The oral histories placed on this Website are from a few of the many people who worked together to meet the challenges of the Shuttle-Mir Program. The words that you will read are the transcripts from the audio-recorded, personal interviews conducted with each of these individuals.

In order to preserve the integrity of their audio record, these histories are presented with limited revisions and reflect the candid conversational style of the oral history format. Brackets or an ellipsis mark will indicate if the text has been annotated or edited to provide the reader a better understanding of the content.

Enjoy “hearing” these factual accountings from these people who were among those who were involved in the day-to-day activities of this historic partnership between the United States and Russia.

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KEITH ZIMMERMAN

July 23, 1998

Interviewers: Rebecca Wright, Carol Butler, Summer Bergen

Wright: Today is July 23, 1998. We're speaking with Keith Zimmerman as part of the Shuttle-Mir Oral History Program. Rebecca Wright, Carol Butler, and Summer Bergen.

Thanks again. I know that you took some time out of your schedule. We certainly appreciate your doing that. We are interested in knowing about your roles and responsibilities with the Shuttle-Mir Program.

Zimmerman: Okay. Well, it started in January of '95, actually. There was a small team that was put together, four people. The program director, Tommy Holloway, had asked MOD to put a small team of some systems engineers together to essentially learn all they could about Mir systems to help provide a knowledge base to NASA management, essentially like a second opinion on things or just kind of a mission assurance role of what are the Russians doing with their space station. I was one of the four people picked for that team, and we chose the nickname "The MEAT Team," which stood for Mir Extension Assessment Team, and, of course, we decided to continue the joke, and we all called ourselves "meatballs," and the leader of the team we called "meathead," of course.

There was, again, four of us. The team lasted for essentially the length of Norm [Norman] Thagard's mission. We were together for about six months, started in January of '95. The initial part of the job was just to find out all we could about the Mir, go scrounge up every document, every telecon, meet with whoever knew anything about the Mir, and learn what we could.

Then during Norman Thagard's mission, at any given time, one of us was in Russia, about a six- to seven-week trip, working in Russia's Mission Control Center, TsUP they call it. Essentially, our job there was just to keep an eye on what's going on. If something broke with the system, go learn about what broke, how are they going to try to fix it, what are the impacts to the NASA mission, that sort of thing.

Of the four of us, I guess I was the third one to go out. I went out in late April of '95, and I stayed through the end of May. It was a pretty interesting trip. A lot of different things go on. Part of the team's job was to review some maintenance contract deliverables. That was the official hook to get us into talking with the Russians. Part of the contract that NASA had with the Russians, we were giving them a small amount of money to buy spare parts to keep the Mir running, and one of our jobs was to monitor the regular deliverables of what spare parts were being bought, what broke, what got fixed, so that just flowed right in with our job.

Typically, the Russians would only tell us about something when it broke. If a system was working fine, they're like, "Well, that system's working fine. You don't need to know about it much yet." Once it broke, we could then ask all the questions we wanted, but working with the Russians is very

different. They don't deal well with strangers. They want to spend a lot of time getting to know a person before they're really willing to help you. So here we were, brand-new people, showing up, saying, "Tell us about your space station," and, of course, they didn't want to do that. So it took a while until they got used to working with us. The first week or two we were out there, they didn't want to tell us anything. After a couple of weeks, they started slowly opening up. Any time something failed, we could then get the information on it. That helped. And as the flight went, we learned more and more, but again, it always dealt with a failure. If some little part broke, we'd learn everything about that part that we could, and then we'd try to get as many questions answered about, "Well, that part connects to this part, so tell us about that other part," and learn everything we could. We put together a pretty good knowledge base. I mean, we did not know everything about the Mir. It's a very complex vehicle. But by the end of Norm Thagard's mission, we knew a lot more about the Mir than we had two months before that.

At that time, after his mission, they created a new position. One of the lessons they learned from his mission was that we had a team out there that was coordinating the science activities, and there was a doctor and public affairs and things like that, but essentially each person was only looking after their own area. Nobody was really coordinating the whole team's effort. So they created a new position that they called the Operations Lead, and this person's job was to essentially integrate the team, lead the team that was out there. They wanted people from MOD who had experience working on console, so they announced the job, did interviews. I think twenty, twenty-five people applied, something like that, and they picked five of us. That was in the summer of 1995.

Of course, the next U.S. mission was Shannon Lucid in '96, which was about eight months later. So for about eight months we essentially trained. We took Russian language lessons. I ended up getting four months of intensive Russian language, and after that I was actually speaking Russian pretty well. I could read a newspaper, watch the news, that sort of thing. After I graduated from the class, since I was assigned to a later mission, I stayed in the U.S. for six months and forgot half of what they had taught me, but that's the way things go.

I also had some miscellaneous jobs. Since I was here in the U.S. for about a year and a half between when I got selected and when I went out, there were some other jobs we picked up during the Shuttle missions that were going onto the Mir. Just as we sent a consultant group to their control center, the Russians sent a consultant group to our control center. Well, those people need to be escorted, taught about our control center, our procedures. They need escorts to get in the building, that sort of thing, so they created a new flight control position here that was essentially the escort or the liaison for the Russian group here, and they called them "groundhogs," the nickname. They came up with this name because the

first flight we needed them for was STS-63, which launched on Groundhog's Day, of all days. So they said, "That's a perfect name. We'll choose groundhogs." So I was a groundhog for several flights: 63, 71, 74. I think I OJT'd [on-the-job-training] as a RIO [Russian Interface Officer] for 76 or 79. I forget what one [*Note: it was 79*]. I basically worked every single one of the Shuttle missions, either from here or Moscow, so, all ten or eleven, however many we've had now. So that was just kind of a job which came up every couple of months. We did that.

