003 -0500, Re: Supporting Bryan on the Columbia Accident I

X-Sender: mstamate@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 08:59:50 -0500
To: Pete Rutledge <prutledg@hq.nasa.gov>
From: Michael Stamatelatos <mstamate@hq.nasa.gov>
Subject: Re: Supporting Bryan on the Columbia Accident Investigation Board (CAIB)

Pete:

Attached is a short description of a scenario that may be important for STS-107.

I have a telecon with the shuttle PRA group at 11:30 AM today.

Can I share this with them?

Michael

At 07:49 PM 2/2/2003 -0500, you wrote:
Code Q staff members,

As you may know Bryan is the ex-officio member of the Columbia Accident Investigation Board. He left for Barksdale AFB this afternoon around noon time. That is where he will meet up with the other CAIB members.

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We have also asked all 10 SMA directors to think of questions or issues that Bryan might pursue with the CAIB. I will be collecting these inputs. Your questions and issues are solicited, as well. Put your investigator hat on, think about this, do your own personal fault trees and hazard analyses, send me your ideas. I'll collect them up, as well, to send to Bryan.

Let's do a great job for Bryan on this important matter.

Thanks,

Pete

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
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Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX: 202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!



Scenario.doc

Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

"Mission success starts with safety"

Potential Scenario for STS-107

1. A piece of insulation from ET debonding detaches and impacts the orbiter
2. The impact causes removal or partial detachment of tile(s)
3. Alternately, the impact causes an indentation of significant size
4. Damage progresses due to air loads and thermal heating loads during ascent but without significant consequences because of decreasing atmosphere density
5. During reentry, the mechanical and thermal loads from aerodynamic heating continue the damage to the orbiter; The orbiter condition from #4 above is used as input to this analysis
6. The aerodynamic heating and mechanical loads are exacerbated by the presence of local hot spots that are generated in the areas of damage
7. Heating increases and propagates into the orbiter due to contact to metal surfaces
8. Fuel lines or cells become exposed to excessive heating and explosion occurs.

This scenario can be analyzed with a combination of system PRA programs (e.g., QRAS), thermal analysis and structural programs (e.g., NASTRAN). An event tree can be developed and the success criteria, probabilities, and uncertainties can be calculated by thermal and structural programs.

Known input information:

- Time and size of the detached piece of insulation
- Time of the explosion during reentry

From these, the shuttle velocity and associated cumulative heating and mechanical loads can be calculated with associated uncertainties.

Gilbert White-1, 06:30 PM 2/2/2003 -0500, STS-107 Hazardous Material List

X-Sender: gwhite1@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Sun, 02 Feb 2003 18:30:16 -0500
To: pruttedg@hq.nasa.gov, Faith Chandler <fchandle@hq.nasa.gov>
From: Gilbert White-1 <gwhite1@hq.nasa.gov>
Subject: STS-107 Hazardous Material List

FYI

Faith maybe you know how to get in touch with Victor?



STS-107 Hazardous Material 2-02-03.doc

Gilbert White

Manager, International Space Station Operations
Office of Safety and Mission Assurance
(202) 358-0562

Mission Success Starts With Safety

(+/-)-2-Methyl-2,4-pentanediol
(1H,3H)-pyrimidinedione
(2-keto-3-deoxy-6-phosphogluconate)
0-Nitrophenyl-beta-D-Galactopyranoside and
1 Potassium nitrate
1,2-Dichloroethane C2H4Cl2
1,4 dithio-DL -threitol
10799 D-Glucose (Well 24)
10806 Fluconazole (Well 26) 4 ug/ml 0.08 ug
2 -Mercaptoethanol
2,3,5 Triphenyltetrazolium chloride (Well 12)
2-Mercaptoethanol
3 g/tissue) Mild to moderate eye 1 0 1 None 1 0 I Last modified
Benzalkonium wipes:
4G-63 Human osteosarcoma cells
5-Bromo-4-chloro-3-indolylphosphate
5-Nitro-6-(1'-D)-Ribitylamino-2,4
Adonitol (Well 16)
Agarose
Agarose Type VII
Agrobacterium suspension in MS medium
Alpha-MEM
Ammonium nitrate
Ammonium sulphate
Amphotericin
Ampicillin
Arabinose
Arginine monohydrochloride
Ascorbic acid
Ascorbic acid-2-phosphate
Aspartyl-t RNA synthetase isolated from
Bacitracin
bacterium Thermus thermophilus
Batteries, lithium manganese dioxide
Benzalkonium chloride
beta-Glycerophosphate
Biotin
Boric acid
C3H10T1/2-derived cell line (xs Brachyury)
Cadmium sulfate crystalline
Calcium chloride
Calcium chloride crystal
Calcium pantothenate
Calcium Phosphate, dibasic
Canamycin (antibiotic)
Candida (Well 1 2)
Carbencillin
Casamino acids
Casein hydrolysate
Catalyst: titanium dioxide granules, 1 mm dia.
Cefotaxime
Cellobiose
Chloramphenicol
Chloromethyl isothiazolin
Chlorobenzene (D,
Chromium potassium sulfate

