NASA AT FIFTY ORAL HISTORY PROJECT
ORAL HISTORY TRANSCRIPT

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INTERVIEWED BY REBECCA WRIGHT
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WRIGHT: Today is March 6th, 2007. We are in Mississippi at the John C. Stennis Space Center to speak with the Center Director, Dr. Richard Gilbrech, for the NASA at 50 Oral History Project. The interviewer is Rebecca Wright, assisted by Sandra Johnson. Also with us today is Paul Foerman [News Chief, Stennis Space Center External Affairs and Education]. In preparation for the space agency's fiftieth anniversary, the NASA Headquarters History Office commissioned this oral history project to gather the thoughts, experiences, and reflections from NASA's top managers. The information recorded today will be transcribed and sent to the NASA Archives in Washington, D.C., where it will be accessed for future projects.

Are there any questions before we can start?

GILBRECH: No, I'm ready to go.

WRIGHT: Okay. Well, we thank you for providing us this time, and we'd like to start by asking you to briefly describe your background and how you came to this position here at Stennis.

GILBRECH: Okay. I wasn't sure how far back you wanted me to go.

WRIGHT: As far back as you'd like.

GILBRECH: [Earlier] You mentioned interviewing Neil [A.]Armstrong. That was actually my first hook into NASA. When I was seven years old and fresh out of first grade, my dad kept my family up to watch the Apollo Moon landing in July 1969, and I just got hooked and fascinated with the space program from then on out, and had pretty well geared my whole life towards trying to get an astronaut flight. I always had dreamt of being an astronaut and was very much an adventure seeker.

The other thing that coupled with that was that I grew up on a farm in Arkansas, and we had crop dusters. I was basically a human flagman for the crop dusters at the time, which meant you would hold the flag, and the airplane would fly over. You'd make so many paces, and then they'd fly over again. But I got to see these beautiful patterns that the wings would make with the chemicals. And I'm healthy today, I'm glad to say. [Laughter]

But I really got hooked into aeronautics and aerodynamics at that time watching the spray pattern of trail edge vortices. Also the pilots would take me up when the winds were too high to fly the different chemicals, and I just fell in love with aeronautics, so that kind of had me hooked in there. I had wanted to be a fighter jet pilot, but my eyesight was too bad, and so I knew I couldn't get jets and go up as a flying astronaut. So I felt my only other option was to be a scientific astronaut. So I set my sights on a first-class education and decided that I would go all the way through a doctorate program and then try to get on with NASA and know the system and then apply for the Astronaut Program.

So that led me to Mississippi State, where I got my undergraduate degree in aerospace engineering. Then I shot out to the West Coast after that and got my doctorate in aeronautics from Caltech, the California Institute of Technology. I also had a little bit of space flavor there. I minored in planetary science and had some really neat experiences. It always spurred my

interest in NASA, knowing what they were doing. We were right next to the Jet Propulsion Lab [Pasadena, California].

I also got to work with Dr. Gene [Eugene M.] Shoemaker, who was of the Shoemaker-Levy fame. He told me stories about astronaut "Jack" [Harrison Hagan] Schmitt, Senator Jack Schmitt; and Gene actually took the whole class, one of our classes, out to Meteoric Crater out in Arizona. We spent the night there looking for meteorites, and he explained all the things they'd done training the astronauts. So, again, just built on the motivation to join NASA and see if I could get a slot.

I finished up my doctorate and then came straight out, with my degree in hand, to Stennis Space Center in 1991. I signed on here as a fresh-out with a Ph.D. and went to work here and had really not had any experience in rocket engine testing, which is one Stennis' two main missions, but learned quickly about cryogenic fluids and rocket engines and that whole test side of the business.

I pursued my astronaut dream right up to the point I found out I had a heart murmur, and that pretty well put an end to that trail, but it opened up some more trails that have been very fruitful for me.

I've been able to have a wonderful experience and know a lot of the astronauts and have kind of gotten the inside scoop of that whole line of what NASA does and get to be involved in all the Shuttle preparation and Shuttle launches, so that's kind of how I meandered my way into my current position.

In '91 I started on here, and ten years fast forward—worked a lot of programs during my tenure here, the X-30 Program that NASA was working with the Air Force; the Orient Express during [Ronald W.] Reagan's term. Then transitioned into the X-33 Program, which was going

to be another one of the Shuttle replacement concepts. Then in 2000—I had never really worked, although I wanted to be an astronaut, —but had not worked in the Space Shuttle Program proper. Even though we tested the Space Shuttle main engines here, and I was around in all those years, I was always on the developmental side, working the new X vehicles, the X-30, the X-33, and had never really directly worked with the Shuttle Program.

So I wanted to jump right into the middle of it, and had an opportunity to go to the Johnson Space Center [Houston, Texas] [JSC] and do a detail with Ron [Ronald D.] Dittemore, the Shuttle Program Manager at the time. That was a little bit of an offshoot from the experiences that I'd had here. Had a wonderful six month experience where. I got fully immersed in Shuttle.

Even though I was familiar with NASA and thought I knew every acronym in the book, it was a whole other language when you entered into the Shuttle Program. [Laughs] It was a baptism by fire with Dittemore. He liked to throw you in the middle of it and give you some loose direction and expected results.

But that was a great experience. JSC was a wonderful place to work. The workforce was extremely focused on the mission, and that was a little bit of a contrast to what I had done here and all the research that we had done and the developmental testing, as opposed to mission support. Everybody there knew what the next launch was, when it was supposed to be there, what activities had to take place before you could do the Flight Readiness Review, and they pared their focus down on those milestones and made sure that they did everything they could to meet them, as opposed to a lot of the development work that we had before that was looser—I call it looser or not as stringent disciplined milestones that everybody was pulling towards.

