PAO Good morning, again. We'll proceed with the rest of this morning's briefings with Karen Ehlers, who's a PDRS, that's Payload Deploy and Retrieve System, specialist, planning specialist. And she'll also discuss the big dumb chunk called the payload flight test article, which will be flown on this flight. After her presentation, please wait for the mike and we'll go to questions here and at the other centers. Karen, you want to proceed?

EHLERS Good morning. This morning I would like to give you a brief overview of the PDRS operations on flight 8. As we were saying, our main objective on this flight is to be maneuvering the PFTA, that is the Payload Flight Test Article. Could I have the viewgraph, please. Thank you. This is a viewgraph of the Payload Flight Test Article. It's dimensions are approximately 15 feet long. The diameter of the screens, this is the aft screen, this is the forward screen, is approximately 12.5 feet. The purpose of these screens are to simulate what we consider close to a full-volume payload. a full-volume cylindrical payload that can fit to the payload bay. The payload bay has an approximate diameter of 15 feet. The weight of this payload is 7,460 pounds, which is considerably heavier than any payload we have maneuvered with the RMS so far. The payload attachment system for this payload is also a first for this flight. It is a 5 point system, there are four longeron trunnions, and one keel trunnion. You will also see that there are four grapple fixtures installed on this payload. On this flight, however, we will only be using grapple fixutre 2 and grapple fixture 5. The reason why we constructed this payload in this manner is to demonstrate the ability to deploy and berth a near-full-volume payload without direct view of the payload attachment trunnions, the trunnions that I just mentioned. Also grapple fixtures, the difference between using grapple fixtures 2 and 5 are that they will give us completely different arm geometries when we do the deploy and berthings of the payload. And also they provide different mass properties when the RMS is operating the payload. In other words, the majority of the weight of this payload is in the back, is the ballast. So, if you grapple the payload here, in one case, the arm is closer to the CG of the payload. When it's grappled up here, you're farther away from the CG and so, thus you have a different moment of inertia. So this will provide us with considerably different, 2 different data points. Okay, it's a couple of viewgraphs down, it's called detailed test objective overview. One of the DTOs, as you'll hear them referred to, will involve a nominal unberth and berth of the payload, using both of the grapple fixtures. The nominal unberth means that we maneuver the RMS in a 6 degree of freedom mode. Also, in this nominal operation, the crew will have full access to all of their visual cues, and all of their RMS data. The direct unberth and berth is a degraded mode of operation. We would like to practice this on orbit. In this mode, the RMS can only move in one joint at a

time. Also we will ask the crew not to look at the RMS, position and attitude data to simulate the case, in case that they would lose this data and that they would have to do it by visual means only. There are several series tests involving the RMS and the orbiter flight control system. As Harold Draughon was saying, we would like to get ready for future flights that involve payload deployments. We would like to analyze how well the orbiter's attitude control system and the RMS position control system behave with each other. So the next test called the RMS/FCS test, FCS standing for the orbiter Flight Control System, will involve monitoring the orbiter's performance under the vernier attitude control system. This one specifically, we intend to get data on, that will help us plan the LDEF deploy mission. The next one it involves is called the control system evaluation, which is the confirmation of RMS performance envelopes. As I said, this is the heaviest payload that we've maneuvered so far, and we would like to confirm that the arm performs per the design. Also, we will receive a lot of data that will help us validate simulation math models. The RMS/PRCS interaction involves putting the arm in certain predefined configurations and firing the primary jets. We don't intend to nominally operate the RMS with the larger jets, the primary jets, but we would like to obtain data for our use that we can perhaps be allowed to use the arm with the large jets in case that were necessary. The LSS vibration damping test is a similar test. It will help us gather data on how the arm damps and any payload damping characteristics, imparted back into the arm. The auto sequence is again a test on the ability of the arm to follow a preprogrammed auto sequence, and to terminate that sequence at the desired position and attitude. The orbiter RMS dynamic interaction test is a test to gather data on loaded arm operations while the orbiter is in free drift. In other words, we maneuver the arm and see how much the orbiter responds to that. The outline of these activities on the crew's timeline, which is the crew activity plan, the CAP, we will have two different days of activities, one on flight day 3, and one on flight day 4. Flight day 3, we will do all of the operations with grapple fixture 2. In other words, we will go through this entire sequence of tests using grapple fixture 2. The following day, flight day 4, we will do similar operations, all of the DTOs again, with grapple fixture 5. Included in the handouts that we're going to try to get to everybody, is an entire series of pictures, graphs of the arm configurations during all of these tests. I don't think we need to go over them here unless you have any special questions, unless you'd like to see them. I guess that's all for the briefing.

AL SEHLSTEDT (BALTIMORE SUN) Why won't you release it and try to retrieve it, merely because it is so massive?

EHLERS No, this test article was never designed to be released. This test article does not have an attitude control system. It was never designed to be released.

MIKE MEECHAM (GANETTE NEWS SERVICE) Can you characterize which of the tests you think may be more difficult as far as the heavy end versus the light end? Are there some differences?

EHLERS As far as the crew's ability to perform the test, they will perceive no difference. There's no feedback system. The crew cannot feel that they're picking up a heavier payload. Both tests are equally important to gather data, to validate our math models.

MEECHAM What about in respect to the arm itself, as to whether its grappling the heavy end or the light end, and the movement of the ship underneath it?

EHLERS Okay, well, of course, I would expect to see larger excursions by maneuvering from the end where you have a larger moment of inertia. That will be grapple fixture 5. That actually provides you with a larger moment of inertia. So there should be more orbiter response to grappling grapple fixture 5.

CARLOS BYARS (HOUSTON CHRONICLE) Your auto sequencing, do you expect to see some difference in the performance of the auto sequencing with this heavy load than you have seen on the multitude of other auto sequencing tests?

EHLERS That's a good question. No, we don't expect to see any difference. However, you will notice that this is the same exact auto sequence that was run on flight 7 and perhaps flight 4. The reason for that is, we would like to execute the same exact sequence and have the only variable being payload weight so that we can compare the exact response, running the same exact trajectory.

LASZLO DOSA (EOA) Since you are operating in zero-g, what difference does it make that one end is heavier than the other?

EHLERS The moment of inertia is the moments, the mass, is what is important in a zero-g environment. Correct, you're not concerned with the weight, but the fact that you are, you do have different mass properties. And so there may be a difference in arm response and . . .

DOSA ...can you compare this to a barbell when the arm is flexing its muscles, testing its strength, lifting to capacity?

EHLERS No, we're not testing the strength of the arm, we're testing its performance, its control system.

MARK KRAMER (CBS) You have the color camera on the elbow joint this time?

EHLERS I believe the elbow, not certain, you'd have to check with the people who set up the flight manifest office. But I believe the elbow is a narrow angle black and white. The

reason for that is is that the elbow camera is very important to the deploy and berthing test. For example, if you look at this configuration that's up on the board, and you know where the elbow camera is, you will be looking down into the payload bay. And the crew will be able to see the trunnions entering the guides. And the narrow angle black and white camera gives them much finer resolution on orbit.

KRAMER What have you seen in earlier missions regarding interaction between the mass on the end of the arm and the spacecraft control system? Is there some kind of oscillation? Does the vernier system fire when that thing moves to keep the spacecraft stable?

EHLERS Both control systems, both the RMS control system and the orbiter's control system have been quite stable, have been able to handle the situation. However, there were cases where there were more vernier firings than when you're using a lighter payload.

DOUG ROSS (KPRC) Maybe I was reading something into your tone, but I was under the impression that eventually the RMS is supposed to grapple unstabilized payloads eventually. And you indicated that you wouldn't be releasing thing because it was not stabilized. Could you sort of clarify that?

EHLERS I don't know of any payload that we will be grappling that does not have an attitude control system of its own.

ROSS A functioning one, like say in a malfunctioning satellite, or a satellite out of fuel that would essentially be considered unstabilized.

EHLERS There are limits to which the arm can grapple a payload that is degraded, that is in a degraded mode of operation.

ROSS Another point. Did you say that the astronauts will be doing some grapples strictly by visual reference, not looking at any of their meters or anything else?

EHLERS That's correct.

ROSS Will they just be looking out the window or looking through cameras, which one?

EHLERS Looking through cameras.

JULES BERGMAN (ABC) Karen, I want to make sure I understand you correctly. Obviously the weight is no consideration in 0-g, but the mass and moment are, and the PFTA is the heaviest thing ever to be released from the orbiter. But the orbiter is meant to carry 65,000 pound payloads. What you're trying to say is,

the 65,000 payload be it a mini-space station, or what have you, yet to be defined by NASA and the Air Force, will be stabilized. Is that correct?

EHLERS I think you're actually getting at two different questions. We are looking at the arm performance characteristics. In other words, how well it can position a payload within a certain accuracy, two inches and 1 degree accuracy with reference to the orbiter's axis. And those arm characteristics we would like to verify by using this weight, this massive payload, 7,400 pounds. Again, we can only interpolate through our math models and prove that the arm can perform within its design specs while deploying a 65,000 pound payload. What the responsibility of the RMS is that most payloads want to be put in a specific attitude, inertial attitude or some other attitude relative to the Earth or relative to the Sun or the stars. So we want to see that our, the RMS control system, can handle that with different masses on the end. The other question about the payload's attitude control system, yes, I expect that all paylaods will have an attitude control system, because once we let them go in space, if they did not have an attitude control system of their own, gravity gradient, vex and torques will take over and natural forces of the environment will put the payload where it wants the payload to be, not necessarily where the payload sponsor wants it to be.

