NASA INTERNATIONAL SPACE STATION PROGRAM
ORAL HISTORY PROJECT
EDITED ORAL HISTORY TRANSCRIPT

MELANIE SAUNDERS
INTERVIEWED BY REBECCA WRIGHT
HOUSTON, TEXAS – AUGUST 6, 2015

WRIGHT: Today is August 6, 2015. This oral history session is being conducted with Melanie Saunders at the Johnson Space Center in Houston, Texas, as part of the International Space Station Program Oral History Project. Interviewer is Rebecca Wright, assisted by Sandra Johnson. We thank you for letting us come to your office today and visit with you.

SAUNDERS: Well, thanks for coming.

WRIGHT: You currently serve as the Center's Associate Director, but in the past you have served in a number of instrumental roles that helped form the International Space Station Program, as well as very vital roles during the time of the program. If you could start today by sharing with us what are some of the significant challenges that you've faced as you were working through bringing the program to where it is today?

SAUNDERS: When I joined NASA, I came into the Agency as a Space Station Program employee in February of 1994. The program had just survived as a program in Congress by one vote. The previous year they were sent to do a redesign to incorporate an additional international partner, the Russians. This was shortly after the fall of the Soviet Union, so we were still in the immediate post-Cold War era. We were given the challenge of not only bringing the Russians

into the program, but figuring out how to work with them. One of the biggest challenges at that particular time was the fact that the export control regulations had not really caught up with politics and world events, and the Russians were still bad guys. So it would be sort of like—imagine if things changed with North Korea, or as things have changed with Cuba in recent months. Suddenly you're trying to exchange technical data, and according to all the export laws and regulations, they're still the bad guys. So there were a lot of hurdles to us being able to just get together and do technical interchange meetings and such.

My job when I first joined the Space Station Program was to work on clearing some of those export control hurdles, and also to work on the international negotiations to bring the Russians into the program. The first thing I did when I joined in February of 1994 was to work with [NASA] Headquarters [Washington, DC], some of the lawyers and the people in what's now the OIIR, Office of International and Interagency Relations, to come up with an approach for export control for the Space Station Program that would allow us to exchange the necessary technical data with the Russians. That meant we had to use some exceptions.

We had to figure out—first of all, there was an issue about what the export control jurisdiction was for the Space Station itself. Traditionally, it would have been under the State Department on the International Traffic in Arms Regulations [ITAR], and those were much more stringent. But as the commercial satellite industry grew in the late '80s and then the '90s, there had been a move afoot to reclassify some of the civil space assets as more commercial and put them under the Department of Commerce, and under their export regulations.

Very different reasons for those export regulations, very different types of restrictions. With the State Department, it tended to be national security, and obviously had much tighter rules. Under Department of Commerce, it tends to be making sure that we keep certain things in

strategic quantities, that we don't oversell on certain products, making sure that we have good business, that we're dealing with countries and entities that are dealing fairly and not doing economic espionage, etc. So there were a lot of totally different reasons for those two regimes, and totally different levels of control.

I worked on a team with the people from NASA Headquarters to try and get the Space Station itself classified as a civil space satellite that was under the jurisdiction of the Commerce Department, and we were able to do that successfully. We even got a special license, sort of a bulk export license, to be able to exchange goods and data with the Russians. There were some data that was related to the [Space] Shuttle and some aspects that were still under the State Department, but we also found a way to use an exception in the ITAR to be able to do the work we needed to do. So that was really interesting, to be up there at Headquarters trying to work these things that were groundbreaking efforts.

Not only did the Space Station Program have to come up with an export control plan, but the entire Agency—as a condition of getting this special bulk license where we wouldn't have to go ask for a license every time we needed to ship a widget here or there, or to have certain discussions, we had to set up an entire Agency framework. So they actually brought a lawyer into the Agency from Department of Commerce who had been going to former Eastern Bloc countries—Romania, Poland, other places—and helping them set up more Western-style export control regimes that would be better received by NATO [North Atlantic Treaty Organization] countries, and put them on a good footing to do business with the West. That was really, really interesting.

So the biggest challenge at that point was just doing the things that it would take to allow the program to survive. If we didn't clear those export control hurdles, we couldn't do our

technical interchange, get to know the Russians; we couldn't implement the Shuttle-Mir Program, which was the getting-to-know-you and figuring out how to work together test bed for the Space Station; and we couldn't come up with a final configuration. There was a System Design Review in March of 1994 that was the big test of had we come up with a new configuration, had we changed things enough, have we figured out enough with the Russians and the preexisting partners to get a new baseline to go forward, and to get the confidence of Congress to keep us alive as a program.

The vote went forward in June of 1994, and the Space Station passed the congressional vote and survived as a program. We had a funding cap that we had to live within, but we went forward and got the blessing to go off and work. I continued with some of those export control activities, but really at that point focused more of my time on the international negotiations.

In that timeframe there was a team working on a contract with the Russians, which is the contract that we continue to use today to purchase Soyuz [crewed spacecraft] seats. It was with the Russian Space Agency, and they called it the "$400 million contract." It obviously has a contract number and a different technical name, but that was the way it was referred to. The idea there was we were trying to make sure that we had the money we needed to get the Russians to do business the way we needed them to do business to be able to work effectively together, and to make sure that we had funding there that would help us ensure that they kept their space experts employed in civil space.

Right after the fall of the Soviet Union there were some really hard economic times—especially in the '93, '94, '95 timeframe—and the federal government wanted to make sure that we had them leaning towards us instead of towards other corners of the world, like Iran and other countries, who would've loved to have gotten a bunch of their space experts and space expertise

and would have used it for purposes that were not in line with what the U.S. government wanted to see.

So it was a little bit of foreign policy through the space program, and a little bit of helping us get a program that had long been in the development stage off the ground and running. Some of their lift capacity was really, really helpful, and their systems were robust, and they'd been flying Space Stations for quite a long time at that point. Mir was still flying, and they were starting to work on Mir-2. We basically tried to co-opt them away from Mir-2 and into the international arena. That was really interesting.

