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**"STS-115 POST-READINESS REVIEW PRESS CONFERENCE"**

SPEAKERS:

**MICHAEL GRIFFIN**, Administrator, NASA  
**BILL GERSTENMAIER**, Associate Administrator  
for Space Operations  
**WILLIAM HALE**, Space Shuttle Program Manager  
**MIKE LEINBACH**, Shuttle Launch Director

[Moderated by Dean Acosta, NASA Press Secretary]

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Kennedy Space Center

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## 1 PROCEEDINGS

2 MR. ACOSTA: Good afternoon, and welcome to the  
3 STS-115 Post-Flight Readiness Review press conference. I  
4 am Dean Acosta.

5 Joining me to my left is NASA Administrator  
6 Michael Griffin; to his left, Space Operations Associate  
7 Administrator Bill Gerstenmaier. To his left is Space  
8 Shuttle Program Manager Wayne Hale, and to his left, Launch  
9 Director Mike Leinbach.

10 We will have some short opening remarks, and then  
11 we will go to your questions. Please, I ask you to  
12 identify yourself and identify who your question is for,  
13 and please, if you can, turn off your BlackBerries and  
14 phones now, so we don't have that disruption.

15 Not you, Mike. You're all right.

16 [Laughter.]

17 MR. ACOSTA: Okay. With that, I turn to the  
18 Administrator for some opening remarks.

19 ADMINISTRATOR GRIFFIN: Well, thanks, Dean.

20 As I always say, it is a pleasure to be here.  
21 It's an honor to work with this team and a thrill to see  
22 another Flight Readiness Review. This was another great

1 review.

2 I was talking to Dean afterward, and he was  
3 saying, "Boy, now that I sit in these things, I'm getting  
4 more insight to how you engineers work, and I still can't  
5 understand it." And that's good. We still have a few  
6 secrets up our sleeves.

7 So this was a great review, and I am looking  
8 forward to moving toward a great launch.

9 MR. ACOSTA: Gerst?

10 MR. GERSTENMAIER: Thanks, Mike.

11 Again, I'd like to echo it was a great review.  
12 In my mind, a great review means we had a lot of good  
13 discussion, and we just had a tremendous amount of  
14 discussion from all the folks involved on a variety of  
15 topics. We covered many things.

16 If you ask me to step back and give you kind of  
17 the general impression of the FRR (Flight Readiness  
18 Review), I think the major things I would pick up that I  
19 learned from the FRR was that the challenge of the  
20 International Space Station assembly is really huge.

21 If you look at what we are going to do in terms  
22 of EVA's (extravehicular activities/spacewalks) and the

1 timelines and the activity associated with that assembly,  
2 it is a very, very busy timeline, with many, many  
3 challenging things in it, and it really impressed me with  
4 how much the teams have prepared for this.

5           They have spent many hours with many back-up  
6 procedures, many contingency situations they are prepared  
7 for. They have worked extremely well with the shuttle  
8 team, looking at capabilities of the shuttle and how they  
9 could maximize use of the shuttle, and we're prepared.

10           So it may not go exactly the way it is all  
11 scripted. The solar array deploy will be interesting, but  
12 if it doesn't, I think the teams are as prepared as any  
13 team I've ever seen to get prepared. So that was one  
14 take-away I had from the meeting.

15           I think the other thing that I kind of went into  
16 the FRR was this is a fairly quick turnaround from the last  
17 FRR to this FRR, and I was concerned that maybe we wouldn't  
18 have enough time to really review the subjects in detail  
19 and do the analysis that was needed to be there. The teams  
20 did just a tremendous job of being prepared.

21           One metric you can look at is just how long a  
22 discussion goes. The discussion went fairly long, and we

1 had actually, probably, slightly more charts at this FRR  
2 than we did in the last FRR. So that says the teams had  
3 enough time to get their data done, to get the analysis  
4 done, and to bring it forward.

5 We are not carrying very many exceptions or open  
6 work out of there. There's a few that Wayne will talk to  
7 you about in a little bit, but there are not many,  
8 considering where we are. So I think that, again, we had  
9 about the right amount of time that we were there.

10 One thing that was also encouraging is some of  
11 the new samples have been returned and checked out in the  
12 arcjet. That is impressive that those have come back from  
13 space, from the last flight. They have been essentially  
14 conditioned in thermal chambers down here underground and  
15 then tested, and it looks like there is some viable  
16 potential repair techniques there. So, again, the teams  
17 have done a tremendous job of pulling that together.

18 So those are my two impressions, one, the  
19 complexity of the challenge of assembly, and then the  
20 second one is the fact that we are really prepared to go do  
21 this flight.

22 The other things we have done is we set the

1 launch date again for the 27th, and I think it is around  
2 4:30 on the 27th. So we are ready to go for that. We  
3 still carry some open work that needs to be looked at.

4           We have a KU-band bolt issue that Wayne is going  
5 to talk about with his team at the PRCB tomorrow. We laid  
6 out some general guidance for them to go into that review  
7 tomorrow, but they will do that at the PRCB (Program  
8 Requirements Control Board), and then APU (Auxiliary Power  
9 Unit) No. 3, we need to do a little bit of work there to  
10 understand the failure we had on the last flight, but those  
11 are really, probably, the two major things that sit out  
12 there that are open.

13           We did discuss foam, like we always do. We did  
14 the poll. All members of the board were "go" for the  
15 launch. There were no "no-go" positions. There were two  
16 dissenting opinions, one from the Johnson Space Center and  
17 one from the Marshall Space Flight Center. Their opinion  
18 was they would like to have the ice/frost ramps redesigned  
19 as soon as possible, and they made that comment to us.

20           Chris (Scolese) and Bryan (O'Connor) were both  
21 "go." Bryan's rationale for "go," which you will see on the  
22 statements which we will release to you, is essentially

1 that we had this discussion at the last FRR. The rationale  
2 still holds. He didn't see anything in this flight that  
3 negated any of the rationale for a flight that we put  
4 together for the last FRR. So Bryan didn't see any need to  
5 be "no-go" at this point, but he did want to recognize that  
6 the same kind of rationale that went into the previous  
7 launch decision still holds in his mind.