BERGMAN Something you said, also, led me to believe that without a stabilized payload, if you will, that the vernier rockets on board the shuttle itself, would be firing constantly during the lifting out of the payload bay and the hoisting in the position up to release, is that true? And during retrieval, let's say you put out there and have to come back 6 months later for servicing, and it requires taking it back to Earth, and lets say it's on the order of 55 to 60,000 pounds, which I understand is the present contemplated weight. What you're doing is a mini-extrapolation here, correct?

EHLERS Yes.

BERGMAN Okay. maybe I've answered my own question.

PAO That sometimes happens.

SUSAN STARNES (CHANNEL 2) The PFTA, how much time spent in this testing is the crew going to be required to look through the cameras alone?

EHLERS Look through the cameras alone.

STARNES You mentioned.

EHLERS That is done mostly in what's considered the direct drive unberth and berth. So in the handout, I have the exact times that it will take to do that and when those operations will

be performed.

STARNES Can you give me an idea on percentage or times.

EHLERS Well, I believe the unberth is scheduled for 20 minutes and the berth is scheduled to take 30 minutes.

STARNES Thank you.

CARLOS BYARS (HOUSTON CHRONICLE) A couple of questions. One, the ballast that you have on there, could you tell us what that is?

EHLERS I really don't know.

PAO Lead.

EHLERS It's a metal.

BYARS You say it is lead, Terry.

PAO Yes, that's what Clay McCulloch tells me.

BYARS On this business about unstabilized payloads. One of the rather important missions that y'all have coming up is one in which you will be grappling a payload that is, as far as know, pretty well unstabilized, and that's Solar Max.

EHLERS That's correct.

BYARS I know that there are several problems involved with the Solar Max, not at the least of which somebody's going to have to fly over there and tack on a grapple fixture, which presumably may stabilize it somewhat. But what kind of limits are there on tying on to something that is not stabilized?

EHLERS Okay, I believe our nominal spec value where we would like to capture a payload is .1 degrees per second in each axis. If you remember on STS-7, we did a special test where we deliberately imparted rates into the SPAS, of .1 degrees per second in each axis, and then the procedure was for the crew to capture the payload, they did so, the arm performed flawlessly and was able to accomplish the task easily, both from a crew standpoint and the RMS handling ability. The mission with the Solar Max invoives a lot of different operations involving the MMU and an EVA and several different scenarios.

BYARS I know that, for purposes of this discussion, I want to talk about the RMS part of that. How this relates to that mission, to that part of that mission.

EHLERS None of the tests that we'll be doing on this flight will relate to that mission. The prime test was the one that was performed on STS-7 with the SPAS.

PAO Any other questions here in Houston? Okay, lets move now to NASA Headquarters for questions there.

Hello, this is NASA Headquarters.

HOWARD BENEDICT (AP) Just wanted to know the location in the payload bay of this article. Is it behind the INSAT or in front of it?

EHLERS It's in front of the INSAT but behind the DFI pallet.

LYNN SHERR (ABC NEWS) I'm sorry if I missed that. Did you say that there would be television of any of the procedures while they were going on? In other words, is there live downlink at the time?

EHLERS Okay, I don't have my CAP, my crew activity plan with me. I don't really know if it will be live TV, but we will certainly have dumped TV, downlinked TV to be broadcast at some more convenient time, perhaps.

That's it for NASA Headquarters.

PAO Any other centers awake. Okay, we're back to Houston, any questions here, again.

GINA SUNSERI (CHANNEL 2) Is there a camera on the PFTA itself?

EHLERS No, there are no cameras on the PFTA.

PAO Any more? Okay, we're getting additional copies of the handout Xeroxed. It should hopefully show up anytime now. Thank you very much for coming, and we reconvene at 1:30 on INSAT 1-B.

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PAO Good afternoon and welcome to our briefing this afternoon on the Continuous Flow Electrophoresis System. Many of you have been with us before on previous flights where we have discussed this particular piece of equipment and how it is improving the process of electrophoresis in space. And I think there are some new elements this time which will be of interest. And we have with us, David Richman, the Deputy Program Manager for Electrophoresis Operations in Space with McDonnell Douglas in St. Louis, and we'll go ahead and turn it over to Dave for a description of what's going on on this particular flight.

RICHMAN Thank you, Steve. The Continuous Flow Electrophoresis System that is flying on STS-8 is part of McDonnell Douglas Astronautics Company's Electrophoresis Operations in Space program. In the Electrophoresis Operations in Space program, we're working with the Ortho Pharmeceutical Corporation, a division of Johnson and Johnson, with the National Aeronautics and Space Administration and with university researchers. Our mission on STS-8 is different than our mission on earlier flights. As Steve said, we have some new elements. One of those is that on this flight, we are flying live cells. Now the previous flights on STS-4, 6 and 7 were protein materials, and proteins are just long-chain molecules. But on this flight, STS-8, we're flying live cells. And this is because we are flying with NASA researchers that are also interested in flying live cells. Next chart, please. I'd like to talk about some of the potential applications of electrophoresis. As I mentioned before on the earlier flights, on STS-4, 6 and 7, we flew mixtures of proteins, and proteins are large molecules that occur naturally in the human body. In fact, they're produced by cells within the body, and hormones include, of course, hormones and enzymes. Now these proteins have different functions within the body. Our blood, for instance, has transport proteins, proteins that carry food and nutrients throughout the body. Other proteins regulate. They turn the functions of cells on and off, or other proteins are secreted by cells in one part of a body and then carried by the blood or the lymphatic system to other organs of the body where they then communicate the situation within the body. And finally, there are proteins which can protect human cells from the effects of infection. Now we're looking at two possible kinds of products, and these are natural products, products that would occur naturally within the human body. And, of course, what we want to do with these natural products is to replace those materials, or proteins that the human body is lacking. Quite often the deficiency, or lack of a specific protein can cause a disease state. So we're looking at two possibilities. One is replacement proteins, and that's what we looked at on STS-4, 6 and 7. And a second possibility that's farther in the future, is protein-producing cells for implant, and in this vein, we're supporting implant research. The possibility of implanting cells is now being investigated at universities throughout the country. Now, of course, it's a

subject of research and research is trying to find the answers to problems, and there are a great many of problems with the possibility of implanting cells. And some of these are to find the right site within the human body to place these cells. Another is the surgical techniques required to implant cells. And a third, and a very important one, is to avoid the rejection of the foreign tissue, or the foreign cells by the recipient of that implant. So there's a lot of work to be done in this area, but we're happy to be starting with some research in support of this kind of work. Now, electrophoresis separation has long been recognized as a good method of separating cells and proteins. And, in fact, it's used on mixtures of proteins as a diagnostic technique. There are small units that are called static electrophoresis devices where you can take a drop of blood sera, for instance, and you can put it on a gel plate and you can place an electrical field across this plate and it will separate the materials within that drop of blood sera, and then you can analyze what's there. However, to ever become a commercial process, we needed the kind of continuous flow electrophoresis device that we're working on. This device has existed for many years, but has not seen its true potential because of the problems we have with it and gravity and I'll talk about those later. Next slide, please. First of all, I'd like to describe for you a little bit about the process. In, the electrophoresis process takes place in a long, thin, rectangular chamber, such as the one you see in the left hand illustration. And through this chamber an upward flow indicated by the arrows and the blue coloring is a continuous smooth flow, very slow flow of a carrier fluid. And this carrier fluid is mostly water, but it also includes buffering agents to protect the materials that it's carrying along with it. Now, in the absence of an electrical field, we insert the sample, the sample is carried as a single thin ribbon up through that chamber, as you see on the left hand side, that brown column of fluid, and it exits through one of the tubes at the exit of the chamber and is collected at a single collection point. Now when we apply an electrical field, as you see in the illustration on the right, then these proteins which are negatively charged, and also cells, because cells are made up of proteins and on their surfaces they have protein material, so they're also negatively charged. They're attracted to the anode, or positive electrode of the electrical field. And because of this attraction, they accelerate rapidly toward the anode, as they're carried up through the chamber and because of differences in electrical charge and their drag, that is, the size of the particle, they take differing lateral paths, as you see in the right hand illustration. And they exit through different outlets of the chamber and are collected in separate collection devices. Next chart, please. We started working on electrophoresis in 1977, and this chart shows the phenomenon that happens when we try to have too many cells or we try to have too concentrated, highly concentrated a protein solution that we separate in the electrical field. And what we found early was that when we would try to concentrate our protein solutions to more than a fraction of 1 percent, that the protein being heavier