Chromobacterium violaceum ATCC 12472
Ciprofloxacin HCl
Citrate
Citric acid monohydrate
Cobalt chloride
Cultisphere microcarriers
Cupric carbonate
Cupric sulfate
Cycloheximide and
Cycloheximide and D-Glucose (Well 22)
Cytosine arabinoside (ara^{-C})
Dexamethasone
Dextrose
D-Glucose (Well 24)
Dihydroxyacetone - phosphate (DHAP)
Dimethoxyethane Proprietary <1 .0 ml
Di-potassium hydrogen phosphate
Dodecyl dimethylamine oxide
Dodecylmal toside
Dulcitol (WELL 15)
Erythritol (Well 20)
Esculin and
Ethylhydrocupreine hydrochloride (Well 3)
Fenichrome
Ferric Ammonium Citrate (Well 8)
Ferric citrate
Ferritin Type I from horse
Ferrous sulfate
Fetal Bovine Serum
Fetal calf serum
Fluconazole (Well 2 1)
Fluconazole (Well 23)
Fluorescent bulbs 8659 Mercury 100%
Fluorobenzene (D,)
Folic acid
Freon 11 5
Freon 22
Freon 502: azeotropic mixture of
Fungizone (amphotericin-B)
Galactose (Well 2)
Gentamycin Amphotericin-B, 1000 UI
Gentamycin
Gentamycin sulphate
Glucose
Glutaraldehyde
Glycerol
Guanidine thiocyanate
Guanidinium isothiocyanate
Halon 1301
HECAMEG (detergent)
Hemicellulase
Hep tanetriol
HEPES, pH 7.5
Hexitol bisphosphate
Human liver fructose -1,6-bisphosphatase
Human parathyroid hormone 1-84

Hygromycin
Hydrocortisone
Inhibitor HNAP (C1106PH7Na2)
Insulin from bovine pancreas
Inulin
Isopropanol
Isopropyl-beta-D-ThioGalactopyranoside (23)
Kanamycin
Lactate (and)
Lactose
L-ascorbic acid-2-phosphate
L-Aspartic acid
Latamculin A (1 UM) in aqueous DMSO
L-Glutamic acid, monosodium salt
Lithium
Lithium aluminum tetrachloride
Lithium perchlorate
L-kginine
Lysine (Well 28)
Magnesium carbonate
Magnesium oxide
Magnesium sulfate
Malonate (Well 9)
Maltose
Manganese
Manganese chloride
Mannitol
Melezitose
Melibiose
Menadione Sodium Bisulfate Complex
Mercury
Methyl isothiazolin
Methyl-D-Glucoside
Molybdic acid, sodium salt
Na acetate pH 4.6
Na Cacodylate
N-acetyl-D-glucosamine
N-dodecyl-dimethyl-phosphine oxide
Niacin
NiCox: Flurbiprofen-nitroxylbutyl-ester
Novobiocin (Well 13)
Octylglucoside
collagen coating (half slide surface)
Ornithine (Well 30)
Oryzalin (1.0 uM) in aqueous ethanol
Oxone
Palatinose
Paraformaldehyde
p-Coumaric (Well 21)
Penicillin G (Well 19) w/GPS A medium
Poly ethylene glycol 400
Poly ethylene glycol 425
Polyethylene glycol 1000
Polyethylene glycol 4000
Polyethylene glycol 6000
Polymyxin B (Well 1 1)

Polyvinyl chloride.
Potassium aluminum sulfate 25.7% wlv
Potassium benzoate.
Potassium chromium sulfate 2.5% wlv
Potassium citrate, monohydrate
Potassium hydroxide
Potassium Iodate
Potassium iodide
Potassium nitrate
Potassium phosphate
Potassium sodium tartrate, KNaC₄H₄O₆
Potassium sulfate
Prostaglandin E2
Proteose peptone
Pullulan (Well 24)
Pyridoxine HCl
Pyrodimium bahamense
Pyruvic Acid (Well 23)
Raffinose
Raloxifine hydrochloride
retradecane
Rhamnose (Well 24)
Ribose
Salicin (Well 18)
Ske-tom-cin
Sodium acetate pH 4.8
Sodium bicarbonate
Sodium Chloride
Sodium EDTA
Sodium molybdate
Sodium pyruvate
Sodium selenite.
Sodium Thiosulfate (and)
Sorbitol (
Streptomycin
Sucrose
Sulfuric acid
Tetracycline
Tetradecane 100%
Tetrahydrofuran
Thiamine.HCl
Thionyl chloride
Tin oxides. Dlatinum. Dalladium
Tobramycin
Tomaldehyde in PHEMD buffer
Tray-Vitek Fluconazole (Well 29) 0 ug/ml
Trehalose
TRIS, pH 7.5
Tris-HCl, pH 8.0
Tryptophan (Well 10)
Urea
Vancomycin
Xylitol
Xylose
Zinc carbonate
Zinc sulfate