My first trip out as an Ops Lead was a short, just two-week familiarization trip in December of '95. There were no U.S. crewmembers on orbit, it was just Russian cosmonauts, but they were still doing some U.S. experiments. That trip was more to go out, meet the Russians that we'd be working with later, to start learning the general processes, the facilities, things like that. So it was two weeks.

The next trip I had was during John Blaha's mission. I did not go out to Moscow for Shannon's mission; I was here for that. At the beginning of John Blaha's mission, the lead, who was supposed to work the entire mission, had to change his plans, and as a result, he was unable to stay for the entire mission. So he came back, and they put together essentially a substitute plan for how we would cover for him. I went out in late September, about a week after the Shuttle landed, bringing Shannon home, and I was there for about six weeks as, essentially, a co-team lead. Since nobody had had time to learn about the mission, they sent two of us out to kind of just help each other out.

So I was a co-lead with Joe Cavallaro for about six weeks until the end of October, then had a month back in the U.S., and then I went out again in December for another month as a--let's see. I think it was the sole lead in December. Originally there was a co-lead for about the first week, but then he went home, and so I was the lead for essentially the last part of John Blaha's mission. I came home right before the Shuttle arrived.

After that, my full-time assignment was to be the overall lead for the NASA-5 mission, which was Mike Foale's mission. So immediately upon getting back, I started going into training with Mike. I take it back. Actually, we had started before John Blaha's mission. I'd been picked for that. We had trained some with Mike in August of '96, but really starting January of '97 is when things really started picking up, and I trained a lot with Mike in January of '97 here.

Then in February I went to Star City and spent about six weeks there, February and March, training with Mike on all the experiments that we were going to be running, plus it gave me some time to get in the simulators of the Mir out in Star City and do that. Then, of course, the mission started in May. I went out about a week before Mike did and stayed until they did the EVA and closed the hatches. So I can tease Mike and tell him he had a short trip, mine was a week longer. So that was about five and a half

months. That was a long trip.

All the trips I had, I usually ended up being there for all the more exciting events. When I was out training with Mike in Star City, that's when they happened to have the fire on the Mir. So I went back into the control center, actually, that week to help out the team that was there, because it was my co-workers, and I knew how swamped they'd be, so we helped them out with just some administrative tasks and answering phones and just whatever needed to be done. And then, of course, on Mike's mission we had a whole multitude of failures, the biggest being the collision, but we also had several times when they lost attitude control. Mike got to do a space walk. So it was certainly a very dynamic mission. A lot of things went on. A lot of fun, a lot of hard work, and when it was over I was exhausted; I was ready to come home.

Since then, it's just been occasional work as a groundhog again on a Shuttle flight or supporting our control center here during an EVA or a Progress arrival or something like that. So that's kind of just a brief summary of all the work I've done with the program.

Wright: We'll go back and take a little bit of time. When you were there for Norm Thagard's, this was the first time that anything like this had ever been done before.

Zimmerman: Right.

Wright: Tell us how you felt about being part of history in the making.

Zimmerman: History in the making. To be honest with you, I didn't really think about it that way at the time. This was more going out to do the job, working the space program. There was the unique aspects of it, dealing with the Russians. Here I am, I'm going overseas to Russia, a completely foreign country, and I'm not doing it on just a short thing, I'm going out there for six weeks on my first time ever. So that was a little daunting. What in the world am I going to do out there for six weeks? Just how am I going to get by? So a lot more of it was a learning experience. What is it really like out here in Russia? I didn't really think much about the history at the time, maybe because by the time I went out, Norm had already been up there for two months. It was kind of accepted by then. I think for me the history thing was back on 63 when we had the approach and then on 71 when we actually had the first docking. That was more the historical event.

Wright: And where were you with 63? You were here?

Zimmerman: 63 I was here, and 71 I was here.

Wright: You were in--

Zimmerman: --in the control center as a groundhog.

Wright: And watching it all.

Zimmerman: Absolutely.

Wright: Share with us what the feeling was in the room and for you, too, watching.

Zimmerman: Of course everyone was nervously watching as it approached, because everyone had worked so hard for this for a couple of years, and everyone wanted it to work. They've got their fingers crossed, and they're on the edge of their seat. Of course, when they finally docked, they just broke out in applause, and the Russians are hugging everybody and pounding each other on the back, and probably if we'd let them, they would have broken out the vodka right then and there. But you know, like, "No, no. We're still at work. Can't do that. Got to wait till the shift's over. After the shift's over, then we go have a drink." When we docked, everyone was just ecstatic. It's like, "Great! All that work, all these years, it's finally paid off." We're working together. Got the Shuttle docked to a space station." People realized that was a historic thing at that point. I saved the Roundup that came out that week with the photo. I've still got that. So that was really exciting, being there for that.

Wright: And then the differences when you were in the control room in Moscow, especially when you heard about the fire, what was the environment there?

Zimmerman: Well, the fire, of course, had occurred overnight. We heard about it the next morning. So by the time we got out to the control center, the Russians were like, "Oh, that's yesterday's news. It's already happened. It's in the past. We're dealing with today now." And, of course, at that point we were trying to get into the recovery of scrubbing up the atmosphere and looking to see if there's any contamination, what was damaged, what are the impacts, that sort of thing.