than the surrounding carrier buffer and cells being heavier than surrounding carrier buffer, we would find that as we tried to flow them, they wouldn't form that single thin ribbon and be carried up through the chamber. What would happen is that the forces of gravity pulling down on those heavier cells or protein particles would cause the sample stream to collapse around the input needle, as you see on the left in the example of the sample being heavier than the surrounding carrier. Now what led us to our experiments on STS-4 and 6 and 7 on proteins was that our biologists told us that we could concentrate protein samples to between 10 and 40 percent protein by weight. In other words, about a 1/4 of the total sample could actually be solid protein particles. If we were to separate in zero-gravity where we wouldn't have this effect that pulled down the sample stream. So that was our goal on STS-4 and 6 and 7 was to show that throughput advantage of protein. Now as I said, on STS-8, we're not flying proteins, we're flying live cells. I'll tell you about how those experiments differ from the earlier protein experiments. On the right hand part of this illustration, you see what happens if the sample is lighter than the carrier buffer as we showed with a particular light weight dyed sample. And what happens there is that the force of gravity breaks that sample stream apart into beads, and those beads then are unstable in the flow. And as they're unstable in the flow, they go up through the chamber and are dispersed in the surrounding fluid. So in either case, whether the sample is heavier than the carrier or lighter than carrier, it spoils the separation here on the ground. Next chart, please. This is the Continuous Flow Electrophoresis System, as it is now installed in Challenger. Now the chamber that we talked about earlier that the process takes place in is in the large module on the left hand side. And you can see just the left hand side of the picture, the large round hatch on the left side of the orbiter. So the nose of the orbiter is to your right and just inside the hatch is the electrophoresis chamber. The sample is inserted at the lower left hand corner and those 200 outlet tubes for the chamber are in linear array across the upper edge of the chamber. The sample is taken from the sample storage module which is the middle module to your right along the front bulkhead and is placed in a syringe pump that's at the base of the chamber. It's at the door at the lower part of the chamber, then the sample is pumped into the chamber and separated under the effect of the electrical field, and then collected in a collection tray, which is inserted into a door into the top of the chamber. Now the other modules that you see here is there's a computer module that's to your right. It's the large module with the handles on it and the keyboard. And this computer automatically sequences the experiment process so that the astronauts know when to insert new samples, when to input the new collection trays, and they're also given cues as to when is the proper time to separate, or to photograph the separating samples. Now in addition to these modules, down in the lower right hand corner of the picture is a pump module, and this was added between STS-4 and STS-6. And this module allows us to have water cooling of the experiment

using the Shuttle radiator system. And because we have that water cooling, we're able to operate at higher voltages on Challenger than we were able to operate with on Columbia. Next chart, please. Now as I mentioned earlier on STS-4, 6 and 7, we separated protein materials. And our goal was to demonstrate a factor of 400 times in throughput, and 100 times, a 100 times factor due to concentration, going from a 1/4 of a percent to 25 percent, and an advantage of 4 times in terms of the sample flow volume. And we were able to achieve that objective on 4, we got a through put improvement of 463 times. Now with that pump module that I mentioned earlier and the improved cooling of the experiment, on STS-6, we were able to use higher voltages than we were on 4. And because we used those higher voltages, we were able to do one of two things. We could either increase the voltage and get improved separation of the materials we were separating, or we could flow the material through the Continuous Flow Electrophoresis System faster. And when we flowed it through faster, there was a theoretical objective of 556 times throughput, and we achieved 718 times in our flight demonstration. And when we flowed through it the same rate, but it had the increased voltage to get increased separation, our goal was to get more than 4 times as much purity, and we got 4.28 times purity in our demonstration. And in addition to that, we flew two NASA samples on that flight. Now on our most recent flight, the flight of STS-7, we again flew two NASA samples, and I think probably you've seen some of the pictures of those samples separating. They were mobility standards, in other words, standard particles of different sizes that were dyed latex beads. And because of their different sizes, they had different mobilities, in other words they moved to different outlet tubes in the machine. And those beads constituted the pictures that you saw after the last flight of red, white, and blue streams within a chamber. In addition to that, we flew mixtures of cell culture media, that is, the mixture of proteins and fluids that surround live cells. And the purpose for flying those on 7 was to fine tune our production conditions for STS-12, where we will be operating between 80 and 100 hours during that mission. And the results of that flight were that we obtained the data, we separated all the samples, we got our data back from the computer memory after the flight plus we got 80 photographs, so we obtained that data base required to go on with the STS-12 flight. Now as I mentioned before, STS-8 is different than these three previous flights in that the materials that we are separating are live cells. And one of the goals of this mission is to demonstrate the handling techniques required to keep these cells alive. Now this is not as easy as it would seem. Basically the carrier buffer, that is the fluid tha we use to separate the cells within the chamber over any extended period of time would be hostile to those cells and they would expire in that carrier buffer. So we carry them up in a different fluid, we then separate them, and then in the collection tray that they are collected into has been modified to include some of the fluids that help them stay alive. In other words, the kind of components of the blood that they need to remain viable, or to

stay alive, plus the kinds of ions and protective minerals that they need to stay alive. So this, just handling the cells themselves and keeping them alive before and after the separation is a big challenge in this mission. Now, in addition to that goal, of course, our goal for separation is to use this purity advantage we have in space to demonstrate improved separation. Now we have some 6 samples on STS-8. Four of these are NASA samples, and here at NASA's Johnson Space Center, we have Dr. Dennis Morrison, who is flying human kidney cells. And then in conjunction with the work going here at Johnson Space Center, Dr. Wesley Hymer of the Penn State University is flying rat pituitary cells. Now, we are also flying some cell samples, and there is a good reason for this. One of those reasons is that the buffers, that is the mixture of water and buffering agents that are suitable for separating cells are not suitable for separating proteins. So this opportunity presented itself for us to separate cells also. And we're doing this work in conjunction with the Washington University School of Medicine in St. Louis, and the researchers are Dr. Paul Lacey, and David Sharp. And they are furnishing us with a mixture of pancreas cells. Now after separating these cells into the protective media that's contained in the collection trays and then storing them back on the spacecraft, these cells will be removed from the sample storage module very shortly after landing. On the last flight, we were able to remove the samples within about 1/2 hour after touchdown. And these cells will then be checked for viability, in other words, to determined how many of the cells have died. And after that, the live cells will be tested to see if they secrete protein. Now I'd like to tell you a little bit more about where the program is going in the long term. After STS-8, then we switch back to testing proteins again. So basically STS-8, the object there, objective is to support the research that's going on with the separation and functions of cells. And after 8 then we will take the hardware back to St. Louis and we will modify that hardware to run continuously on STS-12. And the modifications that are required there are those associated with being able to reuse the carrier buffer that goes through the chamber. And to do that we have to clean it up, removing the waste protein that was segregated from the good protein in the separation. Now those flights, the flight of STS-12, will lead to a production prototype which will fly in the payload bay in 1985. And based on the successful results with proteins on STS-4, 6 and 7, we started the design of that automated production prototype system. And this unit is some 3-1/2 feet long, 14 feet wide, and weighs 5,000 pounds. And it will have 24 times the capacity of the middeck continuous flow electrophoresis system as it's operated in the continuous mode on STS-12. And this flight is scheduled for STS-27 and 33 in mid-1985 and early 1986. Next chart, please. This will give you a review of the total program. At the top line, or the middeck flights, STS-4, 6 and 7, the first flights with proteins, taking individual samples back to the ground and then analyzing those collected samples. In those we collected 200 fractions. And in STS-8, where we're collecting fractions of cells and learning the techniques required to keep

those cells alive in orbit. And then STS-12 and 16, which will be continuous operation over 80 to 100 hours during each of those missions. As I mentioned before we have the production prototype in mid-1985 on STS-27 and again flying in 1986 on STS-33. Now the line at the bottom represents the research that's going on with proteins, not with cells. And this is work that we're doing with Ortho Pharmaceutical Corporation, which involves separating small amounts of material here on the ground for testing, and then separating larger amounts of material on STS-12 in 1984 for clinical trials and then even larger amounts in 1985 and 6 for expanded clinical trials. And the goal of all that testing is to obtain FDA approval early in 1987 for commercial sales. Now once we have that approval for commercial sales, then from that time forward, we need to have some means of staying on orbit for extended periods of time beyond that required for research. Next chart, please. And there are several options. One is to fly several sortie missions, in other words, fly up and down with the shuttle, going up with the shuttle, separating over a period of 80 to 100 hours, or 5 to 7 days, as we do with a continuous flow electrophoresis system, or we will do in 1984, and we will do for the first time in the payload bay in 1985. And that's one possibility. And that would be certainly the way that we would operate, were there not a longer term facility available. Of course, the ultimate goal, is to have a long term facility on orbit so that we would not keep transporting the hardware back and forth to orbit which is very costly. And so our hope is to have an on-orbit facility that would either be, say a multi-use unmanned platform as shown on the left, or a dedicated freeflyer which could support a single production prototype unit of the type that I described to you earlier. And finally, of course, there's an even better possibility of doing some research on orbit and actually interpreting the results there, and that would be possible with a manned space station facility. A manned space station facility could also support plans or separate dedicated freeflyers could be flown in formation with a manned space station as a method of production. So we have a great many possibilities for commercial operations after receiving FDA approval in early 1987. Thank you.

PAO Okay, we'll go ahead and open it up for questions here at Johnson Space Center, if we can get the lights up. We'll start with John Getter in the back here.

JOHN GETTER (KHOU-TV) Couple of questions. First on your last topic there, the space station. Have you or your corporation made any, have you had any negotiations with NASA or any of the private concerns involved in the possibilities of putting up space stations expressed your interest, concern, monetary support or anything of that sort?

RICHMAN We've had extensive talks with the various space station study contractors and the people that are looking at space stations elsewhere.

GETTER Can you expand on that? Have you told them essentially, "Look we want to go up when you put one up," or where's it stand at this point?