8           So, again, we were all essentially "go" with  
9 those couple comments, and again, I think we had a very,  
10 very good discussion about all the aspects of how people  
11 felt, what engineering needed to be done, and what was  
12 missing. So it was just an outstanding review, and we are  
13 really ready to go fly.

14           MR. ACOSTA: Wayne?

15           MR. HALE: Well, let's see. I think we may have  
16 missed a trick by not having Mike Suffredini here to talk  
17 about all the Space Station assembly work that is going to  
18 go forward because, as Bill Gerstenmaier said, this is  
19 probably the most complicated assembly sequence that has  
20 been undertaken, and the record will not last because the  
21 next flight will be more complicated than this one. So it  
22 is a real challenge to the teams to execute the on-orbit

1 timeline. We talked a little bit about that about a week  
2 ago when we had a press conference down in Houston.

3 Talking about the FRR and the shuttle in  
4 particular, I did want to point out that this was a bit of  
5 a challenge for the team. After having a long period where  
6 we had significant time between flights to analyze  
7 problems, do lots and lots of testing, run lots and lots of  
8 analysis, and have -- I don't want to say leisurely, but  
9 let's say extended engineering reviews and meetings, we  
10 needed to turn around from a flight in about 5-1/2 weeks.

11 The problems that we had on the last flight,  
12 while they weren't major, there were also some non-trivial  
13 problems that had to be resolved. We have got almost all  
14 of those resolved. We have a couple that are open.

15 Most notably, we have a couple of thermostats and  
16 a heater line on APU No. 3 that we are still  
17 troubleshooting on Discovery to try to understand why they  
18 didn't work exactly right. We would like to not go into a  
19 flight and have problems with our heaters on those fuel  
20 lines.

21 Right now, we think that Atlantis has tested out  
22 just fine. So whatever problem there is on Discovery is

1 likely not there on Atlantis, but you would like to have a  
2 full resolution rather than going in with troubleshooting  
3 still in works. So we are going to talk about that at the  
4 L-Minus-2 (meeting that is two days before launch). We  
5 have a handful of issues like that, that are still  
6 requiring some minor clean-up.

7           Probably, the longest thing that we talked about  
8 today wasn't the foam. We did have a long discussion about  
9 the foam on the external tank, and while I am talking about  
10 that, I should point out that what we saw on STS-121, the  
11 last flight, is about what we expected. It was about an  
12 average-foam-loss kind of a tank, which is to say we  
13 avoided the big pieces. We avoided anything what we would  
14 call "unexpected," but we had a number of foam releases,  
15 and we know we have future work to do.

16           What we want to see on STS-115 is as good or  
17 better performance, and we do have a team in work that is  
18 working very hard to pull together a new design on those  
19 famous ice/frost ramps to eliminate that hazard from us  
20 starting with the tanks that we will be flying next year.

21           But the longest discussion we had today was about  
22 the famous bolts that we found on the KU-band antenna.

1 Now, this is a real success story. Steve Poulos, the  
2 manager of the orbiter project, reminds me very time we  
3 talk about it. This is an example of improving safety on  
4 board the space shuttle.

5           Some 25 or 30 years ago, a mistake was made in  
6 the design of this particular component, the way this  
7 antenna is bolted onto the orbiter, and for the last 25 or  
8 more years, we had been flying with these threaded  
9 fasteners and bolts that just barely have a thread or two  
10 engaged in to the nut that holds them on. That is not good  
11 engineering practice.

12           We had some questions about threaded fasteners  
13 and went back through an exhaustive review, which is still  
14 ongoing, of all the threaded fasteners on board the  
15 orbiter, in particular, and we found that in this  
16 particular application that bolts weren't long enough and  
17 had been that way for a number of flights. That is not  
18 where we want to be.

19           So, on Discovery and Endeavour, the two orbiters  
20 that we have in the maintenance facility, we immediately  
21 went to those vehicles and changed those bolts out, and  
22 that problem is resolved.

1           On Atlantis, unfortunately, the access is very  
2 difficult. So we are doing some more work to try to  
3 understand exactly how much risk is involved with, A,  
4 either changing those bolts out, because any time you go to  
5 do non-standard work at the launch pad -- and this is in a  
6 particularly difficult location -- you run some risk, or,  
7 B, what is the real risk for this particular flight and  
8 could we accept this less-than-perfect application of a  
9 screw-thread fastener for one more flight.

10           So that work is ongoing. We will be having  
11 discussions on a daily basis through the weekend probably.  
12 I think it is likely we will change those bolts out, but  
13 the analysis is still ongoing, and we want to make sure we  
14 don't sign up to do something and incur damage potentially  
15 from workmen being in there that we didn't have to. So  
16 that is why that is still under discussion.

17           And because it is a story still in development  
18 and the engineering analysis on both sides is not complete,  
19 we had quite an interesting discussion this afternoon at  
20 the Flight Readiness Review, and we know that is open work  
21 that we want to resolve before we go launch Atlantis.

22           That is kind of a normal day in the life of the

1 space shuttle, those kind of discussions, and I expect they  
2 will go on for as long as we fly this vehicle, and it will  
3 probably apply somewhat to future vehicles as well.

4           So, all in all, the team has worked very hard.  
5 We have got 17,000 people around the country working on the  
6 Space Shuttle Program. They have really turned too. We  
7 are ready to go forward with the completion of a few last  
8 items, and on August 27th, we hope to be back here and look  
9 at the skies and see if Mother Nature will cooperate with  
10 us for an on-time launch, Sunday afternoon.

11           MR. LEINBACH: Okay. Thanks. On the processing  
12 side, out at the launch pad, processing is going pretty  
13 well. We have had our share of challenges with our  
14 hypergolic loading, but I can tell you on behalf of Team  
15 Atlantis, they are extremely happy to be at the launch pad  
16 and to have a launch date set now by the agency.

17           You will recall that Atlantis has been mated  
18 twice before, and we have had to de-mate her, and so the  
19 whole team, not just here at Kennedy Space Center, but  
20 across the country that works on Atlantis for a living,  
21 they are really feeling good right now. Atlantis is at the  
22 pad, a couple of weeks away from launch, 10 days away or so

1 from launch. So they are really feeling good.