There were a lot of people in the control center, of course, a lot of very senior Russians. Though the people working on console are very good at what they do, but they're not the top expert on their system. When something breaks about their system, one of the first people they call is the guy that designed it ten years ago, and they bring the guy in who designed it or actually built it or whatever, and he is the true expert. So sometimes that's your first sign that something went wrong, if you start seeing all these people that you now recognize as the designers of the system showing up, it's like, "Ah, something must have happened with that system or he wouldn't be here." Obviously, in this particular case, there were a lot of

people showing up, because they weren't sure what had caused the fire, and there were a lot of problems with cleaning out the atmosphere. There was smoke for a while.

And then, of course, they started forming all the special commissions and such to investigate what went wrong, and I wasn't involved in that stuff. There was just a lot going on. It was probably for a couple of days, and, of course, the press was there in force. It went on for a couple of days until it kind of wound down, got back to more normal operations.

Wright: Then, of course, when the collision happened, you were very much involved in that.

Zimmerman: I was very much involved. I happened to be--it was just a regular communications pass coming up, so, like always, I went down into the main room to sit on our console, which is next to the flight director's console, and by pure coincidence, I happened to take an interpreter with me that day. I don't even remember why. I was probably going to ask somebody a question after the communications pass.

Of course, we plug in, expecting a normal day, average docking, and the communications start right away, and right away the crew starts talking real fast. My Russian's okay, but I could only catch a few words he was going so fast, but I caught the words "Progress" and "Spektr," and then the interpreter got a really funny look on his face and says, "I think they hit something," but it was just the very curious way he said it, I was thinking they hit their hand or something like that, somebody hit the wrong box or who knows.

So I asked him to explain. He goes, "Well, the Progress hit the Spektr module," but at that point, then, trying to listen more closely to what's going on, and I could hear the alarms in the background, and I look at the display and see the pressure's starting to drop. At that point everyone kind of realized, "Ah-oh, we've got a really serious problem here," and things got pretty tense at that point. I mean, they were quite hectic.

Within about five minutes, I guess, the word got out pretty quick, and people just started pouring into the control room. The senior flight director, Vladimir Solovyev, was actually over in the Progress control room, since that's the dynamic vehicle, it was the one doing the moving. But he's the senior flight director for the whole control center, actually, so he outranks everybody. Actually, once the collision happened, within a couple of minutes he took over running both control centers, and he just started issuing orders, "Okay, you guys do this, you guys do this. Commander, go do this. Mike, do this," and just real strict about "Do this, do this, do this." I mean, that helped a lot.

They had to get the Soyuz ready in case the crew had to leave and abandon ship, that was one possibility, but you also wanted someone to try to figure out where the leak was and close that module if

you could. He did a good job of trying to direct the right people in the right way. Of course, they did get the hatch closed by the end of the pass, actually before that, even, and they got out some tanks they keep for spacewalk to repress the station after space walks. He told them, "Get one of those and start opening it now, to kind of keep the pressure up while the leak's still going on to give you more time to close the hatch." That was a good idea and gave us more time.

We got the hatch closed by the end of the pass, but, of course, as we got to the end of the communication pass, the crew had closed the hatch, but it had only been closed for a short time and appeared to be holding, but there was no guarantee. About the next hour, of course, there was the whole debate about was the crew coming home? Was the hatch going to hold? Are we going to come up in a hour and give them and call and the crew won't be there because the hatch didn't hold and they're in the Soyuz now? Or what's going to be the story? So there was a lot of worrying, tense moments there for that first hour.

I basically spent that whole first hour on the telephone. I called Frank Culbertson first, since he was the program director, and woke him up about three in the morning, Houston time. That started becoming pretty regular. These problems always seemed to occur around 3 a.m. Houston time.

Wright: When Frank was sleeping. [Laughter]

Zimmerman: Yes, when Frank was sleeping. So we got pretty used to waking him up at 3 a.m. So we woke him up and told him--I forget what our exact words were, but we told it to him straight, that the Progress hit the Space Station, punched a hole in the Spektr, the air was leaking out, but the crew closed it off, and the Soyuz was ready for an emergency return if they needed it. That's pretty much all we knew at that point. We had a rough idea of how low the pressure had gotten, and, really, there was no more we could say at that point. So we just started calling everybody, had to call the embassy, had to call the training facility, had to call the crew's family to let Mike's wife know what was going on before she heard about it in the press.

Wright: Is that a hard phone call to make?

Zimmerman: Well, the flight surgeon and I made that one together. I mean, Mike's been an astronaut for a while, so she understands the risk. I think, considering the circumstances, she took it fairly well, and she just, "Okay. We understand. Keep telling us what's going on as you hear," and, of course, we gave her the phone numbers, which she already had so she could have called us if she wanted. She did real well.

Then, of course, the phone just starts ringing off the hook after that, as the word gets out. Every manager or every engineer who thinks they have an idea or just wants the latest status starts going on and

then headquarters starts calling to get the status, and the phones were literally just ringing off the hook. We finally had to assign one phone to just--"Okay, this one's for Frank and the crew's family, nobody else, and anyone else who calls on this phone, tell them to hang up and call the other phone."