RICHMAN Essentially what we've done is we've told them what are requirements are and the magnitude of those requirements in terms of the potentials. In other words, we've looked at numbers of plants on orbit that might be possible. We've looked at those in terms of ambitious scenarios, of adding perhaps as many as two of those production prototype units, a year, and more conservative scenarios, looking at say, one a year, starting in the in 1990, 1992 time frame.

GETTER One other quick question, you've talked a lot about all the things that have gone right. What has gone wrong? Is there anything at this point that you think is going to prevent you from going into electrophoresis operations in space permanently?

RICHMAN Of course, we're always looking for those, because we would like to know what they are. Right now, they're unknown unknowns. So we're very happy with the progress of the program. And we sat down at the beginning of the program as people do, and we outlined the milestones that would be required to get us there, and so far we're on track and on schedule.

JULES BERGMAN (ABC NEWS) Mr. Richman or Dr. Richman?

RICHMAN Mister.

BERGMAN You speak of FDA approval in 1985 or 1986 as if it's a sure-fire thing. Why are you so certain?

RICHMAN Well, really we expect, we would hope to get FDA approval early in 1987 and that would be based on test results that would result from bringing down this material in 1985 and 1986. Now one reason that we feel fairly confident of FDA approval is that these materials are natural body materials. In other words, they're not any different than the proteins that would be produced within one's normal, healthy body.

BERGMAN Like interferon.

RICHMAN Yes, that's produced in a normal . . .

BERGMAN Yes, a natural body protein.

RICHMAN So, because those proteins are natural body materials, therefore, many of the side effects that are associated with chemical entities can be expected to be absent. And that makes approval, while not a sure thing, it makes it more sure than for a chemical entity.

BERGMAN What I really don't understand here, never had

about this whole project, is what it is that McDonnell and J&J are after. Is it making pure drugs, using genetic engineering to make better drugs more cheaply? Can you amplify on that?

RICHMAN What we're doing is that the drugs we're making are not synthesized, they are produced by living cell's in culture. So they're produced exactly the way they would be in the human body. Now genetic engineering uses bacteria, like E-coli to produce either complete or fragments, or fragmentary protein particles that are sometimes then wed together. So there is a differece in approach, however, we don't really see genetic engineering as being competetive with what we're doing, because even the genetic engineers after they've made these protein fragments in the fermenters, need to be able to separate the good fragments from the bad ones. So there's a possibility even with genetic engineering and with materials that can be genetically engineered that separation by electrophoresis could be required.

MARK KRAMER Does the joint endeavor agreement that you have with NASA cover the flight of Mr. Walker? Was there any additional money that McDonnell Douglas had to come up with to get him on that spacecraft and do you know what that money was?

RICHMAN The flight is covered under the joint endeavor agreement, the flight itself. Now there's a consistent NASA policy that has been formulated with regard to payload specialists, and it requires reimbursement for certain training costs that are encountered. And I don't know exactly what those numbers are.

KRAMER Can you put an order of magnitude on it, was it $10,000, a $100,000?

RICHMAN I don't know exactly what that number would be.

KRAMER Steve, is that something you could get for us?

PAO I think we can scrounge around and find that somewhere.

BERGMAN Steve, can we?

PAO Yes.

BERGMAN Because that leads into my next question, which has not McDonnell Douglas, and I've made this point before, been given an unfair advantage in one, being given the first commercial use of the shuttle with the electrophoresis experiment. And two, being allowed to name their own payload specialist for STS-12 or 13, whatever it is? And three, who pays for this, besides us taxpayers?

PAO Well, we'll see if we can get what they are paying for his training cost, see if we can find that number.

BERGMAN You're saying he flies for free.

PAO No, I'm not saying that, I'm saying we'll look to see what that is.

BERGMAN But beyond the training he flies for free.

PAO Well, we'll just have to look into that, I'm not certain as to the exact nature of that agreement or the arrangement there. The joint endeavor agreement, as you know, is a generic situation which is offered to others. And I beleive there was one other one that is recently been undertaken, we had something on that a few months back. I don't remember specifically what it was.

RICHMAN Perhaps I could clarify a little bit why we want to fly Charlie Walker on STS-12. The flight itself and the operation of the hardware is covered under the joint endeavor agreement. So really it became a question of with 80 to 100 hours of operation and the large amount of material that would separated and the great loss in experiment return if that didn't operate successfully for that 80 to 100 hours, it became a question of how much training would be required to essentially make the astronauts able to do the inflight maintenance, which is now a possibility on STS-12 with flying our own payload specialist, and to be able to interpret all of the flow patterns within the machine and the idiosyncrasies of hardware. And basically the reason that we chose Charlie Walker for this role is that since 1978 he has operated all our test engineering on all the chambers that we built and in fact right now is following our simulated flights which are taking place down at KSC in preparation for installation. So it became a question of a large amount of training being required to make this transition from STS-7, STS-8 to STS-12.

BERGMAN Speaking on behalf of myself and probably for the rest of the people in this room, we're not challenging Charlie Walker being aboard, per se, he's probably a very nice guy. I don't really know the man. What we're challenging is the principle, therefore, can corporation Z, who can make better ball bearings by using the space shuttle, for example, to dream up a wild one, or not so wild one, can they fly their specialist because you're not talking about a specialized task as much as your talking about the crew time to operate the electrophoresis experiment. Is that not true?

RICHMAN That's really a specialized task because it involves ...

BERGMAN ...are you saying that the astronauts are incapable of learning how to do this?

RICHMAN I think they are capable of learning, but the

problem with that is that we would have to essentially have them go through the same learning process that Charlie Walker has gone through over the past several years. And because of the limited amounts of time available for a mission specialist who has to cover literally all the experiments on the mission, that would probably cut a great deal into their capability to do that.

PAO Michael, you had a question here?

MEECHAM Your pancreas. What kind of pancreas is that, is that human, or is that animal?

RICHMAN Depending on availability, we don't know the answer to that right now.

MEECHAM It could be either one?

RICHMAN Yes.

MEECHAM If it's animal, what would it likely be?

RICHMAN It would probably be dog.

PAO Mark, did you have an additional question?

KRAMER Just one thing, on mission 12, would Walker be handling any NASA samples, or are those all MACDAC samples?

RICHMAN That's one large McDonnell sample.

AL SEHLSTEDT (BALTIMORE SUN) Why pancreas and pituitary cells? Is there something about these cells that make the experiment more effective, or is there some generic scientific interest in those kinds of cells?

RICHMAN Well, the individual researchers have interest, okay, in those cells. The pituitary cells are being investigated by Dr. Wesley Hymer at the Penn State University. And he considers this to be part of his ongoing research in how the pituitary functions. And we should see results of, you know, these are not like the demonstrations that we've done on previous flights where we can get the data within a couple of months. This is part of an ongoing research program, and he should be publishing in learned journals within, say 6 months to a year, what his results are. And with respect to the pancreas cells, Drs. Lacey and Sharp have been doing research in pancreas cells and diabetes for 10 years.

PAO Okay, I think we'll go ahead and wrap this one up, so we can get underway with the next one in a few minutes. We'll have a review of the availability of the Tracking Data Relay Satellite that is currently in orbit, and how we'll be using that on STS-8, that will take place in just a few moments.

END

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STS-8 PRE-FLIGHT CREW PRESS CONFERENCE

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PAO Good afternoon and welcome back, it's my pleasure to promptly turn this over to the commander of STS-8, Dick Truly.

TRULY Thank you very much, and thank you for coming today. I'd like to take just a few minutes to welcome you, tell you a little bit about the flight and introduce the members of the crew, and then we'll turn it over for questions. STS-8 is going to be obviously the 8th launch of the space shuttle and the 3rd launch of the spacecraft, Challenger. The working launch date that we have now throughout the agency is 20th of August of this year. And the vehicle is on schedule to that date with a very few days of pad, some of which is weather contingency. And soon, we hope, NASA will set an official launch day. The 8th mission of the shuttle is going to be a very busy one. I'd like to enumerate, if I could, the major objectives of the flight, and then as I said, quickly introduce the members of my crew. We will launch and deploy into space an Indian National satellite, INSAT 1B, which is an important commercial satellite for the Indian nation, and that will occur on day 2. We will later in the flight, do a continuation of the Canadian-built Remote Manipulator System testing, using a heavy weight test article. That will encompass in total, a little over a full days work on orbit. We will fly, again, the CFES experiment, which is a joint venture by McDonnell Douglas and Johnson and Johnson, which is a device that is to be used to separate important materials on our flight for the first time, living cells. And eventually, hopefully to be used in biomedical research. We have another important objective that's going to be pretty much invisible as far as crew time, and that is a checkout of the first TDRS-A, that is on station today. And finally, we have the unprecedented opportunity because of the fairly recent addition to the crew of Bill Thornton to continue an important series of medical data gathering that we hope will allow us to understand some of the problems in adaptation that some of the crews in the past have had. With that I'd like to introduce the crew to you. To my right is, Commander Dan Brandenstein, is the pilot. Dan's a Navy commander, who's a Vietnam veteran and a very solid citizen and has helped a great deal in developing the flight tests that we've had to do for the night landing work that we are prepared for. And on his right is Guy Bluford, Lt. Col., U.S. Air Force. Guy has two primary jobs on the flight. He is a primarily responsible on board for the correct and safe launch of the INSAT satellite, with Dale Gardner's help, and he's also during the ascent and entry phases, helping Dan and me keep out of trouble with the safe launch and return of the Challenger by doing our center seat duties. To his right, is Navy Lt. Cmdr. Dale Gardner. Dale has a long background in Navy flight test. He'll be the first Naval flight officer to have flown in space. Dale is primarily responsible for the RMS testing that we're going to do. He's also responsible for the CFES operations on the flight, which he and Guy will pretty much, as far as operation of the CFES, will split down the middle. And finally down there at the far end is Dr. Bill Thornton, who is a physician that has been working on

the Space Program for longer than I have. I knew him way back when I was on the MOL crew. In my mind, he is one of, if not the premier individual in this country that has thought about and studied and is, about the physiology of human beings in zero-gravity. As a bottom line, let me tell you that I think the crew is ready if the Challenger were ready to fly next week or the next, we would be ready, and we're hoping to have a lot of fun doing it. So with that, let me just turn it over to questions.

