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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MICHAEL R. BARRATT, M.D.

April 14, 1998

Interviewers: Rebecca Wright, Paul Rollins

Wright: Good morning, Dr. Barratt.

Barratt: Good morning.

Wright: Thank you. We're speaking with Dr. Michael Barratt, flight surgeon with Johnson Space Center (JSC). Earlier you made a remark to us that the life of a flight surgeon was pretty hectic. So if you could expound on that, we'd like to hear the details of your life.

Barratt: I go on record as saying that the flight surgeon position here is the second best job at JSC, the first being the astronauts. But I think that's really true, because we cover a lot of ground. We do some medical practice. We do some research. We do a lot of operational support, we're on flight status in the T-38s, and it's been a wonderful conglomeration of everything that most of us really enjoy. We're now taking more of the role of program managers in some of the medical operations' functions for Space Station.

My role as the lead for the medical operations' integrated product team gives me the chance to consolidate all of the medical operations planned for the International Space Station Project. So it's a very busy time. It's my job to be the liaison for the Space Station Program Office to the medical community, but it's very enjoyable and it's nice to be able to make some changes to things that I've always wanted to be able to effect.

Wright: Before we talk about the changes, give us a little background. How did you get into this?

Barratt: Well, I went into medicine because I enjoyed it and liked working with people. It was a relatively broad field, but as I went through it, I realized that I'd like to broaden out a little bit further, and started realizing that there was this entity called aerospace medicine, that I loved to fly and do a lot of other things that were sort of outside the normal office routine.

I did training in internal medicine mostly to learn pathophysiology in preparation for aerospace medicine, and then entered an aerospace medicine training program at Wright State University in Ohio. This program was run jointly by Wright State University and NASA and Wright-Patterson Air Force Base. It's away from JSC, which in some ways is a good thing, because you learn what the outside world is doing. Wright-Patterson Aeromedical Laboratory is just an outstanding place to support research projects and whatnot. But by the time myself and some of my colleagues got down to JSC, having completed that

program, we were all pretty much bears in honey pots. We were just surrounded by the medical operations things that we had been dreaming about for years before then.

So, having finished two residencies, I came here in 1991 and started working on the Space Station Freedom Project. Of course, that dissolved somewhat, but it was a very interesting transitional process for me, because the passing of Space Station Freedom meant the coming of the joint program with the Russians. Before the Phase One Program was even solidified, I was asked to go to Russia and look at the possibility of using the Soyuz as our crew return vehicle for Space Station.

So, in July of 1993, I was fortunate enough to be among a small group of the first Americans ever invited to a Soyuz landing. So that was a wonderful experience. We had no idea at that point that that would roll into the Russians being a very large force in our Space Station Project or myself living in Star City for a year and a half, as it turns out. But it was a very eye-opening experience for me. This was the Soyuz TM-13 mission, and the crew that was landing was a French cosmonaut, Jean-Pierre Enierre--if I'm saying his name correctly--and Gennady Strekalov and Alexander Poleshuk. I've known these two gentlemen quite well since that time, but it was real interesting to see them land.

So, having done that, we spent perhaps two weeks in Russia, in Kazakhstan, in support of that effort, and returned. Of course, the Phase One plan started to be drawn up shortly afterward, and I was lucky enough to be Norm [Norman E.] Thagard's flight surgeon, myself and David Ward, who deployed together in February of '94. From the time of February '94 until the mission was over in July of '95, I spent most of my time in Star City.

Wright: How was that? Did you find that to be educational?

Barratt: It was definitely educational. It's a very historical place. I visited there in 1993, as well. Star City has always been kind of felt as the forbidden city or the hidden city. It wasn't on any maps, certainly, by then. It was a secret cosmonaut training base. Of course, everyone knew where it was, but it was considered a closed and secure city. Even the building where we were given to live, the Prophylactory, was essentially built to hold the Americans for the Apollo-Soyuz Project. So what history we knew of it was all based on the one and only joint mission that we had done with the Russians several years before.

So, sure, it was quite an exciting thing to get there, to realize how much history was there. It's, of course, called the Gagarin Cosmonaut Training Center, and they were the first in space with manned flight and satellites, with EVAs, with everything. So there's a very rich history there.

Star City at first was a little overwhelming, because there were only four or five of us English speakers and an awful lot of them, Russian speakers. I think we were all looking at each other with a

certain amount of curiosity, maybe suspicion, but that gave way relatively quickly. We built an office there only with the help of a lot of our Russian colleagues and newfound friends as we were there. It was a very short time later that it became a very comfortable place, a second home, really, to live. Star City is a very friendly place and a very beautiful place--peaceful, quiet, forests, trees, fresh air. It's something that I really look fondly on. I go back there maybe two or three times a year for medical operations issues or for crew coverages, and I always look forward to going back.

Wright: Do you feel you shared information with them as much as they shared information with you? Was there a lot of exchange?