Before you could even really blink, it seemed like the hour was over and it was time to go back down for the next pass to see was it still holding together. And, sure enough, the first thing they asked the crew was, "Are you there? Okay. You're there. Good. What's the pressure? You're not on the Soyuz. That's the first thing. Okay." They gave them the pressure, and it was the same as before, so they're like, "Oh, good, the hatch held for an hour. There appears to be no leaks. Go ahead and raise up the pressure a little more with another air bottle," that sort of thing. It was only after that, that they the started having all the power problems. That went on for about another two days we were sweating out the power problem. Actually, I think another three days until they really got power back, because they had a little glitch in the middle and had to start over, but it got pretty tense.

A lot of people started showing up at the control center. The press were out, I mean, in unbelievable force, and they don't really have control over the press out there. They essentially were running anywhere they wanted to in the building except for the main control room. That's it. Unfortunately, to go from the room that we normally have to the main control room, I had to pass through the common area, and they would literally chase us down the hallway every time we went out to try to get a quote. It was crazy. The press were essentially there for the rest of the mission. Some days had more than others, but pretty much there was somebody there every day except the weekend.

What else to say?

Wright: During this time, did you get a chance to talk to Mike?

Zimmerman: I didn't get a chance to talk to Mike until late the next day because of all the power problems they had. That took up most of it. I mean, we'd heard his voice in the background, and we'd actually heard him talking to the Russians, because he was helping out with the systems work. So we heard his voice, so we knew they were okay, and the Russians had actually told us that in their conversations Mike said he was fine, too. But I did not get to talk to Mike directly until the day after, sometime in the afternoon or evening, I forget exactly when. He basically said the same thing, "I'm fine. Tell the family I'm fine."

At that point we started putting together more--you know, "What did you lose?" because Mike had actually been using the Spektr module as his living quarters, so all his stuff was in there. So really, after we got through the "Are you okay? Any messages for the family?" like that, we just started going through a list of, "Okay. What did you lose? What do you need replaced? Because there's another Progress coming up in two

weeks," or a week or whenever it was.

Wright: That may not have been too reassuring.

Zimmerman: Yes, they were a little worried about another one coming at them, I'm sure. It was more just right back to business, "Give us a list of everything you lost that you need replaced, and we'll try to get it together." And a lot of people on both sides of the ocean did a lot of work in a short time to get that stuff together, because I think we had something like only two or three days to gather it all up and get it on a plane to Moscow so that they could then send it down to the launch center. I mean, it was real close to the launch. A lot of people did some hard work there in a short time.

Wright: Was it a long list, or just practical things?

Zimmerman: More of it was practical stuff, it was a toothbrush, a razor, shampoo, just household living items, a bunch of batteries--he'd lost all his batteries. He said if you can squeeze in a book or a CD or something like that, because he lost all that personal stuff, too. So they put together a package pretty quick. But it was quite tense, especially for about the next week.

The TsUP was unbelievably crowded, and they started having a commission within two days, and actually this time they allowed us to participate. They let me, or we actually had some managers out there. The working group happened to be going on. They let myself or the senior manager sit on their formal commission meetings, actually. That was interesting, to see how those went. Essentially they were just very methodical, checked out each possibility and do an analysis, see what the analysis says. I guess that's about it.

Wright: Was there a difference after the collision? Were people working closely together or differently after the collision compared to the time before--I'm talking about the Russians and the Americans--or was it about the same?

Zimmerman: No, our cooperation pretty much was the same. It was very different after the collision versus right after the fire. I mean, when the fire occurred at night, they didn't even tell us until the next morning. With the collision, they gave us full access to everything. They let us in the senior meeting with the presidents of the company and all that, which they had not done before. So that was a major change. Essentially anything we asked for they gave us, any information that we wanted whatsoever. So they were a lot more forthcoming after the collision. Essentially it's because after the fire they realized they goofed. They said, "Oops. Yeah, we should have told the Americans. We messed up." So things got a lot better.

Wright: Now, that wasn't a normal time over there for you, but did you have a normal time while you were there?

Zimmerman: Did I have any normal time?

Wright: What was your normal day like?

Zimmerman: Actually, the week leading up to that was probably close to normal for the mission. A normal week, let's say six days of work, one day off, roughly a ten-hour work shift plus an hour commute on either end, that's if you got out on time. Frequently it would stretch another hour or two. On the weekends, it was really twelve to fourteen hours. Alternating weeks, one week you'd be on the day shift, the next week you're on the night shift, I wouldn't get off until midnight or 1 a.m. The work was still pretty busy.

The normal work consisted of mainly keeping up with all of the experiments going on. I think we had forty-two experiments or something in the forties on Mike's mission, and at any given time there were at least a few of them being done every day. The team had to plan which session to do on which day, review the procedures, and, if any changes were required, write a new procedure, get it approved by the appropriate people, and then give it to the Russians, have it translated and up-linked to the crew.

We also had to pay attention to the other systems activities the Russians were doing. Maybe there was some maintenance activity they were going to do that would prevent us from doing some plants experiments. We had to pay attention to that, too. And then we also had to negotiate anything for future weeks. We had to realize that, okay, next week we're going to plant the next generation of plants. That means we're going to need ten more liters of water for the experiment. Okay, now I've got to go talk to the life support guys and the flight directors to find out is there ten liters of water for us and negotiate for that. So that's more what a normal week was like, and then, once the collision happened, everything pretty much went crazy.

Wright: How were the communications for your requests? Did they respond well to your saying, "We need these things"?

