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MAHONE: Good afternoon. Before we get started today, I'm Glenn Mahone, assistant administrator for public affairs.

Before we go to Johnson space Center in Houston for the rest of today's space shuttle accident briefing, Administrator O'Keefe wanted to spend a few moments with you.

Before we begin, due to a tight -- very, very tight schedule the administrator will not be able to take questions today. We hope to be able to do that early next week. But the administrator felt it important to talk with you for a few minutes today.

And with that, I'd like to introduce Administrator Sean O'Keefe.

O'KEEFE: Thank you, Glenn.

And good afternoon.

First and foremost, I want to thank all of the members of the press corps for the very dignified and extremely thoughtful manner in which the stories were covered here on the transfer of human remains from Barksdale Air Force Base to Dover, Delaware, and the treatment of that particular effort.

Deputy Administrator Fred Gregory, a former astronaut, was there to preside over that particular activity as the Honor Guard was

rendered and, again, the manner in which that was treated is most appreciated, recognizing not only the solemnity of the event, but also I think the importance of the sensitivity of this to the families and to all of us, I think, as humans.

O'KEEFE: I wanted to update you on a handful of different points that just, given the pace of events that have been occurring here in the last few days, it's an opportunity, I think, to, kind of, look at a couple of other factors that are involved.

First of all, I had an opportunity Monday, as was reported, to meet with the president; following that a set of briefings and discussions with him on the events that have occurred since the morning of Saturday, February the 1st.

I've had a chance to meet, Monday evening, with the leadership of the House and Senate, and the chairman and ranking members in most cases of, not only the committees of jurisdiction for NASA, the Senate Commerce Committee, and in the House the House Science Committee, as well as the chair and ranking members of the Appropriations Committee and other interested members Monday evening.

Again, yesterday I had an opportunity to, to a broader congressional group, present the same information, to update them on the facts and the circumstances and the time line, milestones, if you will, of how we've been proceeding since Saturday, February 1, to not only review the evidence and the facts that may have led to the causes of this terrible accident but also to come to conclusions about what that may tell us about the corrections that need to be made so we can get back to exploration and flying as soon as possible, and safely as the paramount operational objective.

O'KEEFE: The Congress and the members that we have had an opportunity to brief and to discuss the information I think have taken that aboard, and we've gotten lots of different input from them in terms of approaches to take, and all of it has been extremely helpful. I think it's been a spirited exchange and dialogue, and I'm hopeful that the sense there is the same.

We will endeavor to continue to brief members of Congress and their principal staff on the events as we know them and as we've attempted to do so with members of the press as well.

Also like to mention that the international response to the events of February 1st and the consequences of this horrible tragedy have been conveyed as recently as today. There was a very large attendance of the diplomatic corps, as well as several of my counterparts in various nations and their space agency administrators, directors and heads of agencies who were here in town for today's memorial service at the National Cathedral. We are most grateful to the vice president for his presiding over that activity to honor the crew of STS-107.

The international response, again, we had an opportunity shortly

after the memorial service to meet with them here at NASA headquarters and brief them on, again, the same kind of information and understanding of the events that have occurred since February 1st, as well as the process we're engaging in in order to ascertain the causes of this terrible tragedy and brief them this afternoon. Again, the deputy administrator, Fred Gregory, provided a rather extensive run-through of that set of circumstances.

I had an opportunity to meet with several of my counterparts as heads of agencies, as well as their principal representatives here who were visiting. And they include, again, predominantly our partners in the International Space Station activity, but also many other members of the diplomatic corps and other space agency activities even not associated there with that specific program.

Overwhelmingly, their expression of support, as well as condolences, not only for the family of the crew of Columbia, but also I think support for the approach that we are committed to, which is to finding the facts, letting the evidence speak for what may ultimately inform us as to what were the causes of this circumstance and this terrible accident; that we make the corrections necessary in order to resume safe flight operations. There is overwhelming support, I think, for that set of objectives.

Also today had a chance to brief the chairman and several members of the NASA Advisory Council, who were here as well for the memorial service. And also had a chance to walk them through the details, as well as the, again, the process we're engaging in to find the facts, examine the evidence, determine what appropriate corrections are necessary in order to resume safe flight operations.

O'KEEFE: And they are planning to adjust their agenda and schedule for the upcoming NASA Advisory Council meeting coming up in March in order to provide a more comprehensive look at that moment, or that point in time in which that meeting will occur so that they are advised and apprised of all the activities leading up to this, at the time.

And between now and then we will, of course, continue to keep the chairman and members advised of developments, as we are with the press, as well as members of Congress.

Let me talk just for a moment here about the Columbia Accident Investigation Board, which, again, I think you'll recall was activated as part of our contingency plan on the day of the accident.

By mid-afternoon the members had been notified, on Saturday afternoon, the 1st of February, as they are identified as part of our contingency plan.

I spoke to Admiral Hal Gehman later that day at his first meeting, or informal teleconference, if you will, of all the members of the board was conducted at 5 p.m. Eastern time on Saturday afternoon.

