CHARLES STEGEMOELLER

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Interviewers: Rebecca Wright, Carol Butler, Tim Farrell

Wright: Today is August 6, 1998. We are visiting with Charlie Stegemoeller, with the Shuttle-Mir Oral History Program. It's Tim Farrell, Carol Butler, and Rebecca Wright.

Thank you for taking time out of your busy schedule to visit with us.

Stegemoeller: My pleasure.

Wright: We would like for you to start by telling us what your roles and responsibilities were with the Shuttle-Mir Program.

Stegemoeller: Well, it started back in October of '93. I had just left the [transition team] space station. I was looking for a different change of pace and I ended up in the Life Sciences Directorate. When I did that, I ended up in the seat of the action, as it was, for the whole Space Station/Phase One Mir Program [Research] activity.

At that time, Phase One was really just one mission to Mir—[Dr.] Norm [Norman] Thagard. We were just going to use Progress vehicles to supply it. [In October of '93], the decision was made that we [NASA was] going to go from one mission [to Mir] to ten. It changed the whole look, feel, and approach to the mission. So I jumped in, volunteered. I was not fully engaged. I just went [across] the hall to Britt Walters, who was the project manager at the time, and I said, "Can I help?"

That end of October is when we had a joint meeting with the Russians, when we started talking about how would we go to ten missions. What would be the component of the experiments? What research would be [sent] up and what would we provide? What would be the outfitting and the tradeoffs? It became a roller-coaster ride from there.

What happened at that point is that we went in through Thanksgiving trying to figure out, what is the [Russian] Spektr module? What was the U.S. involvement with it? What would be the best use of that platform? And we started doing the detailed technical interactions, trying to understand what's the common language [between the U.S. team and our new Russian counterparts]. We had some really interesting times in those meetings.

You know those white boards? Press the button and it prints out the white board? We had just spent, I don't know, several hours, if not a day, talking about allocations. We counted up just the right--we counted up and we finally said, "All right, let's put it on the board." We wrote it on the board and got everybody to agree. The Russians understood the translator. We understood the translator. We said, "Everything's right." "Da?" "Da." So we hit the "print" button and the Russians just went--they sat back in their chair. One of them, Nikoli goes, "Ah, America!" Because of this high technology, just printing out

what we had written on the board. We had a good relationship from then on. It was always a challenge, though.

Wright: How much of a challenge was in the negotiations and how much of it was in just having scientists agree on what should be taken of?

Stegemoeller: Well, there were two sides of it, of course. Myself, I was the project manager for all the payloads that we're putting on. So I led the technical side. Peggy Whitson was the head for the research side and dealt with all the research issues. Getting the scientists to agree on techniques and styles was always a challenge, because the Russians--their temperament, their style, their approach toward research is different than the Western side. That's good, because differences--they combine at some point and they lead to new discoveries.

On the technical side, fortunately, we all had technical common basis. Engineering is engineering. Math is math. Physics is physics. So, regardless of our personal difficulties, you couldn't dispute the math, the numbers. But the negotiations were tough at first because it was a matter of the cultural difference of, Who are you? Why are you here? We on the Western side, "I take you at face value," and we started doing business. The Russian side, based on Soviet background is, "Who are you behind that facade? Can I trust you? Will you be who you are tomorrow after we've talked today?"

It takes a little bit of getting used to, but fortunately the Houston, Texas, mentality of, "Hey, my handshake is my word. I'm a person of honor and I'll stand up behind you. I'll be with you," is very similar in style. Soviet history is fairly much rooted in a rural culture and very similar personality basis, so we [had a cultural connection] to work together on. I don't think it would have been as successful if this had been based in New York City instead of Houston, Texas. So it made it a lot easier.

Wright: What phase was the Spektr in when you started to get involved in the project?

Stegemoeller: Well, the Russian [modules], both Spektr and Priroda, had been previously [initiated] under the planned expansion of the Mir complex and had been put on hold. So the elements themselves had been built, but had not been outfitted completely. They had ten or twelve years of history already on the Spektr by the time we got involved. They had other agreements with their satellite countries flying experiments. They also had some of the CNES (French Space Agency) partners and some ESA (European Space Agency) partner payloads engaged on the module itself. So it was a fairly mature vehicle. In fact, [the] Spektr [name relates to the word] "spectrum," as in visible light spectrum. Priroda is "nature" in Russian and the module was to study the Earth.

You've got to understand RSC Energia was [a key design factory for the Soviet ICBM's] and was a part of their defense infrastructure. So Spektr, at one point, was to [be used to study the spectrum of light from rockets]. So the program was top secret. So it was very difficult [at first]. We were the first [U.S.] team that went into [the module]. So there were a lot of obstacles to overcome, until the Russians finally declassified Spektr and declassified Priroda. We would ask questions like, "What are [our payloads] next to? When we put this here, so we can lay out where we're going to do this exercise device, or this experiment, if you could tell us what's around it, we'll be able to plan better."

They said, "Each of us have our own jobs. We'll let you know."

So that was frustrating that we couldn't get past that point. It took a while before we realized what we were dealing with was a culture, that this was a very top-secret program, that there was risks on their side if they were to exchange information.

So as you asked, it was fairly mature by the [time] we got into it, which complicated our [schedules] and still meeting the launch date. Translations were tough, doing telecons at six in the morning to try to catch them before they went home for the day, and trying to talk about accrued facts, and have translators try to interpret what we're trying to deal with were just arduous [tasks]. [As an example], we spent three weeks just trying to understand each other about a mounting plate for the ergometer. But the moment we got face-to-face, it was resolved in five minutes.

Wright: What were the expectations from the Russians of your team, regarding Spektr? At least in the beginning, what were you all asked to do for them to get Spektr ready for launch day?

Stegemoeller: Well, I don't know that those were ever stated. The expectation was that our expectation on them is that we had a contract that we were going to have 2,000 kilograms of mass on board the Mir via the Spektr and Priroda modules, that we were going to have 2,000 watts of power on board and that we were going to utilize it and have access to get it there. So we expected that they be open and engaging us in how we would get our products on [the modules]. Their expectation is that they were going to come work with us and make it happen.

Most of the individuals, if you look on the Russian side, have been in the space program since they joined it in the sixties, and they're an older crowd. It's a matter of pride that they've been there. Even the infrastructure within the Mir Program was set up back in Apollo-Soyuz. The individuals that we interfaced with were dedicated back in Apollo-Soyuz that this was going to be a long-term relationship. Then [with the Russian invasion of Afghanistan, the U.S. closed off joint Soviet/U.S. activities and our colleagues in Russia] were left with an infrastructure that was ready to proceed without a joint space program.