2           We have got about two days of contingency left in  
3 the schedule at the launch pad. So that is enough for us at  
4 this stage. Meanwhile, back in the orbiter processing  
5 facility, Discovery has gone through the first turnaround  
6 processing flow since the accident. She is about one month  
7 into about a three-month turnaround process, and everything  
8 has gone really well there. So, from a launch-on-need  
9 perspective, if that should be come necessary, right now  
10 Discovery is looking good for a rescue mission if that  
11 becomes necessary.

12           So, from the Kennedy Space Center perspective, we  
13 are glad to have a launch date, and we are looking forward  
14 to it. Team Atlantis is feeling really good right now.

15           MR. ACOSTA: All right. Thanks, Mike.

16           That concludes opening remarks, and we now will  
17 start with questions. We will start right up front with  
18 Jay.

19           QUESTIONER: Wayne, I have a two-parter. First  
20 of all, just how many people vote? How many votes are  
21 there in an FRR? And secondly, what would happen if the  
22 UHF antenna, one or two bolts, gave way in orbit? I know

1 you have to bring it back inside, but what would be the  
2 problems you would have to deal with?

3 MR. HALE: Well, let's see. Voting members for  
4 the Flight Readiness board, really that's Bill  
5 Gerstenmaier's board, but whatever it is, less than a  
6 dozen. I am trying to count in my head. We can certainly  
7 give you the exact number. Voting members, the four Human  
8 Space Flight Center directors, the Space Station program  
9 manager, the Shuttle program manager, contractors --

10 MR. GERSTENMAIER: There's probably slightly more  
11 than 12.

12 MR. HALE: Yes. I'm sorry. You are right. I am  
13 adding it up. I shouldn't do this in real time. We will  
14 get you the list.

15 MR. GERSTENMAIER: We are going to actually post  
16 on the web the same forms we did last time with the various  
17 signatures of all the board members. So you will get a  
18 chance to see that, and you can count them up for yourself.

19 MR. HALE: Now, in terms of the KU-band antenna,  
20 the issue is what happens at launch. The most vibration  
21 environment occurs right at the time that the vehicle lifts  
22 off, and so that would be the time, if it were going to

1 come loose, that we would be worried about it, and, of  
2 course, we want to prevent that from happening, either by  
3 ensuring ourselves that we have a good positive engineering  
4 margin on the structure as it exists or by changing out the  
5 bolts and making sure we have good engagement on all the  
6 threaded fasteners. But one way or the other, we are not  
7 going to have a problem on that antenna.

8 QUESTIONER: Well, are you saying that you don't  
9 think it would be a problem once that you deployed the  
10 KU-band antenna?

11 MR. HALE: This is a problem that occurs at or  
12 near launch time, not on orbit. So, obviously, if it came  
13 off at launch time, you wouldn't have it available on  
14 orbit. We would really like to have the function of that,  
15 but the concern is what happens if it falls off and causes  
16 damage during a launch phase.

17 MR. ACOSTA: All right. Next question. Let's  
18 go, Mike.

19 QUESTIONER: Mike Schneider, Associated Press.  
20 My question is either for Dr. Griffin or Mr.  
21 Gerstenmaier.

22 I guess, the two dissenters, were they the

1 directors of Johnson and Marshall? I assume they hadn't  
2 dissented at the last Flight Readiness Review meeting. Did  
3 they explain, if that is the case? Did they explain why  
4 their decisions had changed?

5 MR. GERSTENMAIER: Let me clarify. They were  
6 "go" for the launch, but they recognized from the folks  
7 that they represent that, within the organization they  
8 represent, they had some folks, that they wanted to make  
9 sure that we knew that they wanted to change the ice/frost  
10 ramps, and that is exactly what they did at the last FRR.

11 So all they did was they took the chance to  
12 express to the board their desire to change the ice/frost  
13 ramps as soon as we could change the ice/frost ramps.

14 QUESTIONER: Did they sign off on the  
15 certification?

16 MR. GERSTENMAIER: They signed off on the  
17 certification, and they are "go." So it is almost a nuance  
18 in a way, but they wanted us to know that there are folks  
19 within the organization that wanted us to know that we  
20 needed to make sure that the ice/frost ramps got redesigned  
21 as soon as possible, and that is what they told us. So  
22 that was their opinion that they had, that they added in,

1 and so that is what we recognize.

2 We all agree with that, and as Wayne described,  
3 we have a team off looking at redesigning ice/frost ramps.

4 ADMINISTRATOR GRIFFIN: And nobody was really  
5 disagreeing.

6 MR. GERSTENMAIER: We all agree with that. I  
7 just said that for completeness because, as part of their  
8 statement, they said, "Go, but we would like to tell you,  
9 we want you to change the ice/frost ramps as soon as we  
10 can," and we are planning on doing that, not on the next  
11 tank, the next 116, but on the flight after that, we expect  
12 to.

13 QUESTIONER: Just to make sure that everyone  
14 understands, could you say this was unanimous?

15 MR. GERSTENMAIER: That we were "go,"  
16 yes. The board's position was unanimous, and we did not  
17 have to appeal above the board.

18 MR. ACOSTA: All right. Let's go over there  
19 against the wall. Mike?

20 QUESTIONER: Mike Cabbage with the Orlando  
21 Sentinel.

22 I guess, again, for Bill. If you could explain a

1 bit more about the decision of Mr. O'Connor and Mr.  
2 Scolese. It appears to me that all the factors remain  
3 pretty much the same going into this launch as far as the  
4 ice/frost ramps were concerned as they did the other one.  
5 What was it that changed their mind? What is the  
6 difference there?

7 Also, were there any notations on the COFR  
8 (Certificate of Flight Readiness) this time, similar to the  
9 ones that they wrote last time?

10 MR. GERSTENMAIER: I think you will see it on the  
11 form that Bryan wrote his statement on, an exception form  
12 which is attached to the COFR which we will provide to you,  
13 and it basically says the rationale was the same. And he  
14 understood our decision before to go fly, and he  
15 understands our decision this time, and he sees no need to  
16 go fly.

17 Brian also stated in the review, and the teams  
18 agree, that the performance on STS-121, there was nothing  
19 in the performance of the tank that cast any doubt on any  
20 of our rationale that we used before for STS-121. The  
21 performance was as expected, as Wayne described.

22 I think we need to be careful sometimes that

1 folks think it was better performance in some sense that we  
2 had less instances of foam loss, but we had two fairly  
3 large mass losses. So that averages out, and that says  
4 that is about average tank performance.