So it was definitely a contrast to me as to how the research and development side of NASA works, as opposed to the operational side. But a lot of great takeaways from that whole experience, and I made good relationships that have really been invaluable to me.

After that detail was over, I did a little bit of struggling. I was very tempted to stay on at Johnson, and of course, they were trying to draft me into the Shuttle Program, but my wife and family were back here. I'd also kind of had made a commitment to come back here to the Center Director at the time, and I just felt like it was the way, to come back here.

I came back here in 2001, and then about two years later *Columbia*, STS-107, came along. That, of course, was a major event for anybody in NASA, especially those that had been close to the Shuttle Program. After that period when the *Columbia* Accident Investigation Board released its report and they had recommended the NASA Engineering Safety Center [NESC] as a way to put some of the technical discipline or technical insight back into the agency and some independence. A good friend of mine, who I had worked with during the detail at the Shuttle Program, Ralph [R.] Roe [Jr.], was tasked to go and start up the NESC.

He called me up and said he needed some help, and it was going to be up at Langley [Research Center], [Hampton] in Virginia, and wanted me to come on board and help him start it up. I had a world of respect for Ralph and a good friendship with him, and so I answered the call and packed the family up again and went up to Virginia. [Laughs]

So I was able to take part in the building of a new organization, which was really fascinating, and got to see Ralph in action firsthand, which was pretty impressive. I had never been to Langley, either. And even though I'd grown up and trained in aeronautics, I had really not done anything in classical aerodynamics and wind tunnels and things like that, so it was exciting for me to get to go to Langley.

We lived in Williamsburg, which is also a nice place to call your home, and I thoroughly enjoyed Virginia. We were up there about three years. My kids loved it. My wife loved it. I like to joke, because when we left here there was tears and sadness. "How can you pull me away?" It's my wife speaking, of course. So we get up to Virginia, and immediately she settles in, falls in love with it, and then when I get the call to come back here to Stennis, it's tears again. I said, "Now we can rewind, and you'll see that everything works out. It's just the way of a career."

At any rate, I had a great time at the Engineering and Safety Center in Virginia. I think the thing that that really brought to me was getting to have insight and experience and involvement in all the other areas of NASA. I kind of had had a myopic view of NASA because of being at Stennis and Johnson and dealing mainly with Marshall [Space Flight Center, Huntsville, Alabama] and Kennedy [Space Center, Cape Canaveral, Florida] and the human space flight arena.

I had really not gotten to taste the aeronautic side, the Earth science, the space science side of what NASA does, so that was really enriching to me to be able to—because the NESC, everything was fair game. We got requests from all over the place that all different areas of NASA was working on, so that was probably one of the neatest things to me was to be able to go there and get insight into spacecraft and airplanes and all kinds of issues there.

It was just a great group to work for, really, some bright people, and it kind of brought me back into a technical arena. I had kind of gotten out of that with project management, and it was kind of nice to get an infusion of real technical experience again.

About probably two and a half years, two years after I'd signed on and had been doing that, I had worked my way up to be Ralph's Deputy in the NESC. Then his wife Lesa [B. Roe]

had been selected to replace Roy Bridges as the Center Director at Langley, and she needed a Deputy, and she asked me to step up and be the Deputy. So I got to work for the other Roe at NASA. [Laughs]

WRIGHT: We won't ask you to compare.

GILBRECH: Both great experiences, different and unique, but just, great friends of ours, and that was a great experience for me, because I spent about four months working under Lesa. It was kind of an intense initiation into that level of management at NASA. Within the first month we both took our inaugural visit to Capitol Hill, and we learned the ins and outs of going to Senators and Congressmen and trying to be prepared for what their constituency interests were, and also to know what your NASA message was, what your issues in their particular districts would be.

It was just a real education for me. I didn't realize at the time how valuable it would be to me four months down the road when I was—I thought I was going to be Lesa's Deputy for quite some time, but Bill [William W.] Parsons [Jr.], who was the Shuttle Program Manager post-*Columbia*, had been asked to come here, and then he had moved on to Florida, and I got the call that they needed somebody to come back to Stennis and take over the reins here. So after four short months of enjoying the deputyship at Langley under Lesa, they gave me the call, and I was thrilled to accept the position to come back here as the Center Director.

Actually, I can remember in 1991 I was sitting at this very table about two months after I started with NASA, and the Center Director at the time, Roy [S.] Estess, was sitting in this seat looking at me across the table, and he says, "Well, you know, you're a bright young engineer. What do you want to do with your career?"

I said, "I want your job someday." [Laughs] So it took me about fifteen years, but I finally got to take over his seat.

So I've been back here a year now, and of course, I came in after [Hurricane] Katrina, so it was a different Stennis than what I had remembered. But it's been a real pleasure to be back, and it feels like home to me. Twelve out of my fifteen NASA years have been at Stennis, so I know the people, I know the business, and I know the area, so it's been a great homecoming, so to speak, for me. That's kind of a roundabout way of how I got to where I am.

WRIGHT: [These have been] full and busy years of your life, and you've had a chance, as you mentioned, of seeing different parts of NASA. Could you share with us what you feel has changed about the space agency from the time that you started to the time you are right now?

GILBRECH: Yes. Of course, when I started, Dick [Richard H.] Truly was the Administrator at the time. He was only in there for a short period as I came on board, and actually Roy Estess, the Center Director, had been called up to Headquarters by Admiral Truly to help him, and then Roy actually rode through the transition into the Dan [Daniel S.] Goldin years.