So they were ready to get back engaged. Some of that hesitancy was up front, too. They said, "Well, is this another deal where we're just going to put some effort in and we're going to lose in this effort?" So the expectation was, "We've got a job to do, let's go see what we can do to get it done."

Wright: How did it change from there?

Stegemoeller: Well, we were a young group, a very young group on the research side that was doing the technical delivery of products and integration. [Our team experience was Space Shuttle and Spacelab flights. Spacelab tasks for us were much less constrained], getting a lot of leeway as we get ready for flight, late deliveries and such, especially when you're talking about space medicine. The first mission was specifically about space medicine kind of aspects, and human life sciences with [Dr.] Norm [Norman] Thagard.

So we weren't used to having a schedule that was so far in advance of a flight and deliveries months in advance. We weren't used to having an acceptance test process similar to what the Russians had imposed on us, where we had to generate these nine volumes of information, have it all translated, and then go through each of those volumes and individually sign those volumes, then review the hardware and review the test hardware and review the training hardware and then deliver it. Once upon delivery, you have to evaluate it again. Once you've evaluated it again, then you go test it in their vehicle. Then the test results come back and you ship it down to Baikonur for launch. When you ship it down there, you do another inspection.

We were not ready for that level of detail. Fortunately, we set up some really good relationships with our counterparts on the Russian side. They probably had a higher expectation of what they were dealing with before they met us. It took a lot of patience on their side, and on ours, to get it right. So the delivery dates shifted and the schedule stretched out. We jointly had to resolve that Spektr was going to be delayed. That decision was back in September of '94, that it was going to be delayed to after Norm's launch to Mir. That's a whole other segment of how we dealt with that.

So when they came over for acceptance tests, a group of eight or ten Russians would come over and they'd stay for six or ten weeks, just trying to get through all of our hardware and all of our documentation, because there was a lot of piece parts. It was a lot of equipment that was interfacing directly with the humans. So they had their human standards to deal with and we had ours. We had some hiccups.

Our first translations of their requirements documents were not fully correct or accurate. Our translations of some of our documents weren't accurate either. For example, we were dependent upon their

power supply, so that we built a power cable and we would leave one end open. Then we'd write the directions on how to unsheathe the cable, to splice this connector that would be plugging into the power supply. I remember once we went over to Moscow, we had the cables with us, we had the documents with us, and they were reviewing the documentation and they just started laughing. All of us were, "Well, why are you laughing? What's the matter?"

He says, "This cable, we must circumcise this cable." It was because the translating staff that we had at that time had not quite caught up with us. We were into deep technical stuff and I think the translator on that case might have been an English major, might have been a history major. Russian is a very poetic language in that it talks in phrases and different phrases have different meanings. So when you unsheathe the end of a cable and you cut it back and you open and expose. Sure, they could have misinterpreted that. But it was pretty funny. It was one of those binding moments, as well.

Wright: Light moments.

Stegemoeller: Light moment. And we had lots of those. There were a lot of tense moments. I mean, our folks were seriously under pressure to perform. We were working nonstop. We pretty much put the rules in perspective, put the time line on the priority. So we had some risk involved in all of our preparations, and so some things didn't make it or they had to be reworked and reworked again, whether mechanical or electrical or just in the documentation. So it took a lot out of a lot of people to get us to the point where we could fly.

I in no way was alarmed. There was at least two hundred folks engaged in various aspects of the research side and preparing or outfitting or building the piece parts or the infrastructure that we actually put into the Spektr modules. And that was just Phase 1A.

Meanwhile, at the same time we were starting on the Priroda Project. Priroda, as well, was a whole other module. In fact, Gary Kitmacher led the team that outfitted Priroda in parallel to us. We finished up the Spektr module. So another group of folks were totally engaged and trying to come up to speed, as well as negotiate and integrate hardware.

Wright: Did you find yourself in all this preparation and planning and implementing and doing things, that's not quite the normal way of doing things that you've done before?

Stegemoeller: Well, to be honest with you, I'd never flown hardware before. I had worked five years on Freedom and was [the] Resource [Node] development manager there. So I was used to integrating Huntsville and Boeing and Marshall with JSC [Johnson Space Center] and Houston and McDonnell-

Douglas.

Wright: So they felt you were prepared to integrate with the Russians?

Stegemoeller: Well, no, I had to draw on every one of those strengths. I hadn't flown hardware before and I went over there, but I had no fear of failing. I mean, just this is something that had to be done. It was the right thing to go do. Everyone that worked on the project knew they were working on the right thing. It was the hardest job we all loved, and there were a lot of personal sacrifices in it. The team just had a really good sense that as frustrations would mount--but there was always some validity behind the frustrations.

Now, what we didn't do is we didn't bureaucratize the process. At that point, in Phase One, there was no Phase One program manager. The project was wholly out within a branch within a division within the directorate. The research was being led out of Medical Operations Division and the technical team was out in the Engineering and Payload Management Division, out in Life Sciences, and we were it. Peggy Whitson would call me up on the phone and fuss at me about me not implementing something or not being aware of something happening. I'd call her back and fuss at her that her research was out of the box and needed to get fit back in it. That would be the extent of a configuration control to the point where it was necessary. So we pushed rules and boundaries real hard and didn't break [any] that I'd admit to.

Wright: Good idea.

Stegemoeller: Oh, yes. But we didn't break any. But like the manifest, if you look at the Shuttle manifest, the manifest is dictated twelve months before flight. The manifest for Spektr was finished while we were in Baikonur finally loading the package drawers. So when I came back from the Baikonur trip, I presented it to Tommy Holloway, who was program manager at the time, I said, "This is the manifest for the Spektr launch. This is the manifest. There are no changes. No revisions. No edits. Any comments?" And that was unique. I mean, that was one of the good things about the job, is [that] pretty much [when] in charge, you [are in charge of] your own destiny of the accomplishments.

Wright: Tell us about Baikonur. How was it to be there in the midst of the Soviet space history and then, of course, what's going on right now?

Stegemoeller: Well, the whole experience of working with the Russian colleagues, going through Moscow, working in their facilities at Energia and their off-campus office for international partners was quite interesting. They had an off-campus office for their international partners because Energia, the plant, was where they made the missiles, and it was a highly secret location. Kaliningrad (now Korolev) itself was a

city that was not on most maps. You ride on their bus [to the facility]. We had to lunch there several times. They'd drive the bus through the big steel gates, and the gates would open, and there's this three-foot thick wall with barbed wire across the top, and spotlights, and this kill zone between the electric fence, because it was to be a protected zone. So, going down to Baikonur was another experience.

