The oral histories placed on this CD 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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Go to Oral History

THOMAS H. MARSHBURN

September 4, 1998

Interviewers: Rebecca Wright, Glen Swanson, Frank Tarazona

Wright: Today is September 4, 1998. We're speaking with Tom Marshburn as part of the Shuttle-Mir Oral History Program. It's Rebecca Wright, Glen Swanson, and Frank Tarazona.

Thank you again for taking time out of your schedule to meet with us. We'd like for you to start by sharing with us what your roles and responsibilities were with the Shuttle-Mir Program.

Marshburn: I was assigned as a flight surgeon to the Shuttle-Mir Program initially, and so I started off taking language training for six months in '95 and then deployed out to Star City in '96. My original responsibility was to follow astronauts as they went through the medical selection and the screening process, which was much more intense in Russia than it is here. They have much more of a select-out mentality, that is, looking for something to disqualify someone, than we do. We do that during selection, but then after that we do what we can to keep people flying. The Russian mentality is not quite the same.

So, given that they were going to go through a very intense observation period, even during their training, also given that the Russian medical system we didn't know much about, heard stories that it was at times outdated, we wanted to make sure that nothing unsafe was done to our astronauts over there as well. So that was the original plan.

Once I got there, it became clear that a better way to work things, perhaps, was to have a flight surgeon dedicated to a mission and as part of a mission team. So that really came about when I was there, perhaps even through discussions with Jerry Linenger. I'm sure other people had decided this would be a good idea, the team concept was a good idea as well. I remember Jerry probably came up with the idea in some of our talks. So I then, in '96, worked with John Blaha a good bit just before he launched. He needed some help with quite a few things, and then I was dedicated to Jerry Linenger for the rest of '96 and then through this mission in '97.

At that time my role changed to being the flight surgeon on console, following the mission and helping take care of any medical or health-related incidents that came up. As an ancillary job, we also were occupational safety and general medical officers for Star City as well and provided medical care when needed.

Wright: Can you take us through a few more details of these, for instance, on a console, some of your experiences that way.

Marshburn: Yes. Jerry and I had spent a lot of time together in Star City during his training period. Tony Sang had as well. So the three of us, we felt like, were a pretty tight team. Matt Mueller was a trainer. He

didn't work on console, but he spent a lot of time with Jerry and John Blaha in their training. I guess the thing that was most unusual about it is, first of all, a flight surgeon talking to a crew member, that's usually a job reserved for the Cap Com, so that was unique to the Phase One Program. It was my first experience sitting on console. I think what was striking to me is how much homework it takes to do that, because you want to anticipate questions so you can answer them right away.

The Russian experience was unique in that we only have five minutes twice a day, at best, to talk to them, although if the satellite passed, we could have thirty to forty minutes to speak with them, but that was very rare. So we wanted to anticipate questions. We wanted to have immediate answers if possible. I'd say 90 percent of the time that was not possible. There was just no way to predict what was going to happen. You didn't want to give a knee-jerk answer. Our conversations with Jerry were oftentimes just business. He had a lot of questions. We'd have a lot of instruction or information for him, a lot of data transfer in the com.

But every now and then, maybe about once a week, we'd have a few minutes left, when we were able just to sit back and chat a little bit. Jerry would talk about some of what he was seeing when he was looking out the window, just his general impressions, but that was fairly rare. Sometimes we'd tell him stuff that we'd been doing in Moscow or what life was like in the ground control team, but that was actually quite rare we had a chance to do that.

Actually, as far as the mission control goes, Jerry's mission was unique in that the com became so bad, there was very limited time that we could talk as events unfurled in NASA 4, and the antenna for the satellite went out due to some heat and cooling problems. So we had very limited com, it was often very ratty, and Jerry suggested and we went ahead and tried to do all of our communication by E-mail using the packet system. So we had no voice communication with him for quite a while, for about two months. We'd hear his voice coming down on the Russian loop, and we would have a chance to say a few words to him, but the standard com, for about two months, we didn't have. I think that was very unique. It hadn't happened since Skylab, probably.

Wright: Did that work well for you, where you had to put so much down in writing?

Marshburn: I think we learned it's probably not a good idea. I think it was worth trying. The benefits were that Jerry didn't waste time on com. He would spend forty-five minutes preparing for a com pass, just as we would spend hours, and oftentimes that time ended up being wasted if there was a drop-out or we found out--sometimes we didn't even know what he had not heard or he didn't know what we had not heard, it was just one way and we wouldn't know it.

But the problems with cutting it off is there's a bit of a psychological disconnect between the teams. He becomes more isolated in our minds and probably we did in his mind as well. That didn't affect our operations so much, but there was that slight disconnect there. And also just the hardware was unable to keep up with the E-mail. We still were a couple of days behind all the time because it was just so backed up. The package system wasn't working that well, and there was so much information they had to transfer for regular station operations that just while we sat back in the queue, we could be days before and knew it would go up. So we'd keep trying to plan further and further ahead. I'd say we never got more than two days ahead in the information we could get to him. So he was pretty much flying solo a lot of the time without any voice communication.

