

AM, LINDA J. (JSC-MA2) (NASA)

---

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

Sent: Wednesday, January 22, 2003 2:22 PM

To: HAM, LINDA J. (JSC-MA2) (NASA)

Cc: WALLACE, RODNEY O. (ROD) (JSC-MS2) (NASA); NOAH, DONALD S. (DON) (JSC-MS)

Subject: RE: ET Foam Loss

D. I will cover some of the pertinent rationale... there could be more if I spent more time thinking about it. Recall this issue has been discussed from time to time since the inception of the basic "no debris" requirement in Vol. X and at each review the SSP has included that it is not possible to PRECLUDE a potential catastrophic event as a result of debris impact damage to the flight elements. As regards the Orbiter, both windows and tiles are areas of concern.

You can talk to Cal Schomberg and he will verify the many times we have covered this in SSP reviews. While there is much tolerance to window and tile damage, ET foam loss can result in impact damage that under subsequent entry environments can lead to loss of structural integrity of the Orbiter area impacted or a penetration in a critical function area that results in loss of that function. My recollection of the most critical Orbiter bottom acreage areas are the wing spar, main landing gear door seal and RCC panels. Of course Cal can give you a much better rundown.

We can and have generated parametric impact zone characterizations for many areas of the Orbiter for a few of our more typical ET foam loss areas. Of course, the impact/damage significance is always a function of debris size and density, impact velocity, and impact angle—these latter 2 being a function of the flight time at which the ET foam becomes debris. For STS-107 specifically, we have generated this info and provided it to Orbiter. Of course, even this is based on the ASSUMPTION that the location and size of debris is the same as occurred on STS-112—this cannot be verified until we receive the on-board ET separation photo evidence post Orbiter landing. We are requesting that this be expedited. I have the STS-107 Orbiter impact map based on the assumptions noted herein being sent down to you. Rod is in a review with Orbiter on this info right now.

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

From: HAM, LINDA J. (JSC-MA2) (NASA)

Sent: Wednesday, January 22, 2003 9:33 AM

To: AUSTIN, LAMBERT D. (JSC-MS) (NASA); ROE, RALPH R. (JSC-MV) (NASA)

Subject: ET Foam Loss

Can we say that for any ET foam lost, no 'safety of flight' damage can occur to the Orbiter because of the density?

FW: ET Briefing - STS-112 Foam Loss

Page 1 of 1

HAM, LINDA J. (JSC-MA2) (NASA)

From: ROE, RALPH R. (JSC-MV) (NASA)  
Sent: Wednesday, January 22, 2003 11:31  
To: HAM, LINDA J. (JSC-MA2) (NASA)  
Subject: FW: ET Foam Loss

---Original Message---

From: SCHOMBURG, CALVIN (JSC-EA) (NASA)  
Sent: Wednesday, January 22, 2003 10:53 AM  
To: ROE, RALPH R. (JSC-MV) (NASA)  
Subject: RE: ET Foam Loss

>the amount of damage ET foam can cause to the TPS material-tiles is based on the amount of impact energy-the size of the  
piece and its velocity( from just after pad clear until about 120 seconds-after that it will not hit or it will not enough energy to cause  
any damage)-it is a pure kinetic problem-there is a size that can cause enough damage to a tile that enough of the material is lost  
it we could burn a hole through the skin and have a bad day-(loss of vehicle and crew -about 200-400 tile locations( out of the  
1,000 on the lower surface)-the foam usually fails in small popcorn pieces-that is why it is vented-to make small hits-the two or  
three times we have been hit with a piece as large as the one this flight-we got a gouge about 8-10 inches long about 2 inches wide  
and 3/4 to an 1 inch deep across two or three tiles. That is what I expect this time-nothing worst. If that is all we get we have have  
problem-will have to replace a couple of files but nothing else.

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

From: ROE, RALPH R. (JSC-MV) (NASA)  
Sent: Wednesday, January 22, 2003 9:38 AM  
To: SCHOMBURG, CALVIN (JSC-EA) (NASA)  
Subject: FW: ET Foam Loss

Calvin,

I wouldn't think we could make such a generic statement but can we bound it some how by size or acreage?

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

From: HAM, LINDA J. (JSC-MA2) (NASA)  
Sent: Wednesday, January 22, 2003 9:33 AM  
To: AUSTIN, LAMBERT D. (JSC-MS) (NASA); ROE, RALPH R. (JSC-MV) (NASA)  
Subject: ET Foam Loss

Can we say that for any ET foam lost, no 'safety of flight' damage can occur to the Orbiter because of the density?