5           So I caution us all as we look at this next tank  
6 that if we lose more foam, it is not that something has  
7 changed and were dramatically worse. That is just typical  
8 tank performance. There is a lot of variation from tank to  
9 tank. Essentially, these ice/frost ramps were sprayed on  
10 maybe three, four years ago. They are still the same basic  
11 ice/frost ramp designs before. So the performance could be  
12 as we saw on STS-114, as we saw in 121. We will see what  
13 we get on this next one, but we are gaining data.

14           The other thing that I think the board recognized  
15 was we did gain some key data from STS-121. We understand  
16 the time of release of the foam. We also understand how it  
17 comes off, and that is key data, and it is starting to put  
18 together a theory on the delamination phenomena, which I  
19 think is really good. We probably need some more flights  
20 to really nail that theory down, but it is really important  
21 data.

22           The other thing we had was we had some

1 non-destructive evaluation where we did some X-ray and  
2 terahertz investigation of the ice/frost ramps where we  
3 could see some divots, some pockets of air inside the foam.

4 Those did not liberate. So we didn't see any correlation  
5 between our non-destructive evaluation and the performance  
6 we saw in the tank, and then that is curious to us.

7 So, again, this flight did exactly what it was  
8 supposed to do. It gave us some key data that is helping  
9 us to get smarter and will ultimately help us make a better  
10 redesign in the ice/frost ramp.

11 MR. ACOSTA: All right. Let's stay right there,  
12 second row. Bill.

13 QUESTIONER: Bill Harwood, CBS, with two  
14 questions.

15 One, for Mike Leinbach, can you maybe give us  
16 some sense if they do approve the bolt change-out, what is  
17 required to do it, and how much time it takes, and how that  
18 plays into your two days of contingency? And I guess the  
19 bottom line is can you make the twenty-seventh if you have  
20 to go do the work.

21 And for Wayne, we talked last week in Houston. I  
22 asked you about tanks and delivery schedules next year and

1 possible slips in that schedule, and you didn't want to  
2 tell me anything last week. Can you tell me anything this  
3 week about where that stuff stands?

4 MR. HALE: They're still working on it, Bill.  
5 That is my short answer.

6 [Laughter.]

7 MR. HALE: I haven't really had a formal review  
8 with the tank people since we talked -- we said a week ago?  
9 It must have been a week ago. And we do know that we have  
10 got a number of facility modifications that we want to make  
11 to the factory at Michoud that will help improve tank  
12 production.

13 One of the big problems is that big old factory  
14 down there is not air-conditioned, and we put restrictions  
15 on when we can spray foam in terms of temperature and  
16 humidity. If we can go into the areas where they do these  
17 critical foam sprays and provide air-conditioning,  
18 environmental control, we can actually allow ourselves to  
19 spray more of the time than we can now.

20 Right now in New Orleans, as you might imagine,  
21 it is difficult to find the right times when the humidity  
22 and temperature don't exceed some of our limits. So we are

1 making some investments down there and improving that  
2 facility, some additional fixtures and so on and so forth,  
3 but a really large part of the review is going in to look  
4 at all of the steps that we did coming out of the Columbia  
5 accident and say, "Okay. We really pushed the pendulum all  
6 the way to the end. We really are making sure it is  
7 absolutely done right in every area of the tank. Are there  
8 some areas on the tank, say, on the side, away from the  
9 orbiter, where maybe we don't have to go through all of  
10 these steps?" And if the foam comes off over there, it is  
11 not transported toward the orbiter, and that would allow us  
12 not to take some of these time-consuming super cautious  
13 steps that we do with foam, and those sorts of questions  
14 are under review. The tank folks are going to report back  
15 to me probably in about three weeks on their progress.

16 Right now we are challenged on Tank 4, well,  
17 spring tank of next year. We have had quite a few  
18 discussions about the tank for the flight that is currently  
19 scheduled in February. That will be the tank with the first  
20 ice/frost ramp modifications, we believe. So that one  
21 pretty much looks like it is coming in when we need it, but  
22 it is the tanks after that, that we are going to have to

1 make some improvements in the production rate to not have a  
2 problem. So that is still very much in play.

3 That was not the short answer. That was the long  
4 answer.

5 Okay. Now your part?

6 MR. ACOSTA: Well, now he can't say you didn't  
7 give him an answer.

8 MR. HALE: Right.

9 MR. GERSTENMAIER: That's right.

10 MR. ACOSTA: Go ahead, Bill.

11 MR. LEINBACH: To the bolt access and change-out  
12 question, Bill, we are going to be studying access over the  
13 next couple of days and, parallel with the engineering  
14 team, continuing to refine our analysis, and we are going  
15 to do that because of the pad flow for the next two days.

16 We still have to finish our hypergolic loading  
17 tonight. We will get into that around midnight tonight for  
18 the FRCS oxidizer side. After that is done, we will get  
19 into our ordinance operation Friday morning. So the pad  
20 will be consumed with those two activities until Friday  
21 afternoon. So Friday afternoon is the soonest we can get  
22 in there, open the payload bay doors, and actually start

1 putting in access if the decision is to go after these  
2 bolts. So, again, that allows us to refine our access  
3 study.

4           We have done some CAD modeling of access, and  
5 that is really good, but until you get the technicians out  
6 there and you build the scaffolding and the PIC boards and  
7 get a technician up there right next to the KU-band antenna  
8 to look at the nuances of this ship versus the CAD drawing,  
9 obviously, we won't know fully what is required until we  
10 get in there. Again, that picks up Friday afternoon.  
11 Probably by early Saturday morning, midday Saturday, we  
12 would be able to tell Wayne if we think we can execute this  
13 plan if the bolt change-out does become required.

14           The program has told us very clearly that if we  
15 get into a situation at the launch pad, that the  
16 technicians are uncomfortable proceeding on, i.e., we are  
17 about to do more collateral damage than is worth the bolt  
18 change-out in the vertical, then we are to stand down, and  
19 that is exactly what we will do.

20           So we typically go into this with a dedicated  
21 team. We have already identified the techs to do this job.  
22 They were the ones that went over and looked at bolts and

1 changed the bolts out on 103 and 105. So they have already  
2 performed that task. So we have the best folks possible  
3 doing the job, and the plan right now looks doable. We  
4 would open the doors Friday afternoon and start erecting  
5 the scaffolding.