We got on the Energia company plane, which says "Aeroflot" on the top of it, at this remote airfield south of the city. You'd fly down there. We unloaded our own gear out of the tail-end of the plane, and put it on our own bus, and drove it out to the Baikonur facility. It's a very open, huge complex on the flat steps of Kazakhstan. Where we were staying wasn't far from Yuri Gagarin's house, the house that he stayed in prior to his flight. So there's lots of history there.

But I didn't feel threatened at any point. Fortunately, all of these events had taken place and the walls had come down. We were always well cared for and no issues. Now, we did have a security handler at Baikonur, so we didn't wander around and wander into some other facilities while we were there. He was the guy that controlled how many pictures we were allowed to take.

What it did do, is that in viewing the very harsh surroundings that they have to work with, [it developed] a tremendous amount of respect [for our Russian colleagues]. I mean, never have so many done so much with so little for so long. There's just an intense sense of pride. The little old lady that sews the ablative shield fabric or the thermal insulation fabric on every one of the nose rings and on the outside of the spacecraft was the same one that was doing it for the last thirty years. She's hunched over on this table on the side doing this hand-stitch work, while we're unpacking our gear and putting it in the module. Just very interesting surroundings. I have a lot of respect for what they've accomplished.

Wright: For this project, was that your first time in Russia?

Stegemoeller: In January, yes. January '94 was my first trip to Moscow.

Wright: What were your first impressions of being there?

Stegemoeller: The Sheremetyro Airport is one of the most imposing, stifling experiences you can deal with. I mean, if the Soviet Union was trying to keep people from wanting to leave town, the airport is one way to do that. It's dark. Its features are lifeless. You're walking off a plane that you've been on for the last eleven hours or so out of New York. They amazingly have five or so planes land at one time and they dump them all into the same Customs line. So the Customs booth lines go back up the staircases.

Lines in Russia don't exist. People talk about lines. They will, they'll line up. But in these kind of scenarios there's no line management. Everybody's on their own. They'll make you stand behind the line

and they'll call you up. How you got to that line is truly on your own.

So it was a very alive sensation about going through that process, standing in a little booth, waiting for them to hand you back your official passport, to keep moving, getting your gear and trying to shuffle through the Customs.

We have some pretty good stories about going through Customs. We had a lot of short delivery schedules that we'd hand-carry gear over with us. We found some techniques on how to make sure we got through Customs without incidents, to put it mildly.

Wright: One of those books that might come out at another time?

Stegemoeller: Well, hopefully not.

Wright: You were able to get in what you needed to get in to do what you needed to do?

Stegemoeller: Yes. We did have, though, in the Customs, it was a new experience for us. With the change in the structure, Energia had some--let me back up. The way it works, as I understand, and there are probably other variations of it, is that when the Soviet Union broke down into Russia and the Russian economies opened up, and the various elements of the government then had to be responsible for their own income, the Customs office then became basically the taxing agent. The amount of gear that Energia was having to be responsible for going into them created quite a sizeable bill. So on more than one occasion our gear was on hold in the Customs agent's office at Kaleningrad until Energia could clear their past apportionments.

So our gear that we shipped for Spektr by December 7th of '94 sat in the Customs warehouse until it was released in January. It was a cold winter, and we had some items that we had to replace because it had gotten below their temperature threshold. Even though we had packed them in temperature crates and tried to protect them as best we could from the environment, we hadn't planned for a cold soak for thirty days in a less-than-freezing warehouse. So that was a novelty and one of those experiences we came up with.

Wright: Now, did that whole process improve as you went through this project?

Stegemoeller: Well, amazingly, not much. When we ship that much gear, and we shipped a lot of stuff--we're talking about we had two tons of gear on Spektr, and I know they had at least that much or so on Priroda. That's a lot of items, a lot of crates, a lot of inventory. The big shipments always found some kind of snafu or hang-up. The smaller items, not so bad.

Every day's a new day in Russia. So when you had to go to the airport, even the guys who were at Star City and they were getting our training gear to them, or the resupply gear, they'd come down time after time to try to get the Customs cleared at the airport to be able to pick up the item and take it to Star City.

When we started our work, there wasn't a Russian liaison office at the embassy. We were on our own. Even after the Russian liaison office was open, it wasn't always a guaranteed activity that we'd get through. Either we'd get the notification to them late and they wouldn't be prepared to pick it up. Just coordinating communication is always a challenge.

In the later phases of the program, I couldn't tell you if it was a real challenge or not. I left the program in January of '97. Yes, that sounds about right. Because I haven't been to Moscow now--it's hard to believe that it's almost been two years since I've been there last.

Wright: The team worked so close together to prepare Spektr for launch. Where were you when it went up?

Stegemoeller: I was at home. Our first child was born in January of '95 and Spektr went up in May. In fact, I had my first trip after our firstborn child was to go to Baikonur for final outfitting in March of that year. We went and finished that task and I came home.

Then Spektr launched and I was at home getting ready to go to Moscow, because I was tapped to go and be the Cap Com and lead the team in operations for activating Spektr. So I was getting packed and ready to go when it went up. So I was in Houston, and was in Moscow just a few days later. Arrived right on the scene when the downlink came down and showed that the [solar] array hadn't deployed, and jumped right into that situation. That was fun. I think I watched the launch--no one got to see the launch of it live, but I got to see the docking of it live. So that was fun.

Wright: Were you here still?

Stegemoeller: Yes. But I like left the next day or so. I can't remember the exact sequence.

Wright: I have to think there was a large smile on your face to see that it had got that far and was actually going to work.

Stegemoeller: Oh, yes. We at least had a couple people that went to the launch. Jim Sackett had been our lead man in the field, basically from the spring/summer of '94 throughout, I guess, for the following two years, integrating, leading the team for integration on Spektr, and then once that was on orbit, counseling and advising the team that was leading Priroda integration process. He went to most of our launches, the

Progress vehicle launches, he was down there for those as our lead representative.

People think that I have spent a lot more time in Russia than I really did. I only traveled nine times and the most I stayed was three weeks. I sent people for months, and, in the case of Jim Sackett, for years. So I always had people in Russia and I always was talking to them, but I wasn't always there. So I'm tickled every time someone says, "You've really spent a lot of time over there." I say, "Okay. You can think that if you want." I had really good people working with us.

