

# NASA ORAL HISTORY PROJECT

## ORAL HISTORY TRANSCRIPT

JAMES R. THOMPSON, JR.  
INTERVIEWED BY KEVIN M. RUSNAK  
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RUSNAK: Today is April 29, 2002. This interview with former NASA Deputy Administrator and Marshall Space Flight Center Director, J.R. Thompson, is being conducted in the offices of Orbital Sciences in Huntsville, Alabama, for the NASA Oral History Project. The interviewer is Kevin Rusnak.

Thank you again for taking the time out this morning to spend with me.

THOMPSON: You're quite welcome.

RUSNAK: If we can start with, maybe you can briefly tell us how you ended up in the position to be returning to NASA in 1986 as part of the *Challenger* investigation team.

THOMPSON: Well, let me just start with a general overview of my total background with NASA. I graduated from Georgia Tech [Georgia Institute of Technology, Atlanta, Georgia] in '58, went into the Navy for a couple of years, then down to Pratt & Whitney in West Palm Beach, Florida, and in the early 1960s got enamored with NASA's lunar program, Apollo. So I left Pratt & Whitney—as a matter of fact, it was the day that President [John F.] Kennedy was assassinated—and came to Marshall.

So I arrived here in November of '63, and pretty much for that decade, for the rest of that decade, worked down in one of the Marshall laboratories, the old P&VE, Propulsion and Vehicle Engineering, on several of the propulsion programs at Marshall at that time, the J-2 engine, both for the S-II stage and then for restartable S-IVB stage. Spent a lot of time traveling out to

Rocketdyne—it was located in Canoga Park [California]—in the role of trying to assist Marshall and Rocketdyne in that engine development program.

Toward the latter phase of the 1960s, I got a little bit involved in the F-1 engine, which was the first stage of the Saturn vehicle, and then also was heavily involved in some of the testing done at Marshall on those engines once they were integrated into the various stages: the S-IC for the F-1, the S-II stage for the J-2 engine, and then the S-IVB stage, also powered by a J-2 engine. So I did that mostly through the 1960s. As a matter of fact, I was still working on the program when we had [Neil A.] Armstrong's landing.

Then shortly after that, the Center started working on some advanced studies of the Space Shuttle. But I was asked to work on the Skylab Program, which was a very early space station using the S-IVB stage, a spent S-IVB stage, an empty S-IVB stage that was outfitted. That ended up being a very exciting program.

I was working closely with Houston and the astronauts in what was called at that time the Man/Systems Integration. Again, I was still down in the P&VE laboratories. It was an exciting program because it got off to a very rocky start. We had a failure of the meteoroid shield at launch. So the stage got to the proper orbit, but the thermal protection was gone, and so for the first probably ninety days of that mission, the people at Marshall and the group that I headed and JSC were working on ways to provide the thermal protection. We came up with several schemes that seemed to work pretty good. The program ended up, in my view, being a great success. It went on house three crews, the first one for, I believe, thirty days, then sixty days, then ninety days, a total of nine astronauts. It was a very interesting program, started out, again, rocky, and ended up, I think, very successful.

Then shortly after that, I was asked by Rocco [A.] Petrone, the Director of the Center at that time, to head up the Space Shuttle main engine program, my background being primarily propulsion up to that point. That also was a very rewarding program. I think I was assigned to the Space Shuttle main engine—I'll refer to it as SSME—in May of 1974, and this was before

any engine tests. It was very early in development, and served in that role through about the third or fourth Shuttle flights. So it would be about 1982, the first launch being in 1981.

The very first engine test was called an integrated system test bed, ISTB, down at Mississippi [Test Facility (now Stennis Space Center), Bay St. Louis, Mississippi]. That occurred probably in 1976. It was a very rough, it was a very difficult program. The SSME was—the performance demands were very high. Starting the engine was one of its biggest challenges. Probably during the development program, as I recall, we had a number of mishaps. We blew up, I think, about eleven engines.