Barratt: There was a tremendous amount of exchange. I think it's no secret that they weren't able to record a lot of things that happened in their programs during the Cold War years. I think the very idea that there was a whole new set of people out there doing the same thing they were--in my case, space medicine practitioners--I think that was exciting to them. I think they were anxious to share ideas and experiences, especially.

And in the Russian program, very little was written down compared to our program. The turnover is low so the same people have done the same jobs for maybe twenty years. The corporate experience is just tremendous, but you have to find these people to get it. Probably the most rewarding aspect of it was to meet these people, to talk to the flight surgeons who had been, for instance, supporting Salyut missions or had been supporting Mir missions for the decade of that station's use. They were much more free to talk during this time. Of course, this time allowed us to come together, and we learned things that we never knew had happened or never suspected.

Of course, what the Russians bring is an enormous experience, practical experience base, and the way to do that, the way to discover and to really make use of that is to get to know them, to talk to them, and to do operations with them, flying U.S. astronauts on the Mir station and cosmonauts on the Shuttle.

Wright: Would you tell us about your experiences while you were supporting Norm Thagard over there? I'm sure that was new for them to have an American standing by.

Barratt: Yes.

Wright: Tell us how all that evolved and how that got started.

Barratt: Well, I learned street Russian pretty quickly, because it was between me and my food and my abilities to do business and everything else. Again, it was a little awkward at first, in particular with the

medical standards. We had a different philosophy on selection and certification and medical monitoring, and we often had disagreements about whose standards should be applied to, for instance, a U.S. astronaut training in the Russian program. Each program had a very large experience base, but a very different philosophy. In particular the Russian philosophy was more towards functional loading: put a crew member under a certain situation of low pressure, high temperature, sleep deprivation, centrifuge training, whatever, and see how they respond physiologically. Our philosophy was more to look for health factors, not necessarily fitness, but health factors, and we would differ quite a bit on what test result would declare a person healthy or certified for training or space flight.

We have learned a lot about each other since then. We've learned that there is certainly some utility to the functional loading tests the Russians do. I think they've learned that our epidemiologies--that is, the distribution of diseases in our two populations--are sufficiently different that perhaps two approaches are warranted here. But more than anything, we've learned to make our systems work together. We haven't changed the Russian system per se, and they haven't changed ours, but we have learned to merge them into a best-fit plan. That was not easy. That was perhaps the most difficult aspect of my work over there.

Wright: Was it the communication factor that made it more difficult or was it just philosophy or practice?

Barratt: I would say yes to all. The communication barrier is always there. Even at this point I speak reasonably good conversational Russian, but the chances for miscommunication are just always there. Now my Russian colleagues and I laugh about it, because we know occasionally when we realize that we differ on an issue that it's because So-and-so said one word out of twenty that the other person didn't understand and it was a very critical factor. Back in the earlier days, that was a tremendous barrier that you could only overcome by working with an interpreter, and even that had a certain amount of impersonal influence, I guess. But since then, we've gotten better. We know how to communicate with each other much better. So, of course, that was a big issue.

We were still the Americans living apart in the Prophylactory and, again, surrounded by all the Russians who eventually would become our friends, but there were certain stigma going on that we were there perhaps to try to glean technology from them and vice versa. That took a while to melt away.

Wright: When you were supporting Norm Thagard and when he was on the mission, were you and Dave Ward the only ones that were talking to him?

Barratt: As it turned out, we launched Norm with the idea of him launching and flying as a cosmonaut. He was to speak in Russian. It was kind of unique among the Phase One missions because of that aspect. He went there with the understanding of flying and training and working as a cosmonaut. So we didn't necessarily have a system set up for us to talk to Norm.

As things went on, we realized that we had a pretty complicated science package, and as we got very close to flying the course after the launch, it just naturally appeared that there were very few people who knew the science who knew Norm well, knew his medical state, and who could speak passable Russian, at least. And that turned out to be Dave or I. So by default, we became Cap Com--the last thing on our minds when we went over there, but that naturally fell out for us.

We did have a science support team there in the Mission Control Center, and we would communicate with them and then communicate with Norm. But back then the comm system was very awkward and very difficult to use, and our comm time allocation with Norm was very limited, so that it became much more efficient for us to speak English to Norm, to try to get experiment results and procedures up and down the best we could. Our job was to pre-brief the Russian flight control team of everything we were going to say. Then we would speak in English. Then we'd have to debrief everybody one by one of what we said. So just getting some words back and forth in English was a very difficult thing.

You must understand, from the Russian standpoint, this was uncontrolled communication to their space platform, so it was not something that they took lightly, nor did we. But there was, again, a certain amount of concern that eventually, as they got to know us better, tended to melt away.

The communications was probably one of the bigger problems we had with Mir. Again, our time allocation was very limited. There were a lot of events on Mir-18 that demanded a lot of flight controller input and interaction between the station and the ground. Often Norm's science was kind of given the last priority there, so that became a bit of frustration.