Zimmerman: It usually depended on what you requested. We had a formal document called the IPRD. I don't know what it stands for anymore, which documented the specific experiments that were going to be done and the specific requirements, how much power something needed or how many times you had to run it or how many hours the crewmember had to dedicate to it, that sort of thing, and if it was in there, written down, the Russians signed that document, and it essentially becomes a contract. If it was in there, they

agreed to it right away because they knew they had to, they'd previously agreed to do it so they couldn't come back and really say no.

For things that were in the gray area or outside it, that's where you kind of had to negotiate something with them, or if they started having a problem that would affect something, like we started having some problems with the water system, even though the documents did say they were supposed to give us so much water for the plants, once you started having problems with the water system, we then had to go back and say, "Well, can you get us this much?"

"No, we can't give you that much."

"Okay, can you give us this much? We'd try to alter the plans as we went.

But usually they granted pretty much every request we made or made some modification to it and then granted it. A lot is that is, again, we were more used to working with them. We had worked with these guys for two years now. We knew them; they knew us. They're a lot more willing to help you out once they know you. The Russians make a relationship with a person, never an organization. So one of the things they hate the most is when we have a hand-over or a switch out; the old guy goes and a new guy shows up. They hate it, because they assume that, "All the agreements I had with the previous person are gone now, and this new guy's not going to honor them. I don't trust him. So I've got to renegotiate all this stuff again."

But the group of us who were frequently on the team out there in Moscow, a lot of us had been doing it now for a year or two years. Some of us had started on Norm's mission. So once they realized that it was the same group of people continuing to come back, then we started getting a lot more done. I mean, we got a lot more stuff, a lot more agreements, a lot more things done, for example, on Mike's mission than Norm's mission, just because they didn't know us. They were much more strictly by the book, by the contract on Norm's mission. We had a lot more latitude after that, where we could adapt or change to unexpected events afterwards much more easily. They also just started being more friendly, inviting us out for social occasions, things like that, too.

Wright: Give us some examples of that time. You didn't have much time off.

Zimmerman: Didn't have much time off, actually; one day a week, and usually you spent it grocery shopping, doing laundry, that sort of thing. But occasionally the Russians would have--you know, there's be a holiday, and, of course, some big party was going on somewhere, or they'd invite some people over to one of their houses for dinner, that sort of thing. Usually, though, the American group hung out by ourselves, again, because it was such a crazy schedule. When we got off, usually four or five of us had that same day off, and some of us would go out to dinner together. If we were on the day shift, we went out

to dinner a couple times a week, usually. You tried to find time.

Usually once a month you got a full weekend off, and you'd try to find time to do a little sightseeing, go to a museum, go to the Kremlin, go to a concert at night if you could. If you got a long weekend, people would try to go to St. Petersburg for two days, something like that, which was a lot of fun.

Wright: You made it there, then.

Zimmerman: Made it there three times. Over two years I made it there three times.

Wright: Was it anything like you expected?

Zimmerman: Oh, yes. St. Petersburg is a fabulous city. I'd read a lot about it. Very European. At the center of the city they've preserved all the historical stuff, so you can go to the Hermitage, which has been there for 300 years, or 200 years. I mean, the artwork is unbelievable, the palaces are incredible, the churches are something. You know, you have to see them to believe them. It's a fabulous city. I'd love to go back again; I'm sure I will.

Wright: And how did that differ from where you were living?

Zimmerman: In Moscow? Moscow is really like just any major city in the West now. I mean, it's got crime, it's got pollution--not graffiti, though. There's not really any graffiti. But it's a big city. It's high-rise apartment complexes everywhere. But there are still some historical places, obviously. You've got the Kremlin, St. Basil's, things like that, but most of those just tend to be in a few isolated areas, and the rest of it's all high-rise apartment buildings and ads and billboards and things like that, and traffic, non-stop traffic. You think Houston's got bad traffic problems. You should see Moscow.

St. Petersburg, at least in the center, they've tried to preserve a little more of the older European heritage, so there's no apartment buildings in downtown St. Petersburg. It's just the more historical areas. There are some somewhat modern building, built in the 1800s, but there's no massive apartment complexes. Those are a little further out in the city. A lot more historical stuff is all centered in St. Petersburg. The palaces and the cathedrals all tend to be together. It's a little different.

Wright: The times that you spent in the TsUP, how were they different from the times you spent in mission control here?

Zimmerman: It's a much more relaxed pace over there. The Russians have a much longer outlook on time, especially with their Space Station. If it breaks on the Shuttle, if something breaks today, we try to fix it

today or fix it tomorrow because the Shuttle's only up there for ten days or twelve days, and we're trying to get everything possible done in that short time, and then the Shuttle has to go home.

With the Space Station, if it breaks today, well, let's think about it for a week, because the station's not going anywhere. If we don't get it done today, we'll get it done next week or next month. So if you try to explain to a Russian that something's urgent, they have a different perspective. "Urgent" to them might mean get it done sometime in the next week. If something breaks, we don't try to fix it right away; we're going to take a week or two to think about what went wrong and put our plan together and then we'll get around to fixing it. So it's a much more relaxed, slower pace that you have to get used to.

They also tend to make decisions a lot more by consensus, even in their control center. So if you ask somebody yes or no on something, they can't give you an answer right away, it's always, "We've got to go back and talk about it with the group," things like that.