But the end of this story, I think, is very successful. The Shuttle main engine has been the backbone of the transportation program for NASA and the Space Shuttle since the 1980s. There's never been an in-flight failure. I think one engine was shut down prematurely on one occasion because of a safety—a piece of instrumentation. The instrumentation actually failed and detected a false problem and shut it down prematurely. But aside from that—and that mission went on to be very successful. But it was a very successful program, very difficult, expensive.

Shortly after, in mid- to late 1982, then I became the Chief Engineer at the Marshall Space Flight Center on all of its programs and served in that role until the spring of 1983. At that time I left NASA and Marshall and became the Deputy for Technical Operations up at Princeton University [Princeton, New Jersey] on their fusion program, and ran the James Forrestal campus fusion program at the Princeton Plasma Physics Laboratory. I really enjoyed that. It was a different pace, but it was technically very challenging. Harold [P.] Furth was the director. He was very much the scientist and led the fusion effort, and then he turned over all of the engineering in the operational laboratory to me. We had about 1,500 people. It was in the heyday of long gas lines and the Carter administration, and at the time the fusion program was on the cutting edge of science, technology, and engineering for the country. The primary facility

there was the Tokamak [Approach to Fusion Power], and that's all I'm going to say about that. But I thoroughly enjoyed my stay at Princeton and enjoyed it quite a bit.

Then in January of '86, I was in a meeting in my office, a group of engineers, as I recall. The secretary stuck her head in the door and said, "The *Challenger* just exploded." So we broke, and then I spent the next week or so listening to the news, as I'm sure everybody did, because I had a lot of friends at Marshall, grew up here, was very involved in the development of not only the SSME, but also the Shuttle itself.

Then sometime about two weeks later, Jim [James C.] Fletcher and Dick [Richard H.] Truly asked me to temporarily take a leave of absence from Princeton and come back and run the NASA investigation that assisted the [William P.] Rogers Commission and lead that activity that was going to be focused on at KSC. So I did that, and the title was chairman of that activity. Bob [Robert L.] Crippen was assigned the vice chairman. I focused primarily on the technical aspects of the investigation. Bob certainly assisted in that, but he was also primarily involved in the recovery of the crew and some of the hardware off the Cape that we eventually recovered and actually submitted the cause of the failure. But it was a very intense time. Had a lot of mixed feelings about it. But, anyway, I accomplished that, or I assisted in that job.

Then in July, probably, our support of the Rogers Commission was over. We had written our reports, submitted it to them. They had published their report. So then I rejoined Princeton. Several months later, Jim Fletcher called me and asked me to become the Director of the Marshall Space Flight Center, which I accepted, and reported to work there in late September of 1986. I served in that capacity up until 1989, as I recall, spring of '89.

Then the President, George [H. W.] Bush, number one, his staff asked me to become NASA's Deputy Administrator. I was confirmed by the Congress, I think in the spring of '89, as I recall, and served as NASA's Deputy Administrator under Dick Truly, who was the Administrator, until late November of 1991. Then I left NASA and joined Orbital Sciences.

So that's kind of a summary of my tenure at NASA, both in and out.

RUSNAK: Thank you for that overview. If we can then talk in some level of detail, starting with the Data Recovery and Analysis Team, particularly how, starting out, how you approached that particular task, what the goals were, what your findings were as you proceeded, and perhaps if you had drawn any conclusions as head of that prior to the end of your investigation, or what your thoughts were on the final report of the Rogers Commission.

THOMPSON: Well, let me start in reverse order. I thought the Rogers Commission did a good job at both concluding, which was supported by the NASA investigation, concluded the technical cause of the failure, or the problem. But, also, I think they did a good job of capturing the essence of other events and things that led up to the problem.

I think the technical, it took us about a month to be conclusive, but I think it was viewed, pretty early in that investigation, there were very strong signs that the solid rocket booster participated in the failure, perhaps initiated the failure. Exactly what the cause was, the rotation of the joint that failed, and why it failed on that launch, being a very cold day, was clearly a focus of the investigation. So it wasn't that hard of a technical mystery to come to grips with. I think there were plenty of signatures and signs. We had very extensive data in terms of telemetry, and so we pretty well zeroed in on the problem. Then, as I mentioned earlier, the recovery of the booster hardware, as a matter of fact, the identical spot that the failure was initiated in one of the joints, it was recovered, and so that just added to a lot of data that we had at the time and made it very conclusive.