J Steven Newman, 03:10 PM 2/2/2003 -0500, Highly Secure PBMA-KMS Work Groups

X-Sender: sneyman@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Sun, 02 Feb 2003 15:10:32 -0500
To: boconnor@hq.nasa.gov
From: J Steven Newman <snewman@hq.nasa.gov>
Subject: Highly Secure PBMA-KMS Work Groups
Cc: jiloyd@hq.nasa.gov, prutledg@hq.nasa.gov, swander@hq.nasa.gov,
mkowales@hq.nasa.gov, bbhner@hq.nasa.gov

FYI: Bryan

Working today with GRC/Chief Information Officer, Ares Corp, Intranets.com Corp, HQ/CI to implement an enhanced security level for selected PBMA-KMS work group sites. We are pressing to be operational within 48 - 72 hours. Anticipate first supporting NASA SMA team(s) (and working groups) with sensitive information/data sharing needs.

We can set up a standard secure site for your Columbia Accident Investigation Board on short notice. The current 107 Team site has standard security.

1. Provides security for data behind NASA GRC firewall (protects data)
2. Provides user password protection. (one factor verification of user)

Within a few days we hope to be able to provide an enhanced security option

1. Secure NASA firewall server (protects data)
2. Secure socket layer protection (protects data in transit)
3. Two factor strong authentication (helps verify the user is whom they say they are)
 - password + secure token ID

Please consider these capabilities among your options. Standing by.
/ status charts attached

R/Steve
358-1408



PBMA-KMS 107 Support.ppt

STS-107 Support

Goal: Implement high level security PBMA-KMS Work Group functionality as soon as possible to support sensitive recovery and investigation activity




February 2, 2002

Dr. J. Steven Newman

Office of Safety & Mission Assurance

PBMA-KMS Support to 107 Recovery/Mishap Investigation 2/2/03



<p>Note: PBMA-KMS Work Groups are user friendly multi-functional, web based collaborative tools to support group activity</p>	 <p>PBMA-KMS Server Behind NASA Firewall at GRC</p>	 <p>Data uplink / downlink protection through SSL encryption</p>	 <p>User Authentication (2-Factor Strong) Invitation Only, User Unique, Password, Dynamic Token.ID</p>
<p>107 Team Work Group http://107Team.Intranets.com</p> <p>DEPLOYED 2/1/03</p>	<p style="text-align: center;">X</p>		
<p>107 MIT and External Board Work Groups Proposed / In-Work</p>	<p style="text-align: center;">X</p>	<p style="text-align: center;">X</p>	<p style="text-align: center;">X</p>

Telecon with ARES 10am EDT 2/2/03

Telecon w/ GRC PBMA Team + GRC/CIO + ARES Houston + NASA/HQ ISEM Team 11 am EDT

Telecon scheduled 9am EDT 2/3/03 with all players

PBMA-KMS: Dr. J. Steven Newman 202-358-1408, 703-528-4352, Stephen M. Wander 202-358-4612

Action Status / 1pm 2/2/03

- Need names of MIT members
- Need names of External Team members
- Need info concerning any other team with a high security work group requirements
- For each team need to know whether or not individuals has secure token ID and center that issued ID
- Action: email info to snewman@hq.nasa.gov
- HQ/IT Security and HQ/ISEM contractors will work with Q to provide secure token ID info to GRC to support user authentication
- GRC-based tem (GRC/CIO, Ares) working with intranets to implement user authentication HW/SW

jlemke, 01:10 PM 2/2/2003 -0500, Independent MIB

X-Sender: jlemke@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Sun, 02 Feb 2003 13:10:20 -0500
To: jiloyd@hq.nasa.gov, prutledg@hq.nasa.gov,
"Wayne R. Frazier" <wfrazier@hq.nasa.gov>, <sbrookov@hq.nasa.gov>
From: jlemke <jlemke@hq.nasa.gov>
Subject: Independent MIB

Jim:

1st cut--short and sweet.

johnl

John Lemke
Manager, System Safety Engineering
NASA HQ, Code QS
202-358-0567 FAX 358-3104
jlemke@hq.nasa.gov

"Mission success stands on the foundation of our unwavering commitment to safety"
Administrator Sean O'Keefe January 2003



Doc221.doc

There were several reasons why NASA developed a policy of appointing an Independent Mishap Investigation Board for major shuttle mishaps.

According to the Rogers' Commission Report:

"In a closed society other options are available; in an open society - unless classified matters are involved - other options are not, either as matter of law or as a practical matter. In this case, a vigorous investigation and full disclosure of the facts were necessary. The way to deal with a failure of this magnitude is to disclose all the facts fully and openly; to take immediate steps to correct mistakes that led to the failure; and to continue the program with renewed confidence and determination.

"For the first several days after the accident - possibly because of the trauma resulting from the accident - NASA appeared to be withholding information about the accident from the public."