So it was a little less than seven hours after the event is when

they first had their opportunity to meet and to at least exchange an understanding of what the approach would be and the manner in which they would proceed at that time.

By the next afternoon -- by early afternoon, again, our deputy administrator, Fred Gregory, accompanied them, picked up all the members and brought them to Barksdale Air Force Base in Louisiana by mid-afternoon on Sunday the 2nd of February. So they were all there and began their first proceeding face-to-face at that time.

Admiral Gehman advises us how he will be and has left the Barksdale Air Force Base activities and is now at Johnson Space Center. I'll have an opportunity to meet with him tomorrow. I plan to spend a little time discussing with him the approach that the board intends to take, what -- how could we be supportive of their activities, to provide all the evidence, all the facts necessary for them to reach an understanding and a set of conclusions on what caused this accident and the support that he may need administratively and any other variety that's necessary in order to reach an understanding here in the next few weeks.

O'KEEFE: So that's there determination of how long they will spend there. Johnson will be guided by that, and that's entirely up to Admiral Gehman and his members of that board.

Again, our approach and our objective here is to help facilitate in any way that the board feels is appropriate, to provide the evidence and the facts to give us the best opportunity to reach conclusions as expeditiously as the board feels they can, in order to understand the events that led to this accident, so we can get on with understanding what the conclusions or fixes may be in order to -- and solutions may be to this particular set of problems, however they may emerge, and get back to operating safely as soon as we possibly can, based and guided by their findings in that respect.

We are conducting, as you've heard from recent briefings, as recently as yesterday from the Johnson Space Center, a fault tree analysis. In other words, every single piece of evidence, every fact, every issue that we could possibly think would contribute to this case has been devised as part of this fault tree. And the analysis is under way in order to make sure we have literally checked each box on everything necessary to support that analysis as this trail remains warm at this time, so that we can look at all the data, all the information before it's either gone cold as a trail or has modified over the course of time, given the circumstances. So we want to assure that that fault tree analysis is conducted as quickly as possible and the facts and evidence collection process is apace.

Again, as you also heard and I think has been reiterated and it is not coincidental, it is something, I think, we have very clearly committed ourselves to, is that we want the facts and the evidence to speak to the conclusions, ultimately inform the conclusions in terms of what caused this horrific event.

And in doing so, we do not want to rule out any theory, any

approach, any possible set of factors that could be, when combined, lead to some other judgment. That is a determination that the Columbia Accident Investigation Board will render.

And as a consequence there, to absolutely assure that that judgment be rendered from the board and only from the board, in terms of how we will be informed about what the causes and ultimate consequences here may need to be, in terms of the approach of fixing and solving some of the issues to get back to safe operations is, we have been advised by the board that certain clarifications of the charter to assure the board's independence be modified.

O'KEEFE: Those modifications we have immediately agreed to. And the clarification of that charter has been, you know, promulgated. We will certainly make those copies of the charter revisions to you. It will be posted on the web site here within moments, I suspect. And we'll certainly make sure hard copy is available for those of you who cannot access that exactly at this time.

This is to absolutely guarantee that there is -- you know, we have eliminated any ambiguity as to the independence of this board. They are, again, acting in a manner that we have -- in the spirit of which was incorporated in the original charter as well. This is a clarification that charge is to simply reinforce the independence of this group. We really want to be sure that there is no ambiguity whatsoever and that we are not eliminating any set of possibilities of what could have contributed to this accident; that we will be informed by the board's judgment in that regard.

To that point, and as an illustration, I think of the independence, the board is considering the addition of members to the board. Several members of Congress have so suggested that they do so to add additional expertise or some other dimension of view or whatever that may give them another avenue or way of looking at a set of issues.

And again the approach that I think has universally been advocated, which we thoroughly agree with, is the folks that may be considered not have a specific association or involvement directly with activities related to NASA so as to assure their independence as well, as is the characteristic of Admiral Hal Gehman.

That particular proposition has been discussed with Admiral Gehman. He has certainly expressed a willingness to consider additional members to the extent that they add other dimension or view that, again, not only guarantees independence, but also gives additional perspective that they may consider to be beneficial or helpful. So I think you can reasonably expect addition or additions in the near future at the direction and at the prerogative and decision of Admiral Hal Gehman.

Again, we are going to be guided by the board's findings. I think the intention here very clearly is they will reach conclusions, and the conclusions will come from them and only them.

O'KEEFE: Anything that we offer or that you hear in the course of this should be treated as, you know, view and opinion or a position, and anything that is other than fact-based or evidence-based is something that might give us a general idea or direction of what we think may have been the contributing causes to this particular case.

And all of that is something we want to encourage everybody in the NASA family to continue to do, is to continue to think, explore, I think, very extensively, the full breadth of all the things that could possibly have contributed to this, so that we're not ruling anything out and that we're not missing anything.

