

NASA HEADQUARTERS ORAL HISTORY PROJECT

EDITED ORAL HISTORY TRANSCRIPT

LESA B. ROE
INTERVIEWED BY SANDRA JOHNSON
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JOHNSON: Today is July 20, 2018. This oral history with Lesa Roe is being conducted in Dallas, Texas for the NASA Headquarters Oral History Project. The interviewer is Sandra Johnson, assisted by Jennifer Ross-Nazzal. I want to thank you again for joining us today, and appreciate you taking the time. I know you have a busy schedule now that you're chancellor of the UNT [University of North Texas] System, which is a little different than NASA.

ROE: It is a little different. Good to be here.

JOHNSON: First I want you to talk about your background and your education, and how you became interested in engineering. There were women engineers at that time, and starting to be more and more, but it still was an unusual field to go into for a woman.

ROE: I think really it was more around I liked math and science in school, or did well at it, and I didn't really know what I wanted to do. At that time when I was in high school there was the Santa Fe Community College [Gainesville, Florida], and it had a software program offered to high school students to enter in their interests. I put in my interests and out popped professional fields that matched those interests, which is kind of hard to believe that long ago that they had something like that, but they did.

Before that I was thinking zoology is what I wanted to do. Out popped zoology, and engineering came out really prominently. You could also see the salaries that these made and then I started to realize “Let’s see, I could be a zoologist and hang out with mountain lions and not make much, or I could be an engineer and make considerably more.” So I started to think “Well, that might be a really good way to go.”

I didn’t really know exactly what engineering was, but when it really jelled for me is when I did my co-op [cooperative education experience] at [NASA] Kennedy Space Center [KSC, Florida]. I got that through the career resource center. Again, it wasn’t like I thought “Oh, I’ll go work for NASA someday,” because I wouldn’t have thought that was something that I could do. But the University of Florida Career Resource Center had it as a job.

I applied, interviewed for the job, and got it. Went down there and started to do some of the work as a co-op student and realized “Hey, this is engineering. And I can do this.” I think that’s really when I started to get even more interested, even though I was in it in college. Unless you’ve been around people, you don’t necessarily know what engineering really is.

JOHNSON: I’ve heard other engineers talk about how college is more analytical and you’re learning all this stuff, but when you actually go apply it—

ROE: Applying it makes the difference to a lot of people. I don’t think universities did that well at “applications” back then. They’re doing a lot better now; I know we need it now as a chancellor. We’re doing a lot better in our universities now to even engage students in high school.

You're doing this math, and you don't know "How does this math apply to something?" Even my kids will say, "Mom, am I ever going to use this?" They're doing this stuff that you just kind of wonder. I think the more that we can get to kids early—even in elementary school or middle school—with "What's this for, what do you use this for?" I think that'll help us tremendously.

JOHNSON: Did you have that kind of support in high school from counselors?

ROE: I don't really remember that being available in high school. I don't really remember counselors knowing exactly what that was. I know now there's so many more programs, there's so many more ways to engage. I'm sure there were programs like that out there, but I just wasn't aware of them at that time.

I think that makes a big difference. Even just in doing math problems, it would be great. I think our elementary school teachers, our middle school teachers, they don't necessarily know. Now NASA does a great job with that, where we provide those examples in the classroom, and we do preservice teacher training and those kind of things. So teachers can learn how to really connect with the students, so they see "Why should I do this, why would this matter." I think that's important.

JOHNSON: I think so, too. Talk about that co-op experience. You said you saw that at the career resource center.

ROE: At University of Florida [Gainesville], yes. Their career resource center had jobs posted. I went over there and applied for it. I interviewed with Lorry [Lorenz G.] Simpkins at Kennedy Space Center, and he was a University of Florida grad [graduate]. I can't remember the name of our division. I interviewed with him, and went down and worked with Lorry Simpkins. Jake [Jacob R.] Rogers [III] was another person that I worked with down at Kennedy Space Center, and I worked in the CIF Building (Central Instrumentation Facility) over by headquarters at Kennedy Space Center.

We were working on little projects to help with overall launch processing. In particular, we were working on this bar coding project. Bar coding was new at that point. What we were trying to do was track parts. As you're putting things on [Space] Shuttle, being able to keep track of those, and you can also reduce processing time.

We were learning how to do that, and so we did this little project, me and Jake and Bobby [Roberta P.] Gnan. Bobby was a co-op student as well. We ended up winning some kind of award. Jake was great. Helped write this all up, and we ended up winning I think a \$1,000 innovation award, each of us personally. That was big money to a co-op student back then.

It was great. I'd say the only thing is you were away from the action. As a co-op student, I met a lot of the brand-new engineers. That was a big hiring time for Kennedy, and I think they brought in a big wave of new, young engineers. You'd interface with them, we'd all go out together, and became great friends.

They were all working on Shuttle, and that seemed pretty exciting. Not that a bar code project wasn't exciting, but going and working on the Shuttle seemed pretty cool. I can tell you who some of those young engineers were that I was working with then when I was working on the Shuttle comm system, the RF [radio frequency] communication system.

Some of those early engineers then were Ralph [R.] Roe [Jr.], who later I married. Also Dave [David A.] King, who later became the Center Director of [NASA] Marshall Space Flight Center [Huntsville, Alabama] and now is head of Dynetics. Another was Bill [William W.] Parsons. He later became a Center Director.

We all knew each other very, very early in our careers. Which was kind of interesting that everybody went where they went.

JOHNSON: Good class of engineers.

ROE: Good class of engineers, it really was.

JOHNSON: How long were you there as a co-op at that time?

ROE: The way it worked is you alternated three semesters. I think when I started I was a rising junior. It could have been the end of my sophomore year, and I was a rising junior. I would go one semester to Kennedy, and I'd come back to school a semester, and then I'd go back to work a semester. I did three semesters down at Kennedy Space Center, so probably one full year.

Through the whole thing, it was a wonderful experience. That's one thing I talk to kids about today. They ask, "Is there one thing you did [that made a difference]?" I say, "Get an internship, co-op. Go do something where you are applying what you're learning, and you're working with people in your field. Not only to build your confidence that you can do it, but also to see if you like doing it, where it might help shape what you really would want to do." Like me saying, "Hey, Shuttle would be a really cool place to work."

JOHNSON: You were there around 1986, around that time period?

ROE: When I started co-oping it was around 1984. Then when I graduated from college it was 1986 and I went out to Hughes Space and Comm [Communications Group]. I took a job out in California in El Segundo, and worked for Hughes Space and Comm in satellite communications, and was also doing a fellowship and going to University of Southern California [Los Angeles] getting my master's degree.

At some point Ralph went out there. We were friends, not dating at the time. He went out there to work on getting us back to flight. This was Return to Flight [after the Space Shuttle *Challenger* STS-51L accident], and so he was out there working on that. That's when we started dating and decided to get married, and so I decided to come back to Kennedy Space Center. I started back at Kennedy Space Center in 1987.

JOHNSON: Let's talk about the *Challenger*, because *Challenger* happened in 1986. Were you still in Florida at that time or already gone?

ROE: I was at school when *Challenger* happened, my last semester of college. That's when *Challenger* happened.

JOHNSON: Talk about your memories of that. I know you were at school, but did you have any communication with the people that were beginning to work on that? Some of your friends that were still there?

ROE: Yes. I certainly knew how tough that—it was tough for all of us. I wasn't working directly on Shuttle at the time, but obviously my friends were, and I knew how difficult that was. Then when I went out to Hughes it was tough for the people there even, because Ron McNair, one of the astronauts that perished, was a Physicist who specialized in laser research and had worked at Hughes Research Laboratories.

