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WILLIAM S. MCARTHUR, JR.
INTERVIEWED BY JENNIFER ROSS-NAZZAL
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ROSS-NAZZAL: Today is May 23, 2018. This interview with Bill McArthur is being conducted at the Johnson Space Center for the JSC Oral History Project. The interviewer is Jennifer Ross-Nazzal, assisted by Sandra Johnson. Thanks again for taking time today.

MCARTHUR: It's always good to visit with you two.

ROSS-NAZZAL: Yes, we appreciate it. I like how you wore your [Expedition] shirt today.

MCARTHUR: I did, I did.

ROSS-NAZZAL: You did, you came prepared.

MCARTHUR: With my consulting company I've adopted this as the logo. This was actually one of my crew shirts from [International Space Station (ISS)] Expedition 12. This is the Roman numeral XII with the astronaut shooting star on it [demonstrates], which are a couple of elements from the Expedition 12 patch. It's not the whole patch, but I was like, "Just put it on your business card." And the name of my consulting firm is ISS12 Consulting, LLC. No one has sent me a cease and desist letter yet.

ROSS-NAZZAL: Can't imagine that they will.

MCARTHUR: Anyhow, the DOR [director of operations Russia] story.

ROSS-NAZZAL: Yes. I thought that sounded like an interesting story we ought to cover.

MCARTHUR: I became the DOR at the end of January, early February in 2001. It was after STS-92. I had asked, probably right after STS-92, if I could convert to being a civil servant. They said I could, and they asked if I was willing to go over and be the DOR in Russia. I thought it would be an adventure to go live in Russia.

I—sort of with a wink-wink—was told I was probably going to be assigned to either Expedition 7 or Expedition 8. Somewhere while I was the DOR, Ed [Edward T.] Lu got assigned to Expedition 7, and eventually—I guess while I was still the DOR—I did get assigned to Expedition 8. While I was there, the first civilian to pay the Russians to fly on board Soyuz was a gentleman named Dennis [A.] Tito.

At the time, the Space Station crews were not flying on Soyuz. They trained to do an emergency return on Soyuz if they needed to evacuate the Station. The Russians would send a Soyuz to Station with a short-duration crew, that crew would stay on Station for about a week, and then would bring the old Soyuz back. The Soyuz could stay on orbit for 180, 200 days.

Normally, the required Soyuz crew is two. So you have the Soyuz commander in the center seat and the Soyuz бортинженер (*bort inzhener*, or flight engineer), in the left seat. Normally in the right seat there would be a космонавт исследователь (*kosmonavt-issledovatel'*, a cosmonaut-researcher), who had really minimal responsibilities for operating the Soyuz, but once on orbit

would perform experiments and do other work. Or, in the old Russian space station days, very well would have been one of the Mir crewmembers or Salyut crewmembers.

What the Russians did is they signed a contract with Dennis Tito. He would pay them twenty million dollars, and he would be in the right seat. But he was not going to be a cosmonaut-researcher. He was going to be an Участнк Космическоово Полёта (УКП) (*uchastnik kosmicheskogo polyota*, a spaceflight participant or participant of spaceflight). We heard that Dan [Daniel S.] Goldin, the NASA Administrator, strongly objected to Dennis Tito flying on Soyuz. I don't know all the reasons why, but there was a concerted effort to get the Russians to back away from the deal.

They [the Russians] were, I thought, pretty shrewd about it. They basically said, "We have signed a contract with this guy. He could withdraw if he wanted to, but we're not going to breach the contract." So there were people here at JSC [who] went to Russia to try to persuade Tito to not fly. They said, "Well, don't fly in the spring mission." I don't know if it was March—it may have been in April, maybe late April. "Don't fly on this mission. Let's wait until the fall, till we can work things out better."

Dennis's quarters were in the same building in which my office was located, one flight up. I think at one point he said, "I'll agree to delay to another flight if I have a letter signed by the president guaranteeing that I'll get to fly"—the president of the U.S. It was just not a good situation to be in.

Since I was the senior NASA person there, I was really trying to not get involved, but one evening I got a fax. They said, "Please deliver this fax to Dennis." So I go up to his room and knock on the door, and Dennis is up there. The head of Star City [Russian space training center, Russia], Pyotr Ilyich Klimuk, was there. I'm going, "Okay, now I'm going to annoy the Russians."

Klimuk—he didn't speak really good English—but he goes, "Oh ho ho, you have flown three times, I flew three times, you should come visit me."

It's like, "You're the general in charge of Star City. I think I'll just stay in my little office, everything will be okay." I remember one night, late Friday night, I get a call.

"We just sent a fax. You need to deliver it to General Klimuk right now." It's like eleven Friday night in Star City. General Klimuk is not anywhere located on Star City right now. He's in his dacha [country house] somewhere.

Fortunately, John McBrine was my deputy. He goes, "No, no, no. Tomorrow morning we'll go to the Star City headquarters and we'll just give it to the duty officer. That's the best we can do. There's no faster way to get it to General Klimuk." You know there is a little bit of tension in the air.

When Dennis flew, the U.S. crewmembers on board—well, I'm going to stop there. I wasn't there, I don't know what happened. He flew, and he came back. I think it was maybe on a Sunday they came back. I knew the Russians had a little pomp and ceremony when a crew returned. I wanted to see that, so I went from my apartment over to the Prophy [Prophylactorium] where my office was, and where the Russian crew quarantine quarters were.

I'm standing out in front with the crowd. The military band is there, and the bus pulls up. Let's see, I'm trying to remember who the crewmembers were on that flight with him. Talgat [A.] Musabayev was the commander. The *bort inzhener* was [Yuri M. Baturin]. I'm surprised I remember Talgat's name, his is normally the only one I can't remember.

The crowd is applauding, and there are a bunch of cosmonauts around. Yuri [I.] Malenchenko was there on the front porch in front of the Prophy. As the crew goes in, he sees me out there—and I had done winter survival training with Yuri, so he waves me in. I go in, and we

go from room to room just congratulating the crew, drinking a shot of vodka, and this, that, and the other. I escape that adventure, and I come out.

Yuri Glazkov sees me out front—and General Glazkov, Yuri Nikolayevich Glazkov, former cosmonaut, had been the deputy director of Star City and had retired. Technically, he worked for TTI (TechTrans International) at the time, that does the translation services and other things. I guess I supervised the performance of that contract as it pertained to Star City, so Yuri Nikolayevich actually had an office almost right next to mine. He sees me, "Bill, Bill." He waves me over, and he said, "We should go to the party."

I'm going, "Well, that could be an adventure."

So we get in his Crown Victoria. He loved his Crown Victoria because that was what American policemen drove. We go over to the *torgovyi tsentr*, the business center, and upstairs in the *torgovyi tsentr* was a restaurant. They had it set up in a traditional Russian *p'yanka*, which is like a drinking party. So you've got a long head table, and then you've got several tables—maybe four, five tables—perpendicular to that one. The distinguished guests are at the head table.

The Soyuz crew is not there because they're in medical quarantine, but they have some family members there. Of course General Klimuk is up there and other senior people. They start proposing toasts, and I think Musabayev's wife was there, so they toasted her. And then they toasted [Yuri Mikhailovich Baturin - Юрий Михайлович Батурин]; they toasted the flight engineer's mother, I think she was there. Then they go, "Who will toast the American?" It's one of those things that you just see right in a movie where they're looking for someone to volunteer, and everyone turns to one person.

As the only American there, it's like suddenly everybody is looking at me. I'm going, "Oh." My Russian was never great, but it was very rudimentary then. What I tried to say—and I

think I actually said it—is, "Do we call Dennis Tito a cosmonaut, or do we call him an astronaut?" I said, "I don't know, but everyone who flies in space is a hero." It seemed to really go over well.

Then, as the party was breaking up, this young Russian comes up and introduces himself, and he speaks pretty good English. He says he's with some website, it's basically an online little space news thing. He said, "Did you mean what you said?"

I said, "Well, I think so. What did you hear me say?" He told me, and I said, "Well, that's what I meant to say. Yes, I believe it. I stand by that." I said, "I wouldn't have said it if I didn't mean it."