And, again, part of the reason, I think, it is most beneficial to assure as extensive and as contemporary a release of that -- of the facts and the information as we gather the evidence, is to assure that others outside the NASA community are also then so informed and can help provide some thoughts of exactly which approaches or what evidence we may have been overlooking; anything.

And, again, there's great benefit in that approach and it's one that we are receiving lots and lots of different ideas of how to proceed and consider looking at evidence and facts and ultimately to serve up to the board as an opportunity for them to make judgment about where that may lead us.

But, again, I want to be sure that we're very clear about the point that any view we express in this regard does not foreclose, doesn't close out, doesn't eliminate any theory, any conclusion that could be drawn, because ultimately those are conclusions that only the board will be authorized to make.

So we will not have competing positions on this. This is going to be a condition where the board findings is what we will be guided by.

And that was the point when that board was activated on February the 1st, it was the objective of the contingency plan when it was written, it is a hard, hard legacy of lesson learned from the post-Challenger experience and we intend to absolutely guarantee that we do not relive an experience in any way, shape or form that we've had previously. There is no further education from the second revisitation of any of those cases.

So as a consequence, we've learned a lot from that. This is one of the object lessons, this process is a direct outgrowth of that, and we intend to be guided by that in order to assure that's the case.

Lastly, I'd observe that, again, members of Congress and the leadership there, particularly, have been, I think, most helpful and most supportive of assuring that all the facts, all the evidence be released in a timely manner to inform the judgment of, not only the public, but also to help contribute toward this larger task of running to ground truth; what it's going to take in order to determine the findings, gather the evidence, determine what the solutions may be as a consequence of those findings, fix that case and get on with the safe operations of what we do every day in support of all the

important missions that we are engaged in.

O'KEEFE: In that respect, and in the attempt to assure the fullness of the exploration, if you will, and vetting of all the information, as well as views, both Chairman McCain of the Senate Commerce Committee and Chairman Boehlert, chair of the Science Committee in the House, have agreed to a joint hearing which will be conducted on Wednesday morning at 9:30. I believe that's been announced. I fully intend to be there, without a doubt.

Their offer and request to me was, "How soon can we put this together?" And my response to them each and every time the inquiry was made was, "As soon as you are prepared to convene a hearing. That's when we're anxious and ready to go to discuss all the facts, all the evidence, all the information and any other discussion that members would like to have about the manner in which we are conducting this activity."

We really are committed, absolutely committed to finding out what caused this accident. There is no other higher objective, I think, than to do that, to not only determine the cause of this, but for, if for no other reason, than for the sake of the families involved. They have been nothing short of heroic and inspirational to all of us in the NASA family for the manner in which they have dealt with the most devastating of human loss and that is the loss of a member of a family.

And the manner in which they approach this, I think is something, again, not only inspires all of us, but recommits us each and every day to that important objective of assuring that we find out the answers to this, and to honor their wish that we make the corrections and get about the business of flying safely again. And that's what we are committed to doing.

So I thank you for your time, attention. Again, I do, as Glenn Mahone advised, have to get on here.

We are planning again to meet Johnson Space Center with Admiral Gehman here to work through all of the requirements we have in order to support the board's activity. We're preparing for that get-together.

And I think we're about to shift to Ron Dittemore and the folks at Johnson Space Center for further update here on where we are on the technical information.

Thank you all very much for your time.

STAFF: Good afternoon, everybody, and welcome to the Johnson Space Center. We'll continue with the accident response briefing. And I'll introduce, once again, the shuttle program manager, Ron Dittemore. He'll have some comment. And then we'll throw it open for questions.

We are fairly limited on time today, so we'll try to get through as many questions as we possibly can before we have to close.

Turn it over to Ron.

DITTEMORE: Our investigation in the past five days has certainly been fast and furious and today it enters a new phase. The Columbia Accident Investigation Board chaired by Admiral Harold Gehman has arrived here at the Johnson Space Center and we have spent the day briefing him and his board. The leadership of the investigation, the oversight of gathering information and other responsibilities, is being transitioned to this board.

I spoke with Admiral Gehman this morning and he is strongly committed to the public's ability to continue to follow the investigation's progress. Regular briefings for you will continue as we have been doing these past several days.

From a personal standpoint, I am very pleased to have Admiral Gehman here with his team and we offer our full support. Anything that Admiral Gehman needs, we will provide to him. And we pledge to him that we will continue to support him as we have done in the past. As we have prepared investigation plans and procedures, we will transition our thoughts and our plans over to the board. And we will follow his leadership.

Efforts to recover debris continue. Unfortunately the bad weather has made the job more difficult. And despite these tough conditions, people in the field are working diligently, sacrificing much of their time, to continue to do their best to retrieve the debris that will be important in our investigation.

And again I want to extend my personal thanks to each and every one of those in the field, both those that are supporting us in the government, local and state authorities, and certainly the public citizens for also helping us immensely.

DITTEMORE: So far, more than 1,000 items have been gathered at various locations. And we are in the process of moving these different items into the central location at Barksdale Air Force Base. New reports are coming in all the time.