Wright: Share some of the experiences that you had when you first got there after it had docked and you walked right in to those situations and you got Spektr ready to go.

Stegemoeller: Well, I'll back up and tell you about Baikonur, because that really sets the stage for what happened. Norm's flight was such a push, both for Norm and as well as the payloads. I mean, he was in constant language training and then went straight to Russia and did nothing but language and technical training about the Mir platform. So he had very little involvement with the hardware, its design, its development. We were outfitting in Spektr. So when he got decoupled from Spektr, Spektr wasn't going to get there until later, last part of his mission phase, that he had almost no interface with the equipment. He launched before Spektr was fully outfitted. So any tour he could get of Spektr was just cursory.

We were still struggling, because back in the September time frame when we redesigned the mission, we pulled stuff out of the Spektr manifest flow and where we had thought we were going to put it, it was now in Progress vehicles. He had to deal with on-orbit stowage issues because he then didn't have a module to store the items that we'd put up on those [Progress flights]. He was learning on the fly, and a lot of credit to Norm that he managed to make it through it and keep his wits about him.

But when we were at Baikonur, we finally finalized how we were going to outfit this gear, and we had to a lot of foam on the stuff to go through the launch loads that it was going to have, because it was sensitive technical equipment, computers and measurement devices and some glass products. So we had lots of foam. So we had written him our final stowage plan while we were there. We printed it up in a letter. We knew that Norm was a fan of old television shows. So we said, "Good morning, Mr. Phelps. Your mission, if you choose to do it, is to reapportion or reallocate this hardware. This is what we hope that you're able to achieve before STS-71 docks," and just listed all the items and puts and takes, and put this from here and there. We stuck it in drawer number one.

We did a photo close-out of the vehicle and that's what this [photobook] represents. I had taken my camera around, got the security guy to let me--he asked, we had a written protocol so we could take pictures. I went through and I just was shooting photographs. I thought, well, this would be interesting. I

need some photographs. So, before I went back to Moscow, we basically took--"Gosh, you know, I'm going to need some information." So we took the layout drawings that we had and where our hardware was placed. Then we had photos of where our gear was and what it looked like. I put some narratives on it, both for Shannon's [Lucid] training and the STS-71 crew's training, but Norm didn't get this. Norm didn't have that back then.

But I get to Moscow and the Spektr module's been activated. They've got it docked. They've got a panel problem with the solar array, and so the first thing I'm into is that we just got the video downlink and I'm seeing it unfurled. I immediately take my engineering pad and sketch out what I saw, fax it back to Tommy Holloway and said, "This is how I think something's hung up." I alerted him of the situation.

At the same time, we were doing a hand-over with the Russian lead, which was Victor Blagov at the Mission Control Center there in Kaleningrad. As a side note, that's disconcerting to know. They really had never dealt with this constant changes of personnel, because we at least three or four different leads in TSUP during the period that we were doing the operations with Norm. Peggy was a lead at one point and Jeff Cardenas was before I was there. When I got there, I was the lead. I didn't know Victor, so I had to establish, "Victor, this is who I am and I represent Tommy [Holloway] and I represent Frank [Culbertson]. How can we help you in this?"

He said, "Well, we're okay right now," on this issue on the array.

I had gotten off the phone with Tommy Holloway and conveyed to Victor, I said, "Anything that we can do to help, we're able to, we want to, and we'll wait for your request."

It was very interesting. We had research we had to get done. We had a strict time line that we were trying to follow. We had an STS-71 launch template to have to contend with. We had another EVA or so that was supposed to be done. So we had a lot of things to rebalance on the research side. So I let the guys that had been in the TsUP, that were doing this kind of planning, continue to do that, and I focused on how we deal with this issue about the solar array. Was it going to affect clearances? Because this is leading up to the first docking flight of the Shuttle. So there was clearance—[concern as to] where that array was [relative to planned location] on the Mir. How is that going to affect the Shuttle? How is it pinned? Is it pinned because when the Shuttle docks will the vibration set it loose? What will that loosen? So there were a lot of questions that were going on.

A lot of people were interested and anxious on both sides, none so as the crew, because the crew were asked to get engaged and go out there and fix it. There was a lively discussion between the commander and the flight engineer on the Mir with the ground as to what that might entail and, I think it's been written up in a couple other places, about how that turned out.

But I established that dialogue with Victor. We worked together as he needed to on trying to convey--I was the relay between Tommy and Victor on what programs could help in resolving this. Sure enough, what I had sketched matched what the cosmonauts sketched and shipped down. They could only see from the same porthole by which they viewed, that we got the video from. It turns out there was a way that we could help them, and that was that the tool that was being built by the EVA team out in Building Seven that got ultimately integrated into the Shuttle. I mean, that was a quick turnaround. They flew it up at the last minute and the Russians got a chance to check it out before they left with it. They chose ours, our proposal versus the other one that was prepared. It worked out really well.

But during that period when the Russian crew, the cosmonaut and flight engineer were talking to the ground, there was a lot of leeway given to us finally to use the air-to-ground with Norm, because they wanted some separation, because it was pretty tense between the flight director team. So every time we got a com pass, they'd look for us to get on the line and talk to Norm. So that's when we started activating Spektr.

One of the things we had to do for activation is start throwing the power switches on board. We had a power distribution system involved, and Norm was looking for the power switch. I said, "Well, I think it's over X." I was saying it. The engineers in the control center were coming up, and they'd show me their diagrams, and I couldn't recognize all the Russian language. I said, "I don't think that's the right circuit." That wasn't the circuit we were working off of down at Baikonur. But the guys that had the drawings hadn't seen the module either. So I pulled out my book and I started showing them my pictures and they went, "Oh! Can we borrow your book?"

I said, "Sure." So one copy went down to the floor.

We got Norm up. "Norm, you need to open drawer number one, read through that. That gives you a list of what's on board, where it's at, what we want you to do with it. We'll get to you on the flipping of switches." Norm started flipping switches and getting things activated.

That was just a real neat experience. We were all working long days. Being that far north, nights are very short in June. We'd get home at midnight or one in the morning and the sun would be back up at three. So you always had to close your curtains. It was about a forty-five-minute or an hour car ride out to Energia from the hotel we were staying at in Moscow, depending on traffic. So there was a lot of intensity in that period. It was a lot of fun.

Wright: So you were there for three weeks and came back?