Yes, it was a really tough time. I know it was really important, with Ralph trying to help us get back to flight and making sure we had the right failure modes in place.

JOHNSON: Talk about coming back to Kennedy and when you went back to NASA, what you were doing in those first jobs, and give us an overview of that time period. Because that was still Return to Flight during that time.

ROE: Yes, we were still trying to get back to flight. I came back, was hired back as a Shuttle communications engineer, so I was working on the RF systems. That's K_u-band, S-band, UHF systems. When the crew is doing an EVA [extravehicular activity] and they're talking to the Shuttle, those were our systems. When we're sending all the data, uplink and downlink, that was our systems that we were working on.

I came back and I was a junior engineer learning those systems. We were busy testing the systems for flight. We would make sure the system was working per specifications. We would check if the system was ready for flight. Sometimes things didn't work right, didn't have the right signal strength, or would fail and we would change out parts of systems and retest.

Sometimes we had new systems to test. You had to make sure the different systems worked together well.

I was busy learning and developing my knowledge of how all of that works, how you do the test. I would sit backup for those tests, until I eventually got to serve as the prime for those tests. I'd sit in the firing room for launches, be there when we're doing the countdown for launch, so that was pretty exciting times.

I eventually rose to be a lead of an orbiter for communications. I became the lead for [Orbiter Vehicle (OV)-]105, which was *Endeavour*, the last Shuttle in the fleet. I actually went out to California and spent, I don't know, maybe three months at a time out in Palmdale [California] as the Shuttle was getting built, as *Endeavour* was getting built.

We were checking the comm systems and doing things out there, crawling around, making sure things were [working]. That was pretty exciting to be on the front end of the Shuttle getting built, of *Endeavour* getting built. I should say the orbiter. I've been calling it the Shuttle, but obviously it's the orbiter.

That was really exciting to do. I had a lot of fun doing that. At that time Tip [John J.] Talone [Jr.] was the manager of *Endeavour*, so he was the overall Orbiter Manager. I was serving under him, and got to work a lot with Tip and got to know Tip really well, which played out later in my career. Those were some of the things that I did.

We learned to test all of the orbiter systems. I'd go out on the [launch] pad, making sure that the hat couplers were on up against the tile so we were ready to do tests. At that time, a lot of the work that we did in communications was also talking to the payload in the bay. So making sure that you could send that telemetry down, or send commands to that particular

payload. There were big payloads in the bay that we were carrying up. Large satellites and experiments.

JOHNSON: We have a list here, some of your memorable ones. I think you had mentioned Hubble [Space Telescope].

ROE: Hubble Space Telescope, when we launched it originally. The mission to Venus (1989) [Magellan (Venus Radar Mapper)]. Galileo (1989), a mission to Jupiter. Tethered Satellite, Atlas 1 and 2, USMP 1 and 2, Space Radar Laboratory, Wakeshield, Shuttle Mir 2. While I was at KSC, I worked on 22 missions prior to ISS [International Space Station] flights. Each mission different and a new learning experience.

JOHNSON: Space Radar Laboratory?

ROE: I worked on SRL. At that point I had become a Payload Project Engineer and was working in the Payloads Organization under John [T.] Conway.

JOHNSON: How long were you on comm?

ROE: I was doing comm for about three years. I worked really closely with the payloads engineers since that was the main interface for our communications systems. In doing that, I worked some DoD [Department of Defense] missions as well. Many of the missions I worked as a communications engineer were DoD missions.

You would work these classified missions, and they had unique configurations. That was exciting, I enjoyed doing that. That was a much smaller team when you worked a classified mission, and I enjoyed that because you had more leadership and responsibility. You did a lot more roles when there was such a small team, so I really enjoyed that.

That led me to the Payloads Directorate. The Payloads Managers said, “Hey, there’s a job over in payloads to be a project engineer. You would be over one particular satellite, all systems for that, making sure they were all ready to go.” I applied for that, got that job, and went over to the O&C [Operations and Checkout] Building. I did that job for about three years, and then I was asked to apply for the payload operations manager job, which I did. Got that, and did that for about three years.

It just seemed to be a cadence of three years, something broader would—and that was all the payloads in the bay and all the payloads in the middeck. Making sure those were all ready to go, that you had everything. You had a bigger team under you, and you were trying to make sure everything was lining up for flight. I did that job for a while.

What I would learn later was that these missions changed our textbooks, so to be a part of that was pretty exciting to me. Galileo was pretty cool and all of the findings, what it really did. Magellan—which went to Venus, which is Venus Radar Mapper—arrived in Venus. That was pretty exciting to be a part of that.

In 1990 there were six missions, including Hubble Space Telescope. Hubble was still when I was in orbiter comm, then I moved over to the payloads world. I worked on the Tethered Satellite [System] as a payload engineer. ATLAS [Atmospheric Laboratory of Applications and Science]-1 and -2 missions, the USMP [U.S. Microgravity Payloads]-1 and -2. I was the payload

engineer on those. The Space Radar Laboratory, Wake Shield Facility, Astro [Observatory] was one I worked on,

Shuttle-Mir 2—that one was especially memorable for me. A lot of these were very memorable, but that one was very memorable because I worked with the Russians. We took this docking module up so that we could dock to the Russian space station that was up there then, Mir. That was pretty cool in that I made some friends with Russian engineers, and really I would say changed the way I was thinking about people.

You always hear these things about the Russians, and I can tell you they were wonderful to work with. They were just like me, and we were really working to get this thing done. I thought that was pretty cool, so for me I found it exciting to work with internationals, and that led to some work I did later as well.

JOHNSON: Did you have a chance to go to Russia when you were working on that?

ROE: Not when I did Mir, but I did later when I worked International Space Station. I went to Russia, I went to Japan. I went to Europe and Canada. I was working the Research Program for the International Space Station.

What happened—tying back to Tip Talone—I had worked my way up to payload operations manager, and at Kennedy they wanted to establish an International Space Station Office. They were building the big new Space Station [Processing] Facility there to process the hardware through.

Tip Talone was assigned the role of going and forming up a team, and building that team. He reached out to me first, and said, “I need you to help me come build this team,” because of

our work that we did back on 105, on *Endeavour*. I went over and helped him, and we handpicked some people to come over and do this. Really formed up the basis of the International Space Station Program that was at Kennedy, which of course reported to the one in Houston, but it was the boots on the ground, getting the work done, laying it out, getting that hardware processed through there and ready to fly. We had just a tremendous time doing that.

I helped him form that up, and then I became the manager for the MPLM [Multi-Purpose Logistics Module], the logistics module being built by the Italians. I went to Italy multiple times for that one. Also under me was the Canadian space arm [Shuttle Remote Manipulator System (Canadarm)], so I went to Canada several times as the arm was getting built up and ready to go. That was pretty exciting doing all of that.

Then eventually Ralph was asked to go and be the head of Orbiter [Manager, Space Shuttle Vehicle Engineering Office] at Johnson Space Center. So when he was asked to do that, I went looking for a job at Johnson Space Center. I looked at several positions there, but ultimately the International Space Station Research Program—I talked to Tommy [Thomas W.] Holloway, who was the Program Manager of the International Space Station Program at that time at Johnson Space Center.

Tommy said, “I think you need to go take this job.” It was the deputy job for the International Space Station Research Program under Mike [Michael T.] Suffredini at the time, who was heading research. He was at that role, heading the research manager job. I took that job, and when we moved to Johnson Space Center, I was Suffredini’s deputy for the International Space Station Research Program.