The other circumstances surrounding the failure, staying away totally from individuals, I think the program had been caught up in a syndrome that the Shuttle was operational. There were cost pressures to show that the Shuttle could pay its way. They were starting to fly commercial payloads. There was a lot of pressure on the flight rate up and down the agency, not just at the Marshall Space Flight Center, but throughout the agency, and I think driven somewhat

by Congress, the Shuttle was at that time, and is still today, in my view, a very unforgiving vehicle. There's a good bit of redundancy in it. It can be tolerant of some problems, but it's very unforgiving of anything of significance, and certainly a rupture of the case or a penetration of that structural integrity of the SRB [solid rocket booster] certainly can lead to catastrophic failure, and it did.

The Shuttle main engine has also a number of failure modes that can lead exactly in the same direction, but fortunately it's amenable to be tested very thoroughly, where the solid rocket motors, because of their size and the fact that they're not easily reused, in the course of the program they may have a couple of dozen tests and the Shuttle main engine could have over a thousand tests.

So the Shuttle engine is very thoroughly tested, and then if you pay a lot of attention to details in the interim, it can be a very successful program, as can the solid rocket booster, which has since been the case, and [unclear] a lot of the engineering and management credit on the program.

But it was a tough investigation, not so much technically, but because of the other aspects of it and the fact that although I spent a lot of time at Marshall, probably one reason I was selected to head up the NASA investigation from Princeton was that I wasn't at Marshall at the time. I was very familiar with the institution itself, but had not been involved directly in the development of the booster. There were a lot of facets to the failure and contributing elements, and most of those are outlined in the Rogers Commission Report, of which, on balance, I thought they did a good job. It was a tough subject to deal with. There were as many faults in the environment, in the management, tendencies, not only at Marshall, but also throughout NASA, and I mentioned, finally lay at the doorstep of Congress and the administration. So it was a tough investigation to deal with. Frankly, at the time that we concluded our report, I was glad to get back to Princeton.

Then, as I mentioned, shortly after that, the rebuilding aftermath of the Shuttle accident began at Marshall, and I was asked to lead that, and enjoyed that, primarily from the people involvement and the rebuilding of that team as much as the technical accomplishment itself.

RUSNAK: Perhaps we can discuss some of that rebuilding process. How did you approach the implementation of the recommendations of the commission? Where did you see as kind of a good starting place when you came back? What were these initial goals and your approach to accomplishing this?

THOMPSON: Well, the first job, of course, was to get the booster joint that failed, fixed. A good bit of that work, at least conceptually, was well under way before I returned to Marshall, and that was, as I recall, reasonably straightforward. The guys and gals knew what the problem was, and, frankly, knew several approaches to fix it. That wasn't the hard part. It took a lot of effort. The testing that I alluded to earlier was substantially beefed up. A number of scale tests were run, culminating in a half dozen or so full-scale firings, with plenty of instrumentation. We actually built in some faults to make sure that we'd adequately addressed the various failure modes of the motor, and ended up with a very solid design.

The more rewarding part of that assignment was rebuilding the Marshall team. When I arrived in late September, the Center was, understandably so, pretty much at a low in terms of morale. So I found it to be—everybody was very receptive to different leadership, just because of what they'd been through. I found the Center to be very responsive, very easy to lead. I knew a large number of the work force. They were very good, very solid, certainly wanted to do everything they could to try to right the ship. Again, very responsible, very supportive of me, and I just found it to be very rewarding.

RUSNAK: How did you go about rebuilding the team and their morale?

THOMPSON: Well, the focus was on the technical redesign. I don't recall some of the things we did, but we re-instituted, tried to make the engineering, the design process, very open, internally very critical, self-critical of what it would take to come up with the proper design. It was the openness that was easy to achieve. And then a number of other things. We started a daycare Center. We re-established contact with some of the old German groups. Opened up, also, the social environment within the Center, which I think helped the overall process. I'm sure that there were some reorganization changes that I made, but I don't recall them. I don't think there were many.