NASA believed strongly in the importance of this openness. Even if NASA conducted an independent internal investigation, it would still be subject to an appearance of conflict of interest. Therefore, the Agency subsequently formalized a policy of not investigating itself for major shuttle mishaps.

This policy also allowed the Agency to take advantage of propositioned expertise from outside the Agency. NASA formalized this policy in the late 80's in the space Shuttle Contingency Action Plan.

welcome@intranets.com, 02:46 AM 2/2/2003 +0000, Welcome to 107team.intranets.com

From: "welcome@intranets.com" <welcome@intranets.com>
To: "Dr. Pete J. Rutledge" <prutledg@hq.nasa.gov>
X-for-your-own-intranet: <http://pbma.hq.nasa.gov/index2.html>
X-for-help-with-Intranets: <mailto:support@intranets.com>
Date: Sun, 02 Feb 2003 02:46:02 GMT
X-mailer: AspMail 4.0 4.03 (SMT412E7EF)
Subject: Welcome to 107team.intranets.com
X-OriginalArrivalTime: 02 Feb 2003 02:46:03.0010 (UTC) FILETIME=[39CDEE20:01C2CA65]

Dear Dr. Pete,

Welcome! Thank you for joining the 107 Team intranet site.

GETTING STARTED

As a reminder, your Login Name is: drutledge
If you forgot the password you selected, we'll email it to you at
your request. Just follow this link:
<http://107team.intranets.com/forgot.asp>

enter your personal Login Name and Password in the spaces provided.
You will no longer need to use the Registration Code you were sent
when you were first invited to join.

The site administrators for your intranet are Don Vecellio and Dr.
J. Steven Newman.

USING YOUR INTRANET

To become familiar with how to use your intranet, please review the
NASA Getting Started:
<http://107team.intranets.com/help/us/to.asp?page=start.html&admin=False>

To change your Login Name or Password, go to Tools > Member Options
at the left of your intranet site.

To change any of the personal information you entered during registration,
read the details at:
<http://107team.intranets.com/help/us/to.asp?page=mem.html§ion=edit>

We are constantly updating the applications and features in our intranet
service, and we welcome member feedback to guide us in these efforts.
If you have suggestions for new or improved service features, please
click the Tell Us link at the bottom of your intranet home page and
tell us what you think!

Regards,

Steve Newman, PBMA Leader

9

James Lloyd, 03:14 PM 2/25/2003 -0500, HCAT ACTION #140

X-Sender: jlloyd@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 25 Feb 2003 15:14:45 -0500
To: hcat@hq.nasa.gov
From: James Lloyd <jlloyd@hq.nasa.gov>
Subject: HCAT ACTION #140
Cc: "Dr. Michael A. Greenfield" <michael.greenfield@hq.nasa.gov>, pruttedg@hq.nasa.gov, Pepper Phillips <pPhillip@mail.hq.nasa.gov>

Has there been any update to this action from the HCAT (Action 140)?

At the time of this particular response the USA MRB records were inaccessible and no information could be obtained and maybe that situation has been cleared? If the records are accessible, can we now obtain an answer to number 3 question in attached?



Columbia Major Overhaul1.doc

Jim

27

GAFFNEY, ROBERT T. (JSC-JA171) (NASA), 03:39 PM 2/3/2003 -0600, RE: FW: Incident Report 1, I

From: "GAFFNEY, ROBERT T. (JSC-JA171) (NASA)" <robert.t.gaffney@nasa.gov>
To: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>, a.h.phillips@larc.nasa.gov,
aodonogh@hq.nasa.gov, alee@hq.nasa.gov, bdolci@arc.nasa.gov,
cathy.miller@msfc.nasa.gov, tsabikos.a.papadimitris.1@gsfc.nasa.gov,
chunt@mail.arc.nasa.gov, clyde.dease@ssc.nasa.gov, dhall@wstf.nasa.gov,
Eric.G.Fuller@jpl.nasa.gov, Ezra.R.Abrahamy@jpl.nasa.gov,
frederick.w.battle.jr@jpl.nasa.gov, h.w.beazley@larc.nasa.gov,
jack.vechil@mail.dfrc.nasa.gov,
"PERRIN, DENNIS G. (JSC-JA171) (NASA)" <dennis.g.perrin@nasa.gov>,
john.griggs@MV.nasa.gov, luequenton.wilkins@grc.nasa.gov,
lengelbert@mail.arc.nasa.gov, michael.moore@maf.nasa.gov,
probes@nmo.jpl.nasa.gov, sonja.alexander@hq.nasa.gov,
stephen.a.turner@maf.nasa.gov, terry.m.potterton.1@gsfc.nasa.gov,
tom.ambrose@dfrc.nasa.gov, wayne.kee-1@ksc.nasa.gov,
Robert.Turner@hq.nasa.gov, howard.kass@hq.nasa.gov, alee@hq.nasa.gov,
william.barry-1@ksc.nasa.gov, odomingu@hq.nasa.gov,
Catherine.Angotti@hq.nasa.gov, mmcneill@mail.hq.nasa.gov,
tspagnuo@pop200.gsfc.nasa.gov, Patrick.A.Hancock.1@gsfc.nasa.gov,
Jim.Carter@msfc.nasa.gov, Edwin.Jones@msfc.nasa.gov,
john.rodders@hq.nasa.gov, bnotley@mail.arc.nasa.gov,
gregory.l.ellis.1@gsfc.nasa.gov, t.f.middleton@larc.nasa.gov,
"ROEH, WILLIAM C., III (JSC-JA171) (NASA)" <william.c.roeh@nasa.gov>,
phillip.j.nessler.1@gsfc.nasa.gov, pete.allen@msfc.nasa.gov,
llabrecq@hq.nasa.gov, cherbert@hq.nasa.gov, astowes@hq.nasa.gov,
Ernest.M.Graham@msfc.nasa.gov, dan.thomas@hq.nasa.gov,
g.m.watson@larc.nasa.gov, rdilustr@mail.hq.nasa.gov,
hstewart@hq.nasa.gov, speyton@hq.nasa.gov, pruttedg@hq.nasa.gov
Cc: whill@hq.nasa.gov, boconhor@hq.nasa.gov, Possible Discovery Shuttle Columbia De
Subject: RE: FW: Incident Report 1, Possible Discovery Shuttle Columbia De
Date: Mon, 3 Feb 2003 15:39:42 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Thanks, Jon, for disseminating Region IV's report. I spoke with that office this morning and provided the information they requested by fax. I wasn't aware it would become a Situation Report, but I'm glad we were able to help.