The headline the next day in his little online thing it's "NASA official Bill McArthur calls Dennis Tito a hero." Okay. The phone calls started. I don't know if it was somewhere in there, or somewhere a few days later that I heard that Dan Goldin wanted to remove me from my flight assignment.

ROSS-NAZZAL: Oh, wow.

MCARTHUR: Is that true? I don't know. Or it was, "Goldin is so mad, he might take you off the Station flight."

ROSS-NAZZAL: Who called you? I'm just curious.

MCARTHUR: Let's see, Mike [Michael A.] Baker, who was the senior NASA official in Russia. I think Charlie [Charles J.] Precourt was chief of the Astronaut Office. I don't remember if Charlie called me or not. I got a call from a couple folks. At the end of that week I actually had a trip

planned back to Houston. I came back I think for two weeks, and I took one week of vacation to go to my daughter's graduation from college.

I get back, and I think it's a Friday. I come into work, and I've forgotten my badge. You couldn't even get in the gate these days, but in those days you could come in the gate without a badge. Down in the lobby here in Building 1 there was a badging office. I dropped by the badging office to get a temporary badge, and somebody saw me downstairs. He goes, "Bill, don't go anywhere else. I need to take you up to the ninth floor to talk to Roy [S.] Estess," who was the Center Director at the time. He was chuckling a little bit. His basic message though was "Don't worry, everything's okay." And I understand Bill [William F.] Readdy, who was Goldin's deputy, was very supportive. So it turned out okay.

Cindy [Cynthia L. McArthur, my wife,] said she knew that the report online was skewed because the guy had written something like, "McArthur, in perfect Russian, toasted Tito referring to him as a hero."

I'm going, "Well, you may have been trying to make me look good by saying in perfect Russian, but." Like Cindy said, she knew the report wasn't accurate from that aspect.

ROSS-NAZZAL: Was she with you in Russia, or did she stay here in Houston?

MCARTHUR: She came over about a month after I got there and stayed for six weeks, and then came back. And then after Kate's graduation, Kate, Meg, Cindy, and I all went back to Russia. Cindy stayed for another six weeks, and the girls stayed for two weeks beyond that. So they actually stayed a couple months that time.

I trained off and on. I was there as the DOR for six months, and then trained for about four years after that, so the girls came over once or twice on their own. That was a lot of fun having them. I'd go to class, and they would do something during the day. I'd come back, and they'd fix dinner or something like that. We'd just visit, and they read a lot. They discovered Kindles; it was wonderful.

ROSS-NAZZAL: A cool place to get to go visit. Last time we spent a lot of time talking about EVAs [extravehicular activities], but one thing we didn't get a chance to talk about was that campout that you had a chance to do. Which I thought sounded kind of fun, except for I heard you did not have s'mores. That was the big headline, no s'mores.

MCARTHUR: No, we didn't have s'mores. I did work hard to try to ensure that we had network connectivity while we were in the airlock, so I was pleased. It wasn't a strong signal, but we had some WiFi card or something, so we did have network connectivity.

The EVA community was trying to develop a technique so that you didn't have to do an in-suit prebreathe. From normal atmospheric pressure you can't immediately do an EVA. The difference in pressure is so significant. Gosh, worse than anything else. The suit is at 5 psi [pounds per square inch] inside and normal atmospheric pressure is 14.7, so it's a little over 14 in the Station.

In the suit it's pure oxygen, so you're going from 14.7—golly, playing with numbers now—which is 80 percent nitrogen, and so 80 percent of 14.7 is a little over 11. So you're going from 11 psi as the partial pressure of nitrogen, down to an environment in which the partial pressure of nitrogen is zero. Got to think about that.

The problem is now the nitrogen that's in solution in your body tissues—blood, fat, cartilage—if the ambient pressure is low enough, the nitrogen comes out, and it can come out as bubbles. If it does that it's the condition called decompression sickness, and in the scuba diving community it's known as the bends. Historically, it's also known as caisson disease. In the 18th, 19th century when they would build bridges, like a bridge across a river, how would you build a support on the bottom of the river? What they would do is they would build a wall from above the surface of the river down to the riverbed, and they would pump the water out. I think they would actually have to pump air in to maintain enough pressure to keep the water out.

In theory, if you were down in thirty-four feet of fresh water it would be twice atmospheric pressure at the bottom of the caisson—the structure is called a caisson. No one understood the effects of nitrogen in the system, so what would happen is workers would spend hours down at the bottom in a high-pressure environment and they would then come right to the surface. So the nitrogen would come out of solution in their bodies, and because it could particularly affect the joints it would be very crippling. They would be bent over, so that's why it was called the bends. Because it happened to people who worked in caissons, it was also called caisson disease. That has nothing to do with spaceflight.

ROSS-NAZZAL: It's a nice little anecdote.

MCARTHUR: Anyhow, we had to stay in the suit breathing pure oxygen for over four hours so that our bodies would slowly shed nitrogen so that when we finally went into the airlock and depressurized the airlock, the ambient pressure was zero. We wouldn't have decompression sickness.

One of the things they wanted to do was try to emulate what was done in the Space Shuttle, in which you lower the pressure in the airlock to about 10 psi. If you don't violate this protocol, then you would stay there overnight at this reduced pressure. Your body would discharge sufficient nitrogen so that the next day you would just go through the normal EVA process and wouldn't have to do this four-hour just hang around on the wall, this four-hour prebreathe. They wanted us to do that. For a number of reasons, they decided it would be best to do it with another U.S. crewmember, so we waited to do it until Expedition 13 showed up. Jeff [Jeffrey N.] Williams and I were going to do it.

There were some logistical challenges, such as the fact that there's no toilet in the airlock. You can urinate into a diaper, and you don't even need to be wearing the diaper. There were ways around it. I had two infant daughters at one time, changed diapers. It's kind of that adult thing. There may be some unpleasant tasks that you have to do, you just go do them. I think we made sure we had snacks and things like that.

There were some problems. You had to very carefully regulate the partial pressure of oxygen during this process. You didn't want to get the atmosphere too rich in oxygen because that's a flammability issue. I don't remember [exactly]—they were having challenges keeping the atmospheric composition where they wanted it. I think we were awakened by an alarm a couple of times.

Annette [P.] Hasbrook was our EVA flight director, I think she was the flight director during this thing. After the alarm had awakened us a couple times she decided that the test just wasn't—they didn't have the procedures nailed down well enough, so at some point she terminated it early. She was looking out for us.

ROSS-NAZZAL: We've talked about different parts of your Expedition, but one part we haven't talked about is launch day and all of the ceremony, the pomp and circumstance, involved with all of that. I wondered if you would talk about that. We haven't interviewed many ISS crews.

MCARTHUR: Golly, how graphic detail do you want to get into?

ROSS-NAZZAL: You're a good storyteller, so I thought you can share as much or as little as you want.

MCARTHUR: You can write in as much or as little as you think the audience can handle. It seemed like we were awakened at somewhere around midnight or so. The doctor shows up first thing, and your lower GI [gastrointestinal tract] gets cleansed twice. It's the price of admission, I guess. We were going to be on orbit for two days prior to docking with the ISS. The Soyuz has a toilet; it works pretty well for urine collection. Feces collection—you can, it has that function, but if you can avoid using it for two days that's better. You did that, and then at some point I got to see my wife.

It's all kind of a blur. Before you actually leave you sign the door of the—I hesitate to call it a suite, but it was a little—of course very spartan, but two bedrooms, a little sitting area, and a bathroom. Valery [I. Tokarev] and I—Greg [Gregory H. Olsen] would have been in a different room, so I'm sure he signed the door where he was staying.

I assume we ate at some point. Yes, we probably went into the dining room and ate. It's in the same complex. Then you go and get suited up, and you go into this area where they do a pressure check on your suit. That's behind a glass window, and on the other side of the glass are

the media, dignitaries, your family. But that's several miles away from the Cosmonaut Hotel. That's actually Baikonur [Kazakhstan] itself.