The way they staff their control center is also a little different. Here we tend to work nine-hour shifts and then you hand over. In Russia, they usually work a twenty-four-hour shift and then you get three days off, but you're not on console the whole twenty-four hours. We have, with the Shuttle, TDRS satellites, and we talk to the Shuttle all the time. There's never a break, really--a little five-minute break over the Indian Ocean. The Russians just use their ground sites usually, so typically every orbit you get fifteen- or twenty-minute communications and then an hour off, and then once their orbit takes they away from the Russian ground sites, they go about ten hours without any communications. So even though they're on a twenty-four-hour shift, they go to work for twenty minutes in the control center, and then they go back to their office and do other work for a while. Once you get past the ground station, well, now, even though they're on duty, essentially for the next eight hours there's nothing much going on, they can go back, work in the office, take a nap, whatever. So again, it's just a much slower pace.

There were times when we thought there were more Americans in their control center than there were Russians in their control center, especially on the weekend. We would go in there, and you'd find, as soon as the communications pass ended, they were shutting down the computers and they'd turn off the lights, close the door, lock it up, go back to the office for a while, take a nap. It was kind of funny to watch. So it's just a much slower, much more relaxed, methodical pace, and it's because they can. I mean, there's no rush. Why rush? The Space Station's going to be there the next week, the next month, the next year.

Wright: Was there one particular Russian official that you tended to either work with the most or admired the most?

Zimmerman: The one I worked with the most would have been Victor Blagov. He was the deputy flight director

of mission control. He's the one who I tended to interface with the most when we needed an agreement on something. He's a very sharp guy. He could easily have been a flight director here on our side, very smart guy, very sharp. He knows the space business very well, and hopefully we'll get to work with him on Phase Two. I haven't heard whether he's going to retire yet or not. I'm curious.

Wright: You had a very long and interesting stay with them since you started out in '95, and basically you worked on three flights over there.

Zimmerman: Three of our flights and trained during another. My cumulative time, all my trips together, is just about a year in Moscow, just under a year, I think.

Wright: Is there a highlight during that time?

Zimmerman: A specific highlight. Hmm.

Wright: You can say more than one. I was just wondering if something stands out more than others.

Zimmerman: Yes. I think I will always remember the first time you see Red Square and St. Basil's. I don't think I'll ever forget that sight. The last several decades that's just been the opposite of us. That was the evil empire, as [Ronald] Reagan said. It's just a very historical place. If you've read any history about it, you know it's 500 years old. Communism was nothing compared to how long this place has been here. Communism was just a short sidelight in the history of the city of Moscow, actually. I don't think I'll ever forget that first time we got to that area and you come up over a hill, and you see St. Basil's appearing behind Red Square. I don't think I'll ever forget that sight. It was something else.

Wright: What about the lowest part?

Zimmerman: The lowest part had to have been right after the collision. There was a time there when we thought, "That's it. The crew's coming home. The program's over." We just weren't sure whether that hatch was going to hold, and until they did get that hatch in place--and it took about ten minutes--for that ten minutes, there was a strong possibility the crew was coming home and that was the end of it. That was kind of a low point.

Wright: When you were a groundhog, not a meatball, you still interfaced with some of those same--

Zimmerman: Some of those same Russians, because the guys who worked in their mission control were usually the ones they sent over here as the consultant groups--shift flight directors, senior engineers. It was usually the

same group. So when they were over here, we would entertain them. There'd usually be a party after the mission. We'd show them around town, that sort of thing.

Wright: What were their reactions to being in America, or, better yet, Houston?

Zimmerman: They were different things. Of course, from their perspective, Houston, especially in the summer, is--I mean, we all know it's hot. The Russians can't believe how hot it is. They just don't get heat like that in Moscow. They get an occasional heat wave where it might be 90, 95, but there's no humidity. So it's hot, but it's real short and it goes away. Here it's 95 for four months, it's humid on top of it, and everything else. They just melt out here. Although one of two of them like it, the ones who tend to like the saunas and all. They're like, "Oh, yeah. This is great. It's like living in a sauna."

I think some of the first ones that we took out to restaurants and things like that, they were surprised at the amount of food that we get at a restaurant. Russians restaurant portions tend to be very small, but you'll order a dozen portions. When it's that way, you sample a whole bunch of different dishes. They weren't used to one thing you order is going to be enough to fill you up entirely.

They were very surprised at people's homes, because in Moscow almost everybody lives in an apartment. I mean, there's ten to twelve million people in the Moscow area, and it's smaller than Houston. So it's just all apartment complexes. I mean, homes like the average family here is like a palace to them. They just can't believe it. Of course, out here everybody has a car. In Moscow, most of the ones we worked with would have a car, but not all.

Wright: Did they find the traffic comforting? Did it look like home?

Zimmerman: Yes, the traffic, they said it's just like theirs, and we would joke, like weather forecasters were just as bad in their country as our country. Nobody seems to predict the weather right.

It's a lot harder to get around here if you don't have a car, which none of the Russians would have. I mean, we don't have any good public transportation here, whereas in Moscow you don't need a car. You can live in Moscow without ever owning a car. They've got probably the best public transportation system in the world I've ever seen, especially the subways. It goes anywhere in the city for what is now, I think, thirty-three cents. It used to be a lot cheaper than that. It doesn't matter whether you're going a mile or fifty miles between the two points, thirty-three cents, that's it. And the trains are always running very frequently. There's a police station in every major station, so there's no crime in those, usually. Just a very efficient system. Over here without a car, the Russians were pretty much stuck in their hotel unless one of us took them out somewhere. So that was

different. But they entertained a lot. Usually when they were here they'd have a lot of parties at their hotel. They've invite everybody over. So that was fun.