Stegemoeller: Yes, I had to. I had issues. My son had gotten sick. There was cholera in the water supply,

or in a couple of places in the Moscow River, and I came back and my son had some ungodly intestinal illness that just wiped me out as well when I got back. But that worked out fine. Somebody else took my place.

In fact, what had happened was that the lead flight director for the Shuttle flight, Bill Reeves went over. Bill was over there, he came over early because of the Spektr incident, to start coordinating back here for the MOD team for the flight director ops on STS-71. So when I had to come back, Bill picked up that lead NASA role. The team itself that was in the TSUP had it well under control, as far as scheduling and keeping up with Norm and the science activities that we had to keep up with.

Wright: What were you doing once you got back to work? Still doing Spektr work?

Stegemoeller: Yes. In fact, I was burning up the long-distance credit card on calling Moscow. We had a local line by then, so I could call up through Marshall com. I'd be talking to them at two in the morning, doing a bottle-feeding of my youngest, or my oldest at the time. So it was interesting. I'd wake up in the middle of the night having to do that, and I'd call them up and see what's up. They'd give me some questions or need some answers and I'd follow up with them.

So one of the things about the Mir Program is it was always a twenty-four-hour-a-day thing. Because they were always nine hours ahead and the shift of the crew on board the Mir always shifted based on what the operations demands were, EVAs or docking missions or launches or departures of Progress or Soyuz. So you could always call up and somebody would be around.

Wright: I know your pictures weren't any use to Norm, but you mentioned that you could at least provide them for Shannon's use.

Stegemoeller: Right.

Wright: How did your experiences start to benefit the Mir residents on what was up there?

Stegemoeller: Well, this was the first attempt at a photo book. If you look at the last versions of the photo book, they're more the standard class of NASA documents. This is typeset, it's got reference numbers and it's a very decent document. I think Gary Kitmacher did a really good job. He built off of what I was doing and even maybe in parallel for Priroda. So the Priroda book was in a lot of detail. So we just incorporated that which we had put up on orbit in the Spektr.

So [the book was incorporated into the crew] training. The lessons learned of having the decoupled training between Norm and the hardware and the flow, we were trying to correct, but Priroda had a similar

problem. Priroda, its launch was delayed. So Shannon's ability to train with all of its hardware was delayed. She went through a similar event.

But fortunately, unlike when Norm activated Spektr, he only had a couple of weeks before he had to pack up and come home. Shannon ended up expectedly with a lot more time. There were products on board, flight data files, and videos that we used with the COSS [Crew On Orbit Support] system that we put on with her flight that allowed her to do some real-time training if she chose to.

Then it really was part of that ground-breaking: what's the minimum we ought to be working at? We established what we didn't want to have to deal with in the Spektr flight with Norm. So we worked off of that. So the Crew On-Orbit Support System that we flew up, we took a laptop and modified and made it both an educational and a recreational device. That helped. Photo documentation and putting photo documents up with the crew and getting it over to them during the training was an advent that we went into. So there's a myriad of lessons that we try to compile and keep learning and building off of, as we went through the system.

Wright: Tell us some about working with the Russians and preparing for what went to the Progress to take to Spektr. Was that part of your duties, as well?

Stegemoeller: Yes. In fact, I oversaw all the hardware that went up, up through STS-71. So our first opportunity to understand where the Russians were coming from was the hardware we put up on that Progress in August of '94. It was a Space Acceleration Measurement System, which has got some really sensitive sensors on it, built specifically for the Shuttle. Then it had to be rewired to work with the Mir power supply, which was a wholly different power scheme.

We built our first generation of Mir Interface Payload Systems Computer, MIPS, computers, which was a modified laptop computer that interfaced directly to the Mir system for telemetry and downlink of information. That was a first. Then we had our first radiation experiment, Tissue Equivalent Proportional Counter. So those three elements went into two metal cases that we loaded up and bolted into the Progress. That first acceptance test was brutal. We finally figured out what it was that they meant by acceptance test. There was a lot of lively debate as to, "You've got to be kidding." Both would do that. We'd say, "You really don't mean that, do you?"

They'd challenge us, "You really don't not want to do that, do you?"

But it was a learning experience. Fortunately, the Russian team that reviewed the payloads were fairly consistent from then, very similar individuals to the process was established. We set the mold for how we wanted to do business. But it was very dynamic. Bolt-mounting holes inside of the Progress

vehicle required some knowledge about loads and they had to share that information with us. So a lot of time was spent away from work trying to get to know each other well enough that “this is okay.” This group of young kids that NASA wasn't about going and stealing trade secrets or undermining the capabilities of the Russian spacecraft, that this was about flying a mutually beneficial research on a very mutually beneficial program.

We had some really good social times together. We'd host them at various houses when we were here, or we'd be invited to theirs when we'd go to Moscow. So the Progress launch was important to us, because it was our entry into Baikonur. Jim Sackett went down for that mission and got to know who the players were there and how do we get the system to work so that when we got there and had some needs, how we would resolve them. So every step was a first step and it led to the next.

When we were doing Spektr, not knowing what their cycle was going to be and not knowing how difficult it was going to be to get all of our work done, we said, "Well, we may need up to two weeks there." At the time we got there, they were really pushing hard to get this thing launched in May. They were real concerned about what our two-week schedule was going to do them.

So the first thing we did when we got there is that their lead management team came over and says, "What can we do to make this go quickly?"

I said, "Just give us access."

So we had our social that evening to bless the upcoming events and the good work that we were jointly going to do, and got up the next morning and just started at it. But there were limitations. There's only so many people we can fit in at a time and there were only so many clean suits that were available. The [deputy head] of Energia was there, and Nicolai Zelinchniko approached Jim Sackett and said, "So, how are things going?"

Jim said, "Well, they could be faster."

Nicolai said, "How's that?"

Jim said, "Well, if we had more clean suits we could be faster."

Sure enough, we got back from lunch and there were four brand-new, unused clean suits. That's one of the things I have over here.

Wright: Want to show us while you're talking about that?

Stegemoeller: This is the fabric clean suit that they have, which is completely different than our style. But the boots and the hats and stuff. The clean suits that the Russians that were using that worked there were far from clean. It's just a different lifestyle, a different mode. The clean room was not fully attached to the

module, so there was dust and dirt. That wasn't their priority. But things worked anyway. I don't know what they did to clean out that module before we left or before it flew, but it needed one.