Then we all make a statement into the microphone. Go march out. You're always sitting or walking in your Soyuz order. Valery is always in the middle, I'm always on the left, and Greg is always on the right. There's a little square that you stand in. Valery reports to the head of the commission, and we go get on the bus. I'm sure you've heard about some of the bus ritual.

ROSS-NAZZAL: Some, but if you want to [expand, go ahead].

MCARTHUR: At some point they stop the bus. They pull the blinds down on all the windows so people can't watch you. Who cares? Then you go urinate on the right rear tire of the bus. And why? Because Yuri [A.] Gagarin did that.

ROSS-NAZZAL: It's for good luck, right?

MCARTHUR: Absolutely. That was something I really enjoyed about the whole experience, observing the Russian traditions. It was a lot of fun. Now there were more somber traditions, such as we went to the wall of the Kremlin and laid flowers by Gagarin, I think, and then [Vladislav N.] Volkov, [Viktor I.] Patsayev, and [Georgi T.] Dobrovolsky, who were in the Soyuz 11 mishap and [Vladimir M. Komarov]. [He] perished in the first Soyuz mishap, Soyuz 1. They give an award each year in his name. I've got a couple of them. His parachutes failed. His backup crewmember was Gagarin, and there were just all sorts of problems with the Soyuz. There were quality issues,

design issues. Part of the legend is that Komarov was sharing his misgivings with Gagarin and Gagarin volunteered. He said, "Well then just withdraw, I'll fly."

Komarov said, "Well no, you can't. You're the first man, so you can't be exposed to that danger." Evidently he was cursing up a storm as he knew he wasn't going to make it during entry.

So the bus gets out there, and then some dignitary escorts you out. Mike [Michael D.] Griffin was the NASA Administrator there, so he was the one who took my arm and led me to the Soyuz. I like Mike. I got his cell phone number, and while I was on orbit I would call him about once a month and just chat. Not complain, if I had a complaint I would talk to the flight director. I'd just call him up to let him know what his sole astronaut on orbit was doing at the time.

ROSS-NAZZAL: I'm sure he appreciated that.

MCARTHUR: He seemed to.

ROSS-NAZZAL: How long does this day last until you get loaded into the Soyuz?

MCARTHUR: God, I think it was probably about seven or eight hours. And then you were in the Soyuz, and then about two hours before you launched, which isn't that bad.

ROSS-NAZZAL: You're one of the few people who's launched on the Shuttle and the Soyuz. I wonder if you could compare and contrast the two. Is there a huge difference? Obviously they're two different vehicles.

MCARTHUR: In the Soyuz, you really have to strap yourself in. There's not enough room to have assistants. Once I was in my seat, and Greg was in his seat, and Valery got in his seat we could help each other out a little bit. In the Shuttle there were the suit technicians, and there was at least one astronaut who would help you strap in. You really didn't do any of that for yourself in the Shuttle.

I liked being MS [mission specialist]-2 in the Shuttle because that meant I was the last person to get in the vehicle. So that meant I could use the restroom at the 195-foot level, as close to launch as possible. It was always an interesting thing. You would suit up at the O&C Building (Operations & Checkout Building) at KSC [Kennedy Space Center, Florida], which is right beside KSC Headquarters. They would suit you up, they'd put your helmet on and your gloves on, and they would pressurize the suit and do a leak check.

And then what would they do? Take your helmet off, take your gloves off. And then what would I do once I got out to the pad? I would unzip the zipper—which actually went from the back, all the way down, then came round on the front—I would unzip it so that I could then take advantage of the facility. The real question was, "We did a leak check earlier why?" I guess it would have found—like if there were a hole or some mechanical damage to the suit or a suit component they'd discover that, and something like that wouldn't likely occur later. So that's one difference.

Another pretty significant difference is once you get on orbit in the Soyuz—and I think it has a lot to do with the fact that the Soyuz 11 tragedy occurred because a valve opened inadvertently and depressurized the cabin and asphyxiated the crew. The Russians—they pay a lot of attention to verifying the pressure integrity of their spacecraft.

Once you get on orbit in the Soyuz you are not allowed—I don't even think they allowed us to take our gloves off, and you absolutely cannot get out of your seat. You can loosen the straps but you have to stay in the seat for, my recollection is, about forty-five minutes as they're verifying the pressure integrity of the Soyuz.

I know in the Shuttle we'd take our helmets off right away, put lightweight headsets on. On STS-74, I went uphill. I was alone on the middeck. Almost immediately after main engine cutoff I got out of my seat, took my helmet off, started getting comfortable, started activating the middeck. So that's one big difference of the postlaunch activities.

At KSC we would go out in this Airstream RV, and it's a big bus for the cosmonauts. But both places you're in this big plush captain's chair, so there's that similarity. Again, I think to a large degree there are just more similarities than there are differences.

The geography is different. Of course, you're much more isolated in Baikonur than you are in the Space Coast of Florida. I do recall hearing that perhaps one of my crewmembers on one of my missions was seen downtown when he was supposed to be in quarantine.

ROSS-NAZZAL: You mentioned quarantine, the Prophy. How long were you in quarantine in Russia compared to out here? Is it identical?

MCARTHUR: We weren't in quarantine preflight in the Prophy, because they send you to Baikonur. You're in the Cosmonaut Hotel, and you're in quarantine there. I can't remember whether it was two or three weeks. When I was a backup for Expedition 8 we went down to Baikonur, checked out the Soyuz, came back to Star City for a week, and then went down for the launch. I think for Expedition 10 backup and Expedition 12 the Russians figured out, rightfully so, it was a lot cheaper

to send us all down to Baikonur and leave us there than to shuttle us back and forth. We were there I'd say at least two weeks, if not a little bit longer.

When we came back, I think I spent only a day or two in quarantine in the Prophy. Then I went over to my cottage. I think I had Cottage 5. Of course Cindy was there, the girls were there, my son-in-law was there. I think we might have owned that cottage, so it was a, "We're going to consider you still in quarantine, but you're just going to be in this building." In a different building, but they still were controlling my schedule. I could see the same people. Other astronauts could come by and things like that, so it wasn't a big deal.

ROSS-NAZZAL: Two weeks sounds like a long time before a mission.

MCARTHUR: It is enough time to be mischievous.

ROSS-NAZZAL: Sounds like a story.

MCARTHUR: You may have surmised that I like being connected. What bad things did I do? WiFi. WiFi was sort of new at the time, and I had bought something called an access point. An access point just provides the WiFi part. If you go buy a device to put internet or WiFi in your house, or let's say you get something from—I don't know who your service provider is, let's say it's Comcast. They will rent to you something they call a gateway modem.

It does a couple of things. One is you plug the cable into it, and that's where your internet signal is, so this acts as the interface for that. Then it also takes that internet signal and either

makes it available to plug-ins or it broadcasts it on WiFi. It just really works great now. But one of the things it does is it assigns a number set to any device that you connect to it.

When you do WiFi you say, "Okay, there's a WiFi network," and in your house it's named Jennifer. Okay, that's good. And it has a password. When you log a device in, you find Jennifer and you say, "That's the one I want to connect to." And it'll say, "Okay, what's the password?" You tell it what the password is, and if it's happy you're connected.

But what that box also does, once you've done that, is it assigns a number to your device. It's actually a series of four numbers, and that function is a router. If this is stuff you know, just tell me. It's too complicated.

ROSS-NAZZAL: I'm a historian—I know how to operate things, that's it.

MCARTHUR: That's a router. All networks have a router, which controls traffic and assigns internet protocol addresses, IP addresses. In those days, in the cottages, we had wired ethernet. If you plugged a computer in, there was a router somewhere that would let that computer function on the internet and would assign it an IP address.

That's not WiFi. Well I had some devices that were WiFi-only, so I bought something called an access point. You plug that into the ethernet and all it does is now provide an access for this radio signal between your device and that other box, that router somewhere.

We're in Baikonur, and we got a lot of time to kill. There is no ethernet in our bedrooms. "How can I fix that?" The floor above ours there was the NASA comm [communications] room. If you went up there they had some laptops there, and if you had your own laptops you could unplug one of those laptops and plug yours in, and you'd have connection to the NASA network.