So we had this contract, and then we were going to renegotiate the Space Station partnership agreement. There's a government-level agreement called the Intergovernmental Agreement [IGA] that's signed by the partner governments, and then there was a series of bilateral Memoranda of Understanding [MOU] between NASA and each space agency, sort of a hub and spoke. We had the multilateral government agreement, and then NASA had an agreement with each partner on our specific responsibilities that all matched largely in areas like what you contribute and what rights you get, but had some unique areas with each partner's specific responsibilities.

We were going to renegotiate those and negotiate a new agreement with the Russians. In the meantime we needed a bridge agreement, so we negotiated in 1994 something called the Interim Agreement [for the Conduct of Activities Leading to Russian Partnership in Permanently Manned Civil Space Station] with the Russians to act as an umbrella for our cooperative activities while we got those other negotiations done. And it was a good thing, because it ended up taking almost five years in the end to complete the negotiations.

One of the things that was funny is when they started out—the idea of the negotiations with the Russians and the revisions of the existing agreements that had been signed in 1988—they talked about minimal changes, and of course what you find out is when you reopen a negotiation, everybody always has that one thing that they didn't get the first time and they're gunning for the second time, so there were a lot more than minimal changes made. And the program was very different at that point. But it was an interesting dynamic.

I worked on the Interim Agreement, and I worked in cooperation with the team doing the contract, but I didn't work on that directly. It was going on in parallel at that point. I worked on the contract quite a bit later on in the following years, but then really worked with NASA and the U.S. team for the IGA, the Intergovernmental Agreement, and the MOU [Memorandum of Understanding] discussions.

The IGA negotiations were led by the State Department, with mostly NASA members. They had three members from the State Department's Office of Oceans, Environment, and Space [Bureau of Oceans and International Environmental and Scientific Affairs], and one of their lawyers. Then NASA had a team that was comprised of our negotiation team, and then there was also a DoD [Department of Defense] representative. There were some DoD aspects that needed to be represented, so they had someone there.

Then the NASA team was Mike [Michael F.] O'Brien, who's now the AA [Associate Administrator] for the Office of International and Interagency Relations; Lynn Cline, who came from OIIR at that point but later went on to become Bill [William H.] Gerstenmaier's deputy in HEO [Human Exploration and Operations]; Al [Albert] Condes, who's currently the deputy AA in OIIR; and Peter Alf, who represented the research community utilization. He was in what was then called Code U, which would be like SMD [Science Mission Directorate] maybe. Then Jay

[E. Jason] Steptoe from the OGC [Office of General Counsel] at Headquarters, and then me as the program representative. We were the team that worked on those negotiations.

So it was interesting. They set this up so we had a new agreement to negotiate with the Russians, and we were trying to align it and make it along the lines of the existing agreements as much as possible, so as to not have to redo three other agreements with the Japanese, Canadians, and the Europeans. We were trying to get them to follow that model. The Russians had their own ideas about what to do, so dealing with them was another big challenge. Just getting the export control in place to be able to get the Space Station to survive, just the scale of the negotiations with the existing and new partner, and then just learning to work with the Russians. It was really, really interesting.

So NASA had this framework for the partnership that was set up where we were very much the senior partner and the stakeholder, and we had other space agencies who had had, at that point, less human spaceflight experience on their own, but had been with us a long time. The whole Space Station partnership was formed out of [President] Ronald [W.] Reagan's State of the Union speech in 1984, where he invited friends and allies to join in building a civil international space station. They'd worked on those agreements and operations concepts and whatnot, and signed those agreements in 1988, and had been working since then. So at this point, when we're starting to add the Russians, the program has been in formulation for 10 years. Hence Congress's impatience, which was not unjustified.

That was one of the biggest challenges, learning to work with the Russians. The dynamics of them having their own ideas about how they did things, them having their own ideas about where they fit in the partnership. NASA, I think, went into that partnership with the Russians with the idea that they would be like the other partners, but obviously a greater

magnitude contribution in terms of what they were bringing to the table with Space Station services, Space Station elements, and systems. The Russians, I think, went into it thinking that NASA and they would be partners, and oh, by the way, there are these other partners. Because they saw a great, great difference between the magnitude of their contribution and what they were bringing to the table, and the other partners. So that was something, trying to re-divide the pie where everybody feels like they have their rightful place, their rightful magnitude, and the recognition of their contributions and their role in the partnership.

And also just getting the Russians to agree to an existing framework was hard. They had their own way of doing space, and we had evolved in parallel but with a few notable exceptions, like Apollo-Soyuz in the mid-'70s. We had evolved our way, and they had evolved theirs, and we had some very different ways of doing things, so that was interesting to work with.

WRIGHT: Were you traveling back and forth to Russia for the negotiations?

SAUNDERS: I was. To work through the agreements with the international partners at the Agency level, the MOUs, we had what was called MCWG, a Multilateral Consultative Working Group. It was basically the MOU negotiation teams from NASA, ESA, the European Space Agency, the Japanese Space Agency [National Space Development Agency of Japan], and the Canadian Space Agency.

Those four agencies would get together, and then we would tell them what we were generally planning to show to the Russians, either in the form of actual agreement text or a concept or an approach or a proposal. Then we would go meet with the Russians, and then come

back and meet with them again. Those were very interesting negotiations. It also gave us a chance to try and keep the agreements, the four MOUs, as much as possible in parallel.

There were some agreements that were necessary just because the Space Station vehicle itself had changed a lot in terms of its configuration, and the responsibilities of the partners had changed. But there were other ones that the Russians wanted because they had an idea, or one of the other partners wanted because they maybe didn't get it the first time and they were trying again. So it was interesting to try and go along and do this sort of "shuttle diplomacy," if you will. That was interesting.

Meanwhile, NASA was having its own challenges. We had the challenge of a budget cap. We were given a certain budget and told we could build whatever space station we could figure out to build within that. Shortly after the Space Station survived in Congress as a program, the Canadians had a financial problem with their program. They had a new government elected, and the government chose to deemphasize human spaceflight and to emphasize, instead, remote sensing. Their contribution was suddenly in play—would they be able to make their contribution? So we had to work with them on that.

