

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

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

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

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**TOM E. CREMINS**

**February 13, 1998**

Interviewers: Michelle Kelly, Doyle McDonald

*Kelly:* Generally, what I would like to start out with is, in your view, when did the Phase One Program begin, and how did it start?

*Cremins:* I would trace it back to President [George] Bush. Back in like, I think, the '91 time frame, or '90 time frame, even, starting by agreeing to do a fly-around and fly Russian cosmonaut on the Shuttle and then do a docking, that was really the impetus to start working with the Russians, after a long period of time where we hadn't been doing anything joint in space. I think they had thought about it once during the [Ronald] Reagan time frame, but I think Major Nicholson getting shot in East Germany, had turned it off. But that's kind of where the genesis of starting to work together with them came from.

Then the Phase One Program, being kind of the broader Mir involvement and having people on board Mir, really began, I guess, back when we were doing, in the redesign time frame, which was during [Bill] Clinton administration. Actually, that was still Bush. So it really started under Bush.

The main reason for it was the political and the foreign policy benefit of working with Russia as it was undergoing change, and having a visible program that did that, as well as people at the highest level at NASA and at the National Space Council seeing that it was an effective way to use the Shuttle, as well as use an existing Space Station.

So I think it could even go back, from another connection, to the synthesis group report, which was done under the Bush administration. That was looking at the moon/Mars. One of the recommendations in scenario three was to utilize the Mir as much as possible, to get as much life science and long-duration medical data to help us prepare to go onto the moon and Mars exploration. So there was a lot thinking behind it that really started before the actual program did, I guess, is the way I'd phrase it.

*Kelly:* Do you know anything about the foreign policy political aspirations, or the reasoning behind it?

*Cremins:* Well, I mean, a big reason, at least when I first got familiar with it, back when there was still a National Space Council during the Bush time frame was, again, as a way, a very visible way, to show us working together in a high-technology area in a positive manner, as opposed to in the old way of building bombs and trying to outdo each other in that venue. So that was the main impetus from that level.

Then the actual Phase One Program, when that got initiated, all the flights and starting to pay for some of that activity, a lot of that was directly related to trying to discourage Russian scientists and engineers from leaving the country and working for folks that didn't necessarily have a global interest or a good global interest, as well as to discourage some sales that were going on at that time of rocket technology to India that we were uncomfortable with. So that kind of along the same lines of trying to

create a positive venue for Russia and us to be working in, in a non-threatening manner.

So that was really what generated, I think, at the top level, generated a lot of the support for doing the flights to Mir. But there's a lot of levels to it. At the NASA level, it was a way to show the Shuttle being visible going somewhere, as opposed to doing--

*McDonald:* Boring old space.

*Cremins:* Boring old space. It was a way to have a destination for the Shuttle and to give early experience. I remember Mike Mott coming over and talking to us when we were doing redesign and trying to bring the Russians into the program. There was kind of their mainstream redesign effort and then there was the Russian integration activity. He came over one morning, and phrased it as kind of we did Mercury and Gemini before we did Apollo, and that the Shuttle-Mir would be kind of the same stepping-stone activity into the Space Station era.

So from a strictly NASA point of view, there was the foreign policy piece, as well as the learning and the operational experience of going into Station, as well, as not just boring holes in space anymore and having a place to go with the Shuttle. I think that was probably a big piece of it, too.

*Kelly:* Who were the primary people involved on the NASA side and on the Russian side to pull the program together?

*Cremins:* During the Bush era it was really done at a very, very top senior level, including the Vice President, the President directly. Mr. Abbey at the time was the senior person on the Space Council staff. So you could trace a lot of this back that direction as well. Then as it got rolling, Brian O'Connor did a lot of the early negotiations directly with the Russians, with Valery Ryumin. On the Russian side they've had a lot more consistent program management on the program than we have. Valery was in charge of the Russian side pretty much from the get-go.