Keep the families and our coworkers in the field from all the centers in your prayers.

Bob Gaffney
JSC Emergency Preparedness Manager
(281) 483-4249

-----Original Message-----
From: Jonathan B. Mullin [mailto:jmullin@hq.nasa.gov]
Sent: Monday, February 03, 2003 12:02 PM
To: a.h.phillips@larc.nasa.gov; aodonogh@hq.nasa.gov; alee@hq.nasa.gov;
bdolci@arc.nasa.gov; cathy.miller@msfc.nasa.gov;
tsabikos.a.papadimitris.1@gsfc.nasa.gov; chunt@mail.arc.nasa.gov;
clyde.dease@ssc.nasa.gov; dhall@wstf.nasa.gov;
Eric.G.Fuller@jpl.nasa.gov; Ezra.R.Abrahamy@jpl.nasa.gov;
frederick.w.battle.jr@jpl.nasa.gov; h.w.beazley@larc.nasa.gov;
jack.vechil@mail.dfrc.nasa.gov; john.griggs@MV.nasa.gov; PERRIN, DENNIS G. (JSC-JA171) (NASA);
lengelbert@mail.arc.nasa.gov; luequenton.wilkins@grc.nasa.gov;
michael.moore@maf.nasa.gov;
sonja.alexander@hq.nasa.gov;
stephen.a.turner@maf.nasa.gov; terry.m.potterton.1@gsfc.nasa.gov;
tom.ambrose@dfrc.nasa.gov; wayne.kee-1@ksc.nasa.gov;
Robert.Turner@hq.nasa.gov; howard.kass@hq.nasa.gov;
william.barry-1@ksc.nasa.gov; odomingu@hq.nasa.gov; alee@hq.nasa.gov;
Catherine.Angotti@hq.nasa.gov; mmcneill@mail.hq.nasa.gov;

GAFFNEY, ROBERT T. (JSC-JA171) (NASA), 03:39 PM 2/3/2003 -0600, RE: FW: Incident Report 1, I

tspagnuo@pop200.gsfc.nasa.gov; Patrick.A.Hancock.1@gsfc.nasa.gov;
Jim.Carter@msfc.nasa.gov; Edwin.Jones@msfc.nasa.gov;
john.rodgers@hq.nasa.gov; bnotley@mail.arc.nasa.gov;
gregory.l.ellis.1@gsfc.nasa.gov; t.f.middleton@larc.nasa.gov; ROEH,
WILLIAM C., III (JSC-JA171) (NASA); phillip.j.nessler.1@gsfc.nasa.gov;
pete.allen@msfc.nasa.gov; jlabrecq@hq.nasa.gov; cherbert@hq.nasa.gov;
astowes@hq.nasa.gov; Ernest.M.Graham@msfc.nasa.gov;
dan.thomas@hq.nasa.gov; g.m.watson@larc.nasa.gov;
rdilustr@mail.hq.nasa.gov; hstewart@hq.nasa.gov; speyton@hq.nasa.gov
Cc: whill@hq.nasa.gov; boconnor@hq.nasa.gov; GAFFNEY, ROBERT T.
(JSC-JA171) (NASA); prutledg@hq.nasa.gov
Subject: Fwd: FW: Incident Report 1, Possible Discovery Shuttle Columbia
Debris (GA)
Importance: High