Again, I think that was about three years. Suffredini almost immediately—I was there for just a short time with him, and he got promoted up to heading the whole vehicle for International

Space Station Vehicle Office. Rick [Richard W.] Nygren came in and he became the research manager. Rick Nygren was the International Space Station Research Program Manager, I was his deputy. And when Rick left, I became the head of the International Space Station Research Program. Reporting then to Bill [William H.] Gerstenmaier, who was the head of all of the International Space Station Program.

The kind of things that we did there—we were working everything. We were getting ready to send up the very first research to the International Space Station Program. There was a whole lot of facilities in development. We needed to define the ISS interfaces for experiments and facilities. Some of that was defining the interfaces within the different modules that were going up. The U.S. module, but then also the Russian modules, the Japanese modules that were to come, the ESA [European Space Agency] modules.

None of those were up there yet, but we needed a common interface that you could move research around that it wouldn't be specific if you needed to put it in a different facility. We were developing the Interface Control Documents, we were doing the development of the research facilities at the different [NASA Centers], so that's how I got to work with a lot of different Centers, because different Centers were building different things.

The human research was all Johnson Space Center. They were building up a lot of those experiments, which were some of the very first experiments to go up to the International Space Station. [NASA] Ames [Research Center, Moffett Field, California] was working on the animal modules. At that point we were going to build a big centrifuge for animals. That never came to fruition because of some budget cuts.

[NASA] Glenn Research Center [Cleveland, Ohio] was building a fluids and combustion facility, so they were busy working on that kind of work. [NASA] Marshall Space Flight Center

[Huntsville, Alabama] was also building materials research facilities and a microgravity glove box. Different Centers were all playing—even [NASA] Langley [Research Center, Hampton, Virginia] was working on some different things to go up to the International Space Station.

We met at the different NASA Centers and did design reviews. I met researchers across the Agency and made a lot of connections. We managed the Program which included the funding, the development, the procedures for integration and operations. All of those things were things that we did in the International Space Station Research Program. While I was there, we launched the very first research up. A lot of firsts during that that time as well.

JOHNSON: If you want to just talk about each one of them a little bit. All these different missions I would assume would have different requirements, because you were dealing with different orbiters and different things that they had to do. And then what you were sending up, because Hubble was different than the Space Radar Laboratory.

ROE: They were all different. They all had different interfaces, different things that you'd need to work. You'd work to understand those interfaces, you'd test those interfaces to make sure you weren't going to have issues on orbit. You would work with the payloads team that were coming in from wherever.

Say if it was [NASA] Goddard Space Flight Center [Greenbelt, Maryland] that had built some big payload, Hubble Space Telescope or something like that. You would work very closely with that team, "What are they going to need as you process that through?" They would need an offline lab [laboratory], say, to process.

They were on their own at that point. You'd make sure that they had all the gases they would need, all the electrical connections they would need, everything they would need to make sure you'd have the success you needed. You'd lay out that whole flow through your facility. You'd lay out your test time, you'd have your test teams ready to go.

All of those things were a part of what we did. Just about every morning I would go in, and Tom [P. Thomas] Breakfield [III] was I think the head of payloads under John Conway. I would go and brief him in the mornings. "Here's what's going on, here's where we are in the flow," that kind of thing.

It was really exciting. There were always things happening, "Here's the problems we came up with last night." It was very much an operations mentality, lots of things going on. You'd keep your leadership informed of that. It was exciting times.

JOHNSON: I would imagine things would be changing day to day, hour to hour, minute to minute.

ROE: Day to day, always day to day. It was very fluid, you needed to know what was happening in the flow, you needed to know who was doing what, things needed to be happening on time. Sometimes you'd run into these problems that you didn't understand, you'd need to solve them.

During test I can remember having an unexplained anomaly, and just trying to figure out what was happening. You'd wake up in the middle of the night, "I know what it is!" Go in the next day and test it, and "Yes, that's what it was." We'd figure it out. It was just a really fun team to work with, and an incredible team.

JOHNSON: How big was that team that you're talking about that was working with you on this?

ROE: I don't remember how big. We had a pretty large payload team. This time I was in the O&C Building. Eventually I was over in the Space Station Processing Facility, but we were in the O&C Building and the test stands there.

We'd need to do full RF end-to-end tests—even all the way to Houston and through TDRS [Tracking and Data Relay Satellite]. We would do a full end-to-end test while you were in the O&C high bay with the facility. Make sure things would run, and then you'd do that test when you got over in the Shuttle bay.

You can imagine lots of things could go wrong when you're doing those things, but it was a lot of fun working with that full end-to-end team. The people in Houston, the people over in the orbiter world once I went over into payloads. A lot of really exciting things that we got to do and I got to learn.

JOHNSON: A lot of those payloads, things would happen. For instance, Hubble of course was supposed to go, and then got delayed because of the *Challenger* accident. But there were other delays I imagine with some of those other payloads. Did you continue to test during those times, or once something was ready it was ready?

ROE: I'm trying to think when we actually returned to flight. You probably know.

JOHNSON: That was September of '88.

ROE: Yes, so we were testing. I don't remember things being slow even during the recovery from *Challenger*. I came in in '87, we went back to flight '88. Yes, I worked two missions. But you don't just hop on a mission. That mission, the payloads were getting there probably I would guess in like '87, '86 even. Processing through and getting ready to go.

We were testing all the comm systems. At that point I was testing "Is the K_u-band system going to be ready to go, is our ground station ready to go, is the S-band system?" Because you had to have all those components working together. You'd be changing out things, making sure things are working. If things didn't work you needed to change them out, put different components in. Sometimes you may not have those on hand, sometimes you would.

You were doing all of those things. I was over in the OPF [Orbiter Processing Facility] bay a lot, because we'd test horizontally, we'd test vertically depending on what the system was. The K_u-band could only be tested in a vertical, so we'd need to do that on the pad. You had to lay out all of those tests and do them where they needed to be, because you had to deploy the antenna, which could only be done at the pad.

It was really exciting. It was a lot of learning for me because I was brand-new engineer coming in in 1987. There was so much to learn. Learn the flight communications systems, learn the ground systems, learn and design the test set ups, work with technicians, MILA, Comm and Tracking Station. You had to learn what other systems your systems were dependent upon. You had to learn how to be safe and work around hazardous systems. Eventually you learned to be a team leader of a vehicle, like I became for *Endeavour* Comm Systems. Those were really, really exciting times. I was very lucky to have people like Tony Ippolito and Richard Rogers, communications leads, who helped me learn.

I also learned as much as I could about the payload in the bay. I found that exciting. The satellites that we were flying. Galileo going to Jupiter, and all the scientists that were involved with that. This was their life's work coming to fruition for missions like this. I found that exciting, too. I was excited about the science part, even though I didn't directly work on that because I was working on a comm system.

But I played a part in the success of that mission, and that was something that I took great pride in. That's what I saw on that team there, everybody took great pride in the thing that you were going to accomplish. They knew their role in that bigger grander, scheme of things. It was pretty cool.

You'd work with the flow managers over in the bay. You needed to know when the bay would be closed down for hazardous operations and if the work was on track. You'd need to keep your team informed so that you would be ready for your test time when the OPF Bay opened back up. If the hazardous operation would slip, and so therefore our test would slip out a couple weeks because of that.

Those kind of things, it was very fluid. I'd go to those flow meetings every day for the orbiter flow. The orbiter flow managers would lead that meeting. I just remember that being a roomful of people, when you talk about that. There were probably 100 people in the room for a flow management meeting. I'm not sure, but I was one of those engineers.