PAO Questions here in Houston.

MIKE WILLIAMSON (KJOJ FM RADIO) Two questions for Dick Truly. Number 1, Cmdr. Truly, are you shooting for a record having flown on the Enterprise and Columbia and now Challenger? And are you looking to fly on Discovery and Atlantis when they come out? Also did you get a proper oil change slip from Bob Crippen after this, for this flight?

TRULY The answer to both questions is yes. I would love to fly all five orbiters. And Crip did promise me that the oil was changed.

BERGMAN Dick, what about taking off at night, does that concern you?

TRULY The major preparations for the night work have been the landing, obviously the take-off it doesn't matter except for the viewers is to whether it's night or day. We have done a tremendous amount of work in night landing preparation. And I'll be honesT with you. Two years ago, when I thought of, before John and Crip flew the first flight, and I thought about night landings, I thought that would be a very difficult thing to develop in a safe manner. We have since then, however, spent the last year in doing flight test against a number of lighting systems, and frankly, I think we were very fortunate. It turned out that one of the least expensive and one of the easiest to set up lighting systems that we looked at, turned out to be the best. And that was simply using these powerful search lights that we already have that are the same, they're the same search lights that light up the pad at night down at the Cape. They're set up in such a way that they are essentially ground level and are pointing directly down the center of the runway. So even at altitude, as you come around the HAC, or the turning circle, you can see the runway location and direction. And the combination of that lighting with some colored lights that we have to help you get lined up with attitude, and our new format on the heads up display, has frankly turned out to be, what I think is going to be very routine operation. We are still treating this first night landing purely though as flight test and we're stacking all the odds in Dan's and my favor because of that, but - -

BERGMAN I understand there was a rather, shall we say, more informal patch that reflected the uncertainties of a night landing, that preceeded the formal patch.

TRULY There has been some frivolity among the crew, like other crews. Yes.

HENLEY JONES (NBC NEWS) Do you have a daylight landing opportunity in the Continental United States during the mission, or by extending the mission?

TRULY Not in my view, a reasonable one. I think there are some daylight opportunities on day 1, which obviously before we do the mission, so that doesn't make any sense. We have planned all our flights to, for a planned mission duration plus 2 days to take of whatever happens. In order to get a daylight opportunity, we would have to use up that, and so we would have to pass up the night opportunities and end up with a day landing, but if anything happened to make you wave off, we wouldn't have the consumables to do that. So realistically, we do not have a day opportunity in my view.

LYNN SHERR Dick, I have a few questions, sort of housekeeping. One, who would do the EVAs if they should come up? Second, can you tell us about the health of the ship, as far as you know, right now? And third, since it was on your first mission that there was an APU problem, and that there seemed to have been an APU problem last time out, is it something you're paying special attention to?

TRULY The EVA crewman is Dale Gardner and myself. I might comment on that. The reason that we elected for me to be the EVA crewman instead of Dale and Guy, was simply training facility time, I had already trained for the EVA on STS-2. And we saved ourselves a lot of chamber runs and water tank runs by letting me pick up that chore. To be truthful, I think that the Challenger is in good shape. One of the reasons, however, that we're still working to a working data instead of an announced date, is the fact there are some uncertainties left. As I understand it, the APU has the final engineering analysis on that anomaly that they had on STS-7, has not been completed. So, the bottom line is that I believe that APU has already been removed and replaced down at the Cape. I have carefully talked to the people about the failures, this particular one didn't seem to be associated with any previous one that we had had so it didn't look like it was suddenly a generic failure that we had not seen in seven consecutive flights with all the other APUs. So as far as the bird goes, I'm happy.

MORTON DEAN Doctor, what did you learn from Dr. Thagard from his experiences on the last flight, what do you expect to do that will be different? And that we hear that two of the astronauts on the last flight did become ill. Are you going to try any new medical procedures or any new medicine on this flight in an attempt to prevent that from happening?

THORNTON Let me take the last portion of that question,

first. No counter measures, no new counter measures are really planned on this one. And as to what Dr. Thagard brought back, what with the training work load, I have only had time for a cursory look at the data. But let's say that it was an unprecedented amount from the cursory look. There are significant, currently significantly features present. Most importantly of all, we got the data when we needed it and in a continuous fashion.

DEAN Did he learn anything that would lead to a preventative measures being taken, which will be used on this flight at all?

THORNTON No, not on this one. We are still in the information gathering phase. It is a phased approach that we are taking.

BYARS Dr. Thornton, I'd like for you to amplify on that response and then I've got a question for Dick. What, even though you've only had a chance for cursory look at the data, you say there appear to be significant features present. Could you identify those significant features for us?

THORNTON No, I'm really not prepared to, because until I have had, I know this is a stock answer that you always get from scientists and such, and I know how unsatisfactory it is. But really, until I have had an opportunity, because frankly, to put it all together, to integrate it, and also to have it evaluated by peers, I really wouldn't care to comment further than that on it.

BYARS Okay, I've got - the other question for our CDR. Do you have, there was another failure on this last mission and it's one that seems to be repeating itself over and over again and that is the potty goes to pot. What has been done, if anything, on this one. Are you going to try, take out the microswitch, put in something else. Do you think they'll make it work this time?

TRULY The, we did have a failure on this flight of a microswitch that turned off one of the slinger motors that's in the waste management system. That microswitch - two things have been done. One obviously the failed microswitch has been replaced and- and we're developing an inflight maintenance procedure so that we could go in and either rewire it inflight or fix it ourselves if that particular failure happens again and - if I - if, as to the part of the question is do I hope that it's finally fixed on this flight, definitely I do.

PAO Jules Bergman please.

JULES BERGMAN (ABC) Dick, what about the brakes? I understand that a washer or rivets, I hear both, came loose as they touched down at Edwards at the 2,000 foot mark where Crip was supposed to

have set down and I understand also this has been a repeated failure in both the Columbia and Challenger and that they were new brakes installed after the Challenger's first flight. Are you happy with that?

TRULY Jules you're ahead of me on information I think. I was told, I'll tell you what I know about it. The, I was told that there was a strong possibility that there was a material incompatability - a washer or something to tne like was, was installed in the brakes. It was of the wrong material and possibly failed which in that one small failure escalated into a failure of that particular brake. The last time that I talked to somebody about it was about a week ago and that was not, at that time, that was not the final iron-clad technical solution or explanation to that mechanical failure and frankly, our training has been such that I know that they are going to have a final answer and I don't have time to hear all the interim ones. I do not think that is the same failure that has occurred. We have had the brake failures going all the way back to the Enterprise during approach and landing tests and, and - but I do not think that this particular failure was a repeat of an earlier one but, but I could be mistaken. I don't know.

BERGMAN The brakes are supposed to be good for five regular landings and one all out max-stop landing or 6 all told. Here they failed on the very first landing attempt of a new system. Do you buy that?

TRULY Well it happened. I mean, I would be much happier had we flown 7 flights of the Columbia and Challenger and had no problems and the same with APUs. But in fact we did. We've got a heavy weight vehicle and, and a set of wheels and brakes that we've got to understand and fix all the technical problems and I won't be happy until we have.

BERGMAN Do you feel safe...

TRULY Oh, yes.

BERGMAN ...with brakes that come apart that way?

TRULY Yes, it's my understanding even on this flight, I was told again, the analysis of Crip's landing was that - and he did use very light brakes, the cause of this particular failure was, was not do to heavy braking but I was told that the failure mode here would have - the brakes would not have escalated into wheel failure or something like that and he would have continued to roll out straight and gotten stopped even with heavier braking.

PAO Morton Dean, here.

MORTON DEAN (CBS) Yes, this is for Colonel Bluford. We asked the same question of Sally Ride about the big deal being made out

of her being the first American woman in space and I'd like to ask you that same question. Are you distressed that there is a big deal being made out of your flight?

BLUFORD Well I recognize it from a historical point of view. The... I recognize it from a historical point of view and can understand the amount of attention that's been focused on this particular flight for that reason. But I also anticipate that, that this will become more routine and you know one day there won't be as much attention paid to it. So I've just learned to accept it and recognize that it will eventually fade away.

DEAN Has there been any added pressure on you during the training period because of this?

BLUFORD None that I can tell.

PAO Lynn, Lynn Sherr.

LYNN SHERR (ABC) Yes, just a follow up. That's what I was going to ask. Sally said very specifically before she went up that she did fell there was some pressure on her not to "mess up" as she put it. Do you think that that pressure is on you also as the first American Black?