6           The way we do that is there is a platform inside  
7 the payload change-out room. It is called the Clean Access  
8 Platform, and it essentially rides up and down the payload  
9 ground handling mechanism to gain access to all areas of  
10 the payload bay. For cleaning purposes, it is a Clean  
11 Access Platform. It is a relatively thin platform, but it  
12 can extend out quite a ways, all the way to the keel area  
13 of the payload bay itself.

14           So we would use that platform, insert that  
15 platform between the top of the payload and the hatch  
16 itself, the airlock hatch itself, and then build the  
17 scaffolding up off of that to get to the KU band in the  
18 upper right-hand corner of the payload bay.

19           So it all looks good on paper in the CAD  
20 modeling, and once we get into the job, if we get scared by  
21 something and we shouldn't proceed on, we are going to  
22 stand down and recommend that we don't do that change on

1 the vertical. So that will be sometime Saturday, Sunday.

2 That would use up Sunday as one day of  
3 contingency. So that would use up that day, and then we  
4 are carrying one more day mid next week, prior to launch  
5 countdown, for any other things that may come up.

6 So it is not a long job. It is probably two days  
7 total to do this, and out of those two days, probably 44  
8 hours of the 48 is the access installation and removal.  
9 The bolt change-out itself is probably going to be very  
10 straightforward, assuming we don't get into any "gotchas"  
11 when we get out there.

12 MR. ACOSTA: All right. Let's stay in that row  
13 with Irene.

14 QUESTIONER: Irene Klotz with Reuters for Wayne.

15 A couple of bolt questions. Given the processing  
16 schedule, are you expecting a decision about whether to  
17 proceed with this will be made tomorrow? And if so, would  
18 the strategy include the options of what you would do if  
19 technically it becomes difficult? At that point, would you  
20 be able to say, well, we are okay to fly as is if we can't  
21 do the bolt change-out, but we would rather try and do it,  
22 or if you make a decision that you want to change out the

1 bolts, are we talking scrub and return to the OPF (Orbiter  
2 Processing Facility) if they can't be changed out?

3           And then if you could just describe a little bit  
4 about -- I think you said there was one or two threads  
5 left. How many should it be? I guess maybe in terms of  
6 the length or diameter or some way to couch the size of the  
7 bolt.

8           Thanks.

9           MR. HALE: Okay. Well, let me start with the  
10 easy one. I think in this particular application, it is  
11 like a minimum of six and preferably eight plus through  
12 threads engaged, and we pulled one of the bolts off, and it  
13 had two-thirds of a screw thread engaged. Some of the  
14 other orbiter bolts had one and a half screw threads  
15 engaged. So what we have got here is we don't have as many  
16 screw threads engaged as you would like to have.

17           There are four bolts, and we are talking about --  
18 the aft two, the forward two are in good shape. So part of  
19 the analysis that the engineers are going to run, will the  
20 antenna stay safely on if we have nothing contributing from  
21 the two screws that don't have enough threads engaged and  
22 it's all carried by the two that are properly bolted in.

1           So we have all that engineering analysis ahead of  
2 us, and rather than speculate on all of the possible  
3 permutations and combinations of what might happen, we want  
4 to let the engineers go off and do their work, come back  
5 with their analysis. We want to let the Cape folks here go  
6 off and look at the access, and then we can make an  
7 informed decision. We will make what I trust will be a  
8 well-discussed and widely talked about decision, and I  
9 expect that it will probably be more like Saturday than  
10 tomorrow because, frankly, we need to give the engineers a  
11 couple of days to do their work, and we don't get access in  
12 the area until late Friday or early Saturday.

13           So tomorrow is not decision day.

14           QUESTIONER: If you were able to change out  
15 Discovery and Endeavour's, how did Atlantis' get skipped?

16           MR. HALE: Well, this was just found.

17           I mean, the joke that I had -- and it is not  
18 really very funny -- is I wish we found this three weeks  
19 earlier when Atlantis was still in the orbiter processing  
20 facility when you have good access.

21           The reason that Discovery and Endeavor's were  
22 changed is they were in the orbiter processing facility,

1 and they have excellent access, and that is where they  
2 normally do this kind of work.

3           The problem that we have now is Atlantis -- and  
4 we just found this problem -- Atlantis is in the vertical  
5 on a launch pad, and we just don't have very good access,  
6 and if we had found it three weeks later, of course, we  
7 would have flown and probably everything would have been  
8 okay. I mean, we have flown 26 times, and everything has  
9 been okay. So there is a school of thought that says it is  
10 probably okay to fly one more time, but I would rather have  
11 good engineering rationale demonstrating that it is  
12 acceptable. So that is what the folks are off generating.

13           If they do find out we can really live almost  
14 literally without these two bolts engaged, then we won't go  
15 to the bother of changing them out.

16           Mike, I am not sure I did it great justice. You  
17 understand the payload change-out room is six-stories high.

18           The guys are operating up at the top of this. So imagine  
19 operating on a surfboard that is tied down at one end,  
20 sticking out over a six-story balcony. I mean, you know,  
21 this has got all kinds of implications that you just really  
22 would rather not do because of the location and access.

1           And if we have to do it, it will be done safely,  
2 and it will be done properly, but if you don't have to do  
3 it, that would just be great too.

4           So we are going to see how the analysis comes out  
5 over the next couple of days and then make a decision when  
6 we have all the information in front of us.

7           MR. ACOSTA: All right. A good description  
8 there.

9           We are going to go to Todd, and then we have a  
10 couple of journalists standing by in Washington, D.C., and  
11 in Houston. We will go to them next, but we will start off  
12 with Todd.

13           QUESTIONER: Todd Halvorson of Florida Today with  
14 one for Wayne and one for -- I guess two for Wayne.

15           You have described the amount of foam loss on the  
16 121 mission as average, and I think some people might  
17 interpret that as no improvement since the Columbia  
18 accident, and I don't think you think that is the case.  
19 Could you characterize what improvement you think you guys  
20 have gained?

21           Also, I am wondering what you have determined  
22 since 121 on the APU signature or failure that you saw,

1 whether you have been able to nail down what actually  
2 happened, and if not, how do you exonerate that APU issue  
3 before L-Minus-2?