Wright: You'd get to see them on a different basis that way.

Zimmerman: You'd see them on a different basis, yes.

Wright: For three years you're been doing this?

Zimmerman: I'm still doing it.

Wright: Would you turn it down if somebody offered it again, knowing what you know, or would you jump at the chance to do it again?

Zimmerman: I'd still do it, and I actually have. They asked me to be to continue to be an Operations Lead in Phase Two and continue being a team leader there. I said, "Sure. Love to." I actually just got back two weeks ago from one trip, and I'm going out again in October, so I'll be there for the first launch of the new Space Station. I'll be there again.

Wright: Wow. That's great.

Zimmerman: So that'll be something else.

Wright: Do you believe the Shuttle-Mir Program was worth all--

Zimmerman: Absolutely. Absolutely. We learned so much about just how to run a space station. There are a lot of things different about a space station than about a Shuttle. One of them's just the time aspect. You've got to take a longer term aspect. There's no rush to get something done this minute. It can wait. We've learned a lot about just cooperation with the Russians. Obviously, with this space station, we're going to have to cooperate with more than just the Russians. There's all the Europeans, Japanese, Canadians, everybody else involved in the program. I think it's given us a lot of experience working with another major country as a partner. It's just taught us a lot in general about space stations, things you need to know to run a space station, things you should put in a space station. We've made some design changes to ours based on things we've learned working with the Russians. That'll make the Space Station a better place for the astronauts.

Wright: Do you remember what you did before you started doing this?

Zimmerman: You mean before Phase One? Sure. I started as a co-op at NASA in 1987, and the first three years I was here, I worked in the pointing office in the Shuttle Program. That was the office that dealt with determining the rotational orientation and pointing instruments at targets, things like that.

In 1990, I went over to the Space Station Freedom Program at that time, and I worked in essentially the lead pointing engineer for Space Station. I was the only pointing engineer. And I also did planning, operations planning. I did that for about five years until this came up, until Phase One started.

Wright: Had you ever worked with international partners before?

Zimmerman: A little bit in the Space Station Freedom days. We worked some with the Japanese and a little bit with the Europeans, but it was like one two-week meeting every three or four months and that was it, not regular day-to-day stuff like with the Russians. So it was quite an experience.

Wright: It was on-the-job training.

Zimmerman: On-the-job training. I had a great time, did manage to get a lot of fun things in on those few days off that we did get or nights that we had off. It was something else.

Wright: I have to assume you were there all times of the year, you were there winter and summer as well?

Zimmerman: The only time of the year I haven't been there, I haven't been there in mid-November, and I haven't been there in late January. Those are about the only two times of the year I've not been in Moscow. I've seen it at its hottest, and I've seen it at its coldest, at minus 30, and that's cold. Although I prefer Moscow at minus 30 over Houston when it's 105. [Laughter]

Wright: Well, at least you have a variety of clothing you can take back with you.

Zimmerman: When it's minus 30, you can always pull on another jacket. What do you do when it's 105? You can only take off so much, and you can only turn the air-conditioner down so far.

Wright: And when you would got back, did you always go back to the same place, or did you have to change rooms?

Zimmerman: The first two trips, we stayed in a hotel. Since then, since we've started doing much longer trips, NASA's gotten us an apartment over there. Actually, there's a whole complex of apartments NASA's got, probably twenty or thirty apartments in this one building for all the people who are either living out there, like as

an embassy employee, who were out there for a couple of years at a time, or people like myself, those in our group who go out for two or three months or five months at a time. There's some very nice apartments that we have out there that are actually cheaper than a hotel room. They're very expensive by Western standards, something like $5,000 a month or more, but the hotel room costs you $6,000 a month. So it's cheaper. NASA's actually saving money, and it gives us a much better place, because after about three or four weeks, that hotel room started to feel more like a prison cell.

Zimmerman: You're stuck in the room. You can't go anywhere. Now we have a nice apartment. It's got a washer and dryer. It's great. You don't have to do it in the bathtub in Woolite anymore. We've got a washer and dryer, even if it is a very slow one. And you've got a kitchen so you don't have to go out every single meal. Going out to dinner's fun, but after doing it for every day for six straight weeks, it's getting to be a hassle. Those are real nice apartments.

Wright: So did you cook food from here, or did you learn how to cook dishes from there?

Zimmerman: Some of both. I would do some of both, and I'd make my favorites, but I also learned some Russian dishes or would buy Russian dishes and make them, like pelmeni, which is sort of like a dumpling, things like that.

Wright: Have you made them for your friends here now that you're back?

Zimmerman: No.

Wright: Not ready to--

Zimmerman: Can't buy them over here. You'd have to roll out and do all the dough by hand and shape them. It would take a lot of work. So I haven't done that.

Wright: When you were there for so long, did you miss anything from this area?

Zimmerman: Let's see, what did I miss? I missed--you can't get any good barbecue out in Moscow, and you miss iced tea. [Laughter] They just don't have that over there. You kind of miss being able to just take a day off and go out and relax and do something over there. You couldn't really do that. When I was on the big trip, like the five month, I was given a week off in the middle to take vacation, and that was great. You miss some--you can't really go to the movies. There's one or two Russian theaters that have English movies, but they might only have one and it's the one that came out here six months ago, so you've

already seen it. You miss that. There wasn't too much that I missed.