As far as the investigation goes, let me emphasize again that we have ruled out any possible cause. And even though we scratch our heads from time to time and wonder if we're going down a right path, it's important to understand that the first step in any investigation is to develop a fault tree. And in the fault tree you examine and identify every possible cause, no matter how remote or no matter what you think about the possibility of that cause.

And once you develop that tree, then you establish a process where you systematically close out each branch of the tree. So in the end you have left no stone uncovered or overturned. You have looked at each branch, each possible block, each possible cause and satisfied yourself that you have done a thorough and complete job independent of

what you might think of the probabilities or the possibilities.

As I talked to you yesterday, I mentioned to you that we believe in some instances that it's hard for us to understand why a piece of foam that has fallen off the tank could have been the root cause. But that is not stopping us from continuing to investigate that particular event as being a potential root cause.

We are planning testing of foam impact on tiles. We are performing analysis. That's just an example.

Even though we scratch our heads and don't quite understand how this could be a contributor, it still exists in the fault tree, and we're going to pursue that branch of the fault tree until we have closed it as possibility. And in many cases in order to close it, you've got to perform some testing. And so even though I mentioned to you I thought it was not one of the primary items in our mind, we are pursuing it with great effort. No possibility is being ruled out.

We're still looking for that elusive missing link. And we're hopeful that as we examine our fault trees across the program and perform our testing and look and examine the debris that we have gathered, that we will find the missing link.

DITTEMORE: That may take some time to do. You can imagine, if you look at the fault tree, it's going to have thousands of blocks to pursue, many different branches to follow and paths to discuss. So systematically the large team that we have gathered will go through each one of those branches.

And this activity, again, will be led by the Accident Investigation Board, and we will support that activity to the best of our abilities.

Again, let me say that it is with some relief that I welcome Admiral Gehman here. We need their expertise, we need their independent look at what we have been doing, and we will work closely with him and his board.

QUESTION: Ron, first, can I ask you a technical question or not? I don't really understand what I'm able to ask you in this context or not.

DITTEMORE: Well, sure you can ask me a question.

QUESTION: A technical question?

DITTEMORE: Sure, absolutely.

QUESTION: OK, I'll leave the administrative stuff to my colleagues, but I have a technical question.

Going back to 7:52 a.m. Central time, when the first telemetry came in on the orbiter that was unusual, there is video, obviously -- I don't you've seen this or your team has -- from Reno and from

Flagstaff and various places, that begin to show something coming off the orbiter at a fairly early state, and one of the big questions in my mind and my colleagues' and others we talked to is, if you're shedding something that early and you still have several minutes of flight left before it goes out of control, I can't -- I'm having trouble picturing how you can -- the flying characteristics of the vehicle if you're losing something, whether it be tile or what.

I was wondering, can you address just the aerodynamic stability of the craft with your stability if you are losing anything.

And I still wanted to get back to the 34-second question because I still can't figure out how you could be generating power for 34 seconds beyond the end of comm and getting data down if you're in the process of breaking up. I don't understand the sequence there.

DITTEMORE: I have seen some of the video, and it's interesting but we haven't yet determined what's happening, obviously. As far as any possible pieces of the orbiter or tile falling off, it doesn't appear to show up on any of our data as affecting our flight control until later on in the time frame that we have discussed.

You mentioned this 7:52 or 7:53 time frame, in that time frame, as we look at the data, unless you had some pictures indicating an event was happening, you wouldn't be able to tell by looking at the systems performance, or even the flight control handling qualities.

DITTEMORE: It looks normal to us. And that's part of the mystery. If there is something that is shedding from the orbiter, we'll have to determine that to be the case, because it doesn't show up on the data.

Now, as far as the additional 32 seconds, remember the loss of signal -- or cut-off of data is a better way to say it, because we received data, this extra 32 seconds, on the ground. But it wasn't displayed to our flight control team, because the software packages that receive the data into the computers are software routines that assess the validity and quality of the data. And when it looks like there's more error bits than good bits, it cuts it all off. And so, it's like having a premature cut-off of data from the total scenario.

In reality, it cuts it off at the right time from a flight control standpoint, because -- our flight controller standpoint, because you don't want them making decisions on data that's invalid or erroneous. So now the labor is to go back into the computer, look at that 32-second period and go through each piece of data, bit by bit, and determine whether it's valid or not.

We may look at all 32 seconds and find out that we only have three seconds of valid data. Don't assume that there's 32 seconds of valid data; it may not be the case. When we get through our analysis of trying to extract information, it may be that you have one or two seconds of good data at the beginning of that period and maybe a second later on at the end. But it's not a continuous stream of good data.

So it's going to be very random. And we're not quite sure what it's going to tell us. We're very hopeful that there's some information in that data stream that would provide us a clue.

QUESTION: I wonder if you can tell us what alarm messages the Columbia crew was receiving during their descent and when they were receiving them and what they signified.