BLUFORD I don't sense it that way, I feel as if I'm a pacesetter, so to speak, but I don't look upon it as - that I have to be perfect as well. I recognize the fact that I'm the guy who's setting the pace for the people who are going fly behind me, but I don't feel as if I have to be perfect as well.

PAO Any other questions here in Houston? Okay, Tom Cook and then we'll go to one more here and then NASA Headquarters.

TOM COOK (KTRK-TV) Colonel Bluford, a Philadelphia station would like me to ask you what's it like being a Philadelphia boy going up in space?

Laughter.

BLUFORD I'm just, I'm very pleased to be flying. I'm looking forward to the experience and I think it's going to be a lot of fun. I'm really looking forward to it.

PAO Sherry Armet and then we'll go to Washington.

SHERRY ARMET I have a question for Dick Truly. I want to know how difficult it's been for the training since they've changed your flight plan, you know, not so long ago?

TRULY I'll be honest with you. The last, the last couple of months have been unsettling to me because we had planned to

fly the IUS and TDRS and because of the IUS anomaly there was some uncertainty there for a while as to whether we would fly the - continue with our manifest or change - or change to what. And my main concern is is that I think as a crew we were coasting along in very good shape at the time of STS-6 and I didn't want that to be changed and so my personal concern has been to make sure that our course and speed has kind of remained steady and that has taken a little bit of doing for all five of us because we have had to deal with a number - many, many suggestions and possibilities, but I must say right now that with the addition of the RMS and PFTA Test Payload and other changes have come to flight and the way that these guys have jumped on those required training changes has gotten us to the point now about 5 or 6 weeks of flight that I think that we're where we were to start with. We're comfortable and trained on the new payload, we've got like every crew we've got some last minute things to do but I'm very happy.

PAO We'll go to the other 3 NASA Centers and then return here to Houston. First, Washington.

NASA HEADQUARTERS This is NASA Headquarters.

JIM SLADE (Mutual Broadcasting) Dick, for those of us who keep lists and scores you mentioned that there were some uncertainties left on the Challenger at this point and the only one you mentioned per se was the APU analysis. Could you give us a list?

TRULY I'm afraid I cannot give you a list as good as - as good as a one you can get from the project office and I'm sure that NASA would be glad to provide it to you, but as I understand it the - we have some weather contingency days due to the hypergolic loading that we might could pick up a day or so. We - NASA wants to understand the failure or the anomaly or the shutdown of that APU that happened on orbit even thought that APU was restarted and ran fine. The earlier question on the wheels and brakes - that may have been resolved as of the last time that I got briefed on it it was not finally resolved. The other things I can't even recall, but that have to do for example with the availability of hardware at the Cape to install in the payload bay just to meet the schedule and routine things of that nature.

HOWARD BENEDICT (AP) For Dick Truly. Dick, in the event of an abort off the launch pad, how do you feel about making a night landing at the Cape and what kind of lighting do you have there if you had to do that?

TRULY The lighting at Cape Kennedy is excellent. It's, it's very similar to any of our large municipal airports plus we have the addition of the search lights just as we do at all the sites and the outer glide slope papi lights. Dan and I have done a number of training sessions at the Cape and in the unhoped for event of having to do a return to landing site abort we both feel

comfortable in landing there.

HARRY ROSENTHAL (AP) For Commander Truly. You all don't seem have to have very much to do on your 5 days. Do you feel like you're underworked a little bit or do you wish another satellite had been added.

TRULY Excuse me John. I'm sorry. I couldn't understand the question. Would you repeat it please.

ROSENTHAL This is Harry Rosenthal of the Associated Press. You, it seems like your flight plan is very light this time. Do you feel like you might be under worked and would you like to, would you have liked to have a replacement for the TDRS Satellite?

TRULY Well, let me answer the last part of the question first. No, I did not wish for a replacement of the IUS TDRS Satellite. I, we were geared up to fly that particular payload and I was frankly disappointed that we weren't able to. But that was more to do with the uncertainty of the situation rather than that particular manifest over another one. If our flight plan looks light it's very deceiving because it's not. It's several busy days. Now the afternoon prior to the final day, just like on all our missions, we're now planning to be as light as we can make it. Part of that lesson we learned on the first couple of flights and particularly on flight 2 that Joe Engle and I flew. When you're getting ready to deorbit the next day you need the time to get squared away and stay squared away if you can do it and so that particular afternoon is light but the rest of it is very busy.

ROSENTHAL And another question please. Is there anything that you do different for a night landing than you do for a day landing?

TRULY I've been doing too much talking. I'll let Dan Brandenstein answer that one.

BRANDENSTEIN Well, it's actually you're flying the same approach. The big thing is the night lighting system and as Richard explained earlier we went through a great deal of work and a lot of people helped us develop this night lighting system. But other than that, we're training to the night lighting system weekly and other than that it's a typical shuttle approach.

LEONARD DAVID (Spaceworld Magazine) A followup on that question. I understand that you're not going to have any planes coming down with you during the landing. How does that complicate your landing?

BRANDENSTEIN The reason we don't have any planes, PAO or chase planes coming down is the Orbiter has no lights on it. So, they

couldn't see us, first of all. Secondly, now that we're operational, the chase planes for engineering data and double checking our instruments against theirs, is no longer required. And I'm sure the public relations people would like to get what pictures they could of the night landing. But since it's in the dark and the vehicle has no lights and you probably won't be able to see it until about 50 or 100 feet above touchdown. There's just no purpose for them. And as far as we're concerned, you know, we're not concerned about not having them there.

TRULY As a matter of fact, it's a blessing.

DAVID Cmdr. Truly, you mentioned inflight maintenance, are there any other aspects in the crew compartment there that you have, other pieces of equipment that can accept inflight maintenance, is that being looked at now?

TRULY There are many things in the vehicle that the crew can fix and has fixed on many flights. On flight 2, Joe replaced one of the CRTs, and that happened again on a later flight. There's a lot of inflight maintenance procedures that we have that we have not had to use. But, in general, people in space are just like people in their garage, when something breaks and it's possible to fix it, they can go at it and fix it. It's only in the space program that we just plan it a lot better.

ROB NAVIOUS (UPI RADIO) For the four rookies on this flight, if you could go down the line in some detail, if you could, give us some insight as to what your feeling of anticipation is, finally, for getting your chance to fly. Some of you have been capcoms and you live around other astronauts who have flown before. We're curious as to what your level of anticipation is.

BRANDENSTEIN We'll obviously I'm looking forward to it. It's something I've wanted to do for many years, and even more so after I was down here and was fortunate enough to be capcom on the first flight. I envied John and Crip very much, and I've envied all the crews that have flown before me. And I'm really looking forward to it and anticipating enjoying it and having a good time and getting the job done.

BLUFORD I have to agree with Dan, I'm looking forward to it also, something that I've been working at for the last four or five years in supporting the work in the office and having seen the other people who have flown and recognized that it's a lot of fun, I'm looking forward to it as a lot of fun.

GARDNER From an excitement standpoint, I don't think that has got to me yet. We've been pretty busy just getting ready for the jobs to be done and with changing over from IUS to the RMS, we've been very busy making that transition. So, I think maybe in the last few days before the flight, when all that's behind us, and the vehicle's in front us, maybe that'll change. But right now it's still a lot of work.

THORNTON After, how many years is it now, 17, and after having made various simulations and being locked up and talking and watching and all rest, I guess I get tired of being a bride's maid, and feel about as prepared as I'll ever be for that. Also I have, I think an unprecedented opportunity here, as a scientist. So needless to say, I'm looking forward to it and ready.

THERESA FOLEY (AEROSPACE DAILY) This is for Richard Truly. I understand that the Navy is looking for an astronaut to run the Naval Space Command this fall. And I was wondering if you're interested in that job, and if you think your experience with the Shuttle Program has given you some special qualifications that could help you in that.

TRULY I think I would defer comment until the Navy talked to me about - - . But, as of now, I certainly have made no decision to stop doing what I'm doing.

HOWARD BENEDICT (AP) For Dr. Thornton. Are you planning to do some of the same types of things that Dr. Thagard did, or are you going to do a different series of tests?

THORNTON No, it is basically a continuation of the same series. There simply wasn't time to develop very much additional. A few items will have become available. We hoping to have an eye/hand tracking task. But very largely it will center around the same kinds of things that Dr. Thagard did.

JIM SLADE (Mutual Radio) Dr. Thornton, let me follow that up. Are you the basic client of your investigations here? In other words, are you going to try to make yourself sick as Norm Thagard did, spending most of your time in individual study?

THORNTON Well, I shant try to make myself sick, conversely if it happens, I will take maximum advantage of it, might even consider myself fortunate if I do. And yes, I shall be the subject of my own minstrations here. However, the rest of the crew, at least at this point has indicated a certain willingness to pitch in as well.

Headquarters has no further questions, thank you.

Kennedy Space Center.

ROY NEAL (NBC) First of all, Rich, I can give you this report, it's from the latest status report, and it says, "The Challenger's potty has been completely retested successfully." We thought you'd like to know.

TRULY Thank you very much, Roy I appreciate the information.

NEAL I knew you'd need that information. Now we need some information, if we can get it. What are your plans, other than simply testing the Ku-band antenna, as far as TDRS is concerned? And, of course, that's a television oriented question. If you're getting good results, would you use TDRS for any TV?