At different points the Europeans came in with a mandate about the following year that they could contribute, but they had to make sure that they could pay their operations cost bill by performing services that would go to European business, that would go to European industry. They couldn't just write us a check or do something that was going to go across the pond to the U.S. And then later on at different points, different partners had their own challenges, Russia a couple of times. So those were some of the early challenges that the Space Station Program faced. We got on track and got the configuration, got the agreements done.

Then we get down to the first [Space Station] element launch. There was tremendous pressure to get something launched and be in the middle of the program and not want to run a risk of being canceled again, so there was some real urgency to that. We got the first element launched in November 1998. That was a Russian element. It was an element built in Russia that the U.S. bought and paid for. The Russians paid to launch it, and we paid to build it through a Boeing [Company] subcontract that was called the FGB, the Functional Cargo Block [Zarya]. And that was the first element. Then the next element that went up was the U.S. node, Node 1 [Unity], that went up from Cape Canaveral [Florida] about two weeks later, December 4.

Then there was this long gap, because the Service Module [Zvezda], which is one of the big next element that was supposed to go up, wasn't ready. The Russians were having financial issues and their economy was tanking, and they were having a lot of challenges getting the Service Module done. Meanwhile, NASA has a real problem and so do the other partners, because we're right there, right in the middle of build. We've got a huge standing army, and every day that they're late, we are suffering financially. It's making us hemorrhage money.

So in 2000 we went over to negotiate something with the Russians that was a way to figure out how to ensure that they could have more funding to spend on finishing the Service Module more rapidly so we could get it up there and get the first crew up there. We ended up buying some of their stowage and crew time rights, which was about the only thing you could do. You couldn't buy hardware, because that would cost money to build, so we had to figure out what to buy that would be of real benefit to the U.S. and wouldn't cost them dollars.

The crew time and the storage were what we ended up negotiating, so that was when I started getting more involved, in '98, '99. The late 1990s was when I started getting more involved in the contract negotiations. We used those as a mechanism for how to accelerate their

completion of the Service Module, which would save NASA a lot of money, but also do it in a way that was palatable to everybody.

So once we got the Service Module launched, the first crew went up, things were going good.

WRIGHT: Can I ask you a quick question about that? I find it interesting, because you started in '94, and this is just going as fast as it can. You're coming into NASA, you're learning all the NASA-ese, you're learning all the international—plus the fact that you're a female and you're talking to the Russians and having to negotiate.

SAUNDERS: That was interesting.

WRIGHT: Can you share what some of those—

SAUNDERS: Oh, sure. Sure, sure. When I came into NASA, there was still the heavily male-dominated workforce. The [NASA] Administrator, Dan [Daniel S.] Goldin at the time, was quite vocal about trying to increase the number of women in science and engineering roles and leadership roles in the Agency. That was something that he spent a lot of time talking about and encouraging.

On our negotiation team, the head of the delegation was Mike O'Brien, but the person who did most of the talking during the negotiations was Lynn Cline. And then the rest were men, except for me. So Lynn and I found ourselves in some really, really interesting discussions. We would go meet with—the European team was all men at that time; the Japanese team was all

men, although they did add a woman lawyer later, which was interesting. And the Russian team—actually, at the government level had a woman on at one of the departments within their government—but the rest was all men. And then the Canadians were all men. So it was a negotiation team of mostly men.

And there was an age difference also. The Russians tended to be very senior individuals who had been in the space business for a long time. They were, for the most part, later in their career, and here I was at the beginning of my career. It was really interesting. There was one guy who was—man, he was tough. We were talking about crew training and other activities, and I had gone and worked very closely with our crew office on how we do the training, how we wanted this agreement to read.

We knew we wanted the Russians to work more closely with us than they had really been planning to do, and they kind of said, "Well, we'll train our people, you train yours." And we were like, "Oh, no, no, no, that's not going to work. They need to train together. Some of your people need to train in the U.S. and other locations, and we need to have some of our people over there." They were not that hepped on that to begin with, so we had some real issues in that area of getting to common ground.

So when we were working on this article of the agreement, I would go and present our position, and this guy would sit back and roll his eyes and look away and do other stuff, and I just kept at him, and I just kept coming back. It was funny, because in the end I really don't know how much of that was he didn't feel like he should have to deal with a woman. I wondered how much of it was that at the time, or if he just didn't like what I was saying.

After the negotiations were over, we were at a Space Station meeting, and we had had a group dinner afterwards at a restaurant, and he came up and gave me a big hug. So, to this day, I

don't know how much of it was negotiation posturing and he just had more of the old Soviet mindset of this is how you negotiate, and how much of it was that I was a woman. I still, to this day, don't know.

What I will tell you is it was really, really interesting. We joked a little bit that maybe the Japanese delegation had made us honorary men or something, because they didn't seem to have any trouble. Although we had heard anecdotal issues with some earlier women from NASA who had negotiated some things with them where they had one male lawyer. The female negotiator would say something and the entire Japanese delegation would turn and look at the male lawyer on the NASA side to respond, and then the female negotiator from NASA would say something, then they would all turn and look at the lawyer and respond back to him. Which was comical, because he was basically pointing his finger down the table, like, "Talk to her, it's not me. It's not my job, I'm the lawyer." We'd heard stories like that, but I didn't really encounter that. And maybe I had a personality where I just ignored it if I saw it.

You could see the differences in cultures and where women were in their workforce and their hierarchy. I will tell you that at that time NASA was very different from the other partners, probably least of all with the Canadians. Europeans, more women integrated in their workforce. Japan, I've seen a lot of change since that timeframe, and a lot more women, but I haven't seen—I haven't worked with them for a while, not very closely, so I haven't seen it. But I did see a progression in that area, and it was kind of interesting to watch. The Russians—what's interesting is that for a long time, it's mostly been the same people that we've dealt with. We've all just gotten older. I eventually moved out of the program, but I still see them at launch events and other things like that. So that was interesting.