I just remember that time as being—it was exciting, because you had a new leader, and people didn't quite know. He was very dynamic, but you also had a lot of angst, because he kind of had a reputation as -- I wouldn't call it a hatchet man, but an agent of change. So people were a little nervous, and he [Goldin] had this faster, better, cheaper philosophy, and really it was a pretty hardnosed style.

From where I was at the ranks, I didn't really get a lot of exposure to that, but over the years when he was in tenure, as I worked my way up, I got more and more insight into his

leadership styles. But it was a downsizing period, at least in the Shuttle Program. They were constantly being told, "You need to do more with less. We need to cut back, and we've got to make room for a new vehicle, and so you've got to take cuts." I just remember feeling that kind of pressure all during those years stuggling with where do we draw the line? How much cutting is going too far? That was always a dilemma that the people within the program struggled with.

But it was also a time of interesting new development. Like I said, the X-30 was in full swing at the time, and I was in the middle of working with that. Then we also had the X-33 and the Reusable Launch Vehicle Program that was supposed to replace the Shuttle. That era, it was exciting. I always wanted to be in on an Apollo-scale development of a new vehicle, and I missed Apollo. I missed the Shuttle development years. So I got to see the X-30.

That one, unfortunately, was just a little too ambitious. It was also one of the last, I think, joint DOD [Department of Defense]-NASA programs, at least that I can recall, and that one probably makes us, I think, both agencies, cautious as to going back into joint development programs. But it was a wonderful program, but I think it was a bridge too far for the amount of technology that they had to deliver.

Then we transitioned into X-30 and went through that era, and still wasn't able to come out the other side with a successful vehicle. So we're back to the Shuttle Program. It has to keep doing its job for a lot more years.

[Space] Station was probably—it had evolved over paper designs from *Freedom* to the *International Space Station*, and that was an era when George [W. S.] Abbey and Dan Goldin had crafted this Russian element and bringing international partners in. To me that was a real—call it what you like, but that was probably the only thing that saved the Station Program. I think it was insightful of them to do that, and certainly it's a great thing right now, especially when we

had such a down period with *Columbia*. If we wouldn't have had the Russian partners to serve the Station, I think we'd have been in a very different position right now.

But at any rate, I was trying to kind of wrap up the Goldin era, so to speak.

Then enter [Sean] O'Keefe. We had poor standing with Congress. I think our relationship with the White House wasn't that great, and they brought in Sean O'Keefe, who was from the Office Management and Budget, was an insider with the administration, had a reputation as an austere budgeteer, had been a critic, and had worked a lot of NASA issues. So he got the call to be our new Administrator.

I think he did a great job with what he was tasked to do. He was told to come in and fix the budget credibility, clean up the accounting systems, get the programs to deliver more on what they're promising, and keep costs under control. For the three or so years that we had Sean, it was basically get your accounting in order. Then, of course, *Columbia* came along on his watch, and we all responded to that and then tried to figure out what happened, and how are we going to fix it and how are we going to get back to flight.

Then at the tail end of his tenure we had an Exploration Vision with the President coming to Headquarters in 2004, and that really jazzed me up, because here was my Apollo-scale effort that I've always dreamt of.

In the beginning it was worrisome, because you had Admiral [Craig E.] Steidle on board, and he had one concept of how he was going to do Exploration. To most of us who wore civil servant badges, it was a nervous time, because it didn't include a lot of NASA involvement. It was basically let's go out and buy Exploration the way the Department of Defense buys advanced fighters, which was Admiral Steidle's background. So I felt like even though we had

this great opportunity, I was going to watch the contractors do everything, and we were going to be on the other side of the glass.

I will say that it was refreshing when Mike [Michael D.] Griffin came in, and now enter our true rocket scientist at the helm of NASA, one of the smartest people I've ever run across. Also, I really, really like Mike, not just because he's hired me to do this job, but I just have always admired him over any of the times that I've had acquaintances with him or heard him talk at Earth orbit conferences or seen him in print. He just is a no-nonsense guy, he's brutally frank and honest and there's no guesswork as to where you stand.

That was a drastic change from a Dan Goldin to an O'Keefe to, with Mike, it's very clear where you stand, where he's going, what he needs of you, and what he thinks. There's not much that has to be left to the imagination. I really like his style, and I've enjoyed working for him in this first year. I think he's got a great leadership team in place, and it's been a real privilege to work with him.

It's very exciting in the exploration arena to be heading where we are. We've seen a few gyrations in that program even since Mike Griffin's come on board. We've changed the architecture pretty drastically about a year ago to make it more feasible and achievable with the budget constraints we were handed by the Congress and the White House.

At any rate, that's another longwinded answer to your question. [Laughs]

WRIGHT: That's the kind we like. While we're on that subject, why don't you share with us what part Stennis have in achieving the Vision for Exploration, and what are your plans as Center Director, your strategy to keep Stennis involved in that?

GILBRECH: I'm gratified, having left Langley, where aeronautics was being cut, job future was uncertain, [where] the mission was—we were having to retool the center to go from a classical aeronautics research center to how do they get more exploration business. Then I come here, and, they're struggling, trying to keep up, continue the SSME, the Space Shuttle Main Engine testing and gear up and figure out which stand they're going to use for Exploration work that's coming. So it was kind of the opposite; it was the flip side of the coin. Here it was kind of a worry about how are we going to fit all this work in, as opposed to where I had just left, where it was a lot of discord about what's our job future, what is our center's future.

When I showed up here [as Center Director, February 2006], there was already a lot of plans on the books about testing new rocket engines. As I had mentioned they started out with an architecture that had Space Shuttle main engines as the primary engines for the first and the second stages. So it was going to be just a lot more of the same. We knew how to test Space Shuttle main engines. We were just going to be testing them in different flight environments than we were used to, or to simulate different flight environments. So that was a bright future.