4 MR. HALE: There were two APU issues. There was  
5 the heater thermostat issue that I was talking about  
6 earlier, which is still in troubleshooting, although every  
7 indication is that Atlantis is okay, and there may have  
8 been some electrical fault due to workmanship or aging  
9 parts of something on Discovery. That is what is still in  
10 work.

11 The other APU problem that we probably talked  
12 about a lot more, both in the MMT and at the press  
13 conferences, was the potential of a leak from APU No. 1.  
14 We have run that to ground. We now believe that there was  
15 what they call a quick disconnect cover on the gaseous  
16 nitrogen side that had a very small Teflon seal that was  
17 deformed, and that probably was the source of that very,  
18 very slow leak, although folks are off doing the final  
19 tests to wrap that up. So we had a couple of issues.

20 Let's go back and talk about the tank for a  
21 minute. When we historically look at all the photography  
22 that has been taken after external tank separation, we only

1 have about half of the tanks that we can look at. The  
2 other half, either the cameras didn't work or we were in  
3 darkness or other things prevented us from getting good  
4 imagery, but of the tanks that we saw, about half that we  
5 have good imagery of, we have now meticulously gone back  
6 and looked at those photographs and done a count of all the  
7 areas of foam loss. And you can see they show up quite  
8 well because foam loss looks white against the orange kind  
9 of basic of the tank.

10           The folks in the three imagery labs that we have  
11 around the country have really done a huge amount of work  
12 to plot up statistics -- my goodness, we have statistics on  
13 foam loss -- statistics on how big, where they were, how  
14 many on every flight, were they associated with the  
15 ice/frost ramps, were they associated with other things,  
16 and so we have a huge number of statistics.

17           When I talk about an average foam loss, I mean  
18 number of areas that we see that foam came off the tank.  
19 They have an average number. What we have avoided was the  
20 large mass releases, and so the improvements that we made  
21 is okay. We eliminated the bipod ramp, which was the cause  
22 of the 107 accident. It is a piece of foam that is no

1 longer in the vehicle. So you cannot lose that in flight  
2 because it is not on the vehicle.

3 The PAL (Protuberance Air Load) ramp, we lost  
4 another large piece, as you will recall on STS-114, Eileen  
5 Collins' flight, and we have eliminated that PAL ramp off  
6 all future tanks. So, again, foam that is not on the tank  
7 can't fall off on flight.

8 We have improved our processes in an area where  
9 the external tank is really two tanks on top of each other,  
10 the hydrogen tank on the bottom, the oxygen tank on the  
11 top, and an inner-tank region, a structural region. Where  
12 that hydrogen tank meets the inner tank, there is a natural  
13 area where we have lost a number of pieces of foam off of  
14 what we called a hydrogen inner-tank flange, where it meets  
15 up. We have done a number of changes to the way the foam  
16 is applied in that area, and we are not seeing any  
17 significant foam losses off that area.

18 So, yes, we have improved the situation. We have  
19 also made a number of improvements on areas where we have  
20 put manual -- what we call "manual sprays" on the vehicle.

21 Now, the area that we know that is next on our  
22 list that we are working very hard to fix is the ice/frost

1 ramp which poses the next level of hazard to us, and the  
2 biggest piece of foam historically that we have seen come  
3 off an ice/frost ramp is about .085 pounds, less than .09  
4 pounds. Statistically, we know we haven't seen what could  
5 happen. So we give ourselves what they call a three sigma  
6 analysis that says we could lose up to a quarter pound,  
7 .25, piece of foam, and we did a risk analysis on that.  
8 All the discussion you hear about is it an acceptable risk  
9 or not an acceptable risk seems to center on that  
10 quarter-pound piece of foam which hypothetically could come  
11 off, which is three times larger than we have ever seen  
12 come off of the ice/frost ramps, which, by the way, is  
13 one-fourth or one-eighth the size of the large pieces of  
14 foam that really caused us concern before.

15           So we have made improvements to the tank. We are  
16 releasing fewer numbers in a strict sense, but more  
17 importantly, the pieces that we are releasing are smaller.

18       We have an average number of losses on 121 tank, and our  
19 goal is to avoid the big pieces, quite frankly, and we did  
20 on the last flight. That is an improvement that we  
21 continue to carry on with in the future.

22           MR. ACOSTA: Did that answer all the questions,

1 Todd?

2 QUESTIONER: Yes.

3 MR. ACOSTA: All right. Let's go to Washington,  
4 D.C. I think we have a couple of reporters that are  
5 standing by. Please identify yourself and the organization  
6 and the question, who you are posing your question to,  
7 please.

8 QUESTIONER: Traci Watson, USA Today, for Wayne  
9 Hale.

10 First, a clarification. When you talked about  
11 the bolts that had only two-thirds of the thread or  
12 one-and-a-half threads engaged, was that on the KU antenna,  
13 or was that somewhere else? I missed that.

14 MR. HALE: Tracy, I could just barely hear your  
15 question.

16 The discussion of the bolt thread engagement --  
17 and I think that is the gist of your question -- there are  
18 four bolts that hold this antenna onto the vehicle. Two of  
19 them are very well engaged, and two of them are not, and  
20 the two that aren't, when we took those bolts off the other  
21 two orbiters, we saw as little as, say, two-thirds of a  
22 thread engaged and as much as one-and-a-half threads

1 engaged. Neither one of those are good numbers. So we  
2 would really like to have more engagement of a screw-thread  
3 fastener.

4 We will get through Machine Design 101 before we  
5 are done with this press conference.

6 But the engineers, as I said, are off doing the  
7 analysis to say, okay, if those two bolts that have the  
8 small number of threads engaged were to provide no real  
9 attach function for us at all, say they were removed, would  
10 the remaining two bolts hold us adequately.

11 In a lot of areas, we over-designed the structure  
12 of the vehicle because we designed really before we knew  
13 where it was going to fly in terms of structural vibrations  
14 and so forth. Now that we know more and we apply what we  
15 know, is it possible that we really don't need those extra  
16 two bolts? And that is part of the analysis that they are  
17 off working on.