WRIGHT: Well, thanks for including that. You started to talk about how the Service Module went up, and how that changed the program.

SAUNDERS: Right. Well, we turned to a new set of challenges. We had gotten the agreements done, gotten the configuration pretty well settled, and then [STS-103] *Columbia* [Shuttle accident] happened. So here we are in the middle of building the Space Station and we had this terrible tragedy. We weren't able to fly for quite a while, but we had a crew on orbit. The chances of losing the Space Station go up exponentially if you don't have a crew onboard, so we really didn't want to add risk in that respect. The Space Station processing facility at the Cape [Canaveral] was about to be chock-full of Space Station elements that were in their final testing phases at their home sites and about to be shipped over to [NASA] KSC [Kennedy Space Center, Florida] for launch. And by the time we returned to flight, they were stacked up in there pretty well. It was a very full building.

We had to try and figure out how we could sustain the crew. In the meantime, there had been this law passed in 2000 called the Iran Nonproliferation Act, where parts of the U.S. government did not really like the level of friendliness between Russia and Iran. So, in an attempt to put political pressure on them to back away from Iran a little bit, especially with respect to selling them missile technologies and services and things like that, they decided to use NASA as a pawn. We called it the INA, the Iran Nonproliferation Act.

What it meant was we had a whole bunch of restrictions and some flat-out prohibitions on our ability to buy goods and services from the Russians. So suddenly, here we were. We had an agreement of what the Russians were supposed to provide, and it did not include them fully supporting everybody on the Space Station. It included them doing their fair share, and we had

obligations with the Shuttle. So suddenly we had a need for them to do more, but we couldn't buy it from them, and they were not really in the position or the mode or anything to just give it to us.

So we had a lot of challenges where we had to go back and work on the understandings related to the agreements and how to make sure that they could support the crew. We went down to a crew of two. At that time, we were just building the Space Station in the relatively early stages, and so there were only three crew onboard. Six crew was supposed to be the final—actually seven was supposed to be the final configuration.

We managed to work through that and figure out how, within the confines of the law, to get the services we needed to keep two people supplied on the Space Station and rotate them. Then, about a year later, in the beginning of 2004, President [George W.] Bush rolled out his Vision for Space Exploration. That included retiring the Shuttle. We had this set of international agreements and a whole plan for building and using the Space Station that was heavily dependent on the Shuttle, and suddenly we found ourselves in a very awkward position, vis-a-vis the partners, of saying, "Yes, you know the Shuttle that was going to do all that, taking your experiments up and taking your people up, and most importantly bringing stuff down"—recoverable downmass was a huge, huge asset—"we're not going to keep doing that, so, sorry."

The agreements allowed for governments to change their mind, but it was very, very awkward and very, very troublesome, because suddenly we had to cut what we were going to do. We were busy working through that while we were trying to get back to flying. We ended up cutting some elements out of the Space Station and making some changes. That was one of the bigger challenges we faced, because nobody wants to hear the fact that their element's going to go up later. They've had their own political challenges.

For the existing partners it had been going on since 1984, so they were under a lot of pressure. It was great that the Space Station was partially built, but the European Lab[oratory, Columbus] wasn't there yet, the Japanese Lab [Kibo] wasn't there yet. The Canadarm was there, but part of it, the hand, Dextre [Special Purpose Dextrous Manipulator], was not up there yet. So that was a tough timeframe, negotiating with that. That was probably one of the bigger challenges.

One of the other challenges that I skipped over earlier was we had gone through a big cost review in 2001 called the [A. Thomas] Young Commission [International Space Station (ISS) Management and Cost Evaluation (IMCE) Task Force], and that caused us to cut down some of the U.S. elements and do some reconfigurations of the Space Station. That was another big challenge, and we had to work through that. But yes, the Vision for Space Exploration with the retirement of the Shuttle sent us into several years of renegotiating and adjusting.

WRIGHT: And included negotiating rides on the Soyuz.

SAUNDERS: Yes, yes.

WRIGHT: Your own part of that—could you explain some of that as well.

SAUNDERS: Sure. We found ourselves in this interesting dynamic. At the time when we negotiated the international agreements, we had been directed to put our people on the Shuttle. Why would we pay the Russians for rides when we could use the Shuttle? The Shuttle came and went five to six times a year. The Russians do their crew rotation on six-month increments with

the Soyuz, because it has a useful lifetime of about six months, so that's what makes sense based on the vehicle's capacity.

The other international partners, who have smaller contributions, smaller rights to have a crew on orbit, they want to have as much flexibility as possible. Because if you're the Canadians, maybe it takes you a while to accrue a whole increment for a crewmember. You don't want to use 10 years' worth of stuff just because you have to go up when the Soyuz goes up and come down when the Soyuz comes down. So they were interested in using the Shuttle for rotation.

Also their astronauts knew the Shuttle. We'd had Mission Specialist agreements with all those countries and their space agencies, and had the ability to have them fly up and down on the Shuttle. So they were used to it, they were comfortable coming to the U.S. for training. Although NASA had built up the infrastructure for training in Russia, the other partners—other than Europe—had really not done much of that. So there was this whole issue of all the attendant services—living accommodations, transportation logistics, other things that had to go along when somebody had to train in Russia—and that was not something that they had readily set up.

That was a really interesting time. And then the INA law expanded, and it became the Iran, North Korea, Syria Nonproliferation Act, so it became INKSNA. They kept adding more and more restrictions. It was still basically using us to put pressure on the Russians to back away from certain relationships. Which is great, except we were totally dependent on the Russians, for at least part of that period, for getting our crews to and from orbit. As a negotiating tactic, it's not necessarily that effective, because the Russians could've just flown to the Space Station without us. So we weren't in the strongest position, and that was interesting.

WRIGHT: The agreements—for instance you mentioned the Mission Specialist agreement—at what level did it have to be signed off?

SAUNDERS: For something like that—I think those were just training agreements, and I think they were the JSC Center Director with the counterpart of the Russian Space Agency, or maybe even Star City [Russia] at the [Yuri A.] Gagarin [State Scientific Research-and-Testing] Cosmonaut Training Center. For the MOUs, those were signed by the [NASA] Administrator and the Administrator's counterparts at the foreign space agencies. The IGA was signed by ministers, like a Deputy Secretary of State signed that.