Wright: As his doctor on ground, how did you feel being so detached from him? Did you feel like you were able to be there for him when he needed you?

Marshburn: Well, Jerry being a doctor, too, I felt real comfortable with his assessment of what was going on to himself and his crewmates up there, and I didn't feel real comfortable with the voice detachment, mostly because I could see in all of us on the ground a mood change after that, a bit of a disconnect with it, which I think is just natural, that happens to people. When things got real serious, with the fire, with the coolant loops, with the heat, the coolant loop leaks and with the heat problems, we just got on open air to com. We were able to exchange some words.

The biggest disconnect occurred probably at the time the fire occurred. I had a visa problem. I had applied for a visa renewal about ten months prior. The visa only lasted for a year, and I'd applied for a renewal ten months prior to the expiration date, still unable to get renewal. We had been assured we ought to be able to get one, but apparently there was a change in Russian law at the last minute. I found out I couldn't get a renewal so I got another visa that had to be activated on entry, so I had to leave the country and come back in. Two hours or four hours after I left the country on a train for Helsinki, fire broke out on the Mir.

Terry Taddeo was on call, so to speak. He came in and did a great job filling in there. I think Jerry did feel kind of a bond between him and me and he wanted me there to help him out. He knew that I knew what his concerns would be, and we kind of knew how each other operated. So that was really unfortunate. That was a disconnect. But otherwise, I think we had a good rapport going. It wasn't standard com, it wasn't on a daily basis, it wasn't even necessarily during the medical conference. It's called a private medical conference, but it's not private, so we didn't even rely on that as having real private information back and forth.

So, most of it was on the open air to ground, and I'd say he and I had a much better, or much more open conversational relationship than perhaps his crewmates with their flight surgeons had, the Russian flight surgeons had. I think the Russians learned something from us in that regard, that having a private communication where the crew members know that no one else is hearing except for their flight surgeon makes a big difference in what they're willing to say and able to say to the ground.

Oftentimes, according to Jerry, his Russian crewmates would ask him for medical advice, and sometimes he'd ask me if he needed some more reference on things, but that's perhaps not unique to our flight, but certainly we knew it happened on our flight, and it was during our flight the Russian began to have some private medical conversations. I'm not sure that that was started with our flight, but it certainly seemed to be taking a lot more attention in our flight and continue on in subsequent flights.

Wright: It's interesting there was a doctor on call down here and a doctor basically up there [on Mir].

Marshburn: Yes. We always had two out there, one in Star City in case something happened and also he was working with Mike Foale, who was going to follow Jerry. Actually, I'd told Jerry--I can't believe I did this, told Terry before I left for Helsinki I was going there just to turn around in a few hours and come right back to activate the visa, but I told them, "Everything's fine, Jerry's real busy up there but there's no problem, and he probably won't call you unless there's a fire or something," and then that's exactly what happened.

Wright: I guess they didn't let you leave anymore, especially with that kind of information on the way out the door.

Marshburn: Yes. You know, the Russians are very superstitious about that kind of thing. Sometimes I hesitated that I even told Terry that, because a lot of Russians could very well say, "You shouldn't have brought that up," because they don't even like it if you say, "Good luck, it's going to be a great launch, great mission." They say, "Don't say that. Whatever will be will be. Just take it in stride," and they're very adamant about that.

Wright: Would you tell us about the experiences when you were on the train coming back from Helsinki, and how did you find out about the fire?

Marshburn: Not until I got back. I had no idea what was going on. It's about a twelve-, fourteen-hour ride out and back, so I was gone for about thirty-six hours, and as soon as I got back, I just came back to the hotel room, and I wasn't planning on going back to work. I was there about 3 p.m., and I called in just

to see how things were going as soon as I got back. Actually, the first place I called was Star City, and Natasha Dorishenko [phonetic], who runs the office out there, said, "Oh, Tom, you mean you didn't hear?"

I said, "No. What's happened?"

She said, "There's been a fire up there."

My first question was, should I be getting ready for Baikonur? Because I would go down there in case they had an emergency de-orbit. But they were still up there, and they fought the fire, and it was out, but they were still assessing what was going on. So I just hightailed it straight into mission control, and really, from that day on, the whole rest of the mission was completely different.

Wright: How so?

Marshburn: Well, prior to that time, we were real busy studying up on the experiments, trying to make things go as smoothly as possible, really no big problems other than just trying to make the science go along smoothly. After that, it was much more, certainly from my viewpoint, health-related, making sure things were safe, that everybody was okay up there, that we were making the right decisions in keeping them up there.

I'd say after that, every few days there was something else that came up after that fire for the whole rest of the mission. We had coolant loop leaks. We had carbon dioxide problems. As things heated up, they had to turn off the carbon dioxide removal system and use their back-up system. There were some water problems, running low on water. It just never stopped from that point on, and every day we'd come in just waiting for the next thing to happen. If we hadn't had a major problem in about three days, we figured we were due for one. It's a little bit of an alarm reaction after a while.