But, again, I found the people to be—and most of the people that were nearing retirement stuck with it until we got the first flight back, which occurred, I think, in late 1988, and then several more. Then my tenure was over, and I went on up to Headquarters, and Jack [Thomas J.] Lee, who had been the deputy there with me—and, again, let me add that Jack was very capable, very supportive, and made major contributions to that rebuilding era.

RUSNAK: Several times you mentioned the importance of creating this open environment, and that was one of the things Marshall had been criticized for, was the lack of this. How did you feel about that?

THOMPSON: Well, I've heard that, and I guess I can relate to it. My own relationship at Marshall, my own experience, I'd never had the feeling that the Center didn't want to hear bad news. I mentioned earlier that the program that I headed up, the Shuttle main engine, was probably the most troubled development program perhaps in the history of Marshall. So I was on the phone daily, nightly, relaying some of our test problems and experiences, and never had the sense that anybody in the Center management hierarchy didn't want to hear bad news. They

understood what we were trying to do, were very supportive, tough in terms of challenging the direction we were taking in the development process.

But my own personal experience didn't replicate what I've heard others at Marshall say about the time that led up to the *Challenger* experience. I don't question that; I'm just stating that my own experience in a very troubled program, I found the Center to be pretty open, I mean self-critical, challenging of some of the development paths and directions that we took. And I'll leave it at that.

RUSNAK: On a related note, by the time you returned to Marshall as the Center director, how much of the German influence and sort of culture they created was still permeating the Center?

THOMPSON: Well, I think most of the transition from the German management team occurred during Rocco [A.] Petrone's tenure, and I believe that was, by and large, completed by maybe the mid-1970s. I mentioned he appointed me as manager of the Shuttle main engine in '74, and I think within a year after that, he had gone on up to Washington, as I recall, at Headquarters. So that transition was done. There were still a few that were there, but the basic German team was gone a dozen-plus years before the *Challenger* accident. A number of them still stayed in the Huntsville community. I remained good friends with some that I'd known quite well.

Then when I came back as a director, I thought one of the things we should do, although most of them were way beyond retirement age, was to re-establish the ties, and it was more a social thing than anything else, but I think it was generally well received by the German team and also the employees of the Center. So it was an easy touch to do.

RUSNAK: How would you describe the culture at Marshall during your tenure as Center director there? What were some of the core values at the time?

THOMPSON: The culture of the Center has always been, up until the time I left the Center—and let me add, I have not stayed that close with Marshall, just because I have gone into private industry, and I always remember when I was the Center director, you didn't need a lot of help from the people that had been there before, so I hadn't been back that much. But Marshall always has been a very proud institution, and they've got a lot to proud for. The engineering standards were very high.

If you just look at the program, starting with Apollo and Saturn V, although they preceded that, but then I've mentioned Spacelab and then Skylab, the Lunar Rover, the development of the Shuttle main engine with the three predominant elements that Marshall was responsible for, the external tank, the solid rocket motors, and the solid rocket boosters, and then the Shuttle main engine, and if you look at all of that and sum it up, clearly the engineering achievement is astonishing. It was first-class. It's always been one of NASA's largest Centers. It's been viewed as a development Center. In other words, that's where the focus of a lot of the development activity on these major programs and, of course, the Space Station were started during my tenure at Marshall, and Marshall was assigned major elements of that.

The Rogers conclusions are well known in terms of their view of the closedness—I'll use that term—of the Center, but I've mentioned that my own view, having managed one of their most troubled programs, I did not experience that first hand, but do not quarrel with their judgments either. But from [Wernher] von Braun through Bill [William R.] Lucas, the demands on the engineering team were very challenging and very tough because the job was tough. I mean, anything less would have not yielded the product that their leadership yielded. So you don't get a free ride in life. I mean, if there are pluses, there are perhaps minuses as well. So that would be my view.

RUSNAK: From your previous experience on Skylab, the Man/Systems Interface there was one of the key areas between Marshall and the Johnson Space Center, one of those interfaces. Now

as Center director, you're working with a lot with the Johnson Space Center, again, on Space Station, for example. How would you describe that relationship and how had it changed over time, and perhaps how you strove to either improve that or to work that maybe in a different way?