Information status on Columbia Debris from Georgia. Regards, Jon
>From: FEMA OPERATIONS CENTER <FEMA.OPERATIONS.CENTER@fema.gov>
>To: Action Officer <ActionOfficer@fema.gov>,
> "AOC (E-mail)"
> <agstenos@hqda-aoc.army.pentagon.mil>,
> ARNGOPS <ARNGOPS@ngb.army.mil>,
> "BBS Submissions (E-mail) (E-mail)" <BBSSubmissions@fema.gov>,
> "Bothell MOC (E-mail) (E-mail)" <Bothell.MOC@fema.gov>,
> "Brian Montgomery (E-mail)" <brian.montgomery@fema.gov>,
> "Cameron, Bruce"
> <Bruce.Cameron@fema.gov>,
> Charles Stewart <Charles.Stewart@navy.mil>,
> "D'Araujo, Jack" <Jack.D'Araujo@fema.gov>,
> David Fleischman
> <David.Fleischman@hud.gov>,
> "Debhi.Yamanaka (E-mail)"
>
> "Denton MOC (E-mail)"
> <Denton.MOC@fema.gov>,
> "Denver MOC (E-mail)" <Denver.MOC@fema.gov>,
> DOE
> <rsp.div@hq.doe.gov> "DOEHQEOC (E-mail)" <DOEHQEOC@OEM.DOE.GOV>,
> "DOI OPS CENTER (E-mail)" <doi_watch_center@ios.doi.gov>,
> "Earman, Margie" <Margie.Earman@fema.gov>,
> "Edward Massimo (E-mail 2)"
> <Edward.C.Massimo@HQ02.USACE.ARMY.MIL>,
> EMAC <emac@adem.state.ar.us>,
> "EPA EOC HQ (E-mail)" <EOC.EPAHQ@epa.gov>, EST-DIR
> <EST-DIR@fema.gov>,
> "FCC Bonnie Gay (E-mail)" <bgay@fcc.gov>,
> FEMADESKREPS
> <FEMADESKREPS@fema.gov>,
> "GRACE. SHEFFEY (E-mail)"
> <GRACE.SHEFFEY@FNS.USDA.GOV>,
> "GSA Montgomery (E-mail)"
> <kathy.montgomery@gsa.gov>,
> "gsa.nsep@gsa.gov (E-mail)"
> <gsa.nsep@gsa.gov>,
> "Hess, Charles" <Charles.Heß@fema.gov>,
> "Homeland Security (E-mail)" <ohscc@who.eop.gov>,
> "HUD McCarthy (E-mail)"
> <bruce.e.mccarthy@hud.gov>,
> "HUD Opper (E-mail)" <jan.c.opper@hud.gov>,
> "James Lloyd (E-mail)" <JLLoyd@hq.nasa.gov>,
> "Jerry Ostendorf (E-mail)"
> <jerry.ostendorf@emd.state.ia.us>,
> "Jonathan Mullin (E-mail)"
> <JMullin@hq.nasa.gov>,
>

GAFFNEY, ROBERT T. (JSC-JA171) (NASA), 03:39 PM 2/3/2003 -0600, RE: FW: Incident Report 1, 1

> "Karen Maguire (E-mail)" <karen.maguire@usda.gov>
> "Lowder, Michael" <Michael.Lowder@fema.gov>
> "Maynard MOC (E-mail)"
> <Maynard.MOC@fema.gov>
> "Naval District, Washington - Security and LE Dir."
> <Stewart.Charles@ndw.navy.mil>
> "NCS (E-mail)" <NCS@NCS.GOV>
> "NIGHT1 (E-mail)" <NIGHT1@USA.REDCROSS.ORG>
>
> "Nora Lewis (E-mail)" <nlewis@USAID.GOV>
> "NORTHCOM LNO Todd Chamberlain (E-mail)"
> <todd.chamberlain@js.pentagon.mil>
> "NORTHCOM Robert Price (E-mail)"
> <robert.price@NORTHCOM.mil>
> "Paolin Hatch (E-mail)"
> <paolin.hatch@gsa.gov>
> "ROSTOSKYC (E-mail)"
> <ROSTOSKYC@USA.REDCROSS.ORG>
> "Russell, Barbara"
> <Barbara.Russell@fema.gov>
> "Thomasville MOC (E-mail)"
> <Thomasville.MOC@fema.gov>
> "Zensinger, Larry"
> <Larry.Zensinger@fema.gov>
> "DOD/DOMS Lacrosse (E-mail)"
> <thomas.lacrosse@doms.army.mil>
> "DOMS (E-mail)" <foxhole@doms.army.mil>
> DOMS Sullivan <ricki.sullivan@doms.army.mil>
> "Porter, Larry"
> <Larry.Porter@fema.gov>
> "Riddle, Margaret" <Margaret.Riddle@fema.gov>
> "DOT Benini (E-mail)" <janet.benini@rspa.dot.gov>
> "DOT Carney (E-mail)"
> <brian.carney@rspa.dot.gov>
> "DOT Medigovich (E-mail)"
> <bill.medigovich@rspa.dot.gov>
> "DOT OPS - 1 (E-mail)"
> <tioc-01@rspa.dot.gov>
> "DOT OPS 2 (E-mail)" <tioc-02@rspa.dot.gov>
> "HOWARD, EDWARDS (E-mail)" <HOWARD.EDWARDS@rspa.dot.gov>
> "USACE Acosta (E-mail)" <louis.a.acosta@HQ02.USACE.ARMY.MIL>
> "USACE Aguilera (E-mail)" <karen.durham-aguilera@usace.army.mil>
> "USACE Gilmore (E-mail)" <george.l.gilmore@usace.army.mil>
> "USACE Hecker (E-mail)" <edward.j.hecker@usace.army.mil>
> "USACE Irwin (E-mail)" <william.e.irwin@usace.army.mil>
> "USACE Miller (E-mail)" <lizbeth.h.miller@usace.army.mil>
> USACE OPS
> <ce-uoc@usace.army.mil>
> Subject: FW: Incident Report 1, Possible Discovery Shuttle Columbia Debris
> (GA)
> Date: Mon, 3 Feb 2003 12:54:14 -0500
> X-Mailer: Internet Mail Service (5.5.2656.59)
>
>
>> -----Original Message-----
>> From: Dupree, Annette
>> Sent: Monday, February 03, 2003 1:01 PM
>> To: R4-INCIDENT-LIST
>> Subject: Incident Report 1, Possible Discovery Shuttle Columbia
>> Debris (GA)
>>
>> Attached is the above incident report.