Wright: Were you involved in making decisions about leaving them there?

Marshburn: My opinion was asked. I mean, I was directly asked by Frank [Culbertson], "Do you think it's safe up there?" One thing that helped a lot was that Jerry, being a doctor, he had done physical exams on everybody. He said they were fine. In terms of their health, they were healthy up there. The environment itself at the time was safe. I think what we learned is that an unsafe environment, that status, is often so quick that it occurs, you don't take care of it right away, then there's no question you come back. But if you can take care of it, then everybody sits back and has time to reflect and say, "That was a problem. At the time it was unsafe, fire, decompression, but we've taken care of the problem. So do we need to come back?" While everyone is walking on eggshells at that point, you still think, well, if it's safe at the moment, we do have an escape vehicle, why end the mission at that point? Especially after they've

made the effort to correct the situation.

That's going to be a problem for ISS [International Space Station], I think. No crew is going to want to be the ones that come back right away. So I'd say, in general, at no point did I feel like they were unsafe, except during the time of the fire. I'd say that was a real brave decision to continue to fight the fire and not just come back, but once that fire was out, then the air was clear, I can see why they wouldn't want to come back right away and just keep things going. So except for those few moments during the fire, few moments during the decompression, the environment was safe. It was just a matter of how much you relied on your environmental systems to continue to work, what's the risk of it happening again, and who can assign that kind of risk, because that just doesn't happen very often.

Wright: Did you have support staff to help you determine the safety of the atmosphere on Mir?

Marshburn: Yes. We were real limited in our insight. We didn't have much up there to give us an idea other than Jerry's description of what was going on. He was able to take samples of the air, but you can't assess those until they come back. Now, I will say--and this was a unique thing--the fire occurred when there were two crews on board. The crew that had been up, I believe it was the Mir-22 crew, was getting ready to come back, and so we had the opportunity to bring some of these samples back, although it was unprecedented for it to come from space, end up in Russia, and get back in the U.S. for analysis. Oftentimes the Russians want to do the analysis in Russia.

So there was perhaps a little bit of cloak and dagger. I'm not sure how it happened. But our support staff in Russian, Kristin Terashevsky [phonetic], who was Kristin Maedlow [phonetic] at the time, was out there. She and Lee--I can't remember his last name. He worked in the liaison office. His first name was Lee. He and Kristin worked together to get these little canisters out of Russia. They look just like hand grenades. They're just a little ball with a little valve on the end. Within three days, it had landed in the Russian staff in Kazakhstan, had been transferred to Energia in Moscow, I don't know how, got them out of Energia, through Customs, through diplomatic immunity or something. He was just carrying them. The X-ray shows this thing looked just like a bomb, and they'd let them go right through New York Customs down to JSC [Johnson Space Center], was picked up at night by Laura Bostik [phonetic], who assured that it got to the lab, and the laboratory ran through the night, got the results back to us.

As it turned out, there was no immediate action that had to be taken. At least we knew that these guys weren't going to suffer from long-term toxic effects. So that made a big, big difference. We also got some water samples back, which actually showed some ethylene glycol in the water, and that's the first time we realized there had been a loop leak, because it showed up in the condensate. So that was when the

coolant loop problem started, once we began to investigate that. But we had no idea that was going on until it showed up in the water. So there was a lot of use to getting those results back quickly, real time.

Wright: Your duties as a flight surgeon or a physician assigned to crew members seems like they kept expanding and expanding. You were research and real-time decision-making on health matters that affected more than one person. Can you give us some other examples of what else that you were tasked to do?

Marshburn: Yes. I'd say there were a lot of things we didn't expect. In Phase One, unique to any flight previous to that, what I would contend is our jobs for long-duration space flight would include, certainly, health advocate for the crew, but also be more involved in the science program and at least having oversight on what's going on. Long-duration flights will be heavy in the life sciences, and Jerry's flight was heavy in the life sciences. That means real invasive procedures on people, even if it's just IV sticks, still it's continual. It goes on and on. Sleep studies, they're having problems with sleeping at night, it's inevitable when you do a sleep study. And perhaps more invasive things. We had an immunology experience where we had to inject an antigen, a pneumococcal vaccine, something you give people on the ground all the time, and you expect allergic reaction to that, as you do with almost everybody who gets it on the ground. That was unique, that you were actually doing something that changes their health status a little bit, even though it's well described and, like I said, a very low-risk thing.

So, having general oversight of the mission and knowing exactly how much blood's being drawn, how much sleep they're losing, the impacts to exercise, that kind of thing, a flight surgeon needs to be more on top of, I think. As health advocate for the ground team as well, in occupational medicine for the ground team, you can best support the astronaut if everybody is healthy. It builds team spirit when they can just turn to the doctor and ask for some help. We learned a lot about just getting more medicines in there. Spending time with the ground team, I think, made a big difference. I tried to fill that role as well because it was not defined before I went out. I just tried to help out with that.