There were leads for other systems that were in the room, and they would say how their system was going for that flow management. If I had something in comm, I'd be attuned to that and then I'd take that back to the team. That would say, "Okay, here's what I learned in the flow management meeting, so we need to readjust." It was that kind of fluid environment over in the orbiter world. It was really exciting, and very active time.

JOHNSON: Especially those early days and so many really amazing things, like you said, going up. Talk about the launches themselves, since you were in Florida to see the launch.

ROE: Oh, the launches were amazing.

JOHNSON: Talk about that. Especially when you were seeing something—I keep going back to Hubble, but in 1990 you had six missions you said you worked on. Seeing those launches, and knowing that your work was working correctly during the launch, and they were communicating with the payload the way they were supposed to, and payload was doing what it was supposed to do.

ROE: I can tell you launches are so interesting. Because most of the time I was not outside watching a launch, I was in the firing room. It's much different in the firing room than it is outside. In the firing room, you are boresight-focused on your measurements. As a comm person I was watching those measurements. If you saw something go out, you needed to report it directly to the launch director.

You were on the headsets, you were watching your measurements. You had contingency procedures that you would work, they were all well-planned out. You had tested those in a terminal countdown test, TCDT they called those. We would run through that and they would throw anomalies at you, and so you'd be prepared for when a launch day came if something happened.

It was nerve-racking. You didn't want to be the one to stop a launch. I can remember how tense that was. When that was over, when the Shuttle got off—because we had all been through *Challenger*, until we cleared a certain point the room was just silent. And when you cleared that point everybody broke out in applause, everybody would start clapping.

It was just such a team, a really close team. But I can tell you it was very tense and very intense sitting on console, watching your system, and calling something and being the person to say—because we would lose telemetry sometimes. There'd be something that occurred. I was working then with the MILA [Merritt Island Launch Annex (Spaceflight Tracking and Data Network)] station to say, "Okay." You try to get clear: is it a ground tracking station issue, is it a vehicle issue?

It was exciting times, but very tense. Your job was very, very serious. People's lives depended on your job. It was that kind of thing. After the launch, we'd all go and have beans. People were lined up in the hall having beans and celebrating. That was how you celebrated a launch [tradition since STS-1, started by Chief Test Director Norm Carlson]. There was a lot of tradition. We were all bound together very tight. That was pretty exciting times.

When I became payloads, sometimes I'd still be on console, but for the ones that I wasn't the lead on I would be outside. I've watched from everywhere, from on top of the Launch [Control Center, LCC] for certain missions to just watching it outside. That was the best place to watch from, outside, because you were the closest to the launch.

But the feeling of it, there's nothing like the feeling of it. You would not have that feeling as much when you were over at the O&C Building, when you were watching from over there. It just wasn't near the impact to me as it was when I was working over on Shuttle.

JOHNSON: The payload commanders that were on the flights, did you work much with the crew themselves?

ROE: Yes, we worked with the crew too. We worked with the crew on the payload configuration. They would come over for some payload tests. As we were getting close to mission, right before terminal countdown test—typically I think it was the night before terminal countdown test—we would go to the beach house. You wouldn't go every time. Only when you were the Payload Manager for the mission. The crew would go to the beach house. We would have dinner with the crew. We would interface with the crew and talk with the crew.

Depending on the mission, especially the more Spacelab-type missions—those kind of missions is where there was a bit more crew interaction. Because you had the experiments inside, there might be conversations around those experiments and how they would operate. The crew had questions sometimes or just wanted to walk through the operations.

I saw a picture recently of me in the O&C bay with the ATLAS team and Ellen [L.] Ochoa was in the picture. I didn't really remember knowing her back then. I have worked with her as the [JSC] Center Director, but when I was working ATLAS she was working ATLAS. Pictures of both me and her, we look like babies in the picture.

JOHNSON: You mentioned the Shuttle-Mir, the docking module. Do you have any memories around working with the docking module itself?

ROE: The docking module was a really big memory for me. Because working with the Russians, where we were again processing the docking module that was going to be a permanent

part of Mir—working with them on how that was going to connect up and how we were going to work all that, that was really exciting. I just remember the relationship I had with the Russians and it being a really good relationship. We were working hand-in-hand on that. That was a really special memory for me.

I can't name some of the people, and that's kind of sad. That wasn't the days that you had a cell phone and you kept in touch. That would be cool, because I would have loved to have stayed in contact with the friends that I made. Because they were really special friendships.

The work that we did with them during this Phase 1 work really paved the way for the International Space Station. We learned so much from them on Mir and how to work together. It really paved the way for ISS, and I think paid a lot of dividends later. I think there were a lot of pretty cool things that went on during that timeframe. Of course, probably you have all the history on Mir and know. But they were very, very proud people and they were very, very proud of their work on Mir and what they had learned, and were willing to share that with us.

I think that was pretty exciting times. I'm trying to think when that launch was.

JOHNSON: It was prior to '95, because STS-71 was the first docking.

ROE: Shuttle-Mir 2 flight was 1995. For me, I had my son. I think I was pregnant in those pictures too, right? I think it all tied together. Still doing all that, having my first child around that time, and then having my twins a bit later. 1998, having my twins.

JOHNSON: Oh goodness. You were a little busy at work and at home.

ROE: I was a little busy doing all that, right? That was a busy time.

JOHNSON: I can imagine it would have been interesting trying to balance just one small child, much less a small child plus twins.

ROE: Yes, being pregnant with twins. I had to actually go on bed rest with my twins at some point, because I was going into labor too early. That was challenging, too. Tip was very gracious with that and accommodated that, and that worked out okay.

It was funny because Ralph was the launch director for that first launch of Station. My twins were getting born, so literally he came for me to have the twins, and then my mom stayed with me and he left to go launch. Then I remember being in the hospital with the twins and not feeling great, right? They asked, "Do you want us to roll you up on the roof to watch the launch?" I said, "No, that's okay. I'm all good here," because I was just not feeling great. So it's cool times. That was some of the things that went on there.

JOHNSON: Yes, that is interesting. Are there any other missions that you haven't talked about that you have on your list there?

ROE: Those are the ones I highlighted. The DoD missions were exciting missions. I really enjoyed working those. I can't talk about what we flew, but I loved it because it was different configurations, and it was a different team, a small team, and I really enjoyed that work. It was really special to get to do that and try new things out. I think that was what I really enjoyed about that.

JOHNSON: I can imagine the configurations would be more military, whatever they needed, and you had to then make it work in your systems. More of a puzzle.

ROE: Yes, then you had to make it work. Wrote the procedures yourself, so it was a lot. There were a lot less people that had clearance. I don't think the contractors were—there were some contractors, but very few engaged in that. They were fun to work and I enjoyed them. I think those might have been the missions—I'm wondering if those were the '88 missions that I don't talk about. Could have been, I don't know. There were quite a few DoD missions that we flew back then.

Tethered satellite was an exciting one. It didn't work quite like it was supposed to on-orbit, but it was a fun mission to work too. The ATLAS-1 and -2 missions were exciting. I can't remember specifics about them, we were just busy in processing them. They were fun, and I enjoyed working with the scientists.

JOHNSON: It seems like with each one of these you would have a new group of people come through.

ROE: It was a new group of people every time. That was what I think I liked. You had a new group, it was a new mission concept. It was fun. I really enjoyed it, and you got to meet people from all over, and those things were really fun.

JOHNSON: Even though you were doing your work, and your work was a certain type of work, it was changing constantly.

ROE: It was changing constantly.