GAFFNEY, ROBERT T. (JSC-JA171) (NASA), 03:39 PM 2/3/2003 -0600, RE: FW: Incident Report 1, I

>>
>> <<Shuttle debris 02-03-03.doc>>
>>
>> Annette Dupree
>> Emergency Management Program Specialist
>> R4, Response and Recovery Division
>> Response Operations Branch
>> 402 S. Pinetree Blvd.
>> Thomasville, GA 31792
>> v: 229/225-4579
>> f: 229/225-4687
>>
>>

Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"

James Lloyd, 06:27 PM 2/2/2003 -0500, Commit to Paper

X-Sender: jiloyd@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Sun, 02 Feb 2003 18:27:50 -0500
To: mcard@hq.nasa.gov
From: James Lloyd <jiloyd@hq.nasa.gov>
Subject: Commit to Paper

Mike,

I would suggest that you take your understanding about the request to use resources for assessment of Columbia and write it down for use when you are interviewed.

Jim

Phil Napala, 12:12 PM 2/3/2003 +0000, Orbital Debris Information

From: Phil Napala <pnapala@hq.nasa.gov>
To: <wfrazier@hq.nasa.gov>
CC: <prutledge@hq.nasa.gov>, <jlloyd@hq.nasa.gov>, <jmullin@hq.nasa.gov>, <yolanda.y.marshall@nasa.gov>, <jlemke@hq.nasa.gov>
X-your-intranet: <http://107team.intranets.com>
X-Intranets-helpdesk: <mailto:help@intranets.com>
Date: Mon, 03 Feb 2003 12:12:42 GMT
X-mailer: AspMail 4.0 4.03 (SMT412E7EF)
Subject: Orbital Debris Information
X-OriginalArrivalTime: 03 Feb 2003 12:12:43.0210 (UTC) FILETIME=[8DEA7AA0:01C2CB7D]

Wayne,

The amount of debris from Shuttle and the collection effort is an opportunity to update our survive/demise models.

We need to think about what data we need to ask for in order to create a standard data sheet for all debris found.

Perhaps, we could get JSC and KSC to develop a palm pilot data collection checksheet to be passed out to all collection teams.

This information could be use to help determine STS107 failure mode and also aid in developing better ways to protect the public on future NASA missions both in estimating debris field and better design for minimal damage.

Phil

Jonathan B. Mullin, 12:19 PM 2/4/2003 -0500, Fwd: Foam problem

X-Sender: jmullin@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 04 Feb 2003 12:19:41 -0500
To: Pete Rutledge <prutledg@hq.nasa.gov>
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Fwd: Foam problem

Here is an idea. Jon

From: "Cardinale-1, Michael" <Michael.A.Cardinale@nasa.gov>
To: "Frazier, Wayne" <wfrazier@mail.hq.nasa.gov>, "Mullin, Jonathan" <jmullin@mail.hq.nasa.gov>
Subject: Foam problem
Date: Tue, 4 Feb 2003 10:23:59 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

I'm sure the idea has already come up, but has anyone considered using some type of 'hair net' to wrap the ET and suppress delaminating foam?

Mike
Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"

Pepper Phillips, 03:33 PM 2/5/2003 -0500, Fwd: RE: HCAT Question

X-Sender: pphillip@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 15:33:35 -0500
To: prutledg@hq.nasa.gov, jiloyd@hq.nasa.gov
From: Pepper Phillips <pphillip@hq.nasa.gov>
Subject: Fwd: RE: HCAT Question

Pete/Jim,

I would like to forward this answer to the HCAT for action closure...OK?