After Brian, Brian was the overall in-charge of the Shuttle, they created a position that Guy Gardner came in and fulfilled as, I guess it was the Deputy Associate Administrator, Russia. That was for the three flights that I talked about: '60, '63 and '71, before the bigger Phase One Program got going, when it was just Shuttle-Mir.

So Guy came in and did a lot of the discussions we had out at Crystal City with the Russian team on those missions. Again, it was pretty much it was Valery Ryumin, although Boris Ostroumov started coming in from RSA and kind of sitting in the room, but really not saying too much or being a player at that point in time.

So the program evolved under Guy into the broader Shuttle multiflight program. People involved with that, it broadened to include like Arnold Nicogolian heavily from the science prospective, the research prospective. Tommy Holloway from a Shuttle prospective down here. They had a working group. Jim probably could help you better, or other folks. Jim Nise or Guy, folks that were heavily involved then.

There was kind of a working group down here that was established that was patterned after the Apollo-Soyuz test program, where they had Working Group Zero was the management group, because, as Ryumin said, "Managers don't do anything." [Laughter] So it's very appropriate to call it Working Group Zero. Then they had working groups one through, I think at the time, there were six working groups. Now we're up to like nine or so. But at the time there was six.

Since the Russians were real familiar with how we--same guys on their side, with how we had done Apollo-Soyuz, they liked that, to have the same kind of working groups on the opposite sides--

*McDonald:* And the same guys.

*Cremins:* And the same guys on their side, with Arnold probably being the connectivity. Actually, Arnold and Gary Johnson on safety down here. Gary Coen was involved early on, on the operations side. Gary probably went back to the Apollo-Soyuz with them, as well.

*McDonald:* Yes, he was one of the originals.

*Cremins:* Well, anyway, I got sidetracked there. But that's kind of how it evolved initially.

Then related to that, and parallel almost, we were told in November, about the same time as the addendum to the program implementation plan that Doyle worked on, I think was about the same time the concept of paying for some of this arose. So I was asked to put together a team to negotiate that piece of it, the \$400 million. So I'm very familiar with how that evolved. That was largely geared around some of these trying to provide disincentives to the Russians in other areas, as well as recognizing that we were going to get some unique capability and benefits that we should pay a reasonable amount for.

Since it was compared to a Space Lab flight, as it evolved, we were getting a real good deal compared to flying a Space Lab. We were getting to use Mir as a research facility and also have, rather than sixteen days, having people up there for four, six months at a clip.

*Kelly:* Would you tell us a little bit about how it was funded and what the money was actually used for?

*Cremins:* The money, it was basically kind of a strange negotiation, because we were told what the bottom line was before we went into it, so it was more of a negotiation around what fits in the box.

*McDonald:* And they needed a bottom line, too.

*Cremins:* They needed a bottom line, too. So it was kind of like a market approach of being out in the market, flea market or somewhere, and you both know how much you got in your pocket. They're trying to sell everything they've got at a higher price in order to sell you less stuff, and you're trying to get everything at a bargain price to get as much stuff. So that's kind of how the negotiation was geared.

We ended up with five long-duration missions and nine--well, actually it was eight--well, let me think. We had up to ten Shuttle flights negotiated. Right now we're using nine of those in the contract, as well as a bunch of research. We helped pay, and we primarily paid for the docking module that was attached to Kvant to enable us to dock regularly with the Shuttle. With '71, we had docked to an APAS on the Station itself. But we added this docking module to give us some extra clearance, as well as to facilitate that.

On Spektr and Priroda, we helped pay a portion of that, so that we'd have that research capability. Those modules, they had been saying they were going to launch them for a long time, but they just kept pushing the schedule out, because they didn't enough of their own resources. So we paid a portion of that. We got a certain allotment of our hardware being allowed on Mir, and power resources from Mir that they had to provide continuously, and cosmonaut participation in our experiments, as well as our astronauts' time. We figured out how much of the time should be spent on research versus housekeeping and that type of thing.