DITTEMORE: The only alarm that I am aware of was very near the end as far as the cut-off of data. And that was an error message that signified that they had lost instrumentation on their left main gear tire pressure. And when they lost that instrumentation, there was a message that was generated. We saw the message on the ground. The crew certainly saw it.

DITTEMORE: And we are aware that they acknowledged the message, because, based on our telemetry, we can see that they pushed a push button in the cockpit that acknowledges the message. We were in the process of calling them about that particular message when we received the actual cut-off of data and loss of comm.

QUESTION: Dr. Dittemore, you said earlier that you had a reporting system -- a safety reporting system agency-wide that allowed people at NASA internally to identify their concerns, anonymously if necessary. And you said that you received none of these alerts ahead of the launch of the shuttle.

Have you received any such alerts subsequent to the loss of the shuttle? And if so, what have you done about them?

DITTEMORE: I am not aware that we have received any alerts in that system. Typically when we do, I hear about that quickly. But I have not received any at this time. I'm not aware of any that have come in, and none have been brought to my attention.

QUESTION: I'd like to know a little bit more about what might have been going on in that left wheel well during the final minutes. Do you know if their tire pressure was going up or down at that time? And anything that could have ignited in there or flammable, anything -- and also the gasket around that door; could it have possibly come loose or have been damaged in any way?

DITTEMORE: Well, some of those questions are -- certainly they are very interesting. And we may never know.

As far as the instrumentation, the tire pressure seemed to be normal, and then they dropped off-line. We have tire pressures on both tires on the left main gear. And one set of tire pressure on one particular tire dropped off-line and subsequently was followed by some period of time by the other tire and its instrumentation failing. There was no trending of pressure going up or down. It just stopped working. And then the other tire also stopped working -- its instrumentation stopped working. And they were -- I don't remember the seconds in between, but that's how that happened in a time line fashion.

And while I am thinking about it, we have been working hard on overlaying all the information on a particular time line. Remember I talked to you about the events that happened, loss of data, increasing temperatures. We are overlaying that information on top of a ground track so that we can see the map of the United States in relation to the ground track and the events that all happened.

It was my intention to bring that to you today.

DITTEMORE: But all that data wasn't quite ready, and so I'm going to have that available to you tomorrow. We're reviewing it this afternoon and tomorrow morning, and hopefully it'll all be done so that you can have that information and we can discuss it perhaps tomorrow afternoon.

QUESTION: First, I understand the debris is being collected at Barksdale. Will that debris be again reassembled much in the way that the Challenger was reassembled?

If that occurs, will that occur at Barksdale, here at KSC?

And finally, once this is all done will the remains of the Columbia be interned much the way that the Challenger was interned out at JSC?

DITTEMORE: Some of the answers to those question are still to be determined. We will collect the debris in the immediate term up at Barksdale Air Force Base. It'll basically be laid out on the floor for viewing and inspection.

It is our intent to transfer the articles and the items to the Kennedy Space Center and reconstruct the vehicle the best we can at the Kennedy Space Center so that we learn more about the accident.

And its final resting place is yet to be determined.

QUESTION: We understand that a former astronaut named Tammy Jernigan traveled to California and received some photos of what appears to be either lightning or some odd electrical event affecting the vehicle as it crossed over California, and I wanted to know if you've received that information here, and if so has it been interpreted and analyzed.

DITTEMORE: Well, I'm certainly aware of the report. I read it on some of the mail on the computer, as many of you did. We do have possession of the photo and are examining it carefully.

Part of our difficulty in receiving information and photos is that because we have so many we have to carefully go through each one of them and validate whether the photo is real. And we are doing that in every case, in all of our photos.

This particular one is no different than the rest. We are examining it and trying to determine whether it is a valid

representation of any event that might be represented on the photo.

So it's yet to be determined whether that will be important to us or not. It's in the process of being examined.

QUESTION: Have you ever observed assymetric drag or yaw anomalies for any other reason in previous flights?

DITTEMORE: Well, I'm not really sure. I might have to go back and check on that. In some cases you might have small disruptions in the airflow and I can't tell you right now whether it's been assymetric or not.

I seem to recall, if I think about it a minute, that in the early years of shuttle we did have some gap fillers on the bottom of the vehicle that either came out or came loose, and it disturbed some of the airflow, and I'd have to go back and research whether that resulted in an assymetric drag introduction or not.

So we'll take the note and I think we can turn around that research fairly quickly and respond to that tomorrow.

QUESTION: Given the California debris, and assuming that's been now confirmed -- please tell us if it hasn't -- does that push -- which possible causes does it push higher up the fault -- higher up your list and which possible faults does it push power down your suspect list?

DITTEMORE: I'm not aware that we have confirmed any debris as being shuttle debris west of Fort Worth. I don't have any information that we have confirmed that it's shuttle debris.

Certainly we are out investigating. We have many reports, so we are in the process of investigating each report. So far we have not identified, as far as I am aware, any shuttle debris west of Fort Worth.

QUESTION: You alluded to this in a previous question from Houston, but I want to ask you a little more specifically. Is there any evidence and/or your personal opinion about whether the astronauts were aware, in the minutes before you lost communications, that there was significant or serious problem?