JOHNSON: That seems like it would keep it exciting.

ROE: I think that's what I loved about it the most. Just leading a team—we had mechanical folks working the mechanical interfaces, we had electrical folks working all the electrical, making sure those things worked. Communications-type folks. We were on console for all of those things. That was over in the O&C Building; that was in the facility there. It was fun, fun stuff.

JOHNSON: Let's move on to when you moved to Johnson Space Center. You touched on that and some of the work you were doing there, but you had to move with three small children at the time.

ROE: Yes. My twins were six months old when we moved to Houston, and my older boy was about three years old. We moved there, and I was the deputy then for the International Space Station Research Program, and so again it was learning.

We were busy working on all the things that were going to be important to research, to make sure we had the things that we needed for the facilities, the on-orbit vehicle. All the electrical support that you needed, the mechanical interfaces. Needed to know that the facilities

that you were putting in were going to be interchangeable and were going to work. There was lots going on there, and it was really exciting.

I was there for four years. What I wrote here is that I had 16 missions for ISS that I worked on. In 1998 I had a mission—unfortunately I didn't write what mission it was. In 1999 I worked a mission to Station; 2000, four missions to Station; 2001 six missions; and 2002 four missions. I went to Virginia in 2003 to Langley, and we'll get there eventually.

JOHNSON: [ISS] Destiny [U.S. laboratory module] went up during that time, while you were there.

ROE: It must have. Yes, it must have.

JOHNSON: The module in 2001.

ROE: All the big modules were getting launched. Those were going up, our first research was going up, we were building the Station then. That was an exciting time in the program, it really was. I loved working with Bill Gerstenmaier. I loved working with Tommy Holloway, he was a great man. He is a great man, we still correspond over the holidays.

Just exciting time building—again, it was a team all focused on building these modules. It was about tracking where you are in the flow, knowing how things are going to work, knowing when pieces are going to Kennedy, arriving from everywhere. We were doing all that. The [ISS] expedition crews—making sure that your research portion of what the crew was going to be doing was all lined out from an operations standpoint. That was exciting.

I traveled internationally to Japan, negotiating agreements with the Japanese on their research, our research. Doing partnerships with those, understanding what their research was, where we could complement each other. The same thing for the Europeans, going to the European Space Agency and doing the same thing.

And the Russians, working with the Russians on their research team. What we had, where we could learn from each other in the research work that we were doing. Getting our scientists together and negotiating the support that we would need for our research in their modules. We did a lot of work around that.

It was just great times getting to do all of those things. They were fun to work with as well, the international space agencies were really fun to work with.

JOHNSON: As an engineer, it seems like your career was a lot of coordination. You did a lot of coordination during your career.

ROE: Yes, integration. I would say building a team and integration is a common theme. Always integrating parts together. We would fund and review teams that were developing and building parts or whole payloads.

Again, you can see how it progressed from me being a project manager as things flowed in, to actually being a program manager and leading the components that are all getting built and coming together. That was fun. It was a lot of learning and a lot of great experience.

JOHNSON: Some of these things were more technical, some of the earlier things you did. Then when you're in this Research Program, deputy manager and moving up in that, and the Research

Program I would think is more scientists, people that were a little bit different than engineers or technical people that way.

ROE: They were.

JOHNSON: You've talked about the different places and the different countries and the different Centers you worked with, but talk about dealing with different types of people that way. Like you said, you were doing negotiations in Japan on the coordination of the research and to make sure everything complements each other. Also I think you did some of the work on the early coordination of the Payload Operations and Integration Center, too? It seems like a whole variety of people that you were working with.

ROE: Yes, there was all of that. You're right, I'd completely forgotten that component. We had lots going on.

I'd worked with those teams building things. Glenn Research Center, they had a great team there. Jack [A.] Salzman was the lead of that team at Glenn, and they were just a really well-oiled, really good machine. That's something I remember well. They were always on track, on budget. They laid out things really well, their hardware performed really well. It was really nice.

At Marshall we had scientists and teams that were doing different kinds of research. Each Center had different research that was aligned with their core capabilities, but also at Marshall was the Payload Operations Integration [Center]. We were moving away from the

more traditional “everybody has to come to mission control and operate there” to where you have your principal investigators [PIs] now teleoperating.

It evolved even while I was doing it, where we had the POIF [Payload Operations Integration Function] at Marshall and the principal investigators would need to come there and send their commands and operate their payloads from there, to eventually we had it where PIs could stay at their home site—whether that’s a university, whether that was somewhere else—and they could send commands from their home site. That was just so much better for the PIs because they had all this stuff they needed to do, and to be away from that stuff for months on end for their experiments [was not ideal].

What we needed to do was get Station to where it was much more cost-efficient and much easier to send research up. Today you’ve got CASIS [Center for the Advancement of Science in Space] that’s more commercialized. But you had these small principal investigators that had small research. They couldn’t afford to go and stay for long periods of time, they needed to be able to fly more quickly. All of those things. You wanted to get to flight much faster, and not have all these requirements put on them.

That was a big effort while I was there, where we had a lot of processes. “You have to submit your data and your information to us here, and then you have to submit it here, and then you have to submit it again here.” That was way too cumbersome, and so we went through and we were reviewed. The Research Program was reviewed in total, and we took a lot of hits on “You’re not doing a great job of getting research to Station quickly. You have cumbersome procedures, they’re onerous.”

I started to learn more about Lean Six Sigma [management methodology], really leaning out your processes. I’ll tell you who was really instrumental in some of that with me was Ann

[R.] McNair at Marshall Space Flight Center. She's somebody that's been around a very long time and I have huge respect for her. She talked to me about some of that, and I went and learned about it from the Johnson Space Center.

We took our team through that and we leaned out our processes. It was a hard thing to do. People were used to doing things a certain way. There's a guy, his name's Rickey [D.] Cissom. He was at Marshall Space Flight, and he and I butted heads big-time on this because he's like, "No, you need to do this." In the end we agreed. We got to a point, though, that we cut 40 percent of our processing requirements out. Forty percent, through going through this process.

I went from where I was getting lots of criticisms from PIs, to where they were complimenting us on what we were doing. It was a big journey, and that was a big part of what I did while I was on the International Space Station. Not just I—it took the whole team to change. They continued to make those improvements later, but that was a huge effort, just trying to get up and running. But continuing to streamline and learn and be a better operation was also a fundamental part of it.

I worked not only externally with all the Centers, but then you also worked within the vehicle that was the Station itself. That was a huge interface that you did when you were part of the International Space Station. I kept Bill Gerstenmaier informed of what we were doing, and briefed all kinds of—that was, and still is, so many external reviews. You'd have numerous reviews.

There were cost overruns. There was a lot of pressure on cost, and we would lose a lot of money. So we had to cut a lot of research out because of overruns and things that happened

more on the vehicle side. Eventually we eliminated our big centrifuge facility and others because we just couldn't afford it.

Replanning was a big part of what you did because you'd get a big budget cut, and you'd replan, and you'd learn. It was those kind of times, too. It wasn't all good and positive. There were a lot of hard times where you had to cut, and to streamline, and to work hard to justify what you were doing, and why it was important to the world. That was another key part of what we did. That was really important.

That was all around the early beginnings of a large part of telecommunicating, telecommanding; telemetry operations are much more remote and different than they were in the beginning. And I watched that evolution while I was doing this.

JOHNSON: Technology changes so fast, and then to be able to take advantage of that.