18 I hope that answered your question because it was  
19 really pretty hard to hear.

20 MR. ACOSTA: Yes. You are better than me, Wayne.

21 I thought it was Charlie Brown's teacher asking a question  
22 there.

1 All right. Traci, hopefully, that covered it.  
2 Is there somebody else at Headquarters?

3 QUESTIONER: I am going to try again, although  
4 Wayne did answer my question. This is Tracy Watson again.

5 If that antenna fell off, can you give me a sense  
6 of where it would go and how much damage it would do?

7 MR. HALE: It would go down, and the damage would  
8 not be good. That is about all I want to say about that.

9 We don't want it to come off. That is not a good  
10 thing.

11 ADMINISTRATOR GRIFFIN: We are not going to fly  
12 if we think there is a possibility that the antenna could  
13 come off.

14 MR. HALE: Right.

15 MR. ACOSTA: All right. Next question from  
16 Headquarters.

17 PARTICIPANT: There are no more questions from  
18 Headquarters.

19 MR. ACOSTA: All right. Let's go to Johnson  
20 Space Center.

21 QUESTIONER: Gina Sunseri, ABC News, for Wayne.

22 I am a little baffled at how to characterize this

1 "no-go vote" that wasn't really a "no-go" vote. Was it  
2 just more of a philosophical statement? What exactly what  
3 the intent on that on the ice/frost ramps from JSC (Johnson  
4 Space Center) and Marshall?

5 MR. GERSTENMAIER: There was no "no-go" votes.  
6 The board's position was we are "go" for STS-115, and then  
7 we now give them the luxury of adding any other words that  
8 they want beyond "go," which we did last time, and they  
9 both, Marshall and JSC, emphasized to us that they would  
10 like to have the ice/frost ramps redesigned, and that is  
11 all they said.

12 So, essentially, it was a unanimous decision by  
13 the board that we were "Go," and that is where we stand.

14 Then Bryan referenced back to the previous Flight  
15 Readiness Review in his discussion he had there, but,  
16 again, ultimately he was "go" for flight.

17 MR. ACOSTA: All right. So, to be clear,  
18 unanimous vote to "go." There were no "no-go" votes, so in  
19 case -- hopefully that didn't confuse anybody.

20 All right. I think we have one more question  
21 from Johnson.

22 QUESTIONER: Mark Carreau from the Houston

1 Chronicle. Thanks for that clarification.

2 I have sort of an esoteric question for Wayne  
3 Hale on the antenna, and that is if you have flown all  
4 these times on all the orbiters and the antenna never came  
5 off or you didn't see any indication of less than a secure  
6 antenna, why is it now that you need to nail this down and  
7 not fly further with that condition?

8 MR. HALE: Mark, you are a great candidate for  
9 program management, and I would tell you that that is  
10 exactly the question I have been asking.

11 The real answer -- and I will be serious about it  
12 -- is that when an engineer does a design that involves  
13 threaded fasteners, having that small number of threads  
14 engaged in the nut or bolt on the back side is just not  
15 good practice, and there are circumstances in which those  
16 thread fasteners can come out. So that is a poor design or  
17 a poor application, and we need to rectify it. It is  
18 something that you really don't want to have. Just good  
19 engineering practice.

20 I don't know. Mike, this is probably an opening  
21 for you. Do you want to help here with the engineering?

22 ADMINISTRATOR GRIFFIN: Sure.

1           To pick up on what Wayne said, engineering is in  
2 part about process and in part about outcome. We embrace  
3 good process with the hope that that yields good outcome.

4           This is a case where the process failed. It  
5 failed 25 years ago. So the question before us now is can  
6 we fly anyway, will there be a good outcome with the bolts  
7 we have in place.

8           Obviously, Mark, your question is exactly on  
9 point. If the design is all that weak, how could you fly  
10 60, 70 times on these three orbiters alone and not have  
11 something break? And, of course, the analysts are now off  
12 busily assessing the answers to exactly that question.

13           The follow-up question is how strong is the  
14 attachment with the two bolts that are known to be good and  
15 then whatever help you might have from the other bolts, and  
16 they are off assessing that.

17           When the original design was done, very  
18 conservative assumptions were made about the vibration  
19 loading that would be imparted to the high-gain antenna  
20 from the acoustics generated by the shuttle main engines.  
21 The assumptions on the loading were very conservative, and  
22 now the guys have got to sharpen their pencils and go back

1 and say, "Okay. What are the real loads?" and we suspect  
2 that the real loads are somewhat less than the conservative  
3 design assumptions.

4 So, as Wayne, I think, or Bill Gerstenmaier  
5 characterized it earlier, the engineers have been given  
6 some homework assignments, and we will wait with bated  
7 breath to see how that turns out.

8 In the meantime, the ground ops folks that Mike  
9 Leinbach heads up here will be worrying the issues of how  
10 you get access to the particular fasteners the most easily  
11 and with the least possibility of any collateral damage in  
12 case we need to do that.

13 And I think if we say any more about that, we are  
14 going to be repeating ourselves.

15 [Laughter.]

16 MR. ACOSTA: Irene had her hand up first. So  
17 let's start there.

18 QUESTIONER: Maybe, Mike Griffin, if you could  
19 take this. I think we all understand that there were no  
20 "no-go" votes, but you kind of characterized the last FRR  
21 with the two people who said that they had some objections  
22 to launches, were all "go" for launch, but these people had

1 a couple of issues with the ice/frost ramps.

2           So this is going to sound a little weird, but is  
3 this launch decision less contested -- and I know you don't  
4 like that word -- than the 121 launch decision? Are people  
5 now just enjoying writing in the margins and stuff? It is  
6 a little confusing when you are explaining that people are  
7 expressing issues and opinions in these official documents  
8 and then saying, "Well, everybody is go for launch."

9           ADMINISTRATOR GRIFFIN: I get the question, and  
10 we ourselves actually have asked ourselves the question of  
11 whether our polling and our documentation process is as  
12 crisp as we would like it to be, and in fact, we are  
13 working on it because although in the end, a decision must  
14 be made by NASA management to launch or not launch -- and  
15 that obviously is a binary decision -- I personally have  
16 never been involved in any spacecraft project where one  
17 didn't have concerns or reservations about something.

18           I mean, you decide to go, but by no means, do we  
19 think it's a slam-dunk, and I have made that quite clear on  
20 many occasions.