We talked to the crew member. That was new. I don't know that we need to be doing that, but I think we need very close contact with the crew and a chance to take the flight director and the flight surgeon and the crew member and all have a conversation. We're going to do that on ISS, once a day to do that. Cap Com will remain the Cap Com. There's no reason for us to talk as much as we did in Phase One, I think, but to have that kind of connection so that if there is a health concern, such as fatigue, that's inevitably going to have some mission impact. You've got to talk to the people and make the schedule. The flight director has to be involved. Fatigue is a major issue for long-duration space flight and the stress

associated with living in a can, academic stress of doing experiments, I guess, to time line, plus all the environmental stress. It all adds up, and they need a health advocate that talks to them. So that kind of more global approach on top of what we already do for Shuttle is going to be very important.

Wright: Were you assisting in their psychological situations or would you encounter that as well? I know that you have a crew support that does that specifically, but just this one on a day-to-day basis, or were you the message-taker if there was a problem or if there was a situation on the ground or in the air, were you able to help solve that, or did you turn that over to that crew?

Marshburn: I tried to help solve. NASA 4 was unique with crew interaction. The ground and the crew had different ideas as to what was going on, and the psychological support team was actually having meetings about the crew during our mission, Jerry and Vasily and Sasha, and they were trying to make decisions as to whether the EVA should continue, based on all the things that had happened and whether the crew was really stressed and fatigued, to try to do that. I didn't know they were having that conversation. It came up later on that it was, and they felt like it was a good idea for Jerry to decrease his work on the science and go do more station-maintenance things. So we tried to get that information up to Jerry. So I was more of a messenger in that regard.

But I'd say, psychologically, there are some very unique things. The way Jerry would tend to write E-mail was just no capital letters, very short, very clipped, and I did this, too, when I first met Jerry and started communicating with him. It sounds like he's being terse, as if he's being angry. Now, like you get E-mails in all caps, and people go, "Why are you yelling at me?" So it's good to know just the makeup of the crew members, and you can tell people, "This is just the way he writes. You can expect this kind of an answer from him." Probably more importantly, people have an answer they send back, and you say, "Don't put it that way, because it's just going to make him angry and it's not going to help him."

For instance, to say things like, "If you have a chance, please look for this cable." Well, some crew members will take that, "If they need the cable, they need it," and we had one crew member who spent eight hours looking for that cable. So the point being, that's kind of a psychological thing that's unique to a crew member. You can tell them, "Don't say that. Plan out time. Give them an hour to do it if you want it, but otherwise tell them just to spend that hour looking for it. Otherwise, they're going to spend all day and all night looking for it because they think you need it." So knowing the crew member that well, I think, makes a huge difference.

Wright: Do you attribute that to the training before they are launched, that you had a chance to work with

them on a day-to-day basis?

Marshburn: Yes, just living with them and working with them, right. I don't know how it will work in ISS because it was really nice being in Star City, living with them, experiencing what they're experiencing. It was definitely a bonding experience there in Star City. We kind of go and have our own separate lives here in the U.S., of course, so I don't think we're going to have the same capability of bonding in that way. But we can do what we can, go to a lot of the training. We'll be participating in a good amount of the training anyway.

Wright: I think when most people think about the elements of the whole Shuttle-Mir Program, they think of training as for the actual Mir residents, but as flight surgeon, did you go through an extensive amount of training to be able to do your job to support them?

Marshburn: Not enough. Six months of language, which is more than a lot of people got, full time, but I don't think we really--I mean, this was a new role for us. I don't think anybody would have known how to train us. We had to have done a Shuttle mission, which I had done as a deputy crew surgeon, but all it did was teach me, really, how things worked for the Shuttle, completely different for the Phase One Program. So I think all of the flight surgeons that worked Phase One think we now do have a training plan for flight surgeons for long-duration space flight.

A lot of it's an attitude and an approach, as opposed to really step-by-step things. Perhaps you might have to have worked a long-duration mission to feel things as deeply as we do about how much you have to stay on top of the crew schedule and how important it is to make sure--this might be our most important role--make sure that the program as a whole has, as one of their boxes that they check off for mission success, to be crew health. So, yes, we got all these goals finished and the crew is healthy. I think that's always been a given, and for long-duration flight, it's something we have to be proactive to make sure happens, and if we're not, it may slip through the cracks.

We're talking about very healthy people, to begin with, that fly in space, so we're not talking about any major disaster, but we're talking about burnout, people leaving the program after they've been in long-duration flight, don't want to go through it again. We're talking about impacts to the family on the ground. If we can do better than that, then we should.

Wright: Could you share with us some of your experiences when you first went to Russia? Was that the first time that you ever went, was for this program?

Marshburn: Yes. I spent a week there just as a familiarization session, and I don't remember much from that first week other than arriving and the sleep shifting is always tough. I was real surprised after several days. You know, you can go without sleep, anybody can, but it does have an impact. We've seen more viral--they're actually doing a study right now just to document that we see an lot more viral infections, people getting sick. Probably thirty percent of the work force gets wiped out. I experienced that for several days. You just can't be up and running right when you arrive there.