ROE: To be able to take advantage of it, and be willing to take it. Because you can imagine the posture is "Oh no, we can't do that. Too much risk, can't command an experiment from a remote site." It took a lot of work with the POIF, the Marshall guys, pushing to really drive us to a new way of operating. So it was a big time of that. That was lots of good stuff.

JOHNSON: Yes, I would think it would take a lot of skill to be able to convince people. Like you said, cutting that 40 percent when people are so used to doing things a certain way.

ROE: When they were so used to doing it. It was a lot of work, but we got there, and that was good. And we got there as a team.

JOHNSON: You did, you were there at the beginning of ISS in '98, those first flights, so you were there at a great time when you have to come up with the Payload Flight Equipment Requirements. All those different requirements documents.

ROE: Yes. All those requirements were being developed for the first time, tried for the first time. Of course now we've learned from orbiter interfaces a lot. We learned how—not learned, I had lived some of it—Interface Control Documents were developed, and took those best practices as we developed ours for Station.

There was a lot of work like that too that went on as part of all of this. I really wish I'd had the foresight—because obviously this is history and we were doing things for the first time, and when you're in it you don't realize it—had been smart enough to journal and to keep track of all that. I think some people are a lot smarter on that. I did not.

JOHNSON: I imagine time had something to do with that. You'd have to be up at 3:00 in the morning journaling with a family life.

ROE: With babies and family, you're just trying to survive the day. It was so busy, it was active times. It was good times, but I wish I had journaled or something just to keep track of all of that.

Worked with wonderful people. One of those people was my deputy, Dan [Daniel W.] Hartman. He was just amazing as a deputy, and later took over the Research Program and moved on up to head Vehicle.

Now he's on up to second in command for International Space Station Program [Deputy Manager, ISS Program]. He was a wonderful person and just a great partner. That's some great memories there, too. There's lots of great people that have now moved up in the ranks. They were wonderful people. Ven [C.] Feng was another one. I just saw him not too long ago.

It's just nice—you've had this team, they were all in it. Everybody rolled up their sleeves and just got it done, it was just that environment. There was nobody sitting around complaining about little things. People were working big stuff.

JOHNSON: Just for a minute, let's just talk about being a woman and working at NASA as an engineer, and being in a position that you had a lot of responsibility. But you did have children at home, you had a family life. You mentioned Ellen earlier, and it made me think about when she was our Center Director, and she talked about work-life balance, and the importance of that work-life balance.

I think we're more aware of it now in this century than we were at the end of the 20th century. I was just wondering how you were able to do that, and if you ever felt any pushback. You had children. They had doctors' appointments I'm sure, and you had things you had to do. You had a husband that also had a high-pressure job. How did you achieve that balance?

ROE: You know, at that time—I later can tell you better techniques I learned when I got more to Langley. But when I was back in the Research Program, and even back when I was at Kennedy first having my children—I was always a member of a team. We were all working and supporting each other in what we did. I don't ever remember being a woman on the team. I remember being on the team, or leading the team.

I never thought of myself or anybody on the team as man or woman. We didn't think that way. I didn't think that way when I was working orbiter. I think the only time I'd ever be aware that I was a woman back in my orbiter days is when you'd go out on the pad and there'd be catcalls. That's the only time that you'd be like, "Oh, really?" But you just keep moving. I never let that stuff—never even thought about that stuff, I just kept moving and didn't pay any attention to it.

But for balancing, probably the hardest time for balancing was when I was at Johnson Space Center and working International Space Station Research Program. Because I was traveling internationally, Ralph was heading Orbiter. Orbiter was constantly having problems and challenges, and he was just always, always working weekends and nights. Just working through problems and trying to get everything done, so it was a constant barrage of that.

How we did it, I don't really know. I know at that time, when I would go internationally we would fly my mom out from Florida. She would stay with my twins and help. Ralph's mom lived with us, and so she would help fill the gaps as well. But she didn't drive. So if I was traveling, my mom would come out a lot of times and help with that. If we were both traveling at the same time, we were lucky in that we would have my mom or his mom help through those times.

We had the twins and our son in the Johnson Space Center Child Care Center, which was a wonderful childcare center. I did not do it at Kennedy. My twins were really young. I had somebody come in when I went to work and stay with my twins there, which was great. But Johnson's was wonderful. It was a great facility, and so our kids learned a lot there. My older boy did kindergarten there. That was good.

We had that as the way we would manage and balance. And, like I said, I had a great team. Dan was a great deputy. I don't know, I guess if we were doing things we would just coordinate and we worked together. Dan also had a young family. I think we just really understood it and supported each other. Everything I knew, Dan knew.

We never practiced any of that "knowledge is power and I won't share." I don't even know, that's crazy, that was just never anything we did. It was very much sharing, and working together, and using everybody on your team and holding them accountable for their work, and everybody pitching in. That's what I remember the most there.

JOHNSON: Just busy times.

ROE: Busy times, and everybody playing their part. That was also where you'd keep the Center Director briefed. We had some great Center Directors at the time. I can remember Roy [S.] Estess coming in for a while and serving as Center Director of Johnson. I just really thought he was a wonderful person. So that was nice, everybody played a role different.

When I was at Kennedy, Roy [D.] Bridges [Jr.] became Center Director at one point. I was asked to come and help with some strategy. Still doing my day job, but also helping on these special teams. So Roy got to know me that way. Roy had a big presentation, I remember going with him for this presentation. They did this presentation at [NASA] Stennis [Space Center, Mississippi], and I helped him as part of that.

That obviously carried later, because then when we went to Langley—when [STS-107] *Columbia* [accident] happened, one of the findings was we really needed something there. Ralph

was tasked to come develop the NASA Engineering and Safety Center. That was going to be at Langley, and Roy Bridges was asked to come and head Langley.

So now it was again time for me to find a job. Seems to be my lease in life. Roy knew me and really liked me, and the Associate Director position at Langley was open so he asked me to come and do that. So I came and did that, which was way different than anything I had done before. It was Associate Director of things like Procurement and Safety and HR [human resources]. I guess IT [information technology] must have been in there. It's all the support kind of stuff.

And it was also institutional, running a Center. I'd done programs and projects and missions, this was infrastructure and running a Center. It was very different for me. The very first task that Roy gave me was to reorganize the Center, so that made me really popular. I didn't know Langley. I didn't know research centers as much, except for the work I had done obviously on International Space Station research.

There's a different culture in the research centers than there is at—Johnson's not so different than Kennedy from an operations mindset, but Langley is very different from both of them. I had to learn that culture a bit, how it was different, and structure. So actually that was the very best task that I could have been—in reorganizing the Center, I learned the Center, I learned the people.

I also built trust. Because in doing that, developing an organization, I didn't just go develop it. I had a cross-center team that I put together, just by asking, "Who'd be really good?" This crosscutting team I got to know, and we built an org [organization], and then we would have a town hall where we'd have people come.

People weren't trusting, because what they had seen before—you'd give them something and this would be it. Where I was asking them for input. They were not trusting of that, and then they would give me input and I'd actually make changes. They were like, "Oh wow, she's taking that."

It built trust with the Center from the very beginning of coming there, because I think people thought I came there to do a reduction in force [RIF]. There were all kinds of rumors because of where we were at the time. People thought there were going to be major budget cuts, major reduction in force. I think at that time they were talking maybe RIFing 1,000 people. There was a lot of issues there too, so we were dealing with that.

We worked through that with Roy, and then within a year of being Associate Director I became Roy's Deputy. And then a year of that, I became Center Director. We did some leadership and some team building as part of what Roy wanted to do, and it was really good. It really helped us coalesce as a team, and it helped us through those big challenges that we had where there were discussions of reduction in force.