I don't think I took it with me to begin with—maybe I did—but I said, "I have that WiFi device in my cottage at Star City." I called back. I said, "I want the next person to come down to bring me that." I think I took that device with me just to see if I could make it work. So I plugged it in in the comm room, but there were too many walls for the signal to go through, so it couldn't get to our bedroom. I'm pretty sure that's how it went.

I called back, and I said, "Okay, for the next person coming down, please bring me fifty feet of ethernet cable." So I come in, and I've got fifty feet of ethernet cable. I go up to the comm room, I plug this fifty-foot cable into the appropriate place, then I lean out the window and throw this coil down to the second floor. It wouldn't go all the way to my bedroom but it would reach Jeff Williams's bedroom, so he pulled it in through his window. We plugged the access point into that, and for the next week we all had internet.

ROSS-NAZZAL: That works. NASA engineering.

MCARTHUR: I had this access point at Star City, I used it in Baikonur, and I know it violated probably every security protocol in the world.

ROSS-NAZZAL: Nobody called you on it though.

MCARTHUR: No. I think though later we figured out that keeping people connected is not a bad thing, and so eventually they, I think, provided internet connectivity to the rooms for the crewmembers.

ROSS-NAZZAL: Probably a good lesson learned you may have passed on. I know in previous interviews you've talked about flying in that left seat, but I wonder if you would talk about coming up on Station. How different it looked from the last time you were there, and what your memories are of docking and the events that happened.

MCARTHUR: You know, you can't see much of it.

ROSS-NAZZAL: Oh, you can't.

MCARTHUR: There's no window, and Valery is looking at it through an optical sight. I can't really see that well because it's between his knees. We have TV images—if you've watched the broadcast of a Soyuz docking, like what you see on that screen.

ROSS-NAZZAL: That's all you see?

MCARTHUR: That's what you see.

ROSS-NAZZAL: I did not know that. I thought it was a bigger view.

MCARTHUR: It's like a video game. Even on the screen, you've got all this data overlay that you're paying attention to. At the distance you see this—but the screens aren't big. There's a certain lack of grandeur. In the Shuttle it's different. You got all the Shuttle windows, and that's pretty cool, that's pretty cool.

ROSS-NAZZAL: That's interesting though. There's another big difference I was not aware of. I know there's a big ceremony after you guys dock and open the hatches. Do you want to talk about that and what that entails?

MCARTHUR: I don't think it's so much a big ceremony. You come through, the crew that you're replacing welcomes you, and then pretty quickly you're going—because you're pretty tired—you're probably pretty quickly trying to set up where you're going to sleep that night. I don't remember where we were in the schedule, how soon we had dinner, but it's really pretty quickly getting back to work.

ROSS-NAZZAL: I thought there was a bell someone had told me about at one point.

MCARTHUR: There is a bell, there's a ship's bell on board. Part of the tradition is you ring the ship's bell for a crew coming on board. While I was up there Bill Readdy retired, and so as a tribute to a friend of mine—albeit a Navy friend—I rang the ship's bell to signal his departure from NASA, and he seemed to appreciate that.

ROSS-NAZZAL: I'm sure he did. What sort of information did you get from the Expedition 11 crew? I know they stick around for a while.

MCARTHUR: They tell you a couple things. They'll show you things that don't work the way you think they will work based on your training on the ground. For example, there's a device that's

used to get air that's trapped in the water—to try to get that out. You want to minimize the bubbles that are in the water that would go into the device called Elektron, which would break water down to provide oxygen. It's over in the Russian segment.

Basically they give you an orientation on how things are laid out. When I give a presentation, I like to say that part of the handover is they show us where they've hidden all the good food. I mean they do. They talk about how the logistics are set up, because on the ground you don't have dozens upon dozens of food containers, sort of briefcase, small-suitcase size containers with food in them.

What they really show you are the ins and outs of habitability, because a lot of the equipment works the way you think it will, it just may not be where you think it is.

ROSS-NAZZAL: Is that because crews have moved it?

MCARTHUR: No, it's because it's just limitations on the fidelity of the mockups. The U.S. mockups in particular, we do a lot of pictures. "Here's a picture of this toolbox," for example. You go train on the tool; you'll see all the tools. You'll see the toolbox, but it won't be in the deck of the node. It may have a picture of it in the node deck, but that's not really where it is. Or you look in the node and what you really have is the vestibule for one of the ports, but it's full of stowage bags. Those are things that are not replicated on the ground. In particular, the stowage volume is at a premium onboard Station. As a matter of fact, there is a degree of chaos on orbit that you just cannot imagine until you're there.

ROSS-NAZZAL: I think you had mentioned that the first Return to Flight [STS-114] just kind of threw everything in and you had to recover from that.

MCARTHUR: Oh gosh, they did. At the very forward end of the U.S. Lab [Laboratory (Destiny module)], probably the L1 Soft Stowage Rack, it was completely covered with additional stowage bags on the outside. Part of the management issue was if you needed anything that was stowed in those lockers, you had to first remove all the individual stowage bags that were bungeed on the front.

ROSS-NAZZAL: That's a lot of work.

MCARTHUR: Then PMA [pressurized mating adapter]-1, there were a lot of small bags. It was like large bricks, more like cobblestones, just all placed around. And very artfully done, but it was interesting.

ROSS-NAZZAL: I had read you were not guaranteed a seat coming back.

MCARTHUR: Right, right. The original plan—and these were the agreements everyone signed—is that the Shuttle would be used to transport crews to and from Station. For a certain period of time, the Russians would provide a Soyuz up there on a continual basis—they would swap them out—to be used as a lifeboat. The U.S. would develop this ACRV (Assured Crew Return Vehicle), and eventually it would go up in the Shuttle payload bay. It would be attached to Station, and I don't know what would happen to the old one.

That was the long-term plan. So the Russians were only obligated to provide Soyuz for a certain period of time under the original agreements. Now, there was a wrinkle out there called the Iran, North Korea, Syria Nonproliferation Act [INKSNA]. Basically, it said because Russia had provided missile technology to Iran, North Korea, and Syria, we could not pay them money. We could barter with them, but we could not, for example, buy Soyuz seats.

Remember, as in Dennis Tito's case, the Russians were using the Soyuz for additional flight opportunities for their crewmembers and to provide the opportunity to sell the right seat for cold hard cash. After *Columbia* [STS-107 disaster], the Russians agreed to use Soyuz for crew rotations, but that covered the number of Soyuzes they had already agreed to provide. The Soyuz that I went up on was the last seat in that agreement. Returning on that Soyuz was not covered by that agreement. Basically the Russians said, "We'll continue flying U.S. crewmembers, but you're going to have to pay cash for it."

Then we had INKSNA, this congressional mandate that said, "You cannot give the Russians cash in order to buy Soyuz seats." It's kind of humorous. They used this idea that a U.S. astronaut had a one-way ticket to the Space Station as leverage to get some relief from INKSNA. Technically, when I launched the Russians' position was "NASA, you're responsible to get him back. You can pay us to do it, or he can stay there until the Shuttle can bring him back."

ROSS-NAZZAL: It would have been a long wait.

MCARTHUR: Let's see. April, May, June, July—so it would have been another three months. There would have been problems with that. If we couldn't do that, that means Jeff Williams could not have come up on the Soyuz. I guess what the Russians would have done is probably sent three

people up. I would have stayed up with Pavel [V.] Vinogradov, and Marcos [C.] Pontes and then maybe one Russian would have come back with Valery.

ROSS-NAZZAL: Were you concerned at all when you launched?

MCARTHUR: Not really, no. I kind of thought it was funny. I was less worried about staying up for a longer period of time than I was not having the closure of coming back with Valery. We had trained to go up together, we had trained to be there together, we had trained to return together. So I would have been disappointed not to have had that experience.

ROSS-NAZZAL: You commanded this mission. I wanted to ask if you would talk about being commander of the Expedition and what it entailed.