Pepper

X-Sender: mstamate@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 15:27:18 -0500
To: Pepper Phillips <pphillip@hq.nasa.gov>
From: Michael Stamatelatos <mstamate@hq.nasa.gov>
Subject: Fwd: RE: HCAT Question
Cc: pete.rutledge@hq.nasa.gov

Pepper:

Jan Railsback is the current acting Shuttle PRA project manager.
His answer is given below.

Michael

From: "RAILSBACK, JAN (JSC-NX) (NASA)" <jan.railsback-1@nasa.gov>
To: "Michael Stamatelatos" <mstamate@hq.nasa.gov>
Cc: "BOYER, ROGER L. (JSC-NC) (SAIC)" <roger.l.boyer1@jsc.nasa.gov>, "Dennis Moore (E-mail)" <Dennis.R.Moore@msfc.nasa.gov>
Subject: RE: HCAT Question
Date: Wed, 5 Feb 2003 13:51:11 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Michael,

The answer is, yes, we do consider the probability of Foreign Object Débris hits to the Orbiter TPS, but we make no distinction regarding where the debris came from. The debris could come from anywhere on the vehicle during ascent, micrometeoroid and orbital debris (MMOD) from on-orbit, and debris from the runway during Landing/Deceleration.

We also have a model for the probability of loss of External Tank (ET) insulation, but only in regards to overheating of the ET due to the loss of insulation. This is a MSFC model.

If you need a more in-depth answer, let me know.

Jan W. Railsback
Lead Analyst
Safety, Reliability, and Quality Assurance
Advanced Programs and Analysis Division
Ph: 281-483-7265
Fax: 281-244-2318
jan.railsback-1@nasa.gov

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

From: Michael Stamatelatos [mailto:mstamate@hq.nasa.gov]
Sent: Wednesday, February 05, 2003 1:06 PM
To: RAILSBACK, JAN (JSC-NX) (NASA); BOYER, ROGER L. (JSC-NC) (SAIC)
Subject: Fwd: HCAT Question

Importance: High

Jan/Roger:

HCAT is asking the following question:

"Was the potential of Foreign Object Debris impact damage considered in the existing PRA model?"

I need an official answer ASAP.

Thanks,
Michael

Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

"Mission success starts with safety"

Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

"Mission success starts with safety"

Michael Stamatelatos, 03:27 PM 2/5/2003 -0500, Fwd: RE: HCAT Question

X-Sender: mstamate@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 15:27:18 -0500
To: Pepper Phillips <pPhillip@hq.nasa.gov>
From: Michael Stamatelatos <mstamate@hq.nasa.gov>
Subject: Fwd: RE: HCAT Question
Cc: pete.rutledge@hq.nasa.gov

Pepper:
Jan Railsback is the current acting Shuttle PRA project manager.
His answer is given below.
Michael

From: "RAILSBACK, JAN (JSC-NX) (NASA)" <jan.railsback-1@nasa.gov>
To: "Michael Stamatelatos" <mstamate@hq.nasa.gov>
Cc: "BOYER, ROGER L. (JSC-NC) (SAIC)" <roger.l.boyer1@jsc.nasa.gov>, "Dennis Moore (E-mail)" <Dennis.R.Moore@msfc.nasa.gov>
Subject: RE: HCAT Question
Date: Wed, 5 Feb 2003 13:51:11 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

Michael,

The answer is, yes, we do consider the probability of Foreign Object Debris hits to the Orbiter TPS, but we make no distinction regarding where the debris came from. The debris could come from anywhere on the vehicle during ascent, micrometeoroid and orbital debris (MMOD) from on-orbit, and debris from the runway during Landing/Deceleration.

We also have a model for the probability of loss of External Tank (ET) insulation, but only in regards to overheating of the ET due to the loss of insulation. This is a MSFC model.

If you need a more in-depth answer, let me know.

Jan W. Railsback
Lead Analyst
Safety, Reliability, and Quality Assurance
Advanced Programs and Analysis Division
Ph: 281-483-7265
Fax: 281-244-2318
jan.railsback-1@nasa.gov

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

From: Michael Stamatelatos [<mailto:mstamate@hq.nasa.gov>]
Sent: Wednesday, February 05, 2003 1:06 PM
To: RAILSBACK, JAN (JSC-NX) (NASA); BOYER, ROGER L. (JSC-NC) (SAIC)
Subject: Fwd: HCAT Question
Importance: High

Jan/Roger:

HCAT is asking the following question:

"Was the potential of Foreign Object Debris impact damage considered in the existing PRA model?"

I need an official answer ASAP.

Thanks,
Michael

Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

"Mission success starts with safety"

Dr. Michael Stamatelatos
Manager, Agency Risk Assessment Program
NASA Headquarters - Mail Code QE
Office of Safety and Mission Assurance
300 E Street, SW
Washington, DC 20024
Phone: 202/358-1668 Fax: 202/358-2778
E-mail: Michael.G.Stamatelatos@nasa.gov
(Please note change in e-mail address)

"Mission success starts with safety"