But they were diligent and fastidious. I mean, they stayed at it. They had been given the order that "They shall fly." In true Russian form, they were on that schedule. But they got us some clean suits and we were out in three--I guess the total time we worked was Saturday and Sunday and then we worked again Monday and half day Tuesday. So we were done in three and a half days and out of their way. They were happy that we were out of their way and we had no problems.

Wright: Did you have a social to celebrate the fact that you were finished, as well?

Stegemoeller: Oh, yes. Oh, yes.

Wright: You want to share some of those experiences with us, as well?

Stegemoeller: Well, when we got there, the ESA team had just finished, finally finished doing their work, but they had to wait for us to be done, because the Energia plane only had so many trips down to Baikonur and back. So they had nothing but time on their hands. So they were real excited that we were done, because that meant that they got to go home, as well.

Baikonur is not an easy place. I mean, we've shipped in our own water when we shipped in--well, we brought it in with us, and when the water ran, it was either scalding hot or frigid cold. It's just really harsh conditions. We had executive accommodations, and those were the best as they got and it was good. Good enough.

There was a lot of pride and emotion on the Russian side. This was a module that was going to Mir. Mir was their jewel in the sky, and this was the first module they'd launched in some time, so there was a lot of excitement. One of the guys we'd been working with got promoted in the team on their side, so we had to celebrate his promotion in good Russian style.

There's just not good hangover food in Moscow. [Laughter] I mean, blintzes and pickled fish are just not--that's not Tex-Mex recovery food. The Russian style of toasting is misinterpreted on the U.S. side. Everybody thinks when you toast, you always drink your glass, and it's not the case. You only drink your glass if you make the toast or if you're toasted specifically to you. On way too many occasions our new guys that we go over with think that, "Oh, it's toasting time."

We'd do a protocol party, and that's an activity you do at the end of your joint meetings. You document your results and in this meeting you'd have a big event, both the leads would sign it. Then we'd go to have refreshments and a light meal. We do the traditional toast for our joint cooperation, and this is

really fostering our good work. This has been an excellent meeting. Here's to our host. Here's to our friends, and until we meet again. We were just doing these toasts. Sure enough, after three or four toasts we'd see some people and they'd just be leaning against the walls. It was like, it's time to take them to the bus. So you learned how to [drink].

I thought I was a vodka drinker before I went to Moscow. It was just my mistake. I came home after the third trip and I took that bottle of Stolychnya out of my freezer and put it in a cabinet, and I said, "I don't need any more of this right now."

There's some other events that, going to their houses and having dinner and learning that you sneak your glass down and you fill it with water every now and then, just so that you've--they come around and fill your glass. "Oh, I've already got some." Because that's a different way to treat it. It's like wine in Italy and stuff like that. It's hard to drink vodka instead of water.

Wright: Was that an honor for you to get to go to their homes?

Stegemoeller: Oh, yes. Well, I thought so. I mean, it was a privilege.

Russian, you think about the individuals there they're making--the same level that I was at, at the time, were making maybe $200 a month or less. The ruble was at 5,000 rubles to the dollar. There was a tremendous amount of inflation going on at that time. But they're very hospitable people. They share. They love their life, because life is what they have, something the government can only taper with. A lot of zest for living.

It was always a pleasure to go and visit with them and meet their families and be in their homes and talk about their lives. It was very interesting to try to do it without an interpreter. So we always tried to have one of our good friends that we established in our interpreting pool to go with us, or to be with us if they were here at our houses. We'd have barbecues and sing songs.

We were always at such a disadvantage in singing songs. I mean, the Russians go to camp earlier in their lives and they've got these great patriotic songs to the homeland. They just sing in these booming voices and you could see tears in their eyes. It's just like, man, wish I had that history, because I don't. Campfire songs--well, there's mosquitoes. I don't want to sing. I want to go in my tent.

Wright: So you had no song to offer as your song?

Stegemoeller: Oh, well, we sang some, but we'd always end up singing some kind of television advertisement jingle. In fact, one of the weekends in April when I was there one time, a group of us went off and we went out in the country together. We went out camping with our Russian colleagues. But there

was just us and them, there was no interpreters. There was just a little bit of Russian on our end and a little bit of English on their end and lots of sign language. We had a great time. We went out into the woods. It was like the Russian night out for the guys. This was the older crowd, they were in their fifties, late forties and fifties. They'd grown up together. One of the head of the collective, and one was the forestry manager, and one was a game warden, and one was the head of plastics group within the collective. They just were out to have a great time.

When they first saw us, they thought we were just a bunch Muscovite city boys. They started talking to us in Russian and we just gave them these "I don't understand" looks. They were going, "Huh?" They'd talk to our friends, our hosts that had taken us with them, and said, "Oh! Amerikanskis!" and slapped us on the back and the party was on.

We were singing songs 'til like one in the morning. We were hurting. We were just hurting for a song. It's like, well, we started off with *Oscar Meyer Wiener*. One of the guys in our group knew enough Russian to realize one of the songs they had just sang was about their car. I said, "Well, shit, if they can sing about their cars, we can sing about anything." So we finally broke into a couple of good songs. *Battle Hymn of the Republic*. We started to balance things out when we started singing that song. But we did *Lion Sleeps Tonight* with the falsettos. We all about fell on the floor. It was great. It was a lot of fun. Good experience.

Wright: When they were here in America did you sing as well?

Stegemoeller: Oh, yes. That was pretty much commonplace when we did those gatherings. Someone would have a guitar, or several of them were talented on guitar, singing, and break into that somewhere along the line. It was a common binding thing. Music is universal in that regard.

Wright: What were their perceptions of Houston?

Stegemoeller: Well, I don't know. Unfortunately, there was no capability to just take them touring. There were restrictions on how the vans that were used to take them around. So I don't know how much of Houston they really got to see, or Texas, for that matter. They had very few stopovers on the way here. We kept them here in the summertime and kept them here in the fall and spring. There's only a couple good days a year that's worth being in Houston. But I don't really--at first it was an impression that, "Do all Americans live like this?"

I said, "Yes." Houston's just the fourth of fifty largest cities in this country. Moscow is the first of maybe ten large cities like Moscow that are industrialized.

One interesting story that was told to me was a guy on one of his visits here had gone to the grocery store, a HEB Pantry Foods or something like that, because it was near his hotel. Bought a ton of bananas. "Why'd you do that?" He says, "They're so cheap and they had so many. They may not be there tomorrow." He was happy and proud, because bananas were a luxury once the break up of the Soviet Union, their access to fruits like that had gone down. They hadn't converted that market economy in Moscow to where people were bringing stuff up and importing it. It was culturally simple, that we had not fully understood what was going on in their own land that we always take for granted. So, their image of Houston, I don't know. It'd be a fair one to ask them.