MCARTHUR: I think it entailed some level of decision-making, certainly. But if you look at it, the Russians really looked to Valery to make decisions related to the Russian segment and Russian issues. Yes, I was ISS commander and NASA science officer—

ROSS-NAZZAL: I was going to ask about that, too.

MCARTHUR: —but Valery and I were partners in this whole thing. I took the lead for anything related to the U.S. segment. I was the lead for anything that we did here in the States. Similarly, Valery really was the one the Russians looked to for the more critical activities on the Russian segment, and certainly for what we did in Russia.

ROSS-NAZZAL: Would you talk about how much time you spent doing things like housekeeping, maintenance, science?

MCARTHUR: The ISS Program has the specific numbers. The vast majority of the work we did was related to operating the Space Station. Whether that was maintenance, cleaning—gosh, every Saturday morning the whole morning, with the exception of the exercise time, was spent housekeeping.

I don't know whether this was considered utilization, but on a regular basis [we were] swabbing down surfaces, collecting bacteria samples, collecting water samples too that would eventually go down to the ground. Replacing switch modules that would fail, cleaning filters, replacing filters. I'm just going to guess that at least 80 percent of our time was spent doing things like that.

Our U.S. spacewalk—the real prime task was to install an external camera, which was critical to future assembly tasks when Shuttle flights resumed. Then we also jettisoned the component. I think that could have been done on a subsequent EVA, but it had to be moved, again as part of the assembly sequence—because it was going to create interference with moving the truss somewhere else—to the far port outboard. Brought in a failed, I think, rotary joint motor controller from the starboard side. I don't think that was critical to do it then, but we were outside anyway, and it fit in the timeline really well.

The preparation and conduct of the EVA, and then the activities after the EVA was over—we're talking about, I would think, the better part of two and a half to three weeks of activities.

There was a few hours every week doing experiments, but I would be surprised if it was more than ten or fifteen hours a week. It could not have been that much.

ROSS-NAZZAL: Were there any experiments that you thoroughly enjoyed, looked forward to operating or tending?

MCARTHUR: I eventually enjoyed BCAT-2 (Binary Colloidal Alloy Test), and Peter [J.] Lu, I think, was the principal investigator. He was just fun to interact with, a little indirectly. It was pretty simple.

I remember there was one experiment I volunteered to do on a weekend. You had to spin the samples to try to get them to separate. I think they tried to say, "Well, just spin it by hand," and I found that if I spun my whole body I could do it better. I found that very provocative. It's like "Okay, if I keep doing this, I'm going to get sick. I think I'm going to have to be careful about that one."

ROSS-NAZZAL: I think you continued to do a lot of ham radio work, didn't you?

MCARTHUR: I did a lot of ham radio. I had, I think, thirty-some school contacts, so I wanted to do a lot of those. Those were fun. I made contact with over one hundred entities. So what's an entity? Each state is an entity. Did I work all states? Don't remember if I worked all states or not, I might have.

I worked all continents. I talked to someone on every continent on two different bands. That includes the Antarctic. Some amateur radio group had a special expedition—it was called

the DXpedition, DX is [distant] contact—to some island off the coast of the Antarctic. Their whole purpose was to go down there and set up a radio station so that amateur radio operators around the world could log a contact to the Antarctic. I talked to them a couple times.

I was telling you about entities. Individual countries are entities, maybe individual states are not. But Hawaii, because it's not physically connected to the U.S., was a separate entity, as was Alaska. I talked to someone from the Vatican.

ROSS-NAZZAL: That's cool.

MCARTHUR: I remember talking to some guy on [Saint] Peter and [Saint] Paul [Archipelago] in the Atlantic [Ocean]. I think that's where the guy was holding his antenna by hand and was being attacked by seagulls. On one of my Shuttle missions, it may have been a guy in South Africa [who] was working in a field driving his tractor and heard me coming over so he contacted me. To record the contact he scratched it into the toolbox on his tractor.

ROSS-NAZZAL: It's funny the different things that people will do. You were up there for so many months. There were all these different holidays that happened. I wonder how you celebrated those events.

MCARTHUR: As much as possible. But what in particular sticks in my mind is the Christmas, New Year's period. Actually it really started off at Thanksgiving. I think we had some time off at Thanksgiving, so we tried to recreate a traditional U.S. Thanksgiving dinner. We had smoked

turkey, green beans with mushrooms, mashed potatoes with onions—that was from the Russian menu. I think we had maybe some cranberry apple cobbler dessert or something, so we did that.

Then of course we decorated for Christmas, which can be a little misleading. I decorated for Christmas, Valery decorated for New Year's. The way we commercialize Christmas with Santa Claus and a Christmas tree and things like that—those are the same symbols the Russians use in celebrating New Year's. So we had a little Christmas tree. I had a little blanket or a little flag, little tapestry with a Christmas tree on it. I put that up in the forward hatch in the U.S. Lab.

We had a few downlinks. We had some Russian downlinks. Valery's grandson was really happy because I think we talked—the Russian counterpart to Santa Claus is Ded Moroz, Grandfather Frost. If you think about a very ornate, elaborate Santa Claus and a long robe that's fur-trimmed with a lot of embroidery, but still with a gray or white beard, that's how the Russians depict Ded Moroz. It's almost, I would say, maybe a Victorian England representation of Santa Claus is how I'd describe Ded Moroz, Dedushka Moroz.

It was a good time. I had a lot of video links with family. We had Christmas. We had a Progress resupply vehicle dock two days before Christmas. I like to show videos of that, especially when I'm talking in schools. I say, "That's what Santa's sleigh looks like in space." I ask, "If you had a friend who was in space and wanted to send them a Christmas present, what would be a good Christmas present?" I try to tease out of them things like air, water, and food. You need those, and they have to come from the ground. Well, I guess we can get water recycled now.

Gosh, I can't remember who the patriarch was. The patriarch is the head of the Russian Orthodox Church, so maybe not quite as prominent in the world as the pope is, but [he is] the head of the church. I want to say the Russian Orthodox Christmas is January 7. It's December 25 on a

different calendar, but the calendar that's used worldwide it's January 7. Whoever the patriarch was at the time, we actually had a radio call from him. That was kind of cool.

Talking about interesting things, the first president I ever spoke to after a spaceflight was Vladimir [V.] Putin. It was via telecom [teleconference], it wasn't in person. Still, having done all my Shuttle missions in the '90s I never once met [President] Bill [William J.] Clinton, never once spoke to Bill Clinton. But did speak to Vladimir Putin after flying on Soyuz. Hats off to him—when George W. Bush became president there was a regular program to get astronauts who had flown between the last White House visit and this upcoming one, that we would all go to the White House and meet President Bush and have our picture taken with him.

My older daughter was—yes, this must have been after his reelection. She went to Florida and I think was a poll watcher for his reelection campaign, so she was quite happy to meet him.

ROSS-NAZZAL: I'm sure she was.

MCARTHUR: I was a little disappointed. She was married with an infant child at the time. They said her husband and the baby could not go to the White House. I'm going, "I bet he doesn't know that, because I bet he'd love to see a little baby."

ROSS-NAZZAL: I bet he would have, I'm sure that the first lady would have loved that, too. You mentioned your Thanksgiving feast. I talked with Vickie [L.] Kloeris many years ago, and she talked about how important food is on Station, that so many people didn't realize how important it was.

MCARTHUR: A lot has to do with your expectations. There were a couple things that annoyed me about food when I was on Station. When *Columbia* occurred, the Shuttle was the logistics lifeline for Station, in particular for U.S. things. You're probably aware if the Expedition 10 Progress had not gotten up there they would have had to have deorbited within a couple weeks, because they were just so low on food.

Things got out of sync. Basically, in those days there was no overlap. Now there's that three-person overlap. We knew. They told us when you go up, they said, "There'll be a lot of Expedition 11 food." This is what I heard. "You'll eat that until the Progress gets there, which will have your food. Your food won't be there yet." I think our food was supposed to go up on STS-121, but when STS-114 launched and lost foam, bang, we're grounded for another year. "Your food won't be there, but you'll eat Expedition 11 food. Your food will come up on the Progress in December." Roger.