DITTEMORE: Absolutely no evidence: no communication to the ground, no voice of concern, data was looking fine. There doesn't appear to be any indicator that says the crew was doing anything off nominal.

QUESTION: Of the thousand pieces -- or more than a thousand items that you have found, can you characterize that in a percentage term as far as percentage of the expected debris?

DITTEMORE: I really can't. I don't have a good understanding of what the folks in the field feel, how much debris is out there and what percentage they believe they have collected.

It's my intention to visit them soon and talk with them more personally about that, but I don't have a good feel yet on what they have collected and what percentage that may represent.

QUESTION: I understand some of the cameras were down during lift-off and that the video and still pictures of the 80-second event aren't as clear and as precise as perhaps you would have liked or may have been in previous flights. Is that a problem during this investigation?

DITTEMORE: Well, it's a disappointment, in that the camera with the very best view turned out to be out of focus. And evidently we had a mechanical problem with that particular camera.

And so we've tried to look at alternate camera views. And we're just not going to get a really good view during the launch phase. We've tried, we've searched. We have what we have. We're going to try and improve the resolution. But we're not going to get the best view that we know we could have had because of the out-of-focus camera.

So we're just going to have to live with what we have and try our best to determine what happens.

QUESTION: Can you take us into that left wheel well and explain where -- exactly where the pyros were, how strong those charges were? And where the relevant sensors are and how far away they were?

DITTEMORE: Well, I think those are all good questions, but I'm not prepared today to answer all those details. I can get that information for you so that you have it. It will take me some time to go pull out the data, because I don't have that level of detail that I can remember. But we can certainly pull it out.

QUESTION: Is your confidence that the foam is not that big a part in this based on new analysis post-disaster? And are you going to be using a wind tunnel in your new tests?

DITTEMORE: Our scratching our head on the foam is based on our analysis that we conducted during the mission and our previous experience with foam that has come off the tank and our experience with what it has represented on the bottom of the vehicle by way of debris damage and impact. And so we, collectively, have reviewed it initially post the accident time frame and it's -- continued to scratch our heads to try and understand if this represents anything more than what we said it did in the mission.

We are still planning to redo the analysis. We are still doing that. We have teams that are going back and pouring over the information and the analysis is starting anew to see if there was anything that we missed in that particular analysis. We are still planning to conduct testing to better understand the foam, its properties, and potential impact to a tile or set of tiles. All that is future work and it will be conducted.

And that will be the evidence that we need to either fully

discount that particular branch of the fault tree or to say that maybe there's more that needs to be pursued. That's one particular branch. And there's going to be many branches that will require testing and analysis to allow us to close those portions of the fault tree.

The foam that shed off the tank and impacted the left wing is just one branch, and we are pursuing that. Even though we scratch our heads, we're going to pursue it. And we're going to pound it flat.

QUESTION: As you know, over the past few years there have been a number of probabilistic risk analyses of the shuttle. And I was wondering how the investigation is making use of the data and the analyses from those PRAs.

DITTEMORE: The PRA, or probabilistic risk assessment, is being used to generate the fault trees. When you establish a PRA, one of the basic ingredients is the cause that may lead to a significant risk. And so, when you start to establish a fault tree, you basically look at all the causes that may be possible that might result in the loss of a vehicle. And so, we are using that PRA analysis and a lot of the work that went into PRA to help us in the formulation of our fault trees.

QUESTION: Several engineers have said that the wheel well and other left side data indicate that it's highly likely that there was some kind of tile damage to the vehicle somewhere along the way. Would you agree to that?

DITTEMORE: Let's see, every time you come through it's a little scratchy. Nothing personal but I'm going to ask you to do it one more time.

QUESTION: Several engineers I've talked to have said that the wheel well and other left side data indicate that it's highly likely that there was some damage to the vehicle as part of the cause of what happened. Would you agree with that?

DITTEMORE: I would say that's speculation. And we have to be careful about speculating for a particular root cause at this point. Just as I mentioned earlier, just because we don't think it's possible doesn't mean we're not going to pursue it.

So I can't comment to say that I believe there is debris falling off the vehicle because I don't have any hard evidence. I have video that I'm going to look at to see if that's leading me to one conclusion or another, but we're going to cross every t, we're going to dot every i, we're going to look at every piece of evidence and data before we draw those types of conclusions.

QUESTION: You said that you found no additional debris west of Fort Worth, but do you have any other clues coming from earlier in the flight, from California or Arizona, any witness testimony or anything that gives you a clue?

DITTEMORE: We've received a significant number of reports based

on visual observations, and we're following up on those reports and actually doing some analysis based on the reports.

If a particular observer identified what he or she thought was a piece of debris being shed from the orbiter, then we are examining that particular report and we can perform analysis that would predict where a piece of debris might land on the ground given that it shed off the orbiter at a particular time, a particular altitude and a particular velocity.