THOMPSON: I never really saw the tensions that others have reported between the Johnson Space Center and Marshall. Back on Skylab, clearly we had some differences of opinion. As a matter of fact, that's where I got to know Dick Truly well, Bob Crippen well, Bill [William B.] Lenoir well. It was in the early days of Skylab. I think we established friendships that I think exist to this day. Again, we didn't necessarily agree on everything, but I thought we worked pretty closely and well together to evolve, in the case of Skylab, what I mentioned was a very successful rescue of that program, and eventually the mission accomplishment itself, I think, spoke well for the way the two Centers worked together.

Now, in the Shuttle, although Marshall had the primary responsibility for the development of the major elements, the tank and the engine and the solid rocket motors, the Johnson Center had the management responsibility for the overall program. In addition to the Orbiter, they had the integration responsibility for the propulsion elements at Marshall. So I, again, them having that role, reported to them on the program, and found them to be very easy to work with. I thought Chris [Christopher C.] Kraft [Jr.] did an excellent job of providing the leadership to the overall development of the Shuttle. On that, let me just add, before I forget, that John [F.] Yardley was the single driving force in that entire program, John, who passed away toward the latter part of last year, I think.

I think the relationship between Marshall and Johnson over the years has been healthy. There have been the natural tensions, but not anything that you wouldn't want. I mean, you wouldn't want two organizations with different responsibilities to not have the natural tensions.

Most engineering is not black and white; it's shades of gray. So I think those differences of opinion and tensions are very natural and healthy.

RUSNAK: I've heard it described as actually improving the way the engineering was done, because you have these differences of opinion that force both sides to look at their approaches, refine them, and come up with the best solution.

THOMPSON: I think probably that's true.

RUSNAK: I've certainly talked to a lot of the engineers at essentially every level there.

With the start of the Space Station, what do you recall of the early organization of Freedom and the responsibilities Marshall had and that was divided up amongst the other Centers as well?

THOMPSON: Boy, that's been a long time ago.

RUSNAK: A few changes since then.

THOMPSON: Well, of course, it was initially sold by Jim [NASA Administrator James M.] Beggs to Ronald [W.] Reagan when he was President, and it was an ambitious project at the time. I think since that time it's only grown in scope, and I think some of that has created some of that growth, which, as I look back on it, I think is totally unnecessary to achieve the original objective, and I think that's added a lot to a lot of the cost problems. You can have small space stations. You can have cheap ones. Skylab was that and, again, very successful. I think it grew too big. It wasn't sized that big to start with.

I think the international—this is a political decision, but getting as much international involvement, as occurred during the [William J.] Clinton administration, I personally believe was a mistake. Politically it might have been exactly the right thing to do. I can't make those judgments. But that program was hard enough without getting the complexities involved with all the international interlocks in it, and just made it tougher. Congress always has different views of that. The politicians view it different. I think, on balance, it was an engineering mistake. Whether there were really broader objectives, I'll leave that to others. But it'll probably end up okay.

I think the biggest thing that you need to do now is spend a lot of money on it, is to make sure they use it and staff it right, by the size of the crew. I don't see how a crew of three can justify the size and the investment that we've made in it. But others are dealing with that now. That's not my problem, and I'm not going to add to it.

RUSNAK: Issues with Space Station followed you up to NASA Headquarters, where you have design reviews, you have Congress becoming involved, asking for reviews, that sort of thing. Maybe you can talk a little bit about your perspective on Space Station as it changed, once you made the move to Headquarters.

THOMPSON: Well, it was still young. It was still on the front end of engineering. During my tenure at Headquarters, we did not have the extensive international involvement primarily with the Russians. That came later in the Clinton administration, primarily, I think, driven by [Vice President Albert A.] Gore [Jr.]. So the focus was on—at that time, at the Headquarters we set up an integration team to make sure that the integration was properly—at least what we thought at that time was proper to manage the various elements from Washington.