Those were the main things, as well as on the Station side, a big part of, and the main element in the negotiation was we were trying to carve as much as possible for the Station side, because we knew they were going to come back and want more at some point in time. So we thought it was in our interest to have as much applied to Station. They wanted as little applied to Station and as much applied to Mir.

So everything I described to you on the Mir side, they thought should take up pretty much the whole 400 million, or more, and that there should be zero money on Station. We felt it was probably about 50-50. So we spent the whole time kind of arguing the difference and getting to an agreeable position.

On the Station side, we got some start-up money for FGB that was in transition into the Boeing contract with Krunichev, as well as some money on their different elements for getting information and integration. Since we were responsible for all the integrate, to get some of the early information on their elements, as well as docking mechanisms for--since we're going to use their docking mechanisms on the Station, to get a bunch of docking mechanisms for the Shuttle and for the Station itself, for the PMAs on the node, for example. Some of the other hardware up there. So that's kind of where that all--that was all a part of.

*Kelly:* What was your role in that?

*Cremins:* Well, we did a letter contract starting in like that November time frame, a negotiation on that. I kind of led a team to put that together in a quick period of time. That was kind of a key piece for Gore and then for Chernomyrdin to have in place, so that they would feel comfortable moving out on the whole program.

Then we spent a long period of time on negotiating the final contract from about--well, it around the time I was getting married, so it was around early '94, I guess, we got together through about early fall on and off.

*McDonald:* One of the things that was difficult is, we had no idea how much anything cost on their side.

*Cremins:* So we were scrambling around trying to find any corollary data we could. We looked at how much does a Space Lab integration cost. If you looked at a module, how much were the development costs on our side? Because we were trying to get the Soyuz as a crew rescue vehicle. Look at how much did Gemini cost. If you actualize those dollars to today, and then how much do you take into account that the Russian costs are less?

Then looking at the Russian side, how much had they charged people to have people on Mir? Then what kind of group discount should we get? [Laughter] Also because we were bringing things to the Mir: logistics and water. We brought a lot to the table, as well, with the Shuttle. What kind of discount should we get and credit should we get for that and the pricing?

You're right, that was the real bear of the thing, was trying to come up with a logical approach that they could agree to, too, where both sides win, and trying to convince them of our logic, because they had no idea, on their side, what things cost. So they were really working. [One of] the main things [was] to try to get them on our approach and our way of coming up with the numbers, as opposed to everything should cost what Lockheed would do it for. Because they would say, "Well, you know, you were going to pay X for Bus One. Why wouldn't you pay that much for our stuff?" It's like, well, [for example], if your loaded rate for an engineer was a hundred, two hundred thousand dollars, as opposed to paying him sixty dollars a month, maybe we could be talking in that manner. So then you had to come to an agreed-to place of what's a fair and reasonable price, as opposed to doing it based on cost or on a Western price. You're right, that was really the guts of the thing.

So, as we got into the final negotiation part, Lee Evey came down from Headquarters and took over from the total prospective. I still was in charge of the technical and cost part of the price teams. Then

we had a legal team, as well, and a contract team to pull that together down the stretch. I guess Lee has since gone on back to the Air Force or something. He was the guy who did the Boeing negotiation on Space Station for NASA. I think now he's the senior civil servant guy for procurement for the Air Force at the Pentagon there, if you wanted to talk to him at all.

*Kelly:* Thank you.

*Cremins:* So, anyways, we got that done and then moved on. The program matured. The program switched in that time frame. It had been directed out of Headquarters, like I said, with Guy. I'm trying to think, at some point, and Jim probably gave you--he's got a much better mind for dates than I do. But at some point the program moved down here, and the focus shifted down to being a Space Station program. As well as Tommy Holloway, who had been kind of working a lot of it down here, took on a bigger role. I want to say that was in May of '94-ish time frame or April '94.

*McDonald:* Early '94 when they established the office down here.