Food just really wasn't available in '95 when I arrived. I got there, and said, "Well, I want to eat something but nothing's open." The closest store is about a mile away, and that's closed anyway. No cars. You can't hop in and drive somewhere. If you could, it would be all the way downtown Moscow and not necessarily anything would be open down there as well. So I've learned to go to Russia with lots of food. Things are a lot better right now. There are now a couple of cafeterias open and stores that stay open. Moscow's a lot better. There's not the same problem. But I lost a lot of weight, and a lot of guys do. Some women do. Women tend to gain weight over there, and guys tend to lose weight, for some reason. So food was--and finding it and keeping it and making sure you have the right amounts of it would be a concern early on there.

But I remember being completely fascinated. I was there in the wintertime both times, with lack of sunlight. Everybody's just kind of in a somnolent mood, and going outside, you have to put on boots and lots of big jackets and things. So once you're inside, you tend to wear your bedroom slippers. It's a casual atmosphere, so you're in jeans and a T-shirt and bedroom slippers. You feel like you're always in your bedroom. You're just kind of schlupping around. While the work is not hectic moment to moment, it's just constant. It goes day and night. So all the days just start to fold into each other.

My best memories, though, are just the beautiful Russian countryside in the wintertime, fairy tale, fairy land landscapes with all this snow, and going out cross-country skiing with the Russians, seeing Russian soldiers walk by with the tall Russian hats, *shapkas* [phonetic] and their uniforms, and just being amazed that I'm out there doing this.

All the inside of the buildings have low lighting. That took a while to get used to, and actually it probably had an effect of just making us a little slower and a little sleepier than we would have been normally as well. I think bright lights might be a good idea over there. The whole pace of life, the amenities, are probably what were in the U.S. in a small town in the 1940s. Old plumbing. They certainly know how to do the heat right. We were always very warm, sometimes had to crack or open windows, but sometimes they shut down the water to clean out the water tanks. It was a communal water system. So we'd rotate around to whoever had hot water, and if not, we'd just go for the cold water.

Had a great time with the Russians one on one, working with them in their offices and in the training centers. I had the unique experience of being able to take a scuba dive course. I'm a certified diver, but over there they wanted to put me through their own course so that I could scuba dive in the hydrolab while Jerry was doing his EVA training. I made a lot of close friends through that, and we had a little party after I'd passed. Russians tend to think of Americans as being weaker and as people who need to be protected, so they wanted to make sure I had all my paperwork, insurance, ready before I did this dive. Fortunately, the person, my buddy diver, a very experienced Russian diver that I went down with, didn't have any problems with putting you through the paces. So we were doing things that probably weren't standard and had a lot of fun crawling in and out of modules and exploring, complete the hydrolab, and so he was pleased I didn't freak out or have any problems with that. But I think they probably tend to think Americans can't handle it, so they're a bit surprised when we come through sometimes.

Wright: How about your Russian counterparts, as far as physicians? Did you trade information with them as well?

Marshburn: All the time. Yes, actually. We considered them as Russian colleagues or physician colleagues that we would trade information with. We in America would tend to think of them as being too conservative on a lot of things. If there were a little blip on an EKG, for instance, we'd be afraid that they would try to do work-ups. We have reason to think that because they are very aggressive in doing a work-up on what we feel is just a normal variant, and that happened a lot. Our response was give them less information so they'll have less information to work with so they won't do all these things and we won't have to get into all these arguments.

I think both sides had to come to a middle ground. I'd say we changed in our perspective a little bit. We still pretty much stuck by what we've always done. We have learned a lot from them, though, about long-duration space flight and the things that we need to monitor and keep track of. A lot of the specialists there are behind the times in terms of technology and the current literature on how to assess a problem. They are excellent diagnosticians when it comes to hands-on things. I would watch them do a physical exam, and they are very good at what they do. What they do with the information concerned us at the time. I'd like to think we opened the doors a little bit on that.

One of my strongest memories is chief medical commission is when all the specialists from around the country, kind of the equivalent of our Yale and Harvard and Stanford, coming in to review the health of the astronauts and see if they're fit for space flight, and we'd find ourselves, myself and Dave Ward and Pat McGinness, very, very young by their standards, standing up in front of an auditorium of fifty or sixty

wizened and grey-haired specialists with years of experience behind them, and arguing with them on certain issues and trying to get them to see our way of things. I can't imagine being in their shoes and having to put up with that. I still think we were right, but still, I'm sure it was very difficult for them to take that.

Wright: Was that a trait that you had before you went over, or did you learn how to stand your ground and argue your case with these physicians when you were there?

Marshburn: No, I'd say that was a completely unique experience. The trait that I had as a physician, if I felt like it was a health care problem, you felt that what you're doing is right. I think what was completely unique to me was saying, "Here's the data. We can send you the articles if you want, and here's what all the textbooks say, and all of our specialists say this, so we think this is the case." And they would say, "Well, but we just disagree with you." And it would just be so frustrating. We had so many meetings that were like that.