This was one of the lessons of *Challenger*, and that is to bring the program management at the real program level to Headquarters and not leave it down at a Center. I think that's right,

and that's we've tried to do since that time. I think it migrated back in the other direction. I'm not going to comment much on the reasons for that. But in any event, it was a tough program to get started.

Then I think it became even tougher when NASA and the administration tried to go international with it. I think it just made it more complicated than it needed to be, although maybe there were other objectives that were to be met, and that was the real reason for it. I'll leave that to them.

RUSNAK: Yes, it's the creation of the Reston [Virginia] office that I assume you were talking about when you were talking about moving the program to the Washington area, which was something of a controversial decision, at least at the Center levels, at the time.

THOMPSON: The Centers never want—you know, they'd like the control to be within the Center. I understood that. I was a Center director. But the single leadership of Apollo was at Headquarters, and that was true during Skylab as well. Once we established the Space Station Program, really got it off and running, then that was the primary function of the Reston office: integrating. Then soon after the new administration came in, they moved that back out into the field, which was just counter to the conclusions of the Rogers Commission.

Now, one can make the argument, but if you have it at Headquarters, it's more bureaucratic. If you put it down at the Centers, it can be more efficient. But at the same time, then I believe that you lose the oversight that's provided by the Headquarters management and leadership. If it's strong, then that's the reason I think it ought be up there. If it's weak, then you've got a fundamental problem. How it evolved after I left NASA, I have my suspicions, but I wasn't there. So I'll leave it to others.

RUSNAK: Was this the perspective that you brought with you to Headquarters, or did that develop after you became the Deputy Administrator?

THOMPSON: No, I participated in the *Challenger* investigation, paid a lot of attention to the findings of an outside group, the Rogers Commission, and I stated at the front end of that I did not quarrel with their primary conclusions. Several I did not experience first-hand, at least didn't think I did, when I was in Marshall, NASA. But their overall conclusions that programs ought to be managed right at the top out of Washington, on reflection, I think they're right. And I just didn't form that opinion now; I evolved it here while I was here at the Center. I thought that was right.

I know Dick Truly tried to institute that on the Shuttle. He provided very strong leadership in the rebuilding of the Shuttle before he became NASA Administrator. After he became NASA Administrator, he continued that, and in the Space Station Program, that was also continued. The leadership and the management at the top would be conducted out of Headquarters. It was later that it was more divested back to the Centers.

RUSNAK: You mentioned Dick Truly, who obviously is the man you're working under. If you could say a few words about him, the management style he had and his approach and how that affected your job and how the two of you divided up the labor.

THOMPSON: I found Dick very easy to work with. I mentioned I got to know him well back on Skylab when he played the role as CapCom. He was the ground communicator with the crew during the Skylab Program and was very heavily involved in the development of Skylab operational procedures and that kind of thing. So that's where I got to know him.

After the *Challenger* accident, he was brought up to Headquarters to head the Office of Manned Space Flight, which the Shuttle reported to. So he provided the overall management of

the return to flight after the *Challenger*. My job, again, coming back from Princeton, was to head up just the investigation in support of the Rogers Commission and then rejoined NASA as Center director of Marshall, asked by Fletcher, but also by Truly. Then when President Bush appointed Dick to be NASA Administrator, I was asked to be the Deputy Administrator. We knew each other well, had worked in the early days of Skylab and then later on in the *Challenger* investigation and to start that rebuilding. Then I was his Center director, still, when he headed up the Office of Manned Space Flight, who the Marshall Center reported to. Johnson [Space Center] reported to him, Kennedy [Space Center] reported to him, and Stennis [Space Center] reported to him.

So I knew Dick well, worked, I thought, quite well with him. When I became Deputy Administrator under him, I don't recall that we ever sat down and said, "You do this and I'll do that." But clearly he provided the outside interfaces with the administration, with Congress, more with the public than I did. My roles were more in dealing with the day-to-day operational parts of the job with NASA Centers and the NASA employees. So that was the first-order division of work.

RUSNAK: What do you recall of the confirmation process, going through congressional questioning, what kind of questions they were being asked, what sort of things they were interested in?