Then they changed gears to the J2X architecture with the upper stage and the RS-68 Delta 4 engine for the *Ares V* first stage. The RS-68, of course, we had been testing here, or the Pratt-Whitney Rocketdyne Company has been testing that as a commercial entity; basically has been leasing one of our big stands, and they did all the development here. So we're very familiar with that, so it's comfortable place to be. It kind of anchors you in the future for at least that part of the program, that they're going to continue to test and supply those engines to the Air Force's expendable launch vehicles, but also would look towards developing and adding a little more technology for NASA's needs in the 2010, 2014 time frame when we start looking at the big booster for a Moon shot.

But again, the J2X also was chosen for the upper stage, and it has a lot of developmental testing, even though it's a heritage engine. It's an engine that was used in the Apollo Program as a second-stage engine; this is an evolved piece of that puzzle. I had some personal experience with the J2 engine, because we had used those pumps, with some modifications, for the X-33 Program, and I was the X-33 Program Manager at the time here. We had actually taken the pumps off of old Apollo—I think it was the Apollo 18 flight set—and they had used those for the development of the X-33 linear aerospike engines.

We had already done some recent—I would call it recent history; had some recent history experience with the J2 evolved pumps and the linear aerospike. So now we're going into kind of the third installment of J2X hardware, so it's, again, kind of familiar ground, but it's exciting new technology that has to be developed, and a lot of testing.

We recently handed over our A-1 Test Stand to the J2X Program; took it out of the Shuttle bullpen and turned it over to Exploration. Now we're modifying it to start on to the J2X engine development.

Then our B stand, the B-2 stand, has classically been where we do large stage-type testing, and it's right now slated to do sea-level upper stage testing for the *Ares I* vehicle, and then eventually we'll do the first stage of the *Ares V*, the big booster that will be down the road that it will take for Moon shots.

WRIGHT: You mentioned a couple of minutes ago some people who have sat in your chair, and each have left their own mark. As Vision for Exploration is now beginning, what do you see as your vision for your center, and how are you beginning to shape those tasks so that it won't just be one piece, but it will be many pieces to fit a larger vision?

GILBRECH: Yes, and that's one thing I've learned as I've gone up through the ranks is to try to think at a broader level. I always try to take the test of what would Mike Griffin do or Rex [D.] Geveden, our Associate Administrator, or Shana Dale, our Deputy Administrator. We have had a second mission here ever since I started in '91. Although rocket testing has always been the bread-and-butter, prime mission of Stennis, we also had a pretty relevant piece of remote sensing work in the Earth science arena. So we've always had a toehold into the Earth science part of NASA's portfolio.

It was never one I was ever too engrossed or mired in. I didn't really work on that side of the business. I was always on the rocket side. But I am now fully immersed in both camps, from necessity of where I am, leading the center. We've worked hard with Headquarters and the Science Mission Directorate to try to figure out what our niche is in Earth science and make sure we're doing the types of things they want to do.

I also am looking to try to diversify. Outside of just the Earth science and the Science Mission Directorate, we're working a new start in the small satellite arena, where we can take what's been done with the Earth science, -- you know, the Earth-observing platforms, all those satellites that are up there that look at the oceans, look at the land, look at the atmosphere, -- and figure out how can you apply some of that to a lunar environment. Can you do remote sensing on the Moon, and can you do it with small satellites that are much cheaper and simpler and faster to produce? So we're trying to branch into that arena, working with the Exploration Program.

I'm also trying to look at opportunities that we can collaborate with a lot of our friends that are also resident on the base here. We actually are kind of a unique NASA center, in that we have over thirty resident agencies. The National Oceanographic and Atmospheric

Administration [NOAA] has a big presence here. We've got a big [US] Navy continent. The [US] Navy Meteorology and Oceanographic Command is located here.

We've got all kind of oceanographers and hydrologists with a lot of ocean theme educated people here. Part of that is trying to figure out how we can work with them and collaborate on some of these Earth science projects. Being close to the Gulf of Mexico, coastal management is an area that's probably ripe for us to be—we've worked in that area for a while, but I'm looking to expand that role.

So part of my vision is to diversify our science applications, to get involved with collaborations with NOAA, with other universities that are in there; maybe branch into the small satellite arena and help that whole side of our business work.

The other side, on the rocket tests, is trying to help NASA make smart decisions in its test plans. Part of the testing will involve altitude testing of this upper stage, and one of the roles we have here at Stennis is kind of as NASA's overall manager of the rocket test facilities that NASA has—and that involves Stennis; it involves facilities at Marshall Space Flight Center—to do rocket tests and do cryostructural testing. It also involves White Sands Testing Facility [New Mexico], which is under Johnson Space Center [Houston, Texas], where they do hypergolic testing for the Shuttle engines. It also involves NASA Glenn's Plumbrook Station out in Sandusky, Ohio, where they have a facility that can do large-scale altitude testing of rocket engines.

One of the things that I'm proud of in [my] first year is trying to make sure that the Exploration Program had accurate facts on the table when they were trying to make decisions on where can we test this upper-stage engine and this full-up upper-stage vehicle in this altitude-simulation environment. I've been pressing on a lot of technical studies for what's Plumbrook's

capabilities. There's another facility at AEDC, Arnold Engineering Development Center; it's the J-4 facility that did a lot of testing in the Apollo days with altitude simulation.

Then when the numbers start getting to the level we've been seeing, in the hundred million plus, to just make these facilities capable of testing these new engines, you start scratching your head and saying, "Well, what can we do with a green-field facility, one that we've built today, instead of taking a forty-year-old facility and trying to modify it and make it last another twenty-five or thirty years in the future?"