*Cremins:* Okay. Yes, because I remember I was kind of shuttling between--I was still living in D.C. and shuttling down here. Jim was down here under Randy. We were over in Four South there. That's kind of where it shifted in emphasis from being a Headquarters [program]. It was reasonable that it ought to do that, because initially it was, like I said, a very political symbolic program and it was limited in scope. As we evolved into this broader program, it was much more of an operational program and broader in scope, so that it made sense to have it located down here.

I guess the main discussion was, it was under Station initially. Whether that was appropriate, because Randy had so much stuff on his plate just to get the Station going, whether there shouldn't be a separate organization just to work these missions, since it was big in scope and required a lot of resources, a lot of people. There was a decision made in that May--I think it was around the May time frame--to shift the program over to Tommy Holloway.

That's really when the Phase One Program was born. Up until then, I mean, we talked about it being the Phase One Program and all, but there was no separate program office or program location. You know what I mean? It was more of an ad hoc kind of organization.

*Kelly:* Who were the peripheral players, so to speak, in Houston then?

*Cremins:* When that all occurred?

*Kelly:* Yes.

*Cremins:* Right from the get-go, including when it was informal and ad hoc, Don Puddy was working crew issues -- the crew and crew training issues. Gary Johnson was working the safety aspects. Gary Coen was working operational aspects. Rick Nygren, I think, was involved at that time working some of the science aspects, although Arnold was still very heavily involved from the Headquarters side. I'm trying to think who else was in that initial group. Jim and I.

I was really tied up so much with the contract stuff that I wasn't as much involved in the ongoing meetings and working group meetings and all that kind of thing at that point in time. I'm trying to think who else. Oh, Tommy. Stu Grissom who's still in the area. Stu would probably be an interesting guy to talk to. Stu is kind of Tommy's right-hand person in the early time frame.

*McDonald:* Stu worked ASTP.

*Cremins:* Stu had worked ASTP. Stu had been around a long time and is a great guy. He'd probably be a good interview for you guys, from his perspective.

*McDonald:* I know him. He worked with us on the satellite servicing and rescue.

*Cremins:* He's around here. He's retired or consulting, doing something. There was another guy. Tommy had a real small staff. I remember going to some of his meetings, and there was probably five or six direct staff. Then what he had done is create a masterpiece document that I think I still have a copy of, that was kind of the birth of the program of Phase One. It was kind of a roles-and-responsibilities document that he and Stu had pulled together. Basically he went around and got every senior manager, including Jed Pearson, to sign the thing. That really gave him the authority to take over the program and to run it from a way that made sense to him.

As I say, it's a brilliant document. The cover page is the most brilliant part. The charts are very general and all, but it gave him the license, by having all those signatures on there, to go out and basically kick everybody's butt and get them into line and do what he wanted them to do. So that would be an interesting, from a historical perspective, document to have for you guys. I think that was signed by everybody and by Mr. Abbey in the May/June, '94, time frame.

So, Stu Grissom would be interesting to talk to. Tommy Holloway, obviously, would be not peripheral, but interesting to talk to. There was another guy, who was kind of a right-hand man to Tommy back then, whose name slips me at the moment.

Kathy Leary downstairs has been with the program a long time. Kathy was, and is, the worker that makes all the Shuttle flights and all the payloads that we've been flying with the Russians and back.

*McDonald:* Payload manifesting.

*Cremins:* Payload manifesting. From the get-go, was really a key person in doing that. I think she had been doing that out of Shuttle, and then Tommy actually physically brought her onto his staff as his staff broadened beyond that initial four or five people. There was a Tom--oh, boy, I forget his name. There was another guy. I can picture him, but I can't remember his name, who was another key guy for Holloway. His name slips me.