As probably people are aware, the science module, the Spektr module, which was to come up much earlier than it did, arrived late. It arrived in May of that year. So Norm, having launched in the latter part of February, had a lot less science on his plate than was originally planned. So I think that was a bit of frustration to Norm. There's nothing worse than training a highly effective person, putting him in a place without tools to do his job.

Wright: It's not like he can get up and go do something else, either, was it?

Barratt: No. Well, Norm did find things to do. Eventually, I think the cosmonauts and the ground crew realized that being a very technically proficient person, he was valuable to do a lot of other things. In particular, he was instrumental in some of the EVAs that they did. When Gennady [M.] Strekalov and Vladimir [N.] Dezhurov were outside doing things, it was Norm's job, for instance, to command the retraction of the solar arrays. Some really critical actions that they realized that Norm could do extremely well. So he did find other things to do.

Wright: What were you doing during all these time periods? Were you constantly in the Control Center in Moscow?

Barratt: David and I were covering both Star City and the Flight Control Center during that time. By that time we actually had additional crews training at Star City. We would trade off a certain number of days in the TsUP, which is the Russian Flight Control Center, or covering Star City. I do remember that we had very few days off during that mission. [Laughter] Whichever one of us was assigned to the Flight Control Center, we would get there before the first communication with the crew and leave after the final one. So there were very long days. We would typically be there at eight or nine in the morning and typically leave at eleven or midnight.

Our goal was to be available to talk to Norm during any communications pass there was, and during any question that Norm might have had, it was our job to sit next to the Russian Cap Com, hopefully be prepared for the questions, and be able to communicate with our Houston Support Group on that. I will never forget this great telephone that we had, that had this awful ring that would just cause you to jump a country mile, and that would be our Houston Support Group's method of getting information to us so that we could relay that to Norm. Typically if I called them, I would get our chief scientist, who was Dr. John Charles. No matter how calm or how stressed out we were, his way of answering was always, "Yes, Commissioner." [Laughters] It always seemed to break the monotony somewhat, to hear that.

So we did the best we could. We tried to enable Norm to talk with technical specialists occasionally, so we would bring that down to the floor. That took a while, because the Russians were by that time feeling very comfortable with David and I, and our ability to at least, in our broken Russian, tell them what we were planning to say and what we did say afterwards. But we eventually got there.

Occasionally if we had any comm time left over, we always had a shopping list of other items, such as Florida State University sports news. Norm was an incurable Florida State University fan. Of course, he's on faculty there now. Or e-mail notes or humorous stories, whatever we could find. We always had to

have something ready if we had that comm time available to us. More often than not, we did not have the comm time available to us.

Wright: So your duties were extremely diverse.

Barratt: They were very diverse. We ended up covering a lot of the science. And, of course, the medical aspects, the medical control regimes that the Russians used on their own cosmonauts, of course, Norm was using almost in full at that time. Of course, part of our role was the medical support, in particular if there were medical problems that arose. We developed the kits that we sent, a supplement medical kit, to the Mir station, which gave us familiar drugs and equipment for Norm to use. We also ended up training the Russian cosmonauts beyond what they would normally get in medical training, but we trained them on our kit as well.

For the first time we made a dual-language checklist. This is old hat nowadays, but this was the first time we'd ever attempted anything like this, whereby the standard medical checklist that we use on the Shuttle was sort of emulated here, but in facing pages it's English and Russian. Interestingly, what we trained the cosmonauts on is somewhat beyond what they would normally train their people to do. For instance, intubation--putting an airway down into the trachea. The cosmonauts were very good technically, and most of these are simply technical skills. You need to know when to use them. But they were quite good at that. So we broke a lot of ground with our Russian medical colleagues of what we could expect a crew member cosmonaut, who was trained as a crew medical officer, to do. Then, of course, if they had a problem up there, they could go quickly to this checklist, and Norm could read in English and the cosmonauts could read in Russian. This was really a groundbreaking checklist. This is, by the way, the actual checklist that flew {referring to book on his desk}. Even this includes some last-minute pen-and-ink changes. You'll see there's a line struck through the bottom, a few words there.

Since then, we've improved on this, and we've flown one of these throughout every Phase One mission, and something very similar is going to be flying on the International Space Station. So this was, I think, a very good first effort for us, and certainly a difference of operation for the Russians, but by now they've accepted this pretty well.

Wright: How did you come up with the idea? Was it something that you came up with?

Barratt: No. The medical checklist is something we fly in every Space Shuttle mission, so this is no new idea. In fact, I would say one of the best medical checklists ever flown was the Skylab medical checklist. It's just an outstanding piece of work. But the idea to train Russians, to fly a supplemental medical kit to

Mir, even though our person was to be flying as a cosmonaut, and to have a dual-language checklist, that was pretty much our doing, David and I, who felt that this was necessary to support our crew member and that this could be done. It would mean working very tightly with our Russian counterparts, because they had to certify and launch our kits and essentially agree with everything we put here. So it was quite an effort, but it did work out reasonably well.