THOMPSON: Well, it was a fairly short hearing, as I recall. I was sponsored, so to speak, by Senator [Howell] Heflin, who was the senior senator from Alabama at the time. Senator [Richard C.] Shelby was the junior senator from Alabama. A number of the senators I had gotten to know somewhat because I was asked to testify after the *Challenger* accident, and in my role as the Director of the Marshall Space Flight Center. Senator [Fritz] Hollings, for one, who was very active in that oversight. Senator Gore, as well, from Tennessee. As I recall it, it was a

very noncontroversial hearing, fairly easy questions and none hard. It lasted about forty-five minutes or an hour, and that's the way I became Deputy Administrator.

RUSNAK: Sounds like an easy enough way to do it.

What were the goals you had in this office? What kind of direction did you want to take the space agency?

THOMPSON: Well, although the Shuttle had started flying again, I think the number one thing that was on Dick Truly's mind, as well as mine, and that was to make sure that the infrastructure was in place, the institution was in place, it would not allow it to happen again, at least the way it did. So that was a priority.

So a lot of time was spent on making sure that Space Shuttle program was healthy. The Space Station was starting to grow, was taking a lot of time. But looking back on it, it was still quite young. But we were trying to establish that organizationally. It was structured in such a way, at least we thought, to avoid some of the mistakes of prior programs, and following, again, to first order, some of the recommendations of the Rogers Commission. I believe that both Truly and myself encouraged an openness, open in the communication sense.

The Space Council got very active at that time, under Vice President [James Danforth] Quayle's leadership. I think Dick had some differences with him, and that eventually led to some disagreements that he had with the administration. But I found Dick to be a very effective leader, worried about all the things you'd worry about: cost, safety, exploration. He was very much an advocate of that. I thought it was a sad day when there was that change in leadership between Dick and his successor.

RUSNAK: Did you have a chance to work with the Space Council yourself?

THOMPSON: Yes, it got to be an active group, and I think represented the President's wishes well. I enjoyed them. I think individually and collectively I didn't, as I recall, have any real issues with the group.

RUSNAK: One of the things President Bush kicked off was the Space Exploration Initiative, looking at some perhaps aggressive options for the future. What were your thoughts on those, and how did NASA deal with this direction coming from the administration?

THOMPSON: Well, it was the kind that doesn't happen frequently, so you get aboard. I mean, the President said he wanted to go Mars, and he had asked NASA to put the planning in place. Looking back on it, the one thing that wasn't done by the administration was prepare the Congress. Somebody's got to pay the tab. Whatever the number was—and I don't remember—hundreds of billions, half of that, a third of that, whatever, it's still a big number. The times were such that the Congress wasn't aboard. It was easy to get NASA aboard. The public was—I'm not sure they were properly prepared. But Congress clearly wasn't, and so the initiative went on for a year or two and then just kind of died out, just because of lack of funding. The studies and that kind of thing went on for a while, but there was nothing really active.

I personally think it'll be a long time before anything like it is revisited. Times are different today: healthcare, education, and now, more recently, terrorism. So initiatives like "Let's go to Mars" is just not in the cards.

RUSNAK: It very much boils down to money, as you pointed out.

One of the accomplishments of your and Dick Truly's administration is securing funding for the Space Station so that development can continue despite some close votes in Congress. How did you go about approaching advocating the Station, and what were your thoughts on continuing that program?

THOMPSON: Well, Dick and I were both very big supporters of the Space Station. We thought it was the right thing to do. Dick spent a lot of time on the hill with Congress. The legislative fellow that he brought into the agency, Marty [Martin P.] Kress, I thought was very effective. Marty came from Fritz Hollings' office, as I recall, and served on one of his committees.

But that was a high priority for us, you're right. The votes were close at times. But the program went ahead. I thought it got off on a good start, and then later it seemed to grow too much and got too big, too many involved, international. I'm not going to play back through that, but I thought it got out of hand.

The other thing that I thought got very much out of hand within NASA is this "faster, cheaper, better" stuff. It didn't work. It never has worked and never will work. Space flight is very hard and difficult if you do it right. If you try to get a free ride, you're only going to have major problems. These unmanned Mars probes that fail for silly reasons are examples of that. There have been others.