WRIGHT: So not only you had to figure out what had to go in there, you also, as you went up the line, had to make sure that the right folks—

SAUNDERS: Oh yes. There's a whole huge coordination process that international agreements that have a certain dollar value involved or a certain level of impact at the national level have to go through. It's called the Circular 175 process, which gives everybody a chance. And all those agreements had to go through that. So if you're in the Department of Energy, you have the ability to comment however you would like, or non-concur, or whatever, on NASA's agreement with a European Space Agency.

It's a coordination, kind of like a concurrence in a correspondence process, but on a very large scale. And then there were differences of having to make sure that the texts all conformed with each other. There was a whole clean-up process, which we humorously called the "toilette

du text," cleaning up the text. But it was getting all that stuff done, and then sometimes there were translation issues. We had to make sure that those matched.

WRIGHT: Wow, it's very complex. Also during this time period, you went from [NASA Administrator] Goldin to [Sean C.] O'Keefe, and then of course Charlie [Charles F.] Bolden [Jr.] came through about the time that you were talking about. Were there differences, or—

SAUNDERS: Oh yes, yes. Goldin had been very, very focused on the Russian relationship, and I think some of that was George [W. S.] Abbey's influence. He was doing a rotation and was in a senior position at [NASA] Headquarters during the Space Station redesign period, and was really one of the major architects behind the Russian relationship and saw the opportunities to that and what it would do for the Space Station program and finally really get off the ground. And he was brilliant, the insight was absolutely right on. So Goldin was very focused on the international relationships.

When O'Keefe came in, we were having cost overruns and other things. There were other parts of the Agency that were just dying to get rid of the Space Station program, because from their perspective it was sucking up all the money. There were people that loved it and there were people that didn't love it, and for very good reasons, for their own particular mission focus.

When O'Keefe came in, one of the first things was like, "Ugh, how do we get rid of that Space Station? Man, it's just hogging all the money." So we went through exercises where we had to provide studies and other things about what were our commitments, what was the framework, what were the benefits to NASA. I spent a fair amount of time working on things like that. Every time a new Administrator came in, we had to do that.

I think the first one was when Tommy [Thomas W.] Holloway was the [Space Station] Program Manager, and the next one was when Bill Gerstenmaier was the Program Manager. I remember working on these things with him. Charlie Bolden, having come from JSC, and having had the astronaut experience—he was not of that mindset at all, but we had a couple that were.

WRIGHT: You had mentioned Tom Young and the review. How did that impact the Station and what you were doing?

SAUNDERS: Let's see, so that was in the 2000 timeframe. Well, what it did is it made us cut down the configuration to a more realistic set of capabilities that we could afford. The unfortunate part is it wasn't a total cost savings, because there were still functions that were in those elements that we cut. We had to figure out how to put [those back in], so we ended up spending money to adapt other modules.

What was unfortunate about it is that that smaller configuration ended up—I don't remember if it was at that stage or later on, it may have been later on with the Shuttle retirement—we ended up having to not fly some modules that we had worked with the international partners to provide, the centrifuge module that the Japanese were building. So that constrained us on that particular type of research, and also there was a little bad blood there about them feeling like they were contributing that as a payment for an ops [operations] cost bill. It was still something that was a source of pride for them, so that was a little bit of a strain on the relationship.

But in the end I think it probably drove us to have a better cost baseline and a better program control, so there were some positive things. It's always hard to go through an external review like that, because it always feels like—it can feel like a witch hunt. I don't think that was the intent, I don't think it was. But depending on the personality of the committee that's doing the oversight, it can miss some of the rationale and come out a little bit more harshly than it was intended. But in the end, it drove us to have a better cost overrun.

Oversight was nothing new. Oh my goodness, all we did in 1994 was answer congressional questions. We had entire teams of people who did nothing but field the latest set of 25 questions from Congress and answer them. And then you have all the normal NASA committees, the NAC [NASA Advisory Council], the ASAP [Aerospace Safety Advisory Panel], all the other—there were just huge numbers of oversight entities that took their turns, all come in to see the program and ask questions. Lots of resources devoted to that. There's an absolutely great thing to having oversight, you need that, but that was probably out of balance for quite a while.

WRIGHT: Did you find yourself in front of these committees?

SAUNDERS: Not so much at that point. People like Bill Gerstenmaier's predecessors at Headquarters were usually the people that were speaking. It would've been more like a Will [Wilbur C.] Trafton at the time, later a Bill [William F.] Readdy, later a Bill Gerstenmaier. People at that level were typically the ones, or the Administrator. But when the Administrator is testifying, guess where all the material comes from, so we did have a lot of constant stuff. It was

mostly just getting the facts, coordinating them, presenting them in a cogent manner. That was interesting.

There was a whole level of agreements I didn't really talk about that were really interesting. One tier below the MOUs there was something called implementing agreements. Let's say the Japanese were planning to launch their JEM [Japanese Experiment Module]. The Japanese laboratory for the Space Station was going to be launched on Shuttle, in the equivalent of like two and a half Shuttle flights. We had to work out how they were going to pay us. Governments don't like to write each other cash, and so we had to work out barters for those things.

That helped us with some of those cost overruns; we ended up passing off building some modules and some equipment to the partners. We did that with Europe and with Japan. And we did a whole agreement with the Russians called the Balance of Contributions Agreement, which we actually did during the MOU negotiations. That was what enabled us to get to an agreement with them and sign the MOU. It was sort of a, "You keep what you bring, I'll keep what I bring, and let's talk about what we do for each other." I could talk for two hours just about that one.

One of the things with the Russians which was interesting—we had totally different ideas about how to do research on a space station. When they owned their space station, they were there to fly in space and to be in space and not so much for the research. It was about being there and being the leader. And the U.S. was very, very different, very much more research focus. Sure, there was a certain part of us that wants to just be there and be the leader, but there was a huge part of us that we were there to do research in microgravity conditions.