Wright: I notice the page you showed us was about a collapsed lung. Does this {book} range from very minor to very extreme?

Barratt: Absolutely. This is designed to handle the simplest headache to the more dire disasters such as a collapsed lung, which you might get from a rapid pressure differential or pressure loss. The treatment for that is relatively simple, although it's something that most people wouldn't think of doing every day, and that is to take a large-bore needle and poke in the right place and decompress the pressure in the chest.

Wright: You're right. Most of us would not do that. [Laughter]

Barratt: Again, it's a technical skill that somebody who's technically proficient can do. It's a paramedic-type skill. Cosmonauts and astronauts can be trained to do this very well.

Wright: What's the length of training? Share some of the details of what you do on ground before they go up in the Mir. How do you get them prepared?

Barratt: Well, we never get enough training, I can tell you that, and I think that's global. Everybody wishes they had more training. For the Shuttle we get about twelve hours or so to train a crew medical officer. For the Phase One Program, it's been more like 20 to 25 hours, and I believe we had about 25 hours to train Norm and his crew members. That was a significant chunk of training time. We were fortunate to get that much. All of the training is done by us, which is useful, because we get a very good idea what the crew medical officer is proficient at handling. Of course, we're the ones talking through it on the ground, so we connect in that way and we can say, "Remember this item in this pallet in the kit. This is exactly what you need to pull out."

The training is pretty well done in our own training labs here. Unfortunately, we don't get field training for Phase One Program. We are for Phase Two, for International Space Station. So that's a quantum leap over what we've done for Phase One. We're actually sending people through paramedic courses, letting them work with real patients under an EMT program--Emergency Medical Technician program--available through the San Jacinto College [Pasadena, TX].

But otherwise, Phase One, 24 hours of training and we did it. And I think it served us well. There have been medical events on Mir, as I think people are aware. There have been environmental problems, fires, depressurization, and whatnot. Our Mir Supplemental Medical Kits, or MSMKs, as we call them, have been very heavily used and, I think, very successfully used. Which is not to say we haven't been improving them continually, but they have been, I think, extremely valuable, and I think even the Russians recognize it as a very useful addition to the Mir station.

Wright: What's in the kits?

Barratt: The kits consist of three relatively large ruck sacks and a couple of smaller ones, and essentially they contain some of the pills, the medications that we normally use on orbit. They contain injectable materials if we need to give a shot for severe pain, for instance. They contain some emergency equipment--the emergency airways that we talked about--intravenous fluids. Of course, mostly the routine things are used. We have a saying, "Common things occur commonly," and especially the routine pain medications, for instance, for back pain that happens on orbit or space motion sickness, sleeping medications for when people are shifting from one Circadian entrainment to another. Those are the things that we tend to use the most. So, blood pressure cups, stethoscopes, everything you'd normally see in a medical field pack.

Wright: Normally when I've visualized the items that you were talking about, I see them on ground here in a normal atmosphere. What have you seen, without really seeing, through that communication, differences? How are they having to do things differently up in space that you would do in your office?

Barratt: Well, the big difference, of course, is nothing stays where you put it. I'm sorry I don't have a kit here. I might have arranged that. But almost every medical procedure demands that you take several uniquely packaged items out that may be sterilely packed or individually packed, and you take something out of its pack, put it down, discard the pack. You may do that ten times to do a simple procedure such as an intravenous line. So you have to learn equipment management, above all, because, of course, every time you put a catheter down, for instance, it's going to do this; it's gone. So simple things, for instance, like an intravenous line, you really have to manage your equipment. It's worth your while, even in an emergency, for instance, if you're trying to put an airway down somebody and you're using a laryngoscope to visualize your landmarks, it's worth your while to put that away or put it somewhere where it's not going anywhere in case you need it in a hurry again. So that's the main thing.

We spent a lot of time developing our procedures on our KC-135. We got our twenty seconds of zero gravity, and we do as much of a procedure as we can. We stop and go on at the next loop, and we try

to find things that otherwise we simply wouldn't have thought of during our procedures development. Then we give it to the crew and they take it on orbit. We really depend heavily on their feedback for these procedures, because they obviously, having done these end-to-end procedures in zero G, find things that we can't even find on the zero G plane. But I think that's your main thing.

The other thing is you don't have a lot of hands up there. In the case of the Mir Space Station, you have a crew of three, one of which is your patient. So you have two pairs of hands only, and one of those hands might be holding you down or a piece of equipment that you need to use. So we've tried to design our capability so that it needs as few hands as possible. Restraint systems, everything that we make is in a pallet that you can deploy somewhere and easily take something out and put it back in. So those are our main things with doing things in zero gravity. Of course, your supplies are limited. You use one, you use two, and there's no more. So you have to be very careful about how you manage your resources.

Wright: Is this becoming a training ground for you in telemedicine, to have to walk someone through these procedures?