So as it turns out, and I don't know the details here so I can't go into it, but as it turns out, a lot of times there was political motivation for doing what they did, so they had already made up their minds on what they were going to do in certain cases. I really don't know what the background is on a lot of that, and I'm not sure anybody does except for the Russian side.

Wright: Share with us your background. You'd mentioned that you had worked a Shuttle flight, but what else was necessary for you to take this role on as a flight surgeon for Shuttle-Mir?

Marshburn: That was pretty much the criterion. When you come on board at NASA, the first thing you do is get certified for Shuttle flight. So you learn to work console and learn to work with the crews and go through the process that they go through, but it's so unique, I'm not sure how much that applied, except just in being comfortable in working with the team, which is very unique at NASA for physicians. We usually work with physicians and not engineers and pilots.

Wright: I'm sure [unclear].

Marshburn: It's great. I'll tell you what, it's just fantastic, because I really like the way the NASA community--how they think ahead. They have to think about not only why is it, but why is it important, what are you going to do with it, whereas doctors oftentimes go with more information is better all the time, as opposed to "I've really got to come up with a plan of what I'm going to do with this information if I get it," because there is an impact to getting it, you know, affecting someone's training schedule and their peace of mind at having to always come back to the flight clinic. So I really like that, and that's been a real

benefit working with them.

I came on board at NASA as an emergency physician. I'd been practicing out in Seattle. I would put in an advertisement as emergency medicine being a good thing to have just because it's a broader overview of a lot of things, and I like that aspect of it. Also, in emergency medicine we tend to do more toxicology and environmental medicine than in other specialties, and that seemed to be very applicable to the space program as well. But probably one other thing to get us ready for being out in Russia was probably just knowing how to work within the system and to work with crew members, having some flight time, some flight exposure, some zero-G exposure. It's much easier to anticipate what an astronaut's going to need when you're been in their environment. Otherwise, we're pretty limited in what we can experience that they experience. Otherwise, we have to rely on them to tell us, which is oftentimes after the fact. So that was of some benefit.

Wright: Do you believe your emergency physician training helped you be able to make quick decisions? I believe in emergency training it's one of those ingredients you have to have to be able to make that decision in a little bit of time with maybe not every piece of information you wanted.

Marshburn: Yes. While in emergency medicine you can't anticipate everything, especially in space flight if someone says, "Gosh, I think I just breathed some ethylene glycol vapors," I'm not going to know the immediate response as to what effect that has on the body, but as an emergency physician you do know what's an emergency and what's not, and say, "Okay. I'll look that up, but let's take a look at things right now," and I think Jerry was doing that up there, too. We would talk about the physical exam oftentimes. If these aspects of the physical exam are normal, then these guys are fine, they're not getting ready to crump on us, we have enough experience to know when to get worried and when not to while you work out all the details, and that was the biggest benefit to me. I was able to feel very comfortable with their situation, despite the fact they were in a big fire, exposed to some smoke. You know, they're out twenty-four hours and they're still looking good, so there's no reason to worry.

Wright: What was probably the most significant time in your years as part of this program that you'll always remember? If somebody had asked you what happened that you're really glad you were part of this program, you were glad you were there, you were glad to be able to make your contribution?

Marshburn: As far as that goes, there was no one moment I could come up with, but, in general, to get an overview of a long-duration mission from the very beginning to the end and to be deployed with the crew, to see what they go through, to have a pretty good idea of what they go through in flight every day just

through the com, and, post-flight, having long conversations with the crew member as they go through rehab, I would stick with Jerry all the time for a month after he got back. I feel like it was just a unique opportunity to have insight into the stresses of a long-duration flight. We're trying to capture that information right now and get it on paper and spread it out. That is probably the greatest benefit.

For me, personally, the benefits are the wonderful times I had in Russia, images of cross-country skiing with friends, the time I spent with the international partners. Mostly we didn't work together as much as we just had good times together and went downtown and ate dinner out in restaurants.

In flight, it was very exciting to be speaking Russian, speaking English to the Russian ground control, to an American on board and Russians on board the station. It was just very exciting. It was very challenging to switch back and forth as well as talk about technical matters as well as just try to work in the com so you feel comfortable, talking to the right person at the right time. There's a lot of interaction there. Things would go smoothly, but afterwards you'd stand back and go, "I just can't believe how we did this." Post-flight also, having a chance to sit down with someone who'd been in space for that length of time and talk to them about what it had been like up there, to see the body as it has made some changes, as it adapted to zero G and see the readaptation kind of slowly come back to normal, that was all very special as well.

You reminded me of one situation when John Blaha was up there when it came to talking to the Russians and to John. He was training for when his crew members went out on an EVA and he was going to have to throw some switches. The Russian word for "on" is *gluch*, and for "off" is *vregluch*. They're very similar. For that reason they often use *utglutch* because it sounds so different for "off," which actually means to disconnect. They were saying, "John, turn it on and *vregluch*," and he would say, "Okay. I turn it on and *vregluch*." And they went, "Is he saying on or is he saying off?" So they would ask him again, and he was being very precise. When he'd say off, he'd go *vregluch*, trying to make it very clear. I think what they wanted to hear was *utgluch* so that they would know that he knew. So they turned around to me--I was standing right behind the flight director--and said, "Tom, what's the English for on and off?"