So we've kind of gotten all three of those stories. The Plumbrook, can it technically do it? Can AEDC? Have we overlooked something they might be able to do with a facility that's bigger and probably is more tailored to what we would need for Exploration's engine testing? Or, this green-field facility that uses modern technology and has no rust falling off of it, like a lot of our forty-year-old stands, we have experience in? [Laughs] So all that's been laid at the program's feet, and right now they're in the final throes of trying to decide what's the best answer for the agency.

If things go well and it turned out to be the right answer, part of my legacy could be adding one new, major test stand to Stennis' Rocket Testing bullpen. We've got basically three major test stands that were built in the Apollo days, and we haven't built a large engine stand since then, not really, in this whole agency. To do that would be, I think, a real—it would be a proud legacy for me to have added, to help add to one of the big capabilities we've got here.

WRIGHT: Well, that was one of the questions I was going to ask you, that if budget wasn't an issue, what programs would you increase or what additions would you make. Would that be

your answer, or do you have some other ideas that you would like to add to the center if you could have a limitless budget?

GILBRECH: Well, with unlimited money you can have unlimited ideas. [Laughs] That's a pretty open question. But I think we've always kind of had a niche here at Stennis for the rocket engine world. I think that would be to me—and I've kind of washed away my colloquial viewpoints after being around so many different centers, so I really am thankful that I've tried to gravitate towards what's best for NASA instead of what's best for Stennis or what's best for Langley.

I really do believe that this new test stand, if it comes about, would be the preferred answer from my viewpoint, just from my years of experience in rocket engine testing and dealing with the limitations you put on the engine developers when they have to fit what they want to do into facilities that are available, as opposed to being able to reset the clock with modern-day facilities. So for Exploration, I think that's what I would do if I had more money. I would build that new test stand.

I would unencumber the rocket engine developers from having to make all these trades and compromises in what they want to do with tests, because in the test world, we're always at the end of the food chain, and I've seen it time and again where the engine developers—and it's what they should be worried about—they're worried about their hardware schedules; how do we build this engine; how can we get enough hardware? Then they always have grand test plans, but as schedules slip and costs grow, they start nibbling away at the test program.

Dr. Wernher von Braun, who was the Apollo original rocket scientist and created the Mississippi Test Facility where we are, was a firm believer in a very robust test program, and

basically built this site so that he could bring out all of the first and second stages of his Apollo rockets.

That's one thing. If I had more money, I would pump it into the most amount of hardware that we could produce, the most engines, the most stages, and the most robust test program that NASA could possibly do, given the balance of getting something flying in a time frame that the President and the public can accept, versus having so much good test data under our belt before we go do the live stuff.

WRIGHT: A lot has been discussed, especially since the *Columbia* accident, about NASA's culture. As a Center Director, are there some areas that you would like to see that would make the culture here at Stennis be one that you felt was functioning well toward the missions and goals that you have set?

GILBRECH: I don't think I've really observed a culture problem at Stennis. It's been known as "the little center that could." It's a small center, so you have a real family-oriented environment. Everybody knows everyone. It's a fairly close-knit group. So most of the culture clashes I've seen over the years involved conflicts and head butting in the test arena.

When I was here in the nineties, we had some major I would call them bloodbaths with Marshall Space Flight Center, because we were both competing after the same test business, and there wasn't a lot of it. At some of the points in our history, there wasn't a lot of testing to go around, and so everybody was kind of in a survival mode, and we found ourselves at each other's throats, competing over the same test business and trying to underbid. It was just a very unhealthy thing for NASA.

One of the things that came out of that was the Center Directors at Marshall and Stennis at the time decided that they really needed to get out of the competition business and figure out how do we divvy up our respective expertise and start complementing each other instead of fighting with each other over this business. So there was a lot of pain and, like I said, a lot of frank discussions and things that went on in the nineties, but coming out of that there was a Test Management Board.

There was an organization that included these four sites, and they had hard discussions on what exactly is the baseline role of each of these four facilities, and this is how we're going to funnel the work. If it's in your baseline role, you're going to be the primary site to do that. That involved moving equipment, and that was a lot of shutting down some test positions, some test areas. That's never a pleasant thing when you're watching trucks roll out with all your equipment on it, but I think in the end NASA was much better off because of that. So anyway, that's kind of one culture conflict that I've seen.

WRIGHT: Overall, you've mentioned working under four Administrators. Have you seen the culture change over these past years in a way that will be more conducive to meeting the goals of the agency?

GILBRECH: I think so. That's always a tough question, you know, culture. It's hard to put your finger on that exactly.

WRIGHT: We've talked about Stennis' role. Give us your thoughts and your beliefs on what you think NASA's most important role is for the nation. Because you mentioned to us about how your whole life has been pointed in this direction, so NASA had very much an influence on you.

GILBRECH: Yes.

WRIGHT: So what do you think it is for the role for the nation?

GILBRECH: I really like—and I won't plagiarize Mike Griffin, but I've had similar thoughts. We've had a lot of discussions about this at the senior-management level, because we've typically never done a good job of communicating, capturing the public's interest the way it was done in the Apollo days. In my view, the Apollo Program, it was about exploration, but it was also about fear of the Russians and kind of a time race against who's going to be the ruler of space, and challenging and conquering that technology.

To me, I think the public wants to know that there is an agency or some entity in the U.S. of A. that is pushing the frontiers of discovery, that is out there discovering all kinds of neat new things that are going to not only help explore strange new worlds— like we go to Jupiter and all the planets with those probes, we go to Mars with our Spirit and Opportunity and the other Mars rovers. But I think they also want to know that there is an agency that embodies, I think, the ability to do the near impossible.