Barratt: Absolutely. Absolutely. We're trying to increase our telemedicine capability on the International Space Station, of course, with dedicated hardware, but in a sense we've done telemedicine on the Mir Space Station and the Shuttle just based on private medical conferences, video conferences or audio only. That's included camera views of, for instance, skin problems or eye problems, where we can take a look the best we can and decide what the best treatment would be or what procedure the person needs to do. So, absolutely.

Norm, of course, was a physician in a former life, as well as a fighter pilot and engineer, a very multi-backgrounded fellow. So training him as a crew medical officer was relatively easy on a comparative basis.

Wright: How about the rest of them? Do you feel like it's something they're comfortable with, getting into the medical part of their mission?

Barratt: Well, obviously some more than others. For a Space Shuttle crew, there are seven people, so you are at least at your leisure to choose the two who are most comfortable and accepting of that role, and perhaps on every few flights one of those is a physician, so that simplifies your life tremendously. On Space Station, on Mir, you only have three people, and we have flown physicians, of course. We flew Dr. Thagard and we flew Dr. [Jerry] Linenger and Dr. David Wolf. They were a joy to train. Because of their space flight experience and their medical knowledge, they could actually make active inputs to the kit and

procedures. Otherwise, you just depend on the technical proficiency of the crew member. Most of these guys are trained and selected because they're able to assimilate large amounts of information relatively quickly and do technical skills. So from that standpoint, I think we feel reasonably confident.

What we lack is the experience base. Having done a lot of these procedures on real people, even a physician who hasn't practiced medicine for ten years is just quite a bit above what others would be. But having said that, we did progress in our medical training, and each successive person in Phase One got more detailed medical training than their predecessors. I think we've demonstrated that training is possible to do in a non-medical person, and I think the life-saving procedures could be done certainly. Mike [Michael] Foale, I think, is almost as good as a paramedic anywhere. He could sew me up.

Wright: That's pretty much a compliment, if you'll let him do that. You were mentioning one of the changes is that the medical training has become more. What are other changes from the first time that you dealt with this, training Norm Thagard? I'm sure other changes have been made as you've come through Phase One. Could you go through some of those and how they've affected your area?

Barratt: My area is mostly the International Space Station area. When Dave and I returned, Dave was put in charge of the medical operations for Phase One flights as they continued, and mine was Space Station. So in my mind it's been a very good thing to apply what I've learned in Phase One, and I had continued some involvement to the International Space Station Project. So every bit of training in medical hardware development and procedures and integration with the Russian medical system, in fact, I've been able to apply our Phase One lessons learned and experience gleaned directly to that program.

I think one of the most important things for those working on Space Station is having a good connection to Phase One. It's simply the next stepping stone. ISS is half Russian. It's almost Mir from the node eastward, if you will, and western from the node westward. So what we've learned on Phase One is just a direct application to Mir.

Other than that, some of the more tangible changes: we've added better intravenous capability. As you're probably aware, you can't just hang a bag of saline and let it drip in; there's no gravity to do that. So we're developed pressure infusion pumps and flow limiters. We've also taken a big step in putting a cardiac defibrillator on the Mir Space Station, and that's a predecessor to what we're putting on the International Space Station as well. But that was a huge step for the Russians to take from an engineering standpoint. Having a large device with a large capacitor that's designed to deliver large bursts of voltage made everybody nervous. From the medical standpoint, it was typically a capability they would only train physicians on, and we were planning to train non-physicians on it. But I think we've done that even

successfully. I think the piece of hardware is very good and it's relatively intuitive. We've trained cosmonauts on it, and I think it could be successfully used. So that was definitely a big leap in medical capability.

Wright: Tell us a little bit about your photos and your collection. Explain your friends and your photos for us.

Barratt: Okay. I was mentioning, in '93 we went down to Kazakhstan to go to the Soyuz TM-13 landing, and we were guests of NPO Energia at that time because we were considering using the Soyuz as an ACRV. This is Aleksandr Aleksandrov, and he's a former cosmonaut and he was our host and RSC Energia representative. And some of our new Russian friends and two other NASA personnel. We had an Australian person with us who was actually representing Australia because we were considering using Australia as a landing site for the Soyuz.

When you really think about how international we've gotten, it really started there. The very idea that we were on a Russian helicopter with an Australian person, thinking of landing the Soyuz in Queensland, I mean, it was mind-boggling to us. But there we were. This was one of the MI-8 helicopters. On a typical landing and recovery, they would fly between four and eight or nine of these. We had quite a few helicopters because we had a French person who was coming down, and they had a big experiment package and a French medical tent there and a French presence, so there were quite a few of us.

We did a dry run the day before the landing in Kazakhstan. It was near the city of Dzhezkazgan. I do remember the temperature being above 112 or so, and I put a thermometer in the sand just to see where that went, and it went to 136 degrees and pegged. So it was a relatively hot day. The old adage "It's a dry heat" didn't seem to cover much there, because it was bloody hot. But the weather improved after that. It got a little cooler because of some local rainshowers.