We had this real fear when we went into the Russian negotiations that they were going to—because of the magnitude of their contribution with launching Soyuz and doing propellant

resupply for the Space Station and bringing up Progresses [cargo spacecraft] filled with crew supplies and whatnot—that they were going to make enough of a contribution that they would end up getting rights in labs other than theirs. And the concern was they would then take it and either sell it or do nothing with it. There were a lot of concerns among the non-Russian partners that that was something that could happen. So we tried to find a way where we would keep all the rights to our labs, and they would keep theirs.

And so we got into this negotiation that was hilarious, because we would describe our research capabilities, and the Russians, who were used to—they would build their capabilities for a customer on a custom basis. The customer pays, "This is what you want, this is what you get." They hadn't built their modules yet, while we're doing these negotiations, so we had this broad elaborate thing of, "Okay, this is a standard rack for payloads and it holds this many drawers of payloads and this many experiments. It has this many kilowatts of power, and it has all the bells and whistles." We'd tell them how much downlink capacity you can buy. The Russians would come in and say, "Yes, we have that too, plus one." It is not an argument you can win, because you're dealing with somebody who has—I mean, they're savvy negotiators, and they hadn't designed that, and it was their custom to design what the customer wanted. And so they're like, "Yes, we have that, plus one."

We ended up—we just got to a tie, an impasse, and finally decided we were going to have to go a different way. So instead of trying to take everybody's contributions and measure them and equate them and calibrate them and then decide how you divide it up, we just did, "Okay, you know what? You're special. You bring what you bring, we'll bring what we bring. You do all your research in your elements, we'll do it in ours, and let's just talk about what we do for each other and how to equate those." That was interesting, because then you'd have to try

and equate how does lifting a pound of mass to orbit, or returning a pound of mass from orbit, equate to kilowatts of electrical power.

And in the end what I learned about that negotiation was probably the best thing I ever learned in my career, which was if you're trying to do a deal like that, the best thing you can do is not try and equate the individual elements. If you want to get to a deal, different parties place different value on each individual component in the deal. We worked through it for a long time, and then we finally said, "Okay, we'll do these things, you do these things, we'll call it even." That was what finally worked. And it was a long list on both sides, and everybody got what they needed, but we didn't have to each agree that this many kilowatts of power is equal to this many pounds of mass to orbit. It ended up being a good outcome, but it was interesting.

It was also really interesting when we went back to try and amend it, because then you started to learn more about how they valued individual components as you try and change one thing and not the whole list.

But I think you asked something about buying Soyuzes.

WRIGHT: Earlier, about buying the seats on the Soyuz.

SAUNDERS: Okay, so in 1998, before the Space Station had really flown yet and we were trying to find ways to make sure we bought services that would help them facilitate the completion of their contribution so we could get to flying, we negotiated a purchase of a Soyuz that was $65 million for a dedicated Soyuz, all three seats, going to the Space Station. And we got shot down by somebody at OMB [White House Office of Management and Budget] who thought that was outrageous and they knew that the Russians didn't have that much money in their space business.

And now we're paying more than that for each seat, so it was kind of ironic and kind of frustrating at the same time. What they didn't realize is, the Russian economy was built on relationships and a lot of barter. So sure, did the Russians have that much money in their budget? No. But were they calling in a goodwill marker from somebody they had done a $5 million favor for 10 years before? Yes. So somebody was spending the money—it just wasn't all in the same timeframe—who had built something that they could then use. Their give-and-take and all that stuff was far more complex that you could discern from just looking at what their budget was.

There were also some interesting times. I remember one of the Russians telling me when we had some of the furloughs in, I think that was '95—we wouldn't get our budget, but we would have money. And they would get a budget, but they never actually got the money. And so he said, "Very ironic. You have no budget, but you have money, and we have budget but no money." It was very ironic as we were at opposite situations, where they just couldn't quite figure that out.

WRIGHT: Since we're talking about the Soyuz and buying seats, could you talk a little more about after *Columbia*, and how that changed because we were going to have to rely on the Russians.

SAUNDERS: Right, right. That's what I was going to tell you. When we negotiated these agreements, our direction was, "Fly our guys on Shuttle and not on Soyuz." They didn't like the rough landing, they didn't want to have to deal with the training, the long periods of time away from home. They wanted our guys to rotate on Shuttle, and so my instructions in working up the

agreement text was to make sure that we weren't forced to put our guys on Soyuz. This is in 1995.

Well, by the time we get to 2003, when we've just had *Columbia*, now we're dying to fly on Soyuz. I mean, we're desperate to fly on Soyuz. And so now we have a different problem. Now we're trying to figure out how to make that same agreement work for us to get more Soyuz and more use of Soyuz. Then when we found ourselves with a combination of *Columbia*, the non-flying era going on for a long time, and also the retirement of the Space Shuttle, now we found ourselves with a more permanent reliance on the Soyuz. Those negotiations were very interesting.

We found ourselves in a very awkward position, because there had been a certain amount of, "Okay, well, we don't want to use that, we're not that interested in it," so they're sort of like, "Well, now what are you thinking? Now you're interested, now you need me." So there was a little bit of that dynamic going on in the negotiations. But their costs were going up, and they knew we were desperate.

They actually—I applaud them for it—they could've really gouged us, and they didn't. They were good partners about that. Were they making money on it? Sure. But they didn't do what they could have done in terms of the pricing. But you get into this whole negotiation of what's included, because it's not just a matter of riding up on the rocket. You have to have someplace to stay and to train in Russia, you have to have the access. What about the winter survival training? What about all these other ancillary training activities? What about the materials?

They weren't big ones for handing out manuals. If you go to a training class in the United States, it's like, "Here, here's your training materials." Oh, no. Not only did they not

want to translate them, they didn't want to hand those out. They looked at it more as proprietary company data, whereas we look at it as, well, why wouldn't you give that to the students? And so there were lots of issues about basic materials and other things, and what was included.