It helped us in reorging and putting people in different positions as part of that reorg, which I was also a part of. Really shook people up in a standpoint of they identified themselves with their org. They were kind of like, "This is *my* org." It was that mindset. We broke that mindset in having people go and lead wearing a different lens. It really helped to build a crosscut where people understood other people. I felt it built a much more solid team in doing that.

It was one of those things you went through and you went, "Is this crazy?" You were getting so much pushback, and it was really hard. I think it built the strength that carried us

through later, and it paid dividends in the long run. But going through it, it didn't initially feel like that.

[NASA Administrator] Mike [Michael D.] Griffin is who picked me, when he came in. Mike kind of cleaned house from the standpoint of changed out many Center Directors, changed out mission directors. At that point he changed out the Center Director of Langley, Roy Bridges, and I became Center Director.

I didn't know Mike at all. I had a conversation—he goes, “I don't know you, but I know people that know you. They say you're really good, and so I'm going to do this.” He put me in the role and trusted me, and so I was a member of his board and a member of his team. That's the genesis of Langley and how that came to be.

JOHNSON: As you said, *Columbia* happened. You were still at JSC.

ROE: I was at JSC when *Columbia* happened. That was really hard.

JOHNSON: I wanted to ask you about your memories of that. Then in 2004 the President [George W. Bush] said, “The Shuttle [Program] is going to end.” So all the Centers were a little stressed at that point. The people that were working—trying to figure out what was going to happen and who was going to not have a job anymore, and what we were going to do then.

If you want to go back for a minute and talk about *Columbia* and your memories of that, and what you were doing at that time. Of course then you moved to Langley and you were still dealing with the aftermath, like you said, of uncertainty. People being unsure about what was going to happen because of the changes at NASA in general.

ROE: Yes. *Columbia* happened when I was at Johnson Space Center. I was heading the Research Program, so I was in ISS at that time. Ralph was there when landing happened, and he was head of Orbiter. It was very, very personal. I'm not going to be able to talk about this one. It was very, very hard. I don't know if I can talk about this.

JOHNSON: That's fine, whatever you're comfortable with.

ROE: It was just a really hard time. Lots of accusations, lots of things going on. On my board was [Astronaut] Laurel [B. S.] Clark for the Research Program. She had served on my research board, and she was a friend. Her son Iain was in my son's class. So my son didn't say, "What happened to the Shuttle?" He said, "What happened to Iain's mom?" Those things were hard.

And Ralph was under a lot of—it was hard for him personally. He felt personally responsible, so it was hard from that regard. It was just really hard. They were our family members, and we let them down. Can't talk about it without tearing up.

JOHNSON: No, that's okay.

ROE: Still comes back. You can't—I didn't think I was going to do that.

JOHNSON: It doesn't go away. That kind of trauma doesn't go away, and you're not the only one that feels that way. Everybody felt like it was family, no matter where you were.

ROE: In going to Langley—for Ralph, he formed up the NASA Engineering and Safety Center. I really think for him it was about making sure this doesn't happen again, because he was providing this team that was there to help solve problems that people didn't understand. People could reach to these teams.

The CAIB [*Columbia Accident Investigation Board*] Report, they called it “acceptance of deviance.” Complacency was the word used. The point is it's really hard to understand. The Orbiter environment was where Ralph was working day and night on constant problems across the orbiter fleet.

We would go on vacation. Me and the kids would go out and do whatever, and he'd be in the hotel room, or in the cabin if we were in a cabin or something. He'd be on a telecon [teleconference] working problems. It was constant problems, constant problems, constantly working. So complacency sounds like an interesting word, because it doesn't feel complacent when you're working problem after problem nonstop.

And that's ALL the team, that wasn't just Ralph. That was the whole team working electrical problems, and all kinds of problems. It was the environment they were in, and it's hard to realize sometimes when you're in that environment—the things that are obvious signs that you miss. I know that, I watched it. That was that environment.

Returning to flight and getting back to flight was so important to all of us. Then to making sure that we don't forget the lessons learned. Ralph is a big part of that still today. He takes those lessons around everywhere, and that strong NASA Engineering and Safety Center that he built from scratch has been a really important thing.

He went out to SpaceX [Space Exploration Technologies Corp.] and he talked to their young engineers who probably don't know any of this. He said it was great, and he's done that

across all of our Centers. “Just remember the lessons learned, so you can maybe see the indications. You can see what happens, to explain the environment.” I think that’s been really important for moving forward. That’s some of the things I remember from *Columbia*.

Langley was a big part of getting back to flight. They did the tests to prove out what happened in the flight in the wind tunnels. They rapidly formed up to do that and were just amazing. The Centers worked together really to understand the problem. Then Charlie [Charles E.] Harris eventually—he was in the NASA Engineering and Safety Center with Ralph, and then later I made him the head of our Research Directorate at Langley.

Charlie is a wonderful man, and had a way of talking to people. With the JSC culture it’s can be a “not invented here” mentality. If you weren’t a known entity, “We don’t want to trust you, we don’t want to bring you in.” Which is part of the culture, I’ve lived it and know it. Charlie was able to come into that culture from Langley, and they would listen to Charlie. Ralph would be running telecons, getting back to flight, and I would listen to Charlie talk.

That was part of the getting back to flight too, where the research centers played a role. This deep knowledge of how things interact and work together that came from the research centers was able to make—and that’s such an important thing. Because people flying, they don’t understand what you can do for them at a research center. They don’t understand that knowledge of interactions, which they had. I didn’t know. I didn’t know the capability Langley had, and Glenn has, and Ames or other Centers. Not really. Until I started working at Langley.

That flight knowledge that came from years of testing and experience, that it needed to be part of the operations of ongoing flight. That’s something that’s hard to get because we don’t do that across our Centers very well. We were really trying to push that, and Ralph was able to try

to do that with the NASA Engineering and Safety Center. He was able to see it, learn it. Wished he had known that kind of stuff before.

JOHNSON: That's one of the things I was going to bring up, because you did go from operations—Kennedy, everything's happening moment to moment, keeping up—to go to JSC. Where again it was high pressure, but as you said that culture at JSC is certainly different than it is at other Centers, just like all the Centers are unique. Then going to Langley, which was the mother Center, it was the beginning. They have all that knowledge about flight because they were there at the beginning of flight, and doing the testing.

ROE: Right, and it continued to do test vehicles, because we were breaking records with hypersonic flight and learning lessons there. So we were still developing and doing things at Langley. I just don't think the JSC crowd knew that and got that. That knowledge plays right into developing new vehicles. That was part of the knowledge, and bringing that together was part of the work that both Ralph and I would do when we were at Langley.

JOHNSON: Coming into Langley, you were the first woman Center Director. Did you feel any—not necessarily responsibility, but as a role model. Because the only time NASA had appointed a woman was once before. You were the second female Center Director for NASA, and then the first at Langley. Did you feel like part of your job—of course you were focused on your job as Center Director—but also being that role model for other women coming behind you?

ROE: Again, I didn't think anything about being the first woman, because I just never thought about it that way. But I talk about this woman that cleaned our office, her name was Selena. First day on the job I think as Center Director, Selena comes in and she says, "Finally," and she comes over and hugs me. That's the first time that it dawned on me in taking the job that this meant something to many women "Oh, this really means a lot to different people, and to women."

It's the first time that I kind of got that I was this role model, because it never mattered to me that there had been a woman before or not. Because I just didn't think that way. I was just, "I can do this job, or I'll figure this job out," and I would go and do it. I'd learn from others and do all kinds of things to learn it and go at it, charge.