I think from the Apollo Program, everybody views that NASA has that capability, but they don't really know exactly what we do anymore. They see the Shuttles go up. They know

the Space Station is getting built. They're excited about NASA, but I don't think they really know why.

To me, it's that everybody wants to believe that we're a world leader in technology, that we're an exploring nation, that we're a pioneering nation, and that we have people that can do these near-impossible technological feats. But again, if you try to put it in day-to-day terms to the average taxpayer, they probably can't go much beyond we went to the Moon. We made this Shuttle that goes up and flies around the Earth. They probably know that we have a Space Station up there, but aren't really quite sure what it's doing.

So that's part of the challenge that we have is letting them know why Exploration is important, and what Exploration does to the other sides of what NASA's involved in, that it does benefit aeronautics. There is a lot of science opportunity that comes with going and doing Exploration.

One of the things that really hit home with me was a speech Mike Griffin had given, and it was even more impressive to me, because he did it off the cuff. After I've read this well-articulated speech that hit home with me, he admitted that his speech writers were off and unavailable, and he had to kind of put this together on the fly, and gave a very elegant talk on why we do Exploration.

He couched it as "and there are acceptable reasons, and there are real reasons why we do it." His acceptable reasons are the ones that can be talked in the Congress and in the White House and that are measurable things that the public can understand, but it doesn't really grab their attention. They're things like economic benefit; things like national security, contributing to national security with satellite systems and technologies and things like that. There's also scientific discovery, which is images from the Hubble [Space Telescope] and pictures from Mars

and aeronautics research and things like that. But again those are acceptable reasons that aren't very grabbing.

He went off to say the real reason, if you boil it down to the nonlogical part of what we do, it's because competition is one reason; that we, just as a human species, have this compelling need to compete and be the best. It's like why does a Tiger Woods want to beat a Jack Nicklaus? I'm a golfer and so is Mike. But at any rate, you know, they don't do it, at some point, for the money. They want to set records that withstand some test of time, and they want to win. They want to be the best. I think that's one of the reasons why America wants us to be number one at what we do in NASA and be the world leader in technologies and pushing those frontiers.

Then the second one is curiosity. Just by nature, we're a curious species. We always want to know what's over the next hill. We want to know—we climb mountains. We go places, to the depths of the ocean, all the things because we want to know what's there. I think that that's another reason why America wants us to keep exploring these areas that no one's ever explored before.

Then the third reason was monument building, which was a little bit of a— it doesn't sound like one that would roll off your tongue when you're thinking about why do you explore, but it really was about—it's a corollary to how the European cathedrals got built and the commitment nations made to go about those real expensive projects. They take years, sometimes decades, sometimes multiple generations to complete. But the whole sense was that you had a country or a whole European mindset back then that wanted to leave things that in hundreds and hundreds of years down the road, people would still want to go see and visit.

So it was kind of that sense of monument building, and that to me is what people always remember, that first footprint on the Moon. I think it's similar that they would always remember

that first footprint on Mars or that first permanent outpost on the Moon where people are going to be living for a year or so or longer at a time. So I think that's what we bring to the nation, and if we don't do it as a country, some other country will, and I just don't think the American people would want to lose that element of what we do here and what we're proud of.

WRIGHT: We talked about how you had such an interest in aeronautics when you started, and NASA has played such a strong role for many, many years in fact first as NACA and then, of course, through the years. Do you feel there's still room for NASA to work in that field as well, to contribute?

GILBRECH: I think so. I mean, a lot of the facilities that you need to do aeronautics research are not geared towards the bottom line of a corporate accounting system. So I think we bring a lot of capability that industry will not sustain. I think we've reshaped the aeronautics program to go back towards more fundamental research, to try to find new areas and new techniques and new physics that will help develop, help benefit, the whole aeronautics line of business. But it' a successful model, of how NACA evolved, and they did all the development and passed it on to commercial industry.

So I think there's a smaller realm for NASA to contribute in the aeronautics side, but I think there's still a relevant one, and exactly what that is is hard to say. They're really retooling the whole aeronautics portfolio of what NASA's doing and trying to, like I said, pull back away from flight demonstrations and developing a lot of hardware, into more fundamental research that is not the things that a typical Boeing or a an aircraft outfit would do.

WRIGHT: Stennis has historically been involved with human space flight. How do you feel, or do you see any opportunity that you may become part of the robotic spaceflight era, and how do you feel that's vital or integral to what NASA wants to do for its future?

GILBRECH: I think it's a hand-in-glove partnership that robotic missions can play with human missions. I mean, some of the first forays to the Moon were from robotics that go there to survey sites, take data on what are acceptable landing sites, you know. So I really do believe that they're very much essential in partnerships; that you can't really do one without the other. Robotic missions can get you a lot of information, but they also don't have the capabilities of a human to think and react and take care of situations that you just can't plan for in a robotics mission. So I think that I very much believe both need to be present in any exploration program, and they are now in the current one we've got.

As far as Stennis' role, I think we are, like I said, involved in the Small Satellite Program, which is the early lunar attempts at can you do remote sensing on the Moon that can help establish an outpost or an eventual base. Also looking at can these satellites, cheap, small satellites, become a communication network for you the way we have the communication networks around the Earth. So we might have a niche in that arena for Stennis. It's probably not nearly as prominent as just the base smoke and fire that we typically contribute to any space program, getting them out of the atmosphere. But there is potential there, but probably not a huge—not nearly as big as the rocket side.