TRULY I frankly don't know the answer to that. Most of the, almost all of the TDRS-A testing is done completely by the INCO, the flight controller over in the control center. I think it has to do with a number of the modes. But, as to the television question, I'm not sure, well, I do not know the answer.

NEAL All right, then, may I follow through by asking, what are the TV plans for your mission, how much of it will you share with us, for example, Guy or Dale, will you be doing any television as part of your launching operations, whatever?

TRULY We are developing a TV plan, just as all the missions have, we hope to get television down at some time during each day of the flight of various things that are going on. I think you should expect about the same amount of TV coverage of STS-8 as you've had of other recent flights.

NEAL The reason I'm asking, Dick, is I have not seen any documentation, possibly there is some there in Houston, but I've seen none here at KSC, which would give me any indication of what television to expect during the flight. I guess that's still in preparation then. And the lateness perhaps, is occasioned because of the changes in the flight plan?

TRULY Roy, I can't answer your question. But John Lawrence has put before me some information about it. It sounds like that we just owe you this information. And I'm sure NASA will get it to you.

NEAL I'll catch up to it later, thank you.

ROB ZEA (WESH) Col. Bluford, you said you recognized the historical importance of your becoming the first American black to go into space. From that historical standpoint, why has it taken this long for a black to go into Earth orbit?

BLUFORD Well, in the past, the requirements to be an astronaut have included being a test pilot. And really there are just very few blacks that are in that particular profession. And it's only been since the development of the shuttle where you don't have to be a pilot or a test pilot in order to become an astronaut, which has opened up the field considerably to other people who want to fly in space. So that has opened up more opportunities for women as well as minorities in the program. And also since the last 20 years, we have more blacks in the test piloting business, so we have a larger pool to choose from. So

it just takes time to draw more people in the test program as well as, you know, we have a larger pool to choose from with reference to the fact that we don't need test pilots as the sole purpose of being astronauts.

PRESS Did it take time to brake down racial barriers?

BLUFORD I don't think, I think that's the case in many ways with reference to our society in general, but I think those barriers are being broken down and are continuing to be broken down, they have been for the last several years, and they're continuing to be broken down.

STEVE SCOTT (WMEL RADIO) This is really for whomever it may concern. I was wondering if you could briefly outline RMS testing that's going to be on during this flight and how it compares with what went on during the last mission?

GARDNER The RMS testing will take place on 2 days, on flight day 3 and on flight day 4 we have approximately 4-1/2 hours on the first of those days, and 5-1/2 hours on the second. We're going to be unberthing the payload flight test article, which is an 8,000-pound, approximately, object. It's about 13 feet in diameter, and 15 feet long. It is the next step in a series of tests, as you know, on flight 7 the SPAS weighed about 3 or 4,000 pounds. We're now moving up the ladder to about double that weight. The purpose of flying the PFTA is two fold. The first of which is to attempt to verify our ground simulators, our ground computers which predict how the arm will handle large weights. The people have worked out already preflight, the response that they think they will get from the arm with this large weight. We will take it up and fly it through identical maneuvers as they put in the computers, come back, compare the numbers. And if everything looks okay, then we are confident we can predict heavier weight payloads. The next being flight 13 with the long duration exposure facility, which I understand weighs a little over 20,000 pounds. We want to make sure that we can predict how those heavy payloads are going to operate on the end of the arm. Another aspect of it is that when we start moving heavy objects around in the arm, we can expect to see a feedback through the arm into the orbiter system. So we have a set of tests that will measure how the orbiter reacts to the movement of this large object on the end of the arm. Lastly, we have a task that will probably be from the arm standpoint, the most challenging for Richard and myself, and that is at the end of each of the day's tests, we are going to attempt to put the PFTA, cradle it back into the payload bay and bring it out again, using the arm in its most degraded mode, and not only that, but also without any real visual cues from the cockpit, with our eyeballs through the windows. We've put screens on the PFTA to keep Richard and I from seeing the attach points where we need to berth it back in the payload bay, and that is to simulate very large payloads that would be up close to the window such that that view wouldn't be there anyway. And we are then reduced to

using TV monitors and other cues, without computer aid, in flying the arm in most degraded mode which is one joint at a time, and we're going to attempt to unberth and berth the payload in that configuration. So, that last test, of course, is a man/machine interface test and we think that it's going to take us a while to do it but that we'll, we will be successful in that task.

PAO (KSC) Okay Peter Adams of Today.

PETER ADAMS (Today) I just have a couple of questions. First, follow up on this arm question. Is the weight of that payload 8,000 pounds in space or is that the weight of the payload on Earth and if there is what's the differentiation?

GARDNER Well, here we go with the famous weight versus mass thing and I've been through it five this morning so we'll try a sixth. We, unfortunately, we speak of objects here in the United States in terms of weight - that is pounds. You know in the metric system they use a different system. They actually speak in terms of mass. Weight is actually a characteristic of a body when it's in a gravity field here on Earth. Mass is a property of an object irrespective of whether it's in a gravity field or not and the easiest example I can probably give to you is if I would put an object on the table and then attempt with no friction on the table and I want that object to move horizontally I have to give it a force - I have to push on it to get started and I have to push on it to stop it. And that I have to do whether I'm here on Earth or in space. The difference is here on Earth I need the table to keep it from dropping vertically. In space I don't have that problem. The amount of force I need to put on that object to start it or stop it is a function of the amount of material in that object - that is the mass of the object. If I have to start and stop a - what we call a heavy object, a massive object, it just takes more force. So what we are faced with here you can see with the arm is in order to bring this PFTA out of the payload bay and move it around the arm has to do exactly that same function as I would here by moving an object on the table. It has to get it started by using a force and it has to stop it by using a force. Those forces then feed back into the joints of the arm and can induce oscillations of the arm itself and it's that type of thing we need to understand before we move onto heavier objects. Thank you.

Laughter.

ADAMS You said that you'll be checking the TDRS-A. Exactly what is the procedure for doing that and what day will that be done.

GARDNER Well, we'll be doing that on both flight days 3 and 4. The difference being that on this PFTA has 2 different points at which we can grab hold with the arm. One point is very close to the heavy end of the object and that would be similar to you grabbing a - somebody used an analogy of a sledge hammer,

grabbing it by the weighty end of the sledge hammer. And you can do that if you're strong enough and move it around. The other grapple fixture is very far away from the heavy end of the PFTA and grabbing it there would be similar to grabbing the, grabbing the sledge hammer one handed on the handle and now trying to move it around with that, with that heavy end out on the large lever arm and that of course will be a more challenging task for the arm.

ADAMS I'm sorry, I was talking about the TDRS-A. You were saying that they were going to be some checkouts of the TDRS while you are in flight.

GARDNER Oh, I'm sorry. That's going to be mainly on flight day 5. That's mainly on flight day 5. We will be using the TDRS for communications starting on flight day 1 but on flight day 5 when the other tasks are complete then INCO on the ground will start his commands and we'll test out the different modes of the TDRS.

ADAMS And one other question too. On - on the - I understand there are going to be a getaway special canister of commemorative stamps. Could you, can anyone please verify that and tell me exactly what the, what the purpose of these stamps is going to be.

TRULY It's, as I understand it the, we're flying a payload for the U. S. Postal Service. It does have stamp covers in it. The Postal Service is reimbursing NASA for all the costs of preparation of the stamp, the covers of, I believe it's a new stamp issue although I've neither seen the stamp or any of the covers. The covers will be flown and returned to the Postal Service and sold to the public. As far as the details of the sale of them, I assume that you should get your information from the U. S. Postal Service. We're flying the covers as a payload.

GARY ELDRIDGE (Kettering Medical Center Television) To Dr. Thornton. What product of your research on this mission might be very visible for the public to recognize as a significant contribution to medical science?

THORNTON Unfortunately, I think the product that will be most significant to medical science will be largely invisible to the public and that is our increased knowledge of the nervous system which to me is simply the most complex mechanism in the universe and one in medicine which I feel that we know least about. But again I say, our - the theoretical knowledge that we gain of this which may translate or may not translate into practical use here on Earth will unfortunately be largely invisible. But this does not mean, for example, that it's not important. Look for example at Harvey's discovery of the circulation of the blood.

PAO (KSC) Okay, over here.

RUDOLPH BRUINGTON (Sheraton Broadcasting Network) For Colonel Bluford. Colonel if you could, give us a detailed breakdown of what you're going to be doing - your duties on this flight.

BLUFORD I'm going to be assisting both Dan and Dick in the ascent and entry phase of the mission helping them with reference to going through their procedures as well as assisting them in emergencies both during ascent and entry. On the first day I'll be working CFES experiment. I'll have 8 hours or 6 hours - 6 and 1/2 hours doing the CFES experiment. On the second day, I'll be working with Dale with reference to deploying the INSAT satellite and I'll also be working with Dale on the CFES experiment. On the third, fourth and fifth day I'll be just supporting the crew in various functions, taking pictures, working with Bill with reference to his medical stuff, supporting the crew with orbiter systems, followup and also RMS activity when needed.

PAO (KSC) Okay, follow up questions?

PRESS Yes, Colonel. Like Sally Ride you're trying to downplay your unique position in this flight. But certainly this just has to strike you as being something progressive in some sort of way. There is some, you're playing some sort of role model here for a lot of people who are watching you, who are going to be flown down here to the Cape to be watching you. I'd like you to talk to them and say something to them if you would.