I probably was not as considerate of Valery as I could have been. I tried to really stretch our food. We were on a ten-day cycle, but I tried to stretch it out so that we really got more than ten days out of a ten-day cycle. Part of my thought was "Let's conserve food, we don't know what'll happen." But in December, when our food comes up, we'll start eating our food which will consist of the items that we requested.

When the food got there, it was then clarified, "No, you need to keep eating the Expedition 11 food until it is gone. Then you can start eating the food that you chose." I started doing things like passive-aggressive [behavior]. I would look, and I would call them on the radio. I would say, "Hey, this food we have up here is past its expiration date. What do you want to do?"

They did not want me saying that over the radio for everybody to hear. They send you up a note like, "No, it's really okay. Just keep eating it, it's just kind of a guideline." I've been eating

this expired food for weeks now, and you told me that I'd have to eat this until my food came. Well my food is here, I want to eat it now. But anyhow, I got over that.

There was a different view, I think, on what I expected of myself as the Space Station commander, certainly as a person flying on the Space Station or flying the Space Station. And that is I wanted to know what the Space Station was doing. If the ground did something to change the Space Station, I wanted to know what it was.

I think there were other astronauts who had been there, especially early on and they didn't care. If the ground changed to a different cooling configuration, they didn't care. They didn't want to know. I remember one time they activated a pump or something in a rack right beside where I was, and it was loud. It suddenly came on, and it startled me. I told them, I said, "Look, you don't have to ask permission to do it, but if you do something that I can see, hear, or feel, or it requires me to do something that I don't normally do later, tell me. Call it up. Don't worry about interrupting me. If I can acknowledge it, I will. If I don't acknowledge it, don't worry. It just means I'm busy with something else, and I can't pick up the microphone."

I remember once I tried to turn one of the camcorders on, and it wouldn't turn on. I finally realized that for the first time ever the ground had turned off the outlet. The power outlet was normally on, and it went into another box. I would turn the power off at the box. I could disconnect and connect the camera safely, but I didn't have to then go into the computer to command this power outlet on. I could just activate power with a switch.

I called down and said, "Why did you guys do that?"

"The procedure tells us to do that." I looked at the procedure and it said "if required." It said the step was optional.

I said, "Please don't do it that way anymore, or tell me if you do."

"We're going to execute the procedure the way it's written."

It came up in a note that said something like that. It was kind of a snarky note from the ground. I called the ground, and I said, "I want to talk to whoever. Tonight I would like a private radio chat with whoever wrote that note." Sally [P.] Davis, the lead flight director, came on that night instead, and she was defending her peeps [people]. She knew that that was not a good answer, but she was going to take care of it. I didn't have to reach out and touch someone directly, which was the right thing for her to do.

You mentioned Vickie and food. I'm sure I hurt Vickie's feelings at the time. We'd been up there maybe a couple months. When we got up there, the previous crew had had the condiments out. The salt and pepper were in these little squeeze bottles that look a lot like bottles that eye drops would come in. Heaven forbid you put these drops in your eyes. The salt was a very concentrated saline, very concentrated salt and water.

We had some tomatoes. If you had a slice of tomato and you wanted to put some salt on it, you'd squeeze out a little bubble of salt, touch it to the tomato, and the surface tension would cause the salt water, the saline solution, to spread out over the tomato. You'd eat it, and it was tasty, it was good.

The black pepper was actually pepper oil, so it was oily, but it would work the same way. Then there were other condiments we had: ketchup, mustard, Tabasco [hot] sauce, taco sauce—and that was just the U.S. condiments. The Russians had [what] looked like big toothpaste tubes, and they would have *myod* (honey), *gorchitsa* (a spicy mustard), *baltika* sauce, which is kind of a ketchupy—not a cocktail sauce, but it was a tomato paste-type sauce.

The little bottle of salt that the Expedition 11 crew had gotten out and been using, we used it up. Now, every food container didn't have condiments in it. Every fourth or fifth container

might have a little Ziploc bag with condiments in it. Maybe there was a pattern there that I just never figured out. To me it was always a surprise to open a container, and lo and behold, there were condiments in it.

So I called the ground. I said, "Hey, we're out of salt. If you tell me which food container has salt in it, I'll pull it out next."

They said, "The only container that has salt in it is this container, which is in your skip cycle." There was this forty-five-day supply of food that you weren't supposed to touch unless you started running out. That would be the point at which they said, "Okay, we have forty-five days to either get more food there or we need to bring the crew back." This must have been like early December.

I said, "Since it's stored with skip-cycle food, I don't really want to pull it out."

They said, "There's no other salt up there other than this location."

I said, "Well, since it's in the skip cycle, I'll just wait till the Progress gets here with our food. If you tell me which containers have salt in them, I'll pick one of those and open it next."

"Well we're not sending any salt with your food supply."

"What?"

"No, previous crews have said that they had more salt there than they need."

I said, "There are a couple issues here. One is clearly they were not correct. Secondly, you made a decision about what you were sending for my consumption, and you never asked me about it. I have a serious problem with that."

So they gave three containers of salt to someone who hand-carried them from Houston to Moscow, and then they were hand-carried—we would have some late stow items on the Progress, so they got them on the Progress. I'm sure this was the most expensive salt in history, but I had I

think three containers of salt. Somewhere I have a picture of our little Christmas tree and three little containers of salt around it.

ROSS-NAZZAL: I do have to ask, because I wonder about this. What did you think of the food that Expedition 11 had picked? I'm guessing it's very different than what you had selected.

MCARTHUR: It was just fine; it was just fine. There may have been certain things that I particularly was fond of that they had less of, but it was good. One thing is [Sergei K.] Krikalev had gotten a lot of fruit punch. I don't think he was very interested in what he selected on his U.S. menu, so there was just a lot of fruit punch. This is that red bug juice-type punch. I didn't care for that at all, but they also had a lot of Kona coffee. I had put no Kona coffee in my menu selection, so I really enjoyed [it]. That was an upside of having their food.

ROSS-NAZZAL: I'm going to read this quote. One article I read said you had "a reputation for both tidiness and an eagerness to communicate" with the public. I wondered if you would talk about that, and where the reputation for tidiness came from.

MCARTHUR: I'm not sure. Any locker I opened—and there were a lot. I mentioned that when STS-114 left they just stuffed things wherever they could. I did try very hard—anytime I accessed a storage location, if it was disorganized I tried to leave it better than I found it. I don't know, I guess somebody somewhere picked up on that, maybe because I'd open it up and complain.

ROSS-NAZZAL: I wasn't sure if that meant you did a lot of media interviews and people were happy about that.

MCARTHUR: As far as communicating with the public, there's the ham radio aspect of that. And I enjoyed doing interviews, I was always willing to.

ROSS-NAZZAL: Was there a lot of interest in this Expedition that you recall?

MCARTHUR: I don't know what a lot or a little would be.

ROSS-NAZZAL: That's hard to quantify, you're right.

MCARTHUR: I don't really have something to compare it about. I certainly don't remember having so many demands that I objected to them. Again though, I was always happy to either do something that was formal or do something that was relatively spur-of-the-moment, such as I think I mentioned Coldplay came into Mission Control. I said, "Yes, I'm happy to talk to whoever is"—especially if it was something that I knew the flight control team would enjoy.

ROSS-NAZZAL: I had read that your mission got extended by a week.

MCARTHUR: A week, or something like that. That was good. I wanted it to get extended by another week and a half.

ROSS-NAZZAL: Why another week and a half?

MCARTHUR: It was like 189 days and something. I thought, "Surely we can get to 200 days," but no. As it was, we landed about an hour before sunrise. Every day that passes, essentially your orbit moves 23 minutes earlier. So if we had delayed another 10 days, that would have been nearly four hours—230 minutes, four hours—so now we would have been landing really like two in the morning.

The downside of that is if there's a downmode in the landing and you do a ballistic entry, that puts you, I want to say, 250 miles uprange. That now means the search and rescue forces are trying to find you—there are hours of darkness that they would have to search in if they're trying to get to you right away. I think the Russians wouldn't have been real pleased with that.