And then it really came down to who was flying and rotating. What about the times when it made sense for a Russian to fly on the Shuttle while it was still flying, and those whole negotiations. They had this very complex crew rotation chart. I mean, we could sit down and we would talk about this for eight hours at a time. It became a joke, because you'd see the chart come out and you're like, "Oh no! There's eight hours of my life I'll never get back." And we would do this for days.

They're good negotiators, so they know when you're leaving. You'd sit there and they would kind of meander around the topic for a few days, and they're hoping that you're waiting till you're desperate. Because in the end, if you don't get a deal, who stops training? Our guys, not theirs. The Russians are not impacted, they're still training. But it's not good to negotiate when it's that imbalanced, in terms of the power.

Now, they did need our business at the time, and it was a good source of revenue for them. But they also had a company called Space Adventures [Ltd.] out there selling the tourist rides, so every once in a while we would think we had it all figured out, and they would, "Oh, no, that one's not available. That rotation's not available." So we had to negotiate building that into the program. But it was certainly interesting negotiations.

WRIGHT: About the time Charlie Bolden came into his role, it was also the time that Constellation [Program] was canceled. Actually, even before that, a small part of the Vision for Space Exploration included a commercial aspect for cargo. Can you talk to us about how that

impacted the growth of the commercial cargo public partnerships, and how that impacted the negotiations and so forth with Station?

SAUNDERS: Sure. So there had been adjusteds. There had been certain parts of the government that were not happy about U.S. reliance on the Russians, putting Russians in the critical path during the '90s, during the Space Station build. There were others that were not happy about us being over-reliant on them for cargo resupply. And so with the Space Shuttle going away, they were looking to try and beef up U.S. capabilities in that era.

What's tough about that is anytime you have a new vehicle coming online, it always takes longer and costs more than people really want to plan for. And the tricky part is we had commitments with Japan for their unmanned cargo vehicle [H-II Transfer Vehicle (HTV)], and also with Europe for the ATVs [Automated Transfer Vehicle], their cargo vehicle, and the Russians for their Progress vehicle, and we had plans for the Shuttle.

So we had this really extremely complex choreography that the Space Station had to work out. What cargo did we need when; where should it go optimally, based on shipping it and when it needed to go; what the lead time is for those vehicles when we really thought those were going to launch. You have this whole fleet of vehicles that you're trying to manage. Now you're going to introduce a certain number of new vehicles, so you have to start spending resources to develop that. Well, where does that come from? It comes from that existing transportation budget, and so the hard thing was trying to come up with what should that cost.

You've got a whole series of commercial companies out there making representations of what their costs were going to be, when they were very early in the development. And that led to some increased scrutiny on, "Okay, how much are you paying the Russians?" "Well, how come

this person can do it so cheaply?" And we're like, "Well, they haven't flown yet, so we don't know how cheaply they can do it." But there was a lot of tension about that. There's always experts all across the government, including congressional staffers and OMB and some at Headquarters—there were some people who thought that the prices were cheaper. That we were paying too much, basically, for those capabilities, and so there was some tension there.

They wanted to trim down the budget in the out years, because they thought, "Well, it should be cheaper than that," or, "You'll have this competition from American providers." In the end, yes, we have had some great success with cutting costs with the commercial providers. But it took them longer to get there than they had originally planned, and then they have problems too. We've seen two issues in the past year.

It's been interesting watching everybody try and figure out how to fund seeding that new industry while still maintaining a fleet of other vehicles—some of which we got through purchase under a contract, some of which we got through international agreement commitments—and try and figure out how to do all that while you're building and maintaining this huge Space Station. I really applaud the Space Station team for all they've done to manage that.

When you start adding the crew stuff—you have to pay for the Soyuz. It's not like an airline ticket, where you can buy it the day before or that day of the flight. You might pay more, but you could buy it. For Soyuz seats, or for Progress's, you have to start buying it several years in advance. Well, same for some of those cargo vehicles that we were buying. You have to pay for the Progress because you know they're going to be able to finish on time and you know when they'll launch. You have to be able to pay for the commercial cargo, but you're not totally sure

that they're going to be there at the right time, because they're new. And so that was always something really challenging.

WRIGHT: And of course we're looking forward to commercial crew at some point.

SAUNDERS: Oh yes, yes.

WRIGHT: It's another dynamic.

SAUNDERS: Another dynamic, another set of challenges.

WRIGHT: During the years that you've worked on the negotiations and the contracts and just watching things evolve—you've mentioned a couple of lessons learned, but what are some of the other aspects that you felt that you have learned that you've been able to help NASA streamline, or those aspects that make the whole procedures and process be extremely valid at the end?

SAUNDERS: Things I learned from Space Station? Well, probably one of the biggest lessons that I think we as a team learned, that I didn't really see coming when we were in the middle of it, was the value of dissimilar redundancy. We fought so hard in the '90s to try and get a certain level of commonality. Certain things absolutely have to be common. Some of the crew interfaces for safety, and caution and warning, and whatnot. And we fought so hard to get them [the Russians] to do things the way we did. We wanted more and more systems to be common so that you could have some common spares and get some efficiencies.

Well, the challenge is, things don't always behave in space the way they do on the ground. So if you have a problem with the system, it sure is nice when you have a different system performing the same function that's built in a different way, with different components, so if you find out you have problems with a certain component or a supplier or something, you have some redundant capability. That was something, if we had won all the arguments, we would've been in trouble. It was kind of a neat thing. It was thank goodness the Russians stuck to their guns and wouldn't agree to as much commonality as we sought, because it probably saved our bacon a few times. That's everything from computers to other systems that support the Space Station. That was something that was really interesting.

The other thing I'll tell you is, it made me a true believer in the value of international partnerships. I think if Constellation, when they were forming—I remember telling Doug [Douglas R.] Cooke, "You guys need to get out and get some international partners ASAP." If we had had international partners and commitments—that saved the Space Station. The Space Station would not have flown if it hadn't been for those international partners, because they saved it again and again from cancellation.