I said, "It's on and off."

And they just burst out laughing, because that sounds very similar as well. And so we had the same problem in both languages. Then John started laughing about it, too. They finally got it worked out to where they understood that he understood what was going on, but just something that simple, how do you say "on" and "off," the fact that we have the same problem in both languages, we spent about five minutes talking about that and kind of laughing about it. That was another time, as far as communication goes, that I don't think I'll ever forget.

Wright: It's something simple on the ground, but not so simple so far away.

Marshburn: Yes, but also you realize you just talked to a bunch of Russians in Russian and it went relatively smoothly, and I didn't even think of that being the problem. We were working through a funny situation, but actually we all knew enough about each other and about each other's languages to do it very smoothly, and that was funny.

Wright: Your experiences there were so not normal compared to what you had here, was there ever a time in the midst of all this that you wished you hadn't been part of this experience?

Marshburn: No, never a time at all. There were a lot of tough times. You're working pretty much day and night, six, seven days a week. During the mission was were easily 100, 120 hours a week, just never stopped. There were times I wanted a break, but I wanted to get the mission done first, of course, so we were kind of looking forward to when everything was fine, Jerry was back. There was a huge sense of relief when he got on the Shuttle, but, of course, things didn't stop at that point either.

But it was really nice to get back to the U.S., but there was no time at which I ever wished I hadn't done it. I think I appreciated the fact that I was in a very good, unique experience. There were tense times. I think everybody, when they're out there and they're isolated, they tend to get angry when they're talking to the U.S. side. Everybody has the feeling that they're the only one working hard and no one else is, but that's just unique to isolation and the time-zone changes. That's just going to happen.

Wright: Do you think the term "long-duration flight" also pertains to those folks on the ground as well, that they were going through a long-duration term?

Marshburn: Absolutely. Yes. And that's a big point for the ISS. The crew's not going to get good support unless the ground is ready to support. There's no reason for us to make the mistakes we made in Phase One, and that is to have one team that works all the time the whole mission and not giving them a break, to have time-zone changes where you don't appreciate what the other people are doing. One of the biggest problems in Star City, too, is living where you work. You really never leave your work behind, and even though you love it, after months and months, you want it after a while and you really need a break for a while. All those things.

For us flight docs, being more incorporated with the team, helping them medically on the ground, making sure they're getting rest, being their health advocate as well, making sure they have a break after flight or at least seeing that that recommendation goes through, I think all those things are going to be

absolutely essential.

Wright: And your accommodations, you mentioned being where you worked all the time. Has that changed for the flight docs, or are they still living--

Marshburn: That's about the same, and actually they were good. It was the best they had to offer, and it was built in the sixties for the Apollo-Soyuz group. It had a little suite, a bedroom and bathroom and little room, and it was wonderful. We built a little kitchen there as well. I don't see any reason for that to change. Maybe a little bit better air-conditioning in the summertime. The mosquitoes would get bad in the summertime, but those were very minor, and I'd say they just added to the charm of being there.

Actually, for the first two months of Jerry's mission I did stay in a hotel downtown. It was all they had available. I much preferred to be in a Russian apartment. I was able to live in a Russian apartment after that. I much preferred that to the nice, relatively nice hotel. It could be home.

Wright: Do you miss much, or is there something that you miss the most being in Russia that you could have had if you'd been back here?

Marshburn: I miss Russian friends and I miss interacting with them. I wouldn't want to do a year and a half again just straight on, but would love to go back for shorter periods of time. I miss being that deeply involved with a flight. I think that was very unique to Phase One. It probably is not appropriate for a flight surgeon to be as deeply involved, because we've got so many other people that can do the job, you know, the Cap Com job and that sort of thing, but I kind of miss that involvement.

Wright: Anything from the United States you missed while you were in Russia?

Marshburn: Oh, yes. Pretty much. I think everybody missed their own home, their own apartment. All your little accoutrements are just set out. Missed being able to do our hobbies. I like to fly, I like to climb, and I couldn't do any of those things, but everybody talked about that. Missed being able to hop in your car and having that kind of freedom. I missed having the convenience that we do in the U.S. of just ease of laundry, ease of grocery shopping. That's a day affair in Moscow. I'm sure a lot of people missed friends a good bit. But those are all well worth what we had.

Someone described it this way, and I think it was very accurate, that going to Russia and then coming back was kind of like going through a time warp, because I came back and there were different faces at Johnson Space Center, different season, maybe different management structure, and yet my life, except for the Phase One Program, my life had not progressed at all, you know, professionally, or my

hobbies, hadn't kept up with the family as well, or that sort of thing. So it seemed like everybody had changed but me in a way. I was right back where I'd left off.

Wright: That's eerie.