ROSS-NAZZAL: What did your wife think when you told her, "I'm going to be in space a little longer than you anticipated"?

MCARTHUR: I think they told us early enough so that it wasn't like, "Hey, instead of being home in four weeks I'll be home in five weeks." I think [I said], "Instead of the 31st of March or the 1st of April it's going to be the 8th of April."

ROSS-NAZZAL: One thing we didn't talk about is getting ready for the next increment. What sort of things did you have to do in preparation for their arrival?

MCARTHUR: A lot of it was more preparing yourself to leave. In other words, packing up your things. There were a lot of things that you were instructed to discard. For example, I used a little battery-powered electric razor sometimes and they said, "Throw it away." The reason I mention that is I thought, "Well, this is kind of neat; it still works. They told me to throw it away, so instead I'm going to take it home and keep it."

Well, they inventoried my stuff when they brought it back. They looked at it and they go, "Mm, still works. He used his allocation to bring it back. It's government property. We'll clean it up and put it back in inventory." Thanks a lot.

Then I think you also make sure you clear out a space where these folks might want to sleep. I don't know if I mentioned this before. Jeff was pretty easy, but Marcos Pontes needed to have an email account and an account to use the IP phone. So I spent some amount of time making sure Marcos's email would work, because when Greg was up there at the beginning of our mission it took a couple days to get his email to work. I found that rather annoying.

ROSS-NAZZAL: Why did that fall to you? There wasn't someone on ground who could arrange all those things?

MCARTHUR: One would think, one would think. But that was a case in which the ground didn't fully understand the way the file structure worked onboard. When we got up there, Greg's email did not work. The way we handled email at the time—it wasn't like real-time email. It was offline email, where you have offline folders. To synchronize your email the ground would download the offline folders, synchronize them, and then uplink the new offline folder file.

When they did that, the offline folder file would pick up the permissions of the higher-level directory. For some reason, we were scared that if we let one of these people who made a contract with the Russians have access to all the files on the network, he might do something bad.

ROSS-NAZZAL: I see.

MCARTHUR: So the desire was to only give them permission to access their one or two files. As soon as they uplinked it, the permissions would flow down from the higher level. They wouldn't have access to them. So there was some guest astronaut account, which I think would have been used for Shuttle crews, that we finally got permission for Greg to use. For the rest of his stay up there it worked.

When Marcos was coming up they said, "We know what went wrong. We've got it fixed."

I said, "Please don't do this. The way we did it with Greg worked, let's do it that way."

"No, no, no, no. We understand what happened."

"Okay. You understand what happened."

"All right, we want you to test his email."

"Doesn't work."

"Oh, wait, wait, wait. We haven't uplinked his file yet."

"Okay."

Few hours later, "Try it now."

"Okay, it works."

Marcos gets up, doesn't work. I said, "Please—"

So they reverted to the way that we'd done it for Greg, and it worked the rest of the time.

Otherwise, maybe it was more that preparing for Jeff was trying to remove my footprint from the spaces that would be his personal spaces.

ROSS-NAZZAL: What are your recollections of returning back to Earth?

MCARTHUR: Oh, it was good. You see the Station receding even though it's just in the TV, and you go, "Well, that's kind of sad." It's like, "Oh, it's been a good place," a little bit sad. As my knees were up near my chin, I thought, "Well these will be the last few hours I ever have to spend in a Soyuz." I loved being in the Soyuz, but it really was not comfortable. So maybe there was a little bit of happiness there.

Now we're really getting down to business, monitoring everything to make sure that everything's good with the deorbit burn. The amount of heat soakback in the Soyuz was more than I thought. It got pretty warm in the Soyuz during entry.

Then I'm looking in the checklist at the timeline, and there is the TOSP, time of the *osnovnaya sistema parashutov*. It's the time that the main parachute is supposed to come out. I'm thinking I'll feel a jolt or something, I don't feel anything. As I mentioned, Komarov had both parachutes fail, and that was what resulted in his fatality. I haven't felt anything, and it's the time that the parachute is supposed to have come out. I'm going, "I just don't know."

Then I hear wind rushing through something. It's the wind going through the suspension line and the risers, so I realize the parachute is out. You don't want it to inflate immediately. That would be such a shock it might damage the parachute or something like that. It really opens a little more slowly. When it finally did open, it was like all heck had broken loose, because it feels like we're tumbling in every axis. And we very well might have been, because initially the Soyuz is

off at an angle, it's rotating this way, and I think we were also rotating that way. It just feels like you're tumbling through space. Then that settled down, and then you get *peretsepka*, which is like rechaining. The cable is not fully released, so the capsule is hanging at an angle. Then the other part of the cable releases and it goes now to being symmetric, and that again triggered this sense of tumbling.

We're coming down, and my expectation is that just before hitting the ground the soft landing retrorockets fire. That cuts your rate of descent in half, so I expect to feel two bumps. There was just this bang, flash, and it felt like we had run right into a brick wall. I think it just happened so quickly. As a matter of fact, it was such a harsh landing I thought the soft landing engines had not fired. I asked Valery [G.] Korzun, who was then the deputy head of Star City, after we landed. I asked him, "Did the soft landing engines fail?"

He goes, "No, no, no, they fired." You look at the picture and you can see the dirt blasted out of the ground, so they did fire.

I asked Valery later. I said, "I expected at TOSP to feel the parachutes right away. I was a little worried."

He goes, "Yes, I was worried, too." He said he crossed himself.

I said, "I'm glad I didn't see you do that."

In part because we landed about an hour before sunrise, the winds were completely calm. Where very often the parachute will pull a Soyuz over, and even sometimes drag it across the ground, ours didn't. The ground was soft, so we just kind of hit and stuck there and stayed upright. Looked out the window and could actually see the search and recovery vehicles pulling up all around the Soyuz. When the recovery forces got there and they opened the hatch, when they

opened it up—it was, I think, about twenty-six degrees Fahrenheit outside. It was cool, crisp air, little pieces of dry grass fell in. It was really a pleasant feeling.

Valery got out, and then Marcos got out. They asked if I wanted help getting out and I said, "Yes, I wouldn't mind having some help getting out." I was thinking one of the recovery guys was going to get in and help me get out of the seat. No, he just came in and said, "Well, you need to do this, and you need to do that."

It's like "I know that." I got out.

Because we were upright, they had this little structure over the Soyuz, and it had a little slide. It's a lot like evacuating an airplane. It was a metal slide, very steep. They want you to cross your arms, keep your legs together, and then they lower you down the slide. It just felt good. I had these people—they're not only caring for you, they are carrying you.

They go put you in these folding chairs that are over on the ground, wrap you up in this fur-lined sleeping bag, give you a cup of herbal tea. Then they pick the whole chair up and carry you into this inflated mobile hospital tent. You get unsuited in there, put on some more comfortable clothes, and really just don't do much for a little while while your doctor is checking your vital signs.

Then after a while they have you stand up, and they want you to try walking. At some point, I think they walk us out to the vehicles and then drive. These are the big, big—I don't know if you've seen pictures of them, PEM (*poiskovo evakuatsionnaya mashina*), search and evacuation vehicle. Then we go over to the helicopters, and eventually fly to where the airliners are to take us back to Chkalovsky Air Base [Shchyolkovo, Russia] which is right by Star City.

Greg Olsen, who went uphill with us and then came back with Expedition 11—he was there at landing, and it was really nice to see him. I remember a couple of things they had for me

that I really enjoyed. I had a can of Coke, and then I had this Starbucks coffee thing that if you twisted it it self-heated. I missed Coke because of the carbonation. I kind of like drinking a fizzy drink, and I missed drinking coffee I could smell.

ROSS-NAZZAL: Oh right, yes, because it's in the bag. Yes, that's right. Nice of them.

MCARTHUR: We may have had some red wine on the flight too, courtesy of Greg. I think we did.

ROSS-NAZZAL: When did you get a chance to see your wife and daughters finally?

MCARTHUR: A few hours. I don't know, how long was the flight? Three, four hours. When we landed at Chkalovsky my wife was there, so I saw her as soon as I came down the stairs. And saw my daughters—I'm trying to remember. They probably were there, probably saw them there. I'd have to go look, I have lots of pictures.