WRIGHT: Through your career with NASA you've had the good opportunity to be at a number of the centers and have a number of just different opportunities to learn. Share with us some of the

lessons that you've learned, both organizationally and technically, that you want to apply here to Stennis.

GILBRECH: I've been doing a lot of research back in the Apollo days, and von Braun is kind of a hero of mine, and trying to see how NASA was developing in the early days. I think one of the lessons is that you have strong personalities; it takes strong personalities to develop new rockets and new vehicles and things. So I read back and I see some of the struggles that they had and which center got what piece of the development work.

I can see that again some today. It's not quite as probably prominent as it was then, but that's just one thing I've learned, is there's always going to be some amount of strife and I don't know if you'd call it healthy tension, but there's always a little bit of competition and turfdom wars that go on until things settle out and you know where things will be assigned. So that's just something I've learned is going to be the nature of the business. When you've got a lot of exciting work and there's multiple places that could do it, there will be competition and some power struggles. I think that is not necessarily bad; it's just something that comes along with it.

I think also that NASA over its history has been really valuable in developing system engineering expertise and integration, and I think within NASA, and it applies to the government, too, there are certain capabilities that industry either won't maintain, or if they take a break, it erodes and you never recover it.

We were talking at the last SM—Senior Management Council, about a lot of difficulties in the science arena they've been having with space optics. It's really just an observation that either that has eroded in the contractor base in the country, or the people that used to know how to do that have retired and not passed that on to their successors, but Goddard Space Flight

Center up in [Greenbelt] Maryland has been actively developing and building spacecraft for the last twenty, thirty years, and they are current, fresh, and doing that, and they know all the hard-earned lessons.

Yet when they'll go task a contractor to go build an instrument, or you might even have another agency that builds an instrument, and then you'll see that they make just some basic critical flaws in basic design. So you begin to realize that that corporate knowledge has eroded, and I think that's one of the real valuable things that NASA does and probably other federal agencies do. But at least in the space arena I think we are the keepers of the flame for a lot of hard-earned lessons in doing things like building spacecraft and rocket engines and launch vehicles and things like that. So that's one lesson I think I've learned.

I think we ought to not commit to do programs that we know are underbudgeted from the get-go. That's one of the mistakes we made in the Shuttle Program is we kept getting budget pressures, and we kept evolving and compromising on the designs. I don't fault them. I mean, they certainly had to deal with the realities they were handed, and that's why we wound up with the Shuttle system that we've been flying. But I think they were always constantly trying to recover from promising something, taking hits and cuts, and then maintaining that commitment to deliver something when they probably knew they were underfunded.

I think that's one thing we're trying to keep from falling into that trap with Exploration, is not overselling what we can deliver to the congress and the people, and then looking like we've failed when we just weren't given the money we asked for to do what we were asked to do, and then have to explain why it's not working on the schedule. You know, it's basically don't overpromise when you know that they're not giving you the funds or the time that's needed to do it the way you need to. So that's another lesson.

One other lesson I joke about is that NASA never learns lessons. [Laughs]

I don't mean that to sound flippant, but it is hard to— we try to capture our lessons learned in the system, and it's just hard to get designers to go in and really look at what failed in previous programs. I mean, you continually see—I think it's just human nature that you think you know best, and you don't want to go and do what the other—those guys did, because you think you're smarter than that or for whatever reason.

But we just got a lesson, a repeat of a mistake that was made in the Apollo Program. We learned something in the Apollo Program when we launched through lightning with Apollo 12, and so NASA went through this whole thing where they made up rules on what weather you should and shouldn't launch in. Then you get into the Shuttle Program, and somehow or another that gets convoluted, and the weather rules, they turned into something that wasn't really directly traceable to that. Then you've got the new weather rules for how we launch things out of Cape Canaveral and Kennedy Space Center.

Then in I think it's the '97 or '98 time frame we launched an Atlas into a thunderstorm, and lightning hit it, and the rocket wound up being destroyed. It was just one of those things where a well-thought rule that we had developed in the Apollo Program because of the Apollo 12 lightning strike got somehow or another convoluted into a rule where it was interpreted as an icing concern instead of lightning. So just a lot of misinterpretations and misconceptions, and we wound up launching an Atlas into another thunderstorm, and it failed. So that one, the intent was there, but the execution of how you kept that lesson crisp and clear throughout history seem to have broken down.

So it's a challenge, and that to me is just one thing I'm constantly on the alert for, because we do better in some areas than others, as far as learning our lesson and actually going back and not recreating those hard knocks from the past.

WRIGHT: Constellation Program is evolving. I know some of the centers have [called in some] previous employees, bringing back some of their heritage folks. Will Stennis do that as well, or have you already?

GILBRECH: Actually, we were a little bit ahead of the program, because we had, when it first came about that we knew we were going to be—even when we were looking at the Space Shuttle main engine concepts here, we brought a bunch of the old Rocketdyne crew that had done the original engine development for the Apollo Program. It's actually called—*On the Shoulders of Giants* was the little nomenclature we put on it, but it was really to bring in all those people who had lived through a lot of the test failures and the design problems and what the things to keep your eyes out for would be when you're going off into a new development program.

So we had gathered that brain trust of the rocket development world and had them come here and share a two-day seminar where they talked about all their experiences, how they learned this thing that they never would have dreamed would have been an outcome, and the value of testing, and things like that. So I think it's very important to bring in, and we're lucky.

At least a lot of the public scratches their head about why we're building something that looks a lot like Apollo, and didn't we do that? Didn't we fly one of these rockets that looks close to this before, and what's exciting about that?