When we saw the Soyuz, we were a few helicopters back. It landed as a very tiny speck in the desert, just a tiny little capsule with its parachute. It started to rain shortly after that. We landed perhaps eight aircraft, all of them MI-8 helicopters like this, but some of the first people to arrive were actually the native Kazahki's. They were informed that there would be a landing, and they didn't know exactly where it would be, because you never know. There's a certain amount of drift that comes with swinging on one chute that opens at a very high altitude. But they found us pretty quickly without the sophistication of radio beacons or telemetry or whatever. But they arrived on horseback and in trucks and motorcycles and everything through the desert. There were small children, there were grandmothers, and everything in between.

So this was our first look at a landing. We obviously have a lot of pictures and film from that time. It was a very enjoyable time. It was very impressive to us how pragmatic the Russians are. When the capsule lands, they recover their crew very quickly. They assemble their medical tents very quickly. The crew is examined. A very minimal amount of medical testing is done, and they're made as comfortable as possible. Within about four hours, the desert is clean. The capsule is recovered, the tents are restowed, and the aircraft are gone. The process by which they do things is really based on experience. You don't see somebody out there reading a checklist and checking each box; you see someone who's been doing this for twenty years, knows exactly what they're doing, and they just do it. They're very simple about their procedures, and I really admired that.

As an example, with our Space Shuttle, we have big restrictions about how you can approach it. There's zones of toxic venting. The tires are hot. There's various things you have to look out for, and that was my mind-set. I asked the recovery chief, "Where can I not touch the Soyuz? Where should I avoid?" And he just looked and showed me the big black area. He said, "You see this, where it's hot and charred?" I said, "Yes, of course." "Don't touch there." And that was that.

Wright: [Laughter] Made you feel real smart, didn't it?

Barratt: That's right. [Laughter] They have only 20 milliliters of oxidizer left, because they purge the entire system, so what you come down with is a vehicle that, indeed, has a cesium altimeter on the bottom and some unspent pyros, but otherwise is a very safe vehicle. As it came time to turn the vehicle over to safe the altimeter and to remove the pyros, they just put a sling around it and pulled it over. It was simple.

Again, they cleaned up after themselves. There was nothing in the desert to show they were there except a little pit with a burn mark where they actually detonated those pyrotechnics before we took off. So the capsule was recovered by helicopter and the crew was recovered and everybody was out of there, and they were ready to do it again.

Wright: And, last, your assortment of friends {referring to photos}.

Barratt: This was from a later training session in Star City. This was during the water survival. We were not able to take a photographer, unfortunately, to Star City during the training of the Mir-18 flight. Of course, this involved two crew members: Norm Thagard and Bonnie Dunbar, who was training as a backup at the time. But during the water survival, we were training several people--Europeans, Russians, and our own two, which are not included here, unfortunately. Ulf Merbold, who's flown on the Space Shuttle, and Pedro Duque, who will be flying on the Space Shuttle in the upcoming STS-95 mission, and others of the

cosmonauts who we've actually gotten to know very well since this time, Yuri Gidzenko will be the Soyuz commander, for instance, of the first Space Station mission. So this was during that water survival training where I'd never seen so many suited crew members at one time who weren't flying in a Space Shuttle, so I had to snap this picture as I could.

Wright: It's a great one. We've talked about what you've done during the missions, what you've done prior to the missions to get the team ready. What do you do when they land? What's your responsibility as a flight surgeon? What happens when they come back?

Barratt: When the crew lands, we've been recovering most of our people--all of our people, in fact, who have flown as U.S. astronauts on the Mir station, on the Space Shuttle, so it's a bit of a twist. Russian cosmonauts are used to coming down in Soyuz, which is a recumbent seating system and quite a bump in being recovered in the deserts of Dzhezkazgan. We have the luxury of landing on a runway, and for the long-duration fliers, we actually land them in a special recumbent seat system.

Typically, the Shuttle lead fight surgeon will be among the first to go into the Shuttle and look at the long-duration flier and see how they're doing, but each long-duration flier is assigned a mission flight surgeon as well. So once everything is declared okay by the Shuttle flight surgeon, then the mission flight surgeon comes in and pretty much stays with that person all the time. Of course, what they're going through is a readaptation after a prolonged absence from 1 G. Readaptation includes many different systems, all of which recover at different rates. It's that flight surgeon's job to kind of monitor that person and those symptoms and make sure that they can, first of all, come out of the vehicle safely and then start, second of all, a very long process of readapting to unit gravity.

Typically, the neurovestibular system is the first thing that people encounter as a problem. You're essentially rebooting your guidance software. In the immediate few minutes after landing, we're very careful with head movements, for instance, or anything that might be provocative of motion control. After that, cardiovascular system. Your heart is not used to pumping against gravity, and so even assuming an upright posture might be difficult. All of a sudden you've got a gravitational challenge, and to get the blood up to your head is a little bit more work than your heart's been doing for a while. And even the neuroregulatory mechanisms that keep your blood pressure normal when you stand up on Earth are deconditioned. So those systems are the first ones that we tend to see as problems.