ROSS-NAZZAL: I can imagine you do.

MCARTHUR: They don't want you to take a shower because standing up really can trigger very bad—let's go back. Let's go back. When we were at Karaganda [Airport, Kazakhstan], where we went to catch the planes—when you get there, there's this Kazakh welcome back ceremony. They give you a Kazakh cloak and a hat, and they have these Kazakh maidens there, offering bread and salt probably. Somewhere in there I had a wave of nausea, but that was the only motion sickness I experienced coming back fortunately. Felt pretty good on the plane.

When we got back, I'm in my room in the Prophy—and again you shouldn't take a shower because then you're having to stand up and that's bad. Very often you're taking a hot shower, and evidently they've had instances here—even for post-Shuttle missions—where crewmembers will get in the shower and then water is coming down, so you tilt your head back so the water will wash over your face, and then that stimulates vertigo. Taking a hot bath is okay, except that water was really brown.

My wife, she loves to tell this story. I go, "Where's my laptop? I got to get online." I don't know what it was. There was some software I wanted to use, and it needed to be updated. I went to update it and my credit card got declined. I called American Express. I had three cards on the account. I had my card, my wife had a card, and my younger daughter had a card.

My wife had a card so she could buy things for my daughters. My younger daughter had a card so she and her sister could buy things for my wife while I was gone. Card got declined, so I called American Express and I said, "Hey, I got a message that my card was declined yesterday."

The customer service rep looks at it and she says, "I don't see where an attempted charge has been declined."

I said, "Well, I guess maybe I made a mistake entering the number."

She said, "Yes, that would have that effect."

I said, "Okay, I'll try again."

She goes, "But before you go, you have really used your card a lot over the last six or seven months. I think you should upgrade to a higher-level card."

I'm going, "Well, miss, I bet my card has been used a lot."

ROSS-NAZZAL: Could be on the next American Express commercial, I remember that.

MCARTHUR: I used my American Express while I was actually on orbit.

ROSS-NAZZAL: Did you really?

MCARTHUR: I did. Have I mentioned listening to this Cajun radio program on orbit?

ROSS-NAZZAL: You did, yes.

MCARTHUR: This is a public radio station so they don't do commercials, they just operate based on donations. Generally when they're doing a fund drive they'll do it over two weekends. I'm listening to it early one week, and they've just started the fund drive, so the next Saturday I call down and make a donation and charge it to my Amex. So yes, I actually was able to use a credit card in space.

ROSS-NAZZAL: I never would have thought that. I would have thought that you would have been completely, I guess, cut off, not using your credit cards.

MCARTHUR: What I had was an application, I think on my computer, which included all my credit cards—the card numbers, the security codes, expiration dates, all those things.

ROSS-NAZZAL: That was a good idea. I doubt you had a wallet with you, right?

MCARTHUR: I did not have a wallet with me, that's true. Didn't have a passport.

ROSS-NAZZAL: I suppose you didn't really need a passport, did you?

MCARTHUR: You didn't. I don't remember what we did for the Space Station flight, because I had to have my passport while I was in Russia. For Shuttle missions though there was a group over in FOD [Flight Operations Directorate] that, before you would launch, they would have a couple changes of clothes for you. There would be one that would go to Florida; there would be another change that could go to California if you went there.

I think if you landed somewhere other than California or Florida they would grab one of those sets of clothes to go there. They would have your passport, because of course the transoceanic abort landings, you could have landed in Spain, you could have landed in Africa. Part of the immediate response team would go there with your passport.

ROSS-NAZZAL: That makes sense.

MCARTHUR: There was a book. I want to say it was called *Shuttle Down* [by Lee Corey]. It was about a Space Shuttle that did an abort landing somewhere on an island in the Pacific [Ocean], and that was one of the issues they had to deal with, these crewmembers not having their passports with them.

ROSS-NAZZAL: Probably not something you put in the middeck locker. How long did it take you to get acclimated to being back on gravity, on terra firma?

MCARTHUR: Sometimes I'm not certain I'm completely acclimated yet. I'm not certain I'm ever going to be completely acclimated. But of course they do a lot of postflight testing to try to identify your progression in recovering, and I think it's as much to assess whether you have any health-related issues as it is to just gather basic data on human physiological response to spaceflight.

There's one where you run through an obstacle course really, and they've got swimming-pool noodles hanging down, and they want you to navigate through them. These suspended noodles are pretty neat because if you bump into them it doesn't knock you over. There's a little barrier you have to step over. Some of those videos are not very flattering.

There's another one. Gosh, where was I the other day? I saw the young lady who did that experiment. It may have been at John [W.] Young's memorial. You stand on a platform, and then you have this three-sided enclosure. The three-sided enclosure has just sort of pastel colors and a pattern. The enclosure itself can move and can tilt, and what that does is it's trying to trick your visual perception of balance. Then the platform you're on can tilt. And these can be pretty abrupt. It's trying to trigger the proprioceptive cues you get from your ankles. Then this little platform also will suddenly shift forward or shift back, and I think that's to trigger the otolith organs in your inner ear.

After about ten days they said I probably could drive safely. Somewhere in there I had started jogging a little bit, and I came back to the States at the end of seventeen days.

ROSS-NAZZAL: I was curious how long you stayed over there.

MCARTHUR: I came back here for just a few days because they had to do some data collection which could only be here. I've mentioned wanting to come back with Valery for closure. Well part of the closure also was the return home ceremony in Star City. I really wanted to be there for that, but part of the contract Brazil had with the Russians was that Marcos had to come back pretty quickly to do his victory tour in Brazil, so we couldn't do the Russian return ceremony while I was there.

So ISS very graciously flew me back to Star City so I could be there for the return home ceremony. I had a doctor—I think Ed [William E.] Powers, one of my flight surgeons, went back with me. I got to fly business class. Unfortunately, Ed didn't. It was a good thing. I still had a pretty appreciable swelling like in my ankles, so I probably needed a little easier time of it.

ROSS-NAZZAL: This return ceremony, is that similar to something we would see out at Ellington [Field, Houston, Texas] or at Space Center Houston [JSC Visitor Center]?

MCARTHUR: No, no, no, it was very formal. They had their band out. I'm trying to remember if they have some of their troops marching as well. You put flowers at Gagarin's statue and then go to the House of the Cosmonauts, which is an auditorium and a museum. It's got an office there—was it Gagarin's office? Maybe. Before you fly there's a book there that you write a message in and sign.

At the ceremony you get presented a lot of mementos, get to make a few remarks. I made a few remarks in particular directed at my Russian teacher. Like many languages, there's a formal way of addressing people and a familiar way to address people in Russian. She had told me how to ask to begin addressing someone in the familiar, using familiar pronouns. I don't know if I

actually asked her at that time, or I just said it, but her response [was], "Well, no. I'm the teacher and you're the student, so can't do it now." So that was one of the things I asked when I gave my remarks. I asked her if we could now start using the familiar to talk to each other. She was a good—I hope she still lives. She was a good teacher.

ROSS-NAZZAL: Were there any lessons learned that you passed along from your increment to future crews or to the Station Program?

MCARTHUR: I'm sure there were. It was a long time ago.

ROSS-NAZZAL: I know it doesn't seem that long ago, but it is.

MCARTHUR: It does when I try to start remembering details.

ROSS-NAZZAL: Actually, I think you've done a great job. We spent a lot of time talking about all this.

MCARTHUR: I think what I did more than anything else is I tried really hard to help people who were just starting to go to Russia and start training, to share the things that I had done to adjust to living in Russia.

ROSS-NAZZAL: Can you give a couple of examples?

MCARTHUR: Things about shopping and how to travel. Things that I found, what I did for relaxation or adventure. If you're going to jog, where the holes in the fence are.

ROSS-NAZZAL: I think this might be a good place for us to stop and then we can pick it up next time. We still have a few more years left. Thanks for coming.

MCARTHUR: Oh, gosh. Good to see you.

[End of interview]