Any particular foods I missed, I tried to have the family send some out, you know, "Send out a jar of barbecue sauce," and we made some barbecue ourselves. If you missed Cajun food, "Well, send out some spice mixes and we'll go pay the twenty dollars a pound for a pound of shrimp and make some crawfish or make some gumbo or something."

Wright: You got CARE packages, too.

Zimmerman: CARE packages, yes. One of the things--we all try to help each other out. I mean, we've all traveled out there. We all know there's going to be things we forgot or want or need brought out, so everyone is usually willing to carry something for somebody else, because they know that next time they're going to be the ones asking. I think one of the CARE packages they even sent me one time was a case of beer from Shiner Boch the brewery.

Wright: That managed to get through Customs okay?

Zimmerman: Yes. They put it in a footlocker, essentially. Well, you're allowed to bring in alcohol, just certain amounts, so they just brought in a case of beer for me. Although you can get plenty of European beers there, this was just something from Texas. Beer from home.

Wright: Did you notice lots of changes from the first time that you went to the last time?

Zimmerman: Oh, absolutely. Prices have gone way up. It used to be we could go out and you got a nice dinner--well, the average dinner, if you had some drinks, you might pay twenty-five, thirty dollars a person. Now it's forty-five, fifty dollars a person for the same meals. That's like Mexican food. Go get Mexican food and a margarita, fifty bucks. But it's pretty much average. It doesn't matter what you eat, it's always going to fall into that forty- to fifty-dollar range.

Traffic's about the same. There's a lot more stores and restaurants that cater to foreigners. When we first went there on Norm Thagard's mission, there were maybe three or four restaurants outside the hotel that we knew about that were considered safe to eat at. I don't think I've been there in a year, because there's a hundred to choose from now. I haven't even gone back to those old ones anymore because we ate there so often.

They've really fixed up the city. Last year was Moscow's 850th birthday, so they spent pretty much a year or more cleaning up the city, repainting buildings, widening streets, putting up new artwork, opening up a

new museum, building a new cathedral, all this kind of stuff. So there's been a lot of changes in the way the city looks, too.

Wright: It'll be interesting to see in the next few years how much more it changes while you're there.

Zimmerman: Yes. I'll be very curious. And, of course, the whole political thing's changed, too, over the last few years. That's been interesting to watch.

Wright: Yes, because you're right there in the middle of it.

Zimmerman: You're in the middle of it. You pay a little more attention to it when you're in that country. You kind of want to know whether [Boris] Yeltsin's going to be staying in power a little longer. I've talked to some guys here who were actually at the embassy, the NASA office, back when the last coup occurred. They said, yeah, they were looking out the windows of the NASA office, and they could see the tanks going down the street. So they've got some great shots of it, but I'm sure that's not what they were thinking at the time. So you pay attention to that kind of stuff out there.

Wright: Do you ever feel threatened or not safe when you're there?

Zimmerman: No, I haven't, but you just take general precautions. You're not going to go walking down Montrose at night by yourself here in Houston, so why are you going to go to some strange part of Moscow and walk alone at night if you don't speak the language, even? So we tend to go out in groups. Since I do speak a reasonable amount of Russian, I have gone out on my own, but I usually do it during the day, or if I go at night, I go to a specific, very well-populated area like the Bolshoi Theater, something that's obviously not a crime zone, there's always going to be a lot of people there. And I haven't had any problems.

Wright: Do you normally go to the ballet?

Zimmerman: That was the first time I've ever seen the ballet, was in Russia.

Wright: What a place to see it.

Zimmerman: Yes, what a place to see it. I go to symphonies a lot. I've always enjoyed that, and they've got some fabulous ones out there, like the Tchaikovsky Conservatory. Actually, this last trip, I walked out, they were having the Tchaikovsky Festival. It's kind of like the Olympics of amateur music, and it happened to be there last months when I was out there. So I got to see some of the finalists. That was pretty impressive.

Wright: That's great. I'm glad there's at least a little more time to do things now that it's not so busy.

Zimmerman: Well, actually, one of the things we've learned is we can't keep working that kind of schedule that we had on previous flights. We're trying to get the hours down a little bit more to work nine-hour shifts, give everybody a weekend off at least every other week. So we'll see. We'll see how we do.

Wright: Do you have any questions, Carol?

Butler: What was your biggest cultural shock when you first went to Russia?

Zimmerman: Biggest cultural shock. It's really got to be the language. I mean, if you've ever traveled to Europe, even if you don't speak French or German or Italian, at least the letters look the same. You might be able to kind of guess, just by looking at the word, what it might be. In Russia, you can't do that. It's an entirely different alphabet. So, trying to navigate around the city is just much, much more difficult if you don't know the alphabet. Luckily I did know it, so I did okay, but just that general thing, there's almost no one who speaks English out there. In the major hotels, the expensive restaurants, yes. They speak English because they're trying to cater to the foreigners. But in general, wherever you go in Moscow, nobody speaks English, whereas in Europe there's always somebody you can find who knows a little. So that's probably the biggest cultural thing. You are really on your own out there. You've got to be smart and pay attention to what you're doing to get around. That probably was the biggest shock.

Wright: Thank you. We enjoyed hearing about your adventures, and I guess that's one way of casting it.

Zimmerman: That's one way of putting it.

Wright: I'm sure there'll be many more.

Zimmerman: It's certainly an adventure.

Wright: Thanks again.

Zimmerman: You're welcome.

[End of interview]