Marshburn: Yes, especially when you come from lots of snow in Russia and you come back to the bright sun in Houston. Flying in that jet is more like a time machine than anything.

Wright: Is there something you learned about yourself through all these experiences, that you felt maybe you learned or maybe you grew since you were part of everything that was going on?

Marshburn: Actually, probably not, only because having done a residency, that was probably one of the more intensive, difficult times, like working in emergency rooms in terms of stress and all that goes. So I wasn't put to the test any more than I had been previously. I probably became a little more hard-edged when it came to medical matters in the space program than I'd been before, more willing to pound the desk if needed, to argue certain points more vehemently, but that's about it.

Wright: At least you got to test yourself in a new culture and a new climate and with new friends.

Marshburn: That's true. I'd never learned a new language, never lived in another country for that period of time, but I just chalk that up as a lot of great experiences. I'm not sure that what I learned from that would ever change me at all.

Wright: Learned to enjoy it.

Marshburn: Yes. Exactly.

Swanson: I was curious how accessible were past medical data from previous long-duration flights that the Russians had, previous Mir flights before Phase One and the Salyut missions were. Did you pursue any of that material to help in some of your work, and, if so, how accessible was it?

Marshburn: The information they had was very accessible, and the way you got it was to find the right person, sit down with them, pour out some tea or some vodka, and talk to them, because they just didn't have the archives that we do. We asked for that information many, many times. Some things have been published in the U.S. There's the occasional Russian report that you could find. It would take a lot of work for them to find it, and they just don't have the paper memory that we have here. We turn over people

in the U.S. space program, they go on to other things, and so we have to document things in books and documents. The Russians, once a person's there, they stay there. They've been working the space program since the mid to late fifties, and that same person may very well still be there working it. That's the person you talk to if you need to know the information.

Finding the right person to talk to is often very difficult. The Russians don't often say, "I don't know. Talk to this person." They'll tell you everything they know, everything they think is going on. And you have to talk to a lot of people and ferret out the information. So it just requires a lot of time. So accessible, yes, you're just talking to a person, but ultimately no, because you have to find the right person and make sure that they are the expert on it.

Swanson: For example, when the fire occurred, were you aware that there were previous occurrences with a similar device previously, or was that brought out after the fire?

Marshburn: It was brought out after the fire. If we'd known about it before, I'm not sure it would have changed things much, because it was not nearly to the same degree this fire was, at least according to their description. Apparently the fire was different in the sense that the candle on the Salyut, the cloth covering had caught fire, because that thing does get real hot anyway, and that was no big deal, we just put it out, and we believed them, that's probably the way it was. But this was more of a blow torch with the actual solid oxygen in the canister catching fire, so it was almost impossible to put out and a flame about that long, and worried about punching a hole through the other side of the module.

So I did not know that fact. I imagine it would have been relatively easy to find, but I can't imagine going to the Russians and saying, "So have you had problems with this device?" They probably would have said, "No. We've been using it for this many years and really haven't had any problems," and you'd probably have to talk to them for a while before they said what that little incident was on Salyut, because they really would feel like it was not a big deal.

What's a big deal to us is not necessarily a big deal to them because they have so much experience, and in the Shuttle Program we're so used to throwing a huge army at any one problem and it makes the news sometimes, sometimes it doesn't, but it's a major issue for a short flight. You just can't work that way for long-duration flight. You'll burn out people, and you just don't have the resources to do it, and it's maybe not even appropriate to have a siege mentality for every problem. We came on in the Mir Program that way, and we felt like they thought we were kind of nuts, that we were kind of skittish. In retrospect, I think we probably were, starting out, especially once we saw what the real problems can be.

That's not what you asked, but getting more information about the device itself when that fire

happened, that was very difficult. The Department of Defense, there's a lot of that stuff, they say it's private, you can't have it. Even to this day there's a lot information we don't have about those devices, and it's just going to be a matter of time before we open up enough and have enough trust to get all the detail and it flows really well. I think we're getting there. It's going to take a while. I kind of wonder what we would think if the Russians asked about Department of Defense information. We'd probably be just as closed-minded about it.

The unique thing is that their technology might be something we had used a couple of decades ago, so we're thinking, "Gosh, it's really not a big deal. Why don't they just give it to us?" when they probably think of it as we would, say, maybe a spy satellite, say, "We're not going to give you that information," only as needed or eyes-only basis.

Swanson: Will the Department of Defense [unclear] because they were used on submarines?

Marshburn: Right. The same with the batteries. When Priroda docked, the batteries heated up and leaked. Finally we found out it probably was leaking sulfur dioxide, but it was very difficult to get the information on what was in those batteries. Yes, that happened several times.

Wright: We certainly appreciate your time sharing this information with us.

Marshburn: No problem.

Wright: We look forward to hearing your next adventure. Are you going to be participating in the ISS?

Marshburn: Yes, I'm signed up for one flight, but that's about a year and a half down the road before that flight, maybe about a year. Right now I'm just trying to help out getting ready for that.

Wright: We wish you the best of luck. Thanks again.

Marshburn: Thanks very much.