After that, there is bone and muscle loss that's accrued over long periods of time in weightlessness, and people are relatively weak. We have to very carefully, but decisively, challenge that system to try to get it back up to what it was prior to flight. That's really the flight surgeon's job to oversee that entire

process. So it starts a few minutes after landing and ends when, hopefully, every system is back to baseline several weeks to a few months later.

Wright: Is a flight surgeon assigned to a crew member from start to finish? Is that part of your job?

Barratt: For a long-duration flight, that's correct. I was assigned to Norm Thagard. I was fortunate in that I had a partner, who was Dave Ward, of course. We were doing a lot of things back then and we were setting up an infrastructure as well. But every Phase One person has had a dedicated flight surgeon as well. For instance, Pat McGinnis is supporting Andy Thomas on the Mir Space Station right now, the last flight, and he was also John Blaha's flight surgeon. So, a dedicated flight doc to that crew member. And as soon as we have a successful docking of the STS-91 flight, which I am assigned as the lead flight surgeon on as well, Pat will get on an airplane and come here as quickly as possible and be ready on the Space Shuttle recovery team to see Andy as soon as he gets back and start that process again.

For the Space Shuttle missions, we typically have two flight surgeons, a lead and a deputy, assigned to each short-duration flight, each crew.

Wright: The advantages of assigning one flight surgeon to the crew member, is that something that will help us through with the ISS as well?

Barratt: Well, for a long-duration flight, of course, on the Phase One arena we have a U.S. astronaut and a U.S. flight surgeon, but the Russian cosmonauts are there as well, so they have their standard medical support group. There is a crew surgeon typically from Star City who follows it more in the pre-flight phase than in flight. But the Russian medical infrastructure clicks right along with their people.

For the International Station, we're trying to merge those two systems somewhat. We would like to have a flight surgeon from each country who has crew representation on orbit. For the first flights to ISS, for instance, Increment One, we will have one American and two Russians. William Shepherd, of course, is the American commander and Yuri Gidzenko and Sergei Krikalev on the Russian side. So we will have a Russian lead flight surgeon, who is Yuri Katayev, who we've gotten to know very well through Phase One, and an American lead flight surgeon, who right now is me. I think that we will try to run our long-duration missions in a similar fashion, having international partner flight surgeons represented as points of contact. We will, for instance, see the Russian flight surgeon as in charge of the pre-flight, in-flight, and post-flight period in ways that they haven't been in the past. So we have a person and a body to talk to and the crew has a person and a body to talk to, rather than a large group. So we're trying to emulate that, what we've done on the Shuttle, for the International Space Station flights.

Now, the big difference is assigning one person to a mission over several months of training pre-flight, and then, of course, all of the flight, which may be three to six months, and then the rehabilitation process. It's a huge chunk of someone's life, so the person really has to be dedicated to that crew in ways that we really haven't done in the past, certainly before Phase One. That's the best way. It's the right way to support the crew, knowing what they're doing up there.

Wright: And these are among some of the changes you mentioned earlier that you're glad you're in the position you are so you can help make those happen?

Barratt: Absolutely. Again, I have a lot of experience--or a lot of respect, rather, for the Russian experience. One thing, we have taught each other a lot of things. There are some things that I'd say they've done better and some things we've done better. One thing I think we hold valuable is continuity, meaning the same people who take care of the crew pre-flight take care of them in flight and post-flight. In the Russian system, it's been more separated. There's pre-flight trainers and examiners, and then the medical support group, which resides at the Flight Control Center, is different and often meets the crew for the first time on the video screen after launch. Then there are rehabilitation specialists after flight.

We feel the continuity is very important, that the person who takes care of the crew pre-flight is the same one who trained them, who can talk to them on a regular basis during the flight, and they know that you're watching their backside. We feel that's really important.

I think that the Russian flight surgeons we've been working with are seeing that as well. The crews are seeing that. That's going to be our norm for the International Space Station. So we've worked very hard to ingrain that in the policies which give the flexibility for the Russians to do their typical program of training and medical support, but still hold that continuity and that personal contact as a very valuable asset.

Wright: We've talked a lot about the contributions that Phase One has made to ISS. Personally what do you feel that your participation has done? Can you remember something that you feel like you were glad you were there because it's going to make a difference later?

Barratt: Well, from a tangible standpoint, a lot of my work right now is writing requirements documents and overseeing medical checklists and everything. So I'm literally putting pen to paper. So what I learn in Phase One I'm writing down and putting into ISS policy when and where appropriate. So I would say that's the tangible aspect.

The intangible is probably the more important, in that we found out early on that your ability to do anything, to get any work done in Russia, is 99.9 percent based on your relationship with your counterparts, the people doing it. No matter what agreements you make or sign or whatever, you simply cannot work unless you know these people and understand them, and vice versa, and there's mutual trust. So I would guess the best thing that I've been able to do or come away with from Phase One is the knowledge of all these people, who they are. We're friends. We talk a lot and we work together. They're truly my colleagues now. I could not imagine doing an international project without that Phase One experience base.