What I realized in taking this job is that some people need to see somebody else in that job before they can feel comfortable in taking it. I never had kind of "got" that before. So I started to think about that and talk to people about that. Talk to women about that, and take on that role and help them.

Learned a lot about everything from—you talk about balance and family, what I realized along the way is a lot of women thought they had to choose. A lot of really good women wouldn't take on the next level job because they didn't think they could balance it with their family.

I was a perfect example of continuing to climb and do stuff. My family was raised by NASA, so they saw that I could do it. I learned along the way "Well, here's how you can do it." Because I said "You treat your work folks as a team, and you make sure you're informing them."

Steve [Stephen G.] Jurczyk, who was my Deputy Center Director at Langley, had a family about the same age. We'd keep each other informed. Dave [David E.] Bowles became

our Associate, Cindy [Cynthia C.] Lee before that. Everything I learned when I went to [NASA] Headquarters [Washington, DC] in a board meeting with the Administrator I'd come back and share.

I trusted my team to keep a close hold, but I also trusted my team to—because that way they were equipped. If I needed to be somewhere from a family standpoint, Steve Jurczyk could go to that board meeting and he would be informed and he could do well. Because that would not be fair to him if he was kind of, “I don't know what's going on.” I wanted him to do well, represent us well if he was there.

We treated our team that way, and I can tell you when I moved up to be Robert's Deputy [Associate Administrator] at the Agency level—the deputy chief operating officer basically—Langley ran great because we had a great team that was developed, had all the knowledge that I had. It just kept running smooth, and I felt pretty good because succession planning is a key part of leadership, and I thought I'd done that well. I was pretty proud of that.

But not only that. By doing that, it enabled people to realize “Oh, I can take on this job because I've got a team. If I need to do something, they're going to support me in doing this.” I think that was really important to our leadership.

JOHNSON: Yes, and being a role model I think is important because, like you said, a lot of women at Langley were secretaries. Or early on they were computers, mathematicians. They had a long history of these women, and we've talked to some of the computers that were there.

ROE: Did you interview Katherine [C. G.] Johnson?

JOHNSON: We didn't, because so many had. There are so many interviews out there with her, and she was getting elderly. The last time we were interviewing some people for NACA [National Advisory Committee for Aeronautics] and we were out there, she was doing some other interviews at the same time because that's when people were starting to get excited about the author of the book.

ROSS-NAZZAL: *Hidden Figures [The American Dream and the Untold Story of the Black Women Who Helped Win the Space Race]* by Margot Lee Shetterly].

JOHNSON: She was out there at that same time that we were there, so it just didn't work out that we got to talk to her. But since then so many people have. We feel like her history is already told.

ROE: She had great—and I believe in this. She only made a few comments, but great words of wisdom. She said, “If you don't love what you're doing then shame on you. Do it, and do it well.” And that's just true. That's been true to my whole life.

JOHNSON: Yes. A lot of the computers reminded me of the same attitude that you had coming in. “I can do the job, so I'm going to do it.”

ROE: Yes, that's what you see.

JOHNSON: In the '40s and '50s these women coming in, they were coming from an education, but then they were coming to Langley. The different Centers used them in those situations, and they never thought they couldn't. I think it's a unique.

ROE: I think that's something we share.

JOHNSON: Yes, I think so.

ROE: I've seen that on some of the astronaut interviews. I've seen them say a similar thing. I think that's part of it, you just don't think you can't.

JOHNSON: You're not thinking about being the first, you're just thinking about doing the job.

ROE: Yes, I was just thinking about doing it. And what I did, I reached out to Dave King—now we're back to my co-op days. I reached out to Dave King, who was a fellow Center Director, who had been one for a lot longer than me at that time. I said, "Dave," and I just asked him questions about how he did things.

I didn't always take on everything somebody else did, but I would take the pieces that I thought would work for me. Dave was one and Bill Parsons was one. They were people that I knew from early on that I'd just ask advice. I felt very comfortable reaching out and asking advice of other people. I think that really helped me feel comfortable in the job.

JOHNSON: Making those connections early on. I don't want to get too close to 11:00, but I do want to talk to you about Langley. Maybe we can do it as a second interview, we can set that up. We'll see what we can do.

ROE: You're getting more into my fresher categories. I don't forget as much now. I lost a lot of brain cells when I had kids.

JOHNSON: We all did.

ROE: They're smart children. They took those brain cells.

JOHNSON: That's right, we gave them to them. Before we close, I was going to see if Jennifer had a couple, maybe about your early career, that she wanted to ask you real quick before we stop.

ROSS-NAZZAL: You had actually brought up Dave King again. But when we started you were talking about some of the big hitters that we all know about from NASA history, like Bill Parsons and Dave King. You obviously had some sort of connection. I'm wondering why you think that these people and yourself rose through the ranks and made it to the top?

ROE: Isn't that interesting? I don't know. I think it's funny because we all came in around the same time. I was co-op a little bit younger than them, a little bit. Honestly, Ralph got Dave

King hired. They were both at the University of South Carolina [Columbia]. They didn't really know each other very well at South Carolina.

I don't know, I think we were all friends. Pat [Patrick A.] Simpkins was a friend as well. We'd go to movies together, we'd all go out to dinner together. We kind of had a group that would go, and we just became friends. Why we rose I don't know.

You know, Parsons wasn't as much in that early group. I knew Parsons when I started working DoD, he was working DoD payloads. But it was still probably '87, '88. He and I knew each other. He didn't necessarily know Ralph or some of the other guys.

Why, I don't know. I think maybe it's the kind of people we are. We were hard workers, loved what we were doing. Not the whole group. There was a bigger group, and some people didn't of the group. But it was kind of a small group, and it's kind of funny of the ones that went up, and in different places.

I can't explain it except that maybe we loved what we did. Worked, did it well—as Katherine Johnson said—said yes a lot of times when we were asked to go do things, and just rose up that way I guess. I can't really explain it, but it's kind of funny. And we're still really, really good friends. I just saw Dave King not too long ago. It's a good group.

ROSS-NAZZAL: You talked about going out to Palmdale, and I thought that was very unique. I wonder if you could elaborate more on that, the build of *Endeavour* and the role that you played out there.

ROE: Yes. Again, after working my way up through the comm ranks, I was named as the Communications Lead on *Endeavour*. I went out there, and then we were just busy again.

Things had to happen out there. Parts were coming together, things were coming together. I was kind of guiding all of that, making sure it was getting built up, and just spent a lot of time out there doing that work.

Tip was out there, too. Dawn [M.] Schaible was out there. Dawn was Ralph's deputy for a while, and I've got pictures of me and Dawn from way back too. Now she's heading the Engineering Directorate at Langley. We were all just out there getting the vehicle ready to go and getting it to Kennedy.

I can remember crawling around in the orbiter, literally crawling around as it was getting built. Just checking things, like "Did that get done, did this?" It was that kind of thing.

ROSS-NAZZAL: Yes, it must have been very unique seeing part of an orbiter and watching it as it was being built, being an engineer.

ROE: Watching it being built. I don't think I grasped the magnitude of that. Again, I was just trying to learn all the things—I was a pretty new engineer—how things needed to come together. Didn't want to mess it up, wanted to make sure I was thorough. But I think it was just you're learning fast and you don't have time to grasp really the magnitude of what's happening. You're just proud. It's your baby, right?

JOHNSON: That's right.

ROE: It's your baby that's getting built.

JOHNSON: It's a good time to stop, and we'll talk to you again. Thank you so much.

ROE: Sounds good.

[End of interview]