So I thought it was a shortcut, so to speak, the agency took during the nineties that I thought did not serve NASA well over the long haul, and I think that's the detour that they took, that it's going to take a while to get back.

RUSNAK: Since you've mentioned that, it seems that one of the precursors to that idea was revamping the Earth Observing System satellites from the system of fewer, it's like \$3 billion satellites, and replacing them with many smaller satellites.

THOMPSON: If you don't like big satellites and you want to focus on more that are smaller, I think that's fine. That's not what I'm talking about. What I'm talking about is having stated as an objective, "I don't want big satellites, I want small ones, and I want to do them on the cheap." That's a mistake. It never worked. Lewis and Clark failed, a little bit for that reason. The two

Mars missions failed. They stopped and started the X-33 and X-34 Programs. Those were not well thought out by NASA when they started them. You don't start an endeavor like that and then stop a third or halfway through. So having been a director of Marshall, having been a long-time employee of this Center, having ended up in the administration in Washington, I look on the 1990s as a detour that NASA took that did not serve it well.

Here in the last decades, the budgets have not just been flat; they've been decreasing in terms of buying-power. I don't think NASA properly communicated to the Congress the worth of the agency. It almost came across like, "You want to do NASA, or invest 2 billion less? We'll go one better. We'll make it 3 billion." And that sounds good. That makes for a nice press conference, but it's done a lot toward a "faster, cheaper, better" that failed. It's done a lot toward demoralizing, I believe, the overall NASA work force. If you look at what's going on today, what's been started, what's new, very little, very little, and it's going to take a long time to bootstrap that back up, I think.

RUSNAK: Before we run out of time, there were a couple other specific things I wanted to ask about, starting with the Hubble deployment and the mirror problem it had.

THOMPSON: The aftermath of the deployment, when we found out that the mirror was faulty, was very disappointing. That was a problem that had been laying in the weeds there for probably a decade and a half, from the time we launched it. The Hubble has since been shown as very serviceable. It could be corrected, but it was a tremendous disappointment initially, and I think NASA's done a fine job of recovering and going on to make it a far more useful telescope than was ever envisioned.

RUSNAK: Another one was the problem the Shuttle Program was having with hydrogen leaks. I guess it forced the grounding of the program for a period of a few months.

THOMPSON: There were several runs in there where we seemed to have a number of hydrogen leaks. I don't recall any single reason for them. I don't recall any particular reason for them, except they plagued us for a period of about six months, and as I recall, we finally stood down for a month or two and spent an awful lot of the time inside the inner stage running down the reason for them, because there was some problem there just winking at us, and we had to get it fixed, and eventually we did.

I think the recovery of the Shuttle Program after the *Challenger* accident, which was caused to happen by a large number of NASA employees, as well as contractors, that I thought did a super job.

RUSNAK: Clearly, the recovery process in getting the Shuttle Program back on a firm footing is a major accomplishment of the administration you were a part of.

One of the other significant events from that time period was Norm [Norman R.] Augustine's commission and the report they put out. What were your thoughts on their conclusions and recommendations for the future of the space program?

THOMPSON: Well, I thought they did a good job. The one thing that I think where they missed the boat is they were seeing a NASA budget increase of 10 percent a year for a number of years, and, of course, that didn't happen. So it was a misreading of what could be done in the Congress. But I thought their report was very constructive. Where it was critical of NASA, it was on target. So I didn't have any issue with it.

RUSNAK: Unless you'd like to say any words about why you chose to leave NASA and go into private industry, we can close.

THOMPSON: Well, it was fairly simple. I was in my mid-fifties. If I was ever going to do it, join the private sector, that was the time. Orbital Sciences was a company that I did not have a lot of involvement with at NASA, so there were certain restrictions. It was a young company, growing, dedicated to making some of the smaller space products. I like that part of it, always have, and for that reason joined Orbital and I've enjoyed every minutes of it.

RUSNAK: Great. Thank you very much.

THOMPSON: Thank you.

[End of interview]