Right now--and I frequently do this--I can pick up the phone and call my Russian counterpart at the Institute of Biomedical Problems and discuss a problem or work an issue. If I couldn't do that, if I had to set up a telecon weeks in advance and work through an interpreter and we didn't know each other, we simply couldn't fly. I would say that goes for the medical, the environmental life support, the cosmonauts, the astronauts. It's across the board. I think the whole Phase One Program gives ISS credibility that we can really do things together.

I guess I'd have to say that it was important to do something with technology that we both understood. That was hard enough. The Russians had their Space Station; we had our Shuttle. We started working joint programs and joint science on Mir. That was not easy to do. We certainly needed to do that before we built something brand new and did new things together. So that would be my feeling on Phase One and really the tangible aspect.

Wright: You said earlier you like to fly. Are you a pilot as well?

Barratt: I'm a private pilot. I have been for many years, although my time available for flying has been quite a bit limited over the last couple of years, partly because of my job and partly because I have four children and I can't afford to fly anything big enough to take everybody on. But I do try to keep flying with NASA. Again, we're T-38-qualified and we fly with our crews in mission support and various other activities. I fly the zero gravity airplane whenever I can. I'm flying that next week. We do hardware evaluations and training sessions and things like that. I've had the pleasure to fly various Russian aircraft, not as primary pilot--make no mistake--but I have enjoyed getting on some other platforms and try to make sense out of the control panels.

Wright: Do you think you'd like to fly in the Space Station at some point?

Barratt: Is that an offer? [Laughter]

Wright: Sure, I'd be glad to offer it to you. Or do you see yourself as a ground crew person? Is it something you'd like to--

Barratt: As I said, I have the second best job in town. Being in my area, which is space medicine, obviously the desire to fly is there. Practicing medicine from afar is very difficult, and everything I do is because I am fascinated in what medicine is like in zero gravity, in space. I see them before they fly, I see them on the video, I see them when they come down, but, boy, even a short exposure to what they go through, to really experience what it's like, it would make me, (a), very much better at what I do, and, (b), of course, it would be very exciting and be very fulfilling.

I studied G-induced loss of consciousness and effects of high-G turns for many years before I ever got in a T-38 and did a high-G turn, and all of a sudden the lights went on--or out, depending on how you look at it. But I could understand so much of what I knew from a cognitive standpoint so much quicker. Space flight would be that times 100. So, sure.

Wright: I'll see what we can do, but don't count on us. [Laughter] We certainly appreciate your time and your enthusiasm. It's got to be very rewarding to know that those folks that are working with you, I'm sure they get caught up in your excitement and enthusiasm for learning.

Barratt: Fortunately, we're surrounded by enthusiastic, bright, young, pro-space psychopaths who really work hard at this.

Wright: Is this something you wanted to do? Have you always wanted to be a doctor all your life, and just the aerospace came with it, or the other way around?

Barratt: I can't say that. I had a lot of interest. In fact, I would say aerospace medicine attracts people who aren't sure where they want to focus, but who are interested in a lot of things. I was a marine biology major as an undergrad. I really liked the ocean and sailing and whatnot. I like to fly. I like medicine. I like medical research. I like astronomy; I build telescopes. There's nothing that pulls all that together better than what I'm doing.

Wright: I think you called yourself correct, that you are lucky that you've found something that you can have all your interests in and do well at.

Barratt: Absolutely.

Wright: Thanks again.

Barratt: You're welcome.

Rollins: I always ask this question. What's your favorite beer?

Barratt: My favorite beer. Well, most of my friends in Russia know that I don't tolerate alcohol very well, but I do drink a Guinness about twice a year like clockwork.

Rollins: We spoke with one of the Russians and he said milk was his favorite beer, because he didn't drink.

Barratt: That's a very unusual Russian. Very unusual Russian.

Wright: Introduce us to your family. We kind of closed them {photograph} off there.

Barratt: I had to move them [the photographs]. Well, these guys actually get a tremendous amount of credit, because I had to leave them for many, many months at a time during that Phase One period. This is my dear wife, Dr. / Professor Barratt, Michelle, who is a pediatrician up at the University of Texas and Assistant Professor of Medicine, public health master's and all that kind of stuff. And my children, as you can see, some of them are not homegrown, but Angela, Joey, Meeta, Prasad, four reasonably enthusiastic, also relatively pro-space individuals who are also extremely tolerant, and I owe them a lot for having to leave them for so long. But great kids, lots of fun.

Wright: I'm sure they're always glad to see you.

Barratt: Oh, yes.

Wright: I'm sure they're very proud of their dad, too.

Barratt: That's a soft call. I think they're actually a lot prouder when I actually make a basket, if I'm trying to teach them how to play basketball, than anything I've done with Phase One. But we've had an awful lot of fun together.

Wright: They're beautiful.

Barratt: Thanks.

[End of interview]