So we have a special team that is off looking at that type of information. And we have teams that are heading west, and not only are they interviewing some of the observers in these reports, but they're trying to understand, for those that think they have identified some debris on the ground, whether or not that debris is shuttle-related.

QUESTION: I wanted to ask about Columbia's susceptibility to early boundary layer transition, and whether it's wings were rougher, so to speak, than other shuttles. We spoke to a former astronaut today who had some 1989 data that showed that Columbia had rougher wings than the other shuttles and that its left wing in particular was much rougher as measured by the step and gap of the tiles.

QUESTION: Could you talk a little bit about that and whether it could have been a factor in what happened?

From the research we've done on it, it shows that this could have made the left -- it could have led to drag on the left side and extra heating or heating earlier.

DITTEMORE: I'm not aware of any particular roughness on the under side of the vehicle that would cause us to have any concerns with flying qualities or boundary layers or anything like that.

And our teams are scouring over information and they will be reviewing all previous flights of Columbia. They will be looking at the modifications that were performed in as recent modification period. They'll be looking at repairs and any replacement of tile. They'll be looking at bonding techniques, all those types of modifications, inspections, repairs, will be reviewed to determine if there's anything different pertaining to the bottom of the vehicle this time around as related -- as compared to previous flights prior to the maintenance down period.

But I am not aware of anything today that would indicate that there was anything unusual about the tile installation or the bottom of the vehicle.

QUESTION: After the Challenger incident, there was increasing discussion within NASA and in the public about the possibility of devising an escape system for shuttle astronauts. Has that subject, since the Columbia disaster, come up again at NASA? And do you believe that there was any sort of escape system that could have been devised that would have saved astronauts during a catastrophic event

like this?

DITTEMORE: Well, in the five days since we lost Columbia and its crews, we have not had the time to discuss future modifications for other vehicles. Our sole focus has been on what might have happened, what evidence do we need to accumulate, the process by which we will go gather debris and protect evidence.

Certainly those types of questions I am sure will be asked in the future, but not in the recent days. There's much more work to be done in the near term as far as trying to determine what the cause of this disaster was.

DITTEMORE: And we'll have plenty of time to talk about future modifications or other types of improvements in the vehicle as we move into the future.

QUESTION: Do you plan to use signal processing software or algorithms to clean up the 32 seconds of faulty data, and could you comment on that and other computer technology you're using in your investigation?

DITTEMORE: I'm not exactly sure how these computer wizards do this. All I know is that we have experts who believe they can extract the data. There are well-known techniques that can be used, there are tools that are available, we have done it in the past.

We felt very confident that we could do it again in this case. It turns out to be a little harder than we suspected. I don't know the reasons for that yet.

So it's just a process that we'll have to go through and allow our engineers and out technicians the time to determine whether or not they can extract useful data or not. So we'll just need to give them more time.

QUESTION: You mentioned earlier there would be physical testing of foam and tile. Can you outline when that will begin, or has it begun, what will be happening? And what's Marshall's role in that?

DITTEMORE: Marshall's role is the lead role in developing test plans, analysis, to put together the facilities and conduct the test.

We have not developed those plans yet, they are in the stages of being developed. Those will undergo review, and all these types of activities will be discussed by the Accident Investigation Board, will be approved by the Accident Investigation Board and it will be under their auspices that these types of events will be conducted.

QUESTION: I wonder if you could talk about your people who are analyzing all the data going back through this investigation, especially here at Marshall.

I imagine they're not only dealing with the human loss but also having to requestion their work during the shuttle and making sure

that they didn't make a mistake, that it wasn't their work that caused the problem.

Can you just talk about the kind of stress that they're under, how they're dealing with this, what kind of hours they're putting in?

DITTEMORE: Well, I'm sure you know that it hasn't been the easiest of days for the members of our team.

DITTEMORE: And I'm sure there are heightened levels of stress and pressure as they feel they need to scour over each piece of information to determine whether there was anything that might be a clue to lead us to the determination of cause.

We have talked amongst ourselves as managers and our very desire's that our people get the necessary rest. Yet in the same light we are very anxious to complete the work. So we're balancing the working with a lot of enthusiasm and energy, because of the influence of the events in our lives, with the need to step back and take some needed time outs so that we don't make errors because of our enthusiasm to find a root cause.

Certainly there has been trauma in our system. Certainly there has been a lot of disappointment. They have talked with one another and discussed our disappointment at losing seven crew members, seven members of our family.

But I think that the healing process has begun, as I mentioned yesterday. I am seeing a very professional manner in all of our teams, a resolve to get to the bottom of this, a determination to find the root cause.

And I know that to a person we will not rest until we have solved this problem, until we have put all of the pieces together, until we find that missing link. And we will support the leadership of our investigation board to make sure this happens.

So these five days have been exhausting to the team. They have been difficult emotionally and physically. But we're going to carry on and we're going to continue our determination to find the root cause and do so as quickly and as reasonably as we can.