21           So we are looking at what we call our COFR, our  
22 Certification of Flight Readiness, and the whole process

1 that leads to that to provide essentially the opportunity  
2 for people to note their concerns or reservations even  
3 while they say, "Yeah, I am go for launch."

4 I don't mind using the word "contested." I  
5 didn't mind it that the STS-121 review was a contentious  
6 review. I think that is how we get truth out on the table.

7 I would say that this review was less  
8 contentious, maybe not a lot less. I don't want them to  
9 be, but with regard to the ice/frost ramp foam, it is only  
10 fair to note that the analysts have now had two more months  
11 to work those issues, and they had produced a more refined  
12 set of numbers which were, in fact, better.

13 So the numbers were both more refined. They are  
14 still quite conservative, but they were more refined, and  
15 they are better, which gave everyone a good feeling.

16 Also, we flew, and flew quite well, last time.  
17 One flight is one flight, but it certainly goes in the  
18 right direction.

19 The station (International Space Station) is in  
20 excellent position for the CSCS, the Crew Survival on Orbit  
21 Option, while we wait for the shuttle to launch on need, if  
22 we need it, and so, again, I would remind you that what is

1 at issue here is the programmatic risk of how we go about  
2 completing the station and which is the greater risk for  
3 the program, a lengthy delay or a concern about possibly a  
4 foam strike on the orbiter, and that is a decision that we  
5 have answered in the way that we have answered it, but the  
6 point is we don't feel we are risking crew, and no one in  
7 the room felt that we were risking crew.

8 Our decisions might be different if we thought we  
9 were risking crew, but we are not, and so the review was  
10 active. It was participatory. I was really, really,  
11 really proud of the team and proud to be working with these  
12 people, and in the end, everybody said, "Let's go."

13 People, as Gerst said earlier, want to get on  
14 record that although the answer is "go," we really need to  
15 redesign these ice/frost ramps, and as I said earlier,  
16 nobody disagrees. This is not an argument we are having.

17 So have I answered that as fully and thoroughly  
18 as can be done?

19 MR. ACOSTA: A good explanation.

20 Okay. A couple more before we wrap up. Let's go  
21 with Bill Harwood, right there.

22 QUESTIONER: You had until the very last thing,

1 which prompted this question. Is it still technically red?  
2 Is it still in the probable category?

3           And for Mike, a sharp-eyed reader, I call this an  
4 unprecedented repair if you did it, and the reader sent me  
5 a note saying that he worked on the orbiter back in the  
6 '80s and the '90s, and that he recalled changing out an  
7 entire KU at the pad versus a roll-back in the past, and I  
8 don't remember that, but is that true?

9           ADMINISTRATOR GRIFFIN: I can't remember that  
10 myself.

11           MR. LEINBACH: I don't remember that one, no.

12           We have done some other unusual jobs at the  
13 launch pad, but I don't recall doing that particular job  
14 before.

15           MR. ACOSTA: All right. Stay along the wall.  
16 Mike Cabbage.

17           QUESTIONER: Mike Cabbage. Again for Wayne.

18           Could you talk a bit about what some of your  
19 candidates are with the APU issue? Is that considered an  
20 unexplained anomaly right now, and if so, would you guys go  
21 ahead and fly with it like that?

22           MR. HALE: Yes. It is considered an unexplained

1 anomaly, "UA" as it gets in NASA parlance, and that is one  
2 of the things that we really like to avoid if at all  
3 possible.

4           What we are doing, the first anomaly that we  
5 really tried to resolve with the APU was this potential of  
6 a leak on APU-1 because that has somewhat more serious  
7 consequences. So we spent quite a bit of time  
8 troubleshooting this leak on APU-1, and because that  
9 involves hazardous or toxic chemicals, hydrazine, and there  
10 it gets right next to the other APU, that means it is a  
11 serious operation to the troubleshooting. So we actually  
12 came to troubleshoot the thermostat problem later in this  
13 sequential nature of that troubleshooting. That has put us  
14 a little bit further behind.

15           We have an indication that perhaps one of the  
16 wires has been damaged potentially due to some work that  
17 was done in the turnaround flow between flights. So we  
18 would like to get in there and understand that a little bit  
19 better.

20           There are a number of potential causes we would  
21 like to rule out, things like are thermostats just getting  
22 old and failing. That would not be a good thing. We would

1 also like to make sure that if it was a collateral damage  
2 or workmanship issue on Discovery, that we don't have that  
3 same kind of problem on Atlantis. So those are the kinds  
4 of areas where we are continuing to do work.

5           It is not unprecedented and, as a matter of fact,  
6 it is quite usual for us to launch with some unexplained  
7 anomalies.

8           The consequences of this unexplained anomaly, if  
9 you had this same thing happen on the next flight -- by the  
10 way, we were able to muddle through that situation on the  
11 last flight. Given exactly the same circumstances, we  
12 would be perfectly fine through the next flight. It would  
13 take something worse to get us into trouble, and at that  
14 point, the worse thing that could happen to you is you  
15 would have one hydraulic system not available for entry,  
16 which is certainly undesirable, but we have redundancy in  
17 the system, and that provides us fully certified entry  
18 capability.

19           So, while I would like to see this driven as far  
20 as we can before launch, it is possible that we could  
21 launch with an unexplained anomaly and wrap up after  
22 Atlantis is off the pad.

1           MR. ACOSTA: All right. We have time for one  
2 more question, and we will wrap up the press conference.  
3 Let's go with Mike.

4           QUESTIONER: Mike Schneider, Associated Press.  
5 Question for Wayne.

6           You said you are still doing a review of the bolt  
7 issue, and I was wondering if you expected that it could  
8 show up on any other hardware on Atlantis.

9           MR. HALE: A really good question, Mike. You  
10 know, we are still going through all the threaded fasteners  
11 on board the orbiter. We have a number. As you know,  
12 there are a lot. So there could be another one found, and  
13 we have given quite a bit of thought to should we continue  
14 to do this. Well, yes, we should continue to do this  
15 because if there are deficiencies, we would rather find  
16 them and deal with them than be ignorant and have an  
17 accident caused out of ignorance. So we want to keep on  
18 improving our safety record.

19           I guess the real story I would tell you about,  
20 the bolts is -- I was reminded today that the aerodynamists  
21 have conclusively proven that bumblebees can't fly. Now,  
22 we all know that they can. So what does that mean? It