Wright: You mentioned earlier that in order to make everything work the way it did, many people made personal sacrifices. Do you feel like everything that you had to do to make this program work is worth the benefits of the Shuttle-Mir Program overall?

Stegemoeller: Oh, without a doubt. I mean, I was walking in with a gentleman that was also in Phase One, and we all have been dispersed now to various other duties now that the Phase One Program is over. We were asked, "Would we do that again?" I would. It was just such a unique experience, one of those opportunities in life that only come around once. What we were doing, I rightfully think that was as important as Apollo-Soyuz, as important as Apollo in that the only way that we're going to expand and further the frontier of knowledge regarding space and expand the presence of humans in space is in a global endeavor. The two largest, most experienced space-faring nations have to work together. I felt that it was my role as lead to make sure that the U.S. hardware came together, was just as much to make sure the U.S. team and the Russian team worked together. I wouldn't trade it.

It was hard. Woke at night with sweating and bad dreams because of the stress and strain at the time, but it was because I cared about it and I had an emotional commitment to it. The people I worked with, they wouldn't have stayed through it and suffered through the tough times and the long hours if they didn't have the same kind of commitment level and the emotional level to it. So, yes, I would do it again. It was just one of those unique events.

Wright: How was it for you when you heard about the collision of Spektr? What were your feelings that, the work that you'd put into that now may not be able to work until its full life?

Stegemoeller: Well, I first thought about the Russians that we'd worked with that Spektr had been their career. That was their baby. I got to see them when I got to Moscow and when Spektr was being activated, and the smiles on their faces were so huge. They'd been working on that project for ten years and

I was just a interloper. I had been there just enough, caused them further agitation because we'd put in so much gear, and we'd caused them to have to redo so much hardware and change their plan. So I thought about that, after I got over the initial concern with the crew and what the status of the vehicle was and could they recover from it at all.

From a personal standpoint do I feel like--I had done that. We had put Spektr up there. We had met our commitment, and that's one of the perils of space flight is that some things can happen you can't control. It was a good module and it served us well. It's a shame now that it's not going to be restored and it's going to come down with the rest of the Mir complex next year.

Wright: Is there a time that you look back on during those years that you feel is the high point of everything that happened?

Stegemoeller: There's just too many, too many good memories. My first trip to Moscow in January, that was tough. I had never done international travel before and I had gotten the flu in the middle of the trip, so I was hurting. But I hadn't gotten over it. But I knew I was having a long plane ride on the way back, and so we went down, I wanted to do one last bit of shopping before we went home that last night. So we took the Metro, me and this other guy took the Metro down to the Kremlin and walked around Red Square in the snow with the bright floodlights on in the middle of the night. Just seeing the red brick of Kremlin and the flags waving and the quiet of the snow, that was just a great moment.

Just singing songs and doing the stuff in the forest. Being down at Baikonur and being involved in outfitting the module. The thrill of talking on the phone to our guys as STS-71 is launching, saying, "We're on our way." This phase of the mission is coming to an end. Those are all great moments. Sit in console and talking to Norm and getting him through that. There are just too many collections of items to say there's one in particular.

Wright: Is it easier to find the lowest point during the time that you were involved in it?

Stegemoeller: Well, it was probably the time I had the bad dream where I had the Russian bear eating on my head that woke me up in a scream. That was probably the easiest one to recall. [Laughter]

Wright: Was that here?

Stegemoeller: Oh, yes, I was at home. It was in the middle of the acceptance test process. We were just under significant amount of stress. We were getting attention all the way up to the administrator. It was just like I just woke up--it was a bear chomping on my head. The symbology was unmistakable. That

wasn't necessarily a low point, it was just one of those things going through it.

Wright: Having your sleep abruptly stopped and then having a bear chomp on your head, I can see why that [memory] would last for you. That's for sure.

Stegemoeller: I mean, I've got a fairly forgiving memory, so I've already forgotten all that stuff that was tough.

Wright: Was there one of the payloads that seemed to be more challenging than the others to get it ready?

Stegemoeller: Yes. There was one in particular. It was a rotating chair that was a fairly important payload for the neurosciences team. It was not going to be used on Norm's flight, it was going to be pre-positioned in the Spektr for later on. We couldn't get it turned around. It was a big disappointment for the Russian side and their research, as well as our own teams. But the cost and the schedule hit to try to make it fit, couldn't happen. So that was one of the times where we couldn't make everybody happy, and had to make a decision in that regard, and so I had to atone for that on the science side. But I think most have forgiven me.

The GN-2 Dewar was a challenge. It was a gaseous nitrogen dewar where we hold things in frozen state until the nitrogen boils off and it returns to ambient temperature. So the crystals inside will start to crystallize after they start to thaw. That was an experiment that wanted to be flown early. They wanted to use the Progress vehicle to fly it since the Spektr wasn't available. They wanted to get it up before the Shuttle could deliver it, because it was a standard Shuttle payload. But we could never get that one working. Every time we'd think we'd get it locked in, something else would come up. We finally had to pull the plug on that because it was just too complex to install it on the pad in Moscow or in Baikonur, was just going to be logistically impossible. We were going to have to ship liquid nitrogen, and no aircraft carrier was going to carry liquid nitrogen for us. Those kinds of things would come up.

The logistics of just shipping our gear over to Moscow was a constant challenge. Getting through Customs, on our Customs sides and getting our hardware characterized and getting it shipped and getting it out of Customs, or out of hock, and getting it into our hands. Then checking it out, then finding ways to ship it and handle it, those were probably the hardest things to do. It shouldn't be this hard, but it was. And there was really nothing we could do to control it. Just give it to the shippers and say, "Well, we hope to see you soon."

Wright: We've talked about how well your group worked with the Russians and how wonderful everybody

worked together on the Shuttle-Mir Program here. But when you put so many types of disciplines together, and one of the main factors is that so many people were doing things for the first time, how did you overcome all those challenges of putting so much together so new, but it all worked out?

Stegemoeller: If I'm being true to memory, we equally shared the pain. There was not one group that was dominating any other element. It wasn't the technical guys that were trying to install hardware. It wasn't the operations guys trying to come up with the operations procedures. It wasn't the trainers that were having problems. It wasn't just the science team that was having problems. It was everyone were under the challenges. So it kind of coalesced. It goes a lot to the credit of the science team. Peggy Whitson and then John Uri, he basically inherited the integration of the science team. They knew that things had to work out.