BLUFORD I'm not to sure what I'm supposed to be saying, but I think as I pointed I'm really looking forward to the mission. It's, I think we have a lot of good work to be done on this mission. I think it's going to be a historic mission in the - in several senses and I'm hoping to do a very professional job of - with reference to the job that I have to do.

PAO (KSC) Are there any more questions? All the questions from KSC.

PAO (Marshall) Marshall Spaceflight Center, Huntsville.

DAVE DOOLING (Huntsville Times) For Dick Truly. First off was there ever any consideration of sliding the INSAT launch and cancelling the STS-8 launch. There's been a great deal of juggling back and forth of payloads and trying to find things to fill the payload bay and secondly, could you possibly give us some kind of comparison on the shuttle night landing and an aircraft carrier night landing since some similar lighting systems are used along the way?

TRULY First of all, I think almost, after the IUS anomaly, I think almost every payload combination was considered and I'm quite sure that in some circles delaying the launch of the INSAT may have been a possibility and for all, but I - frankly I heard a lot of different possibilties during that month

or so and I think in the final analysis the Space Transportation System feels an obligation to meet its commitments to its customers and I think keeping the flight pretty much on schedule and flying the INSAT was something that was done very wisely and with clear heads on the part of the people who did it. We were fortunate in that there were several things, for example, the RMS testing, that was - that had to be done anyway and could be moved forward so that we could keep this Challenger flight on schedule. I don't think there's any comparison between landing the shuttle at night as far as what I've seen and landing at night onboard an aircraft carrier. That's a much more difficult operation.

JIM ADAMSON (Channel 31) First of all for Dick Truly. Is the, as far as the night landing goes, is it going to make is easier to use the heads up display at all having you know not in daytime. Is it going to be more visible and if so, is that going to help at all as far as making the night landing?

TRULY I think the heads up display is going to be invaluable in the night landing because the thing that the heads up display does is it decreases the pilot's work load. It makes the scan that's required to keep up with change in air speeds and altitudes and glide path angles in relationship to the runway both longitudinally and laterally. It is just made much easier by the heads up display. It has a brightness control on it so I really don't think you can see it, I mean you can see it perfectly adequately during the daylight. I must say that we, I think the people that designed the format on the heads up display and the night lighting though did an outstanding job because there is very good harmony between the displays before the pilot's eyes on the landing and the night landings. So they play hand-in-hand very well.

ADAMSON I have a question for Dr. Thorton. This time on the test that you'll be conducting and I assume it'll be on yourself, do you plan a decompression test this time around?

THORTON Negative. No decompression test.

ADAMSON Okay, so there would be no opportunity for that this time. Then I have a question for Colonel Bluford. As far as the CFES experiment goes, the living cell sample that will be used this time, who is - who is providing the sample for that and can you describe what it is a little bit?

BLUFORD We got 6 samples that will be flying in CFES and all of them are living cells. Two of them are industrial - are from MacDac. Two of them are from or I think four of them are from NASA and there are 2 of them from Penn State and 2 of them from some other, right here, I think, Johnson Space Center. And I think what they are pancreas cells and kidney cells and someother type of cells but there are...Pituitary. So there are 6 sets of cells and all of them are living cells.

TOM KNIGHT (WAFF TV) For Dick Truly or Dan Brandenstein. The, I understand that the life, your landing system, will be exceptionally bright in that air. Will that have any effect on vision as far as your approach. I know normally night landings, light, any lighting there in the cockpit is a consideration that all pilots try to keep down. Will that have any effect at all?

BRANDENSTEIN No, we've worked on it for the approach. We've, have the interior cockpit lights set up such that we can look out and not affecting our night vision and not causing any glare off the windscreens, and the lighting system on the runway is essentially behind us, so we're looking, if you will, downstream from the lights and once you get into the final flare and the night lighting on the scene is almost like daylight, and there's no problem. We are not looking at any glare into our eyes.

KNIGHT Second quesion for either one of you. Since the orbiter will have no lighting, lighting, what precautions are being taken to a possibility of other aircraft coming into that area where they wouldn't be able to see you?

BRANDENSTEIN Well, as you know, over the whole United States there's control centers that handle all the traffic, air traffic flying, and they're all under radar control. And NASA coordinates with the air traffic control system to essentially clear up that. And normally where we're flying over where there the normal airlines are flying, we're well above the altitude that they fly at. And once we get into the Edwards Landing area, that's a restricted area that is closed to all air traffic exclusive of us when we come in for our landing. So there's no problem of running into anyone.

TRULY It's their problem anyway, we're bigger than they are.

PRESS More in terms of small civil aviation, someone who might not be under radar contact who might actually slip into that area without intentionally being there.

TRULY Well, as Dan said, we haven't had a problem when the FAA has closed the areas for us, even in the daytime, and this is going to be 1 o'clock in the morning. So, a civil airplane would almost have to really want to be there to go there, and when he does, he's not going to see us. But we've handled it procedurally with, by using the restricted areas in the past and I'm sure that that will work just fine this time, too.

DAVE DOOLING (HUNTSVILLE TIMES) I've got several questions and we're running out of time here. For Bluford and Gardner. On the cancellation of the IUS and adding the PFTA, do you feel, ignoring the catch-up training, do you feel that you've been given a more challenging mission with the RMS work than you would

have had with IUS?

GARDNER It's more challenge for me, Dave, only from the standpoint that I've had less time to get up to speed on the arm than we had on the IUS. As Dick mentioned, we went through, with STS-6, all of their simulations, we're training along with them because we were a parallel mission and we were very comfortable at the end of that time. And now, in the last few months, we've had to switchover and go to the arm. So, it's only more challenging, I think, for me because of that shortened time. Richard, of course, had the experience from flight 2 on the arm. So, it was an easier step for him.

BLUFORD I'm just the reverse. I lost a set of responsibilities when we lost the TDRS IUS, so it really hasn't had any impact on me other than it loosened up my training versus increased it.

DOOLING For Guy Bluford, could you elaborate a little bit on the cells that are going to be refined, the kidney and pancreas are complex organs, could you give us a little more detail on what cells will be used?

BLUFORD Really I can't, other than they're going to be provided by the sponsors that I've already discussed, and our job is to separate them out on orbit and then return them to the various sponsors.

DOOLING Dr. Thornton, do you expect that the medical tests that Dr. Thagard ran last flight and that you'll run this flight will result in any changes in the experiment plans for Spacelab 3 next year?

THORNTON Yes, that's a distinct possibility, although, I think it would be premature at this time. Conversely, Spacelab 3 experiments are reasonably well frozen, but we may still have the opportunity to, if not modify those, I don't anticipate modification of existing experiments, but nevertheless to possibily add a few small procedures.

DOOLING Okay, finally for Dale Gardner, I'll like to pass on a comment remind you the advice that you gave me last September when we rode the KC 135, and remember that the key to not getting sick is don't think about it.

GARDNER Well, Dave, if it happens, you certainly gave me a good example on how to talk into that plastic bag, so.

DOOLING Yes, I did.

No further questions from Marshall.

PAO Any final questions from here in Houston.

GARY SCHWEITZER (CABLE NEWS NETWORK) Dr. Thornton, I'm just wonder why you didn't fly before Dr. Thagard. You designed many of the experiments and hardware that he used last time. Just a technicality in scheduling, or what?

THORNTON I'm not privy to the decisions that involve scheduling or I might have flown before. But, seriously, I think it turns out to have been a very, both wise, and optune schedule, because remember, Norm also had other duties which I had not been trained for. When he first was put on board, there was a very real possibility of an EVA, so he spent a good bit of his time on EVA. There's no way that I could have come up to speed for that sort of thing. And as it has in fact turned out, in preparation of the experiments, hardware and so forth, it has been very well that I've had this opportunity for as much time as possible.

SCHWEITZER So you will not have any of the other duties that Thagard had?

THORNTON No, that is correct. Mine is purely medical observer with one or two very small exceptions.

MAZ RIZLEY (GALVESTON NEWS) Yes, Capt. Truly, since you're going to be communicating through the TDRS this time, does this mean we'll have fewer and shorter LOS periods?

TRULY Yes, I think it does. We'll have wider coverage, you know, of voice communication with the shuttle with the operation of the TDRS. As you know the TDRS-A will be positioned generally over the western hemisphere and so we will, for example, the LOS periods that we've had after Hawaii and prior to the States, and after the States and prior to Ascension Island, we'll generally have the opportunity to talk to Houston if necessary.

PAO ..take one more question so I don't get hopelessly behind on events for the remainder of the day, John Getter.

GETTER For anyone who'd care to address it, what's the story on the rats, and what provisions are being made to make sure they don't wind up like the ants?

THORNTON Yes, the story on the rats is that this is a portion of preparation for the student experiment which will follow on. It uses exactly the same cage, and NASA has taken the usual precautions. This is a new biological load that is different from mankind, so the cages are being thoroughly tested. There is previous, extensive history of flying rats in the Russian program especially. They have been adequately provided for with food, water containing food, they are breathing the same air that we breathe, same temperature, we are cycling their lights on and off to keep them happy. And see no reason at all to think that they will have any difficulties other than an exciting ride.

TRULY We'll try to bring them to the post flight press conference.

PAO On that happy note we end this with our thanks for your time and attention.

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