So yes, does it cost more money sometimes? International partners save you money, and they cost you money. There's a savings in terms of you don't have to build all the components; there's a cost in terms of coordination, integration. Sometimes they have problems when you're not and that slows you down, and sometimes it takes longer to get to a decision or a consensus. But man, they typically have problems at different times, so you have some redundancy where you have some give-and-take. Somebody can help you when you're having a problem, and you help them when they're having a problem.

But also that political safety net is huge, and it's a huge inhibitor to the whims of an administration and Congress. It really, really can help you through transition and those different changes of focus and desire and people's visions and their legacy and all of that. We can end up changing constantly and never get anything done, which has been kind of a problem. Having the international partners really mitigates that. Those were two of the big ones that come to mind.

The other thing—I remember what it was like in 1994. We'd just show up. We were in survival mode, and so it was exciting. It was energizing, there were people—there are always the haters out there who say, "You're never going to fly, why are you doing that with those partners? Why don't you just do it ourselves?" And they were proved wrong. The value of the International Space Station, and what we have been able to build across the globe, and the impact that it has on the globe has been tremendous.

Just incredible the outreach they do. If you look at a map of where they've reached out and talked to kids, school kids across the globe, and how many countries and how many events like that, it's just incredible. It's making humanity better, encouraging people to go into science and engineering and those sorts of fields, and just showing what people can do. It has that same feel as the Olympics, where you get that feeling that, "Gosh, if we can just work together and figure out how to do these things together, why can't we do more together with less conflict?" I think Space Station is a perfect example of how that can happen.

And because of those relationships, of going through all the really tough challenges and surviving, it really did forge those types of bonds that last a lifetime. I know there's been some friendships that were made that will last a lifetime. It's neat to see.

WRIGHT: You were talking about commonality. I remember one of the things that I had read is that you worked on the Code of Conduct [for the International Space Station Crew].

SAUNDERS: Yes, that was interesting.

WRIGHT: Can you share with that?

SAUNDERS: Sure. On the Shuttle there was a series of federal regulations that dealt specifically with artifacts and taking mementos on the Space Shuttle. And any U.S. crewmember, or anybody who flew on the Shuttle was bound by a combination of laws—ethics laws that are relevant to federal employees, whether they're military or civilian, and also the actual Code of Federal Regulations about what you could carry on the Shuttle, for what purpose, and what you could do with it afterwards. It was designed to prevent people from going up and doing the older equivalent of selling stuff on eBay [Inc., online commerce site] for cash. The crewmembers have some right to carry some personal items of meaning, but to prevent stuff from showing up and it being just sort of cheesy. They shouldn't be allowed to use their position for private gain.

We had these restrictions. The Russians did not. So when we got to Space Station, there were already things from Mir that were showing up online for sale or in auctions in different places. We realized that we had a need to have an agreement that would make sure that everybody had the same sorts of restrictions on carrying things to the Space Station, what purpose could they go for—advertising, other things like that. So we worked on the agreement called the Code of Conduct, which basically multi-lateralized the types of rules that we already had in place for the Shuttle.

That was something that we negotiated with all the partners, to make sure that we had a standard set of rules. Because you don't want to have crewmembers from one country up there and they could do whatever they want, and then others were like, "Well, great. I could bring my son's class ring, but that's it." Or my mother's wedding ring, or something like that. You wanted to make sure that they were a relatively equal set of rules. It was really, really an interesting discussion. The crewmembers in general are a pretty good group of rule-abiding people.

There were some other interesting discussions in the negotiations when we were doing the IGA about criminal jurisdiction and what was a crime in one country and what wasn't. That was at the time when the U.S. anti-smoking laws were really proliferating and regulations were really proliferating across the U.S., and the Russians were still big smokers. One of the questions they asked was, "Well, what if, for example, a Russian crewmember was to smoke?" Okay, first of all, they don't do that on the Space Station, but we said, "Oh, you can smoke, you just have to step outside." They didn't like that answer. But we had interesting discussions, because in that one it was sort of a different set of issues.

For the first time, we might be having crewmembers that come down in Kazakhstan. Before that, everybody that flew on the Shuttle went up from the United States, and they came back to the United States. We weren't worried if we had a problem with one of our people or somebody, an international astronaut—which is still unlikely, given the nature of the astronaut crew—we had the ability to deal with it under U.S. law.

When somebody's coming down in Kazakhstan under Russian control, we didn't necessarily know how they'd be treated, and what would a trial be like. Would they be arrested

without what we would consider due cause? So we had a lot of interesting long discussions about that. That was interesting. But yes, the code of conduct was interesting.

WRIGHT: As our time is starting to close, I was going to ask Sandra, did you have a couple of questions?

JOHNSON: You were mentioning the international partners and how they really saved the Space Station. Now,—after the [U.S] National Lab was established [on ISS] and then commercial companies like NanoRacks [LLC] coming in 2011—are the commercial people in that same position that they can help save ISS if it gets to a point with Congress that there's an issue?

SAUNDERS: I would say yes. I think that there's less of a threat in general right now, just because it's built. I don't see the same threat landscape that there was at that point, because you wouldn't cancel it once it's built. But absolutely yes, they can be a very valuable ally in getting continued support and getting the word out about what is possible to do.

And ISS is, frankly, a test bed for exploration. Those partnerships—and not only government seeing the value of the international partnership, but international industry seeing the value, the economic benefit, that it could bring. Even though the governments might start out and form the first portions of an exploration program, there are business opportunities to be pursued, first in low-Earth orbit and then potentially later on further out. So yes, it's always helpful to have another advocacy group.

The biggest thing is, NASA is a member of the executive branch. So we have Congress that appropriates the money, and the [presidential] administration that sets the priorities, and

we're not supposed to be out there lobbying for ourselves. Sometimes we get caught in the middle between the administration and Congress, and that can be an uncomfortable place to be. It never hurts to have other people with aligned interests who don't have those restrictions, to have that ability to advocate for something they believe in. That's always good.

WRIGHT: Well, thank you. I think our time is up for today, but maybe we can come back another time and learn more. So thank you so much.

SAUNDERS: Sure. I'm sure there's tons of stuff I could tell you.

[End of interview]