As the program evolved, as we got through the Spektr phase, and we really established the Phase One operating structure, the Working Group Six, Mir Operations Integration Working Group, which is where I came to work after I finished with Spektr, Rick Nygren chaired that process and how we did it. Both the science and the operations team were in the same group. So if there were an issue with microgravity discipline, whether it was their payload, by the time they got with their crew, or how they were integrated, or just getting through an acceptance test, they knew that we'd listen and we'd figure out solutions if we could. We worked together and collectively in the acceptance test and negotiations with them. We had to work as a team.

Surely we'd never get it accomplished if we didn't at least come with one voice. We established a very open process for doing reviews and technical exchanges with our Russian counterparts and scientific exchanges. We'd sign these protocols and our planning and documents and we tried to stay faithful to them. And there was a lot of give on the Russian side. They had to break some processes down on their own to deal with some of the late changes. After the fire, how do we get new hardware up there? After the collision, how do we restore what was lost, so that we can still pursue our science? It was really a community effort, it wasn't much of an "us and them" event.

I remember when the furloughs in the government happened. STS-74, it was mandatory it had to work. So we're in Mission Control Center here in Houston and we're calling up Oleg Lebedev, who was the team lead for the Russian side that we interfaced with. He commented back to us, he said, "So I've never talked to an unemployed American before." That humor was there on both sides. We were talking to him about we've got a change in the manifest that we're launching today. "Oh, really? Is this good?" [Laughter] But it was knowing that we had enough history with each other that we weren't going to hurt each other in the process. We knew we could work together.

Yes, there was some frictions as we tried to formulate it. "Are you sure you're doing [the right thing]"--all it took was for each discipline to go through an acceptance test to realize that this was not an easy activity to come together.

Wright: I imagine you learned a lot from each other of areas that you may not have known before.

Stegemoeller: Oh, yes. I'd never flown payloads before and I had [no experience with] science, dealing with those guys that would change their minds at the last minute and then not tell us until they're sitting there. Russians say, "Well, why did you change this?"

"Change what?"

They said, "Well, is no longer this."

I look at the science guy and he goes, "Well, this is better science." So we'd have to work the issues.

So we learned how to work with each other. We learned about our families. We learned about what our goals and objectives are in the research arena, how long-duration operations differs from short-duration operations.

It's oversaid, but the Shuttle and the station are a natural fit. Why is that? Well, the Shuttle was built to support a Space Station and Mir needed a vehicle like the Shuttle. So we both just gained immeasurably by joining assets. So that's what we're hoping, that when Phase Two comes together that it's a continuation of both the best of the lessons learned on both the Russian and the U.S. side.

Wright: Sitting next to you, you have a poster or a board that has patches and a picture of the Shuttle with the Mir. Would you tell us about that, so we'll know more about it?

Stegemoeller: Well, this came from the Phase One Program management, both Valery Ryumin from the Russian side and Frank Culbertson on the U.S. side at the conclusion of the last [Phase One management] team's meeting, presented those of us that had the honor of leading teams in the Phase One Program a commemorative plaque.

What they are, the Shuttle patches that were related to the Shuttle missions that were in the Phase One Program, like STS-63 and STS--I'm trying to remember which one that one is. The two approaches. Well, this is the first one with the Russian, [Sergei] Krikalev on board and this was the first time they got within thirty feet or thirty yards of Mir.

Then STS-71, the first docking mission, which was really the first time and only time we brought up the Russian crew complement for swap-out, which is exactly how we're going to be doing it on Phase

Two.

Then we have 74 and 76 and 79 and 81 and 84 and 89 and this is 91. These are composite patches from the flight and the Russian-U.S. flag. That was the Shuttle-Mir Program patch, program emblem.

This photograph in the center was the photograph taken during STS-71, when the Shuttle was just about to depart. This lower boom here is off the Soyuz and this is taken by the Soyuz crew. I've got an original from Oleg Lebedev, from their side, that I'm going to have mounted, as well. But that's the Spektr module and the Kvant II, and the Mir core base block and the Kvant I. I believe that's the Krystall module. So that was just before we undocked, and the Russians, if you recall, had to quickly redock because the gyros went down shortly after we undocked. That's a neat composite photo and board.

What it doesn't have are the Progress launches and the Spektr launch and Priroda launch and the other Russian element launches that would have gone into this that we'll have jointly with the Phase Two Program.

Wright: I guess, those were part of those good memories that you have.

Stegemoeller: Oh, yes. It was a good memory because we had a lot of autonomy. When I was Cap Com at one point in the height of trying to deal with the resolution of the solar array problem, the phone rang. I answered it. It was Tommy Holloway. The phone rang. I answered it. It was Frank Culbertson. They were both wanting a debrief. So I'm standing there with both phones, and at the same time Victor Blagov comes up and he wants to know the status, too. So I've got the three of them talking and I'm, "Hold on guys. Want do you want, Victor?" So it was a conference call in work. It's just that kind of aspect of it.

Bill Gerstenmaier was our operations lead in Moscow for Shannon's flight. He's now in a senior management position within the Shuttle Program. You'll have to ask him, but I'm sure that he found that his ability, his autonomy in that role is unlike he's ever had.

I remember talking to Aaron Cohen at one point, that he had less authority as center director than he had when he was command service module project manager for Apollo. So that's one of those uniquenesses about the Phase One program is that because it was so new and it was separated by its nature that we had an unique opportunity to do business in a way that hadn't been done that way in about twenty years. So it was kind of neat.

Wright: We're glad you're a part of it. Anything else you'd like to add that we might not have covered?

Stegemoeller: I don't think so. I think that to me, again, I can't emphasize enough that I just represent about a couple hundred people's worth of hard work and effort. I got the pleasure of leading them and

being with them as they put their lives out on the line, just said, "This is what we're going to make happen," both on the U.S. side and the Russian.

Some really neat experiences. We got to know our international partners, as well. Our ESA friends, CNES, DARA. We strengthened those relationships that we will again utilize as we go into Phase Two. I thought it was a very successful program.

Wright: It certainly has been our pleasure to sit here and have you share all those experiences. We wish you luck in your next adventures. I hope that they're full of good dreams and have lots of good memories when you're finished.

Stegemoeller: I appreciate that. Thanks.

Wright: Thank you very much.

Stegemoeller: Thank you very much.

End of interview]