QUESTION: Regarding the California debris, if it does, indeed, turn out that some of that is from the shuttle, how does that change the direction of your investigation? What possible additional theories would you look at in terms of a cause?

DITTEMORE: Again, speculation on you part, and it would be mine also.

But certainly it would be very interesting to know if we were shedding debris earlier than what we have now indicated. It would be very encouraging to find debris, if that were the case, and identify it as part of our investigation, because it could provide important

clues in determining the root cause.

So if this debris does exist, it's very important to us.

QUESTION: There has been some video that has shown up from areas here in California, one specifically from Fairfield, that shows early breakup of the shuttle Columbia.

How important is that, in addition to finding debris in California, for the sequence of events? Does this place the time of breakup earlier or later, and how will you guys look at that in the investigation?

DITTEMORE: Well, I'm not aware of any photography that shows early breakup of the vehicle.

Again, let me remind you of the events. The vehicle was flying very well across California and Arizona, across New Mexico. It wasn't until we were in the North Texas time frame that we saw events start to occur that started to indicate to us that we were having some sort of control issue eventually leading to loss of control.

Now, we have seen some of the photography and videos provided to us by citizens. We're reviewing that photography in our attempt to identify exactly what it represents. But, again, it is too early for us to conclude anything. We don't know what it means, we don't know what it represents, and that will be the work in the days ahead to try to identify and ferret out the facts.

QUESTION: If I may ask you to return to the photo taken by the amateur San Francisco astronomer showing the purple phenomenon intersecting the shuttle, has your early analysis been able to rule camera movement in or out of the cause of that image? Do you have any telemetry at this point suggesting any sort of electromagnetic event affecting the shuttle, and could such an event have contributed to the loss of the shuttle?

DITTEMORE: Our efforts right now are concentrating on determining the validity of the photography. As with many other pieces of information, both video and photographic, still pictures, the first step is to determine validity of the information.

The next step will be to determine what it means to us. We're in the very first phase. And so you need to give us the time and the space for us to determine validity and then we'll be able to answer or try to attempt the answer the following -- or the subsequent questions that you asked.

QUESTION: I wanted to ask you again about the California debris. I know that it is speculative. Based on what you know about the flight path of the shuttle above California, what is the likelihood, in your mind, that these could be pieces from the shuttle?

DITTEMORE: I don't know. It is too early for me to tell. I have allowed the team to continue to analyze -- even before analyze,

to continue to collect the information.

And you have to pause for a minute and understand we're getting thousands of pieces of information. And the team is working through each piece deliberately. And so, it's too early for me to comment on one particular picture or one particular piece of video until we have the collective evidence gathered together.

When we do, I think we'll be able to put the total picture together to the best of our ability, because that's all the data that we have. And that's all that we can do.

But at this point, we've made no judgments on what these events mean to us, whether they represent something coming off the orbiter or not. We'll just have to review that information and determine what it means to us and whether or not its important in our investigation.

A lot more to do. And there's a tremendous amount of information that we have already. But we need some more time to pull it all together, sort it out, get it to the right experts, and then analyze it so that we can start putting the puzzle together.

QUESTION: NASA officials, the investigators and the EPA are working in San Francisco area to discuss the possible sightings of debris in California. There has been 80 reports. How do they determine what is considered a credible sighting or a credible piece of evidence that might be involved in the investigation?

DITTEMORE: Well, I think the first step, once we get our hands on the evidence, is to determine whether or not the photography is accurate.

Unfortunately we have received some information that is not accurate. We have received pictures, photographs that are not accurate. And because of that, that's slowed down a lot of our process. We have to go through each individual piece of information, photograph, and make sure that it has not been altered in any way and represents the facts.

DITTEMORE: So the very first step is to determine the pedigree of the video or the pedigree of the picture or film or photograph. And once we have documented its pedigree and are satisfied with its validity, then it's going to go into the process of analysis to determine what it means to us and what it represents.

STAFF: OK, that's all the time we have for. And while we've got some of our California colleagues and the media on the line, we'll have an opportunity once again to put up our slate that offers our friends to pass this information along so that anyone who might have seen debris that they may think is a piece of Columbia, especially out in California, as Ron mentioned, and in Arizona and New Mexico, to please call the Emergency Operations Center at 281-483-3388.

Again, there is an e-mail address there on the screen, columbiaimages@nasa.gov, for text or images, small photo files. Non-

electronic images and video can, obviously, be mailed. And the address is there, the Emergency Operations Center here at the Johnson Space Center, Columbia, MIT. The mail code is JA17 in Houston. So we'd appreciate getting the word out for us on that as well.

A couple of programming notes for tomorrow: Tomorrow morning at 8:15 Eastern time in the morning, Kennedy Space Center in Florida will honor Columbia's crew with a memorial service. That will air on NASA Television. We are planning a morning briefing tomorrow from NASA Headquarters in Washington; that to air at 11:30 Eastern time. And that will be followed in the afternoon by our briefing from here at the Johnson Space Center. And that's scheduled for 4:30 Eastern time.

Thank you all.

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