They don't see that we're putting a lot of—we are putting a lot of new technology in it, but we also are not reaching so far, like we did with the X-30 and the X-33 programs, that we're much more likely to fail with those approaches than we are with this one that's just a small evolution away, but also affords you the luxury of having the people that learned all those lessons and that are still alive that can come and talk to you and say, "This is why we wound up going this way, and these are the other two things we tried, and this is why they didn't work."

So I think that's one of the real values of the current approach that we're taking, and I think the real value of being able to go talk to these people and really pick their brains at what worked and what should raise the hairs on the back of our neck like it did in your day.

WRIGHT: What was their reaction to returning to the Moon?

GILBRECH: Oh, they were as jazzed as any of our youngest college fresh-out engineers. [Laughs] I think that's one thing that's so great about this whole business is people don't get in it for the glory and money. They get into it for the love of exploration and discovery and excitement of a brand-new program. So you could just see the original excitement they must have had in those early days after [John F.] Kennedy's speech just if it was yesterday.

WRIGHT: Before we close today I wanted to ask you -- you've talked about NASA's effect on you, and also about its role for the nation. But what do you believe to be NASA's impact on society? We've talked about the past, about Apollo, but if you'd talk a little bit more about why you feel that NASA has had an impact then and now, and then what you'd like to see its impact on the future.

GILBRECH: Yes. That's one of the hardest things to put your finger on, because we constantly get asked that. The public wants to know "Why should I give my tax dollars to NASA? What do I get for it?" You can fold out a big sheet that shows all the things that I think NASA has brought to the public that they're probably not even aware of. The ability to put satellites in orbit; everybody can't live without a cell phone. That cell phone wouldn't be working if NASA hadn't worked with the Air Force and gotten the ability to loft payloads into low-Earth orbit. Plasma TVs. Technology in computers and technology in power tools.

You know, one of my favorite topics is NASA probably has done more to advance power tools than any— I mean, just a wealth of things that we brought into the home that people probably aren't really aware of. But again, I don't think that's the main heart of what we do. I think it's the fact that we go and look at things that are risky and try to do things that are risky and try to do things that no one else really sees an immediate bottom line for.

You know, a lot of companies have these research and development budgets, which are a small part of their overall operating budget, but that's their seed money as to how they stay ahead of their competitor, how they develop new things that are going to be the next Google or the next gadget that's going to keep them one step ahead. Whereas for basic research and development, universities really can't fill that role with large programs.

So I think NASA really has a niche in our areas that we do that's the science and the aeronautics and the exploration, space ops; that we sustain a whole line of expertise that I don't think the American people would enjoy if it weren't for NASA being here. So it's a hard one to articulate, and I don't probably think I did a great job at it, but I just feel like our fifteen-billion-dollar-a-year budget is really pushing a lot of frontiers in these different areas.

If it went away, it's one of those things that I think it might take a few years, but if you shut NASA down, I think the public would feel a sense of loss, and then they would start to see that suddenly you don't have all these neat things that are being developed in air traffic control or airplanes and your fuel efficiencies and new material being spit out because you have to solve these problems for the harsh environment of space. And, oh, by the way, it makes your car lighter, and you've got a different container in your kitchen cabinet because of some development that NASA had to solve to be able to provide that to the astronauts or to a spacecraft. So that's just kind of a general viewpoint that I've had on that.

WRIGHT: I think we can end it, on my part, by asking you what I think will be an easy question for you. You've spent your whole professional career with NASA. Why would you encourage anyone, or what would you say to someone who said, "I think I might be interested in working for NASA. Why should I do that?"

GILBRECH: I think because there's no other place to go to do the types of things we do. For me it was the excitement of space flight. I always knew in aeronautics that NASA was a world leader and in airplanes and hypersonic vehicles. I knew we were eventually, hopefully, going to have to retire—I say hopefully—I knew we were going to have to retire the Shuttle, and I knew we were going to have to come up with some other way to go beyond the Shuttle, and I just had been a space buff.

It is amazing to me. We never have a problem getting people to hire on with NASA, and I've had people that have taken tremendous pay cuts to come and work for NASA because they love what we do. It's beyond what's in their checking account. It's they want to be part of that.

We have a tremendous brand with NASA and what we do, and I just think that it's a great place to work, and people get a lot of freedom to, like I said, take risks and follow some of their wilder ideas to see if it pans out. There's not a lot of freedom like that in the corporate world. You know, I've never been there. [Laughs]

WRIGHT: But that's why you like it here.

GILBRECH: But that's why I like it, yes, and the people are great to work with. I mean, that's probably one of the most enjoyable things. Everybody takes pride in what they do. You get a real sense that people enjoy coming to work, that they're excited about it. That's probably as big a part of it to me as anything else.

WRIGHT: Well, before we close, is there anything you'd like to add or was there a thought that might have crossed your mind that we didn't get a chance to come back to? We can take a second and make sure we didn't lose anything.

GILBRECH: I think just that I've been privileged to work with some great mentors. People that have taken me under their wing and helped me get to the point I am today. I've really tried to learn from the people that I admired, their leadership styles and the guy who was sitting in this chair before me, Roy Estess, has been one of my greatest mentors and aids in helping advise me throughout my career.

That's been one of the biggest things, the quality of the people you work with. I think NASA people do it because they really not only feel a sense of pride, but there's kind of a

selfless dedication they have that there's something bigger than themselves that they want to be a part of and contribute to. There's a lot of sacrifice that goes on with people, in terms of the time away from their family, the travel that they have to do, the long hours that are sometimes required, and all that's done willingly, because they feel like they're part of a higher, noble achievement.

WRIGHT: I'm glad you added that, because leadership has definitely been important the last fifty years for NASA. Well, we wish you luck in your position and all the rest of the ones that will come to you.

GILBRECH: Thank you very much.

[End of interview]