So anyway, that's kind of where that happened. Around that same point of time, when he got that charter signed for the Phase One organization and the Phase One implementation, [Frank] Culbertson was put in as his deputy. I'm trying to think who his deputy was before that. He had a deputy before that, but that person left, and so Culbertson was brought in as his deputy. After about four or five of the flights, Tommy moved on and Culbertson ended up being the guy. So it kind of went from Brian O'Connor to Guy, to Jim Nice, and then to Tommy, and then to Culbertson. I think that's the tract there. Have you heard any other names in there?

*McDonald:* No.

*Cremins:* I think that's the lineage there.

*Kelly:* Can you tell me a little bit about the Russian side? Did it evolve around the same time frame?

*Cremins:* Yes. Like I said, the Russian side has been very stable in the sense that they had Ryumin. It's been Ryumin, Ryumin and Ryumin all along. RSA was a relatively new organization when we got started. RSA was interesting, because RSA, on the contract side, since they're responsible for funding the Russian space program as a whole, was really the key player in that negotiation.

They had a guy who has since passed away, he was a wonderful guy and tough negotiator, Nikolai Zhulin, who I dealt with extensively, and Alex Krasnov and a few people on the Russian side who have consistently been the players on the Russian side, as well, who were in charge of negotiating the contract part. Ryumin was very involved with that, as well, but the RSA guys were really the folks who were the deciders on that.

Alexander Derechin was the key guy on the Energia side and on the total side of bringing in their cost estimates of stuff. But Zhulin was in charge of a part of RSA called National Space Program

Formation. Then he has a counterpart who is in charge of the Space Program Implementation. So he was at the time deputy to Koptev level. So that was a key function at that point in time for them.

Additionally, I mentioned Boris Ostroumov earlier. On the technical side, Ostroumov was, and is, in charge of manned space programs for, kind of like a Rothenburg-level position within RSA deputy to Koptev, as well. Like I said, he started out not really saying a lot in all these discussions. I think that was really because Energia, with Mir, had been given kind of the job of going out and marketing that and getting what they could for it and basically running it, with the exception of some inputs from RSA.

*Kelly:* It seems that their structure is very different than NASA's.

*Cremins:* Yes, in the sense that there is no real commercial entity in Russia. They're all still very much affiliated with the government, including Energia. Krunichev, who's their most successful commercial organization, reports directly to [Boris] Yeltsin. It's so commercial that it works for the President. [Laughter] So I mean, as opposed to being off on its own. People think, well, they're 100 percent commercial. They are and they aren't, I guess is the way to phrase that. So it is very different from us.

I think people get confused. A lot of folks on our side thought, well, Energia's running this thing. Well, that's yes and no. I mean, Energia is given the authority operationally to work a lot of these issues, but the Russian government runs this thing, because Energia is not separate from the Russian government.

*McDonald:* RSA is much smaller than NASA.

*Cremins:* RSA is much smaller than NASA, yes. RSA's got about 250 people on its staff. It evolved from the Ministry of General Machine Building (MOM), which, during Soviet times, they had these huge ministries and that ministry was kind of overall the defense and space and aero organizations in the Soviet Union. From what they call management, and had about 2,000 people at that time, MOM did. Then MOM went away and they kind of broke out RSA as kind of the MOM for space. Then they created this Ministry of Defense Industries, which was kind of the MOM for defense industries. Then they have an Aviation Ministry. So they kind of separated it into three, where now it's actually getting all pulled back together under RSA, since RSA's really got the--they're really focusing now a lot more on commercializing or bringing in dollars, leveraging off of the national budget. "We'll give you 50 percent of your budget, you need to bring the other 50 percent in on your own."

So RSA's in a very different position from NASA, in that they're responsible for the defense side of the house, as well as the civil side of the house, as well as the commercial side of the house. So they kind of have all that with a couple hundred people.

On the Russian side it's been fairly consistent. At the technical level, it's been fairly consistent-- Victor Blagov. The counterparts to those working groups, those six working groups. I'm trying to think. I don't think any of them have changed since the beginning, with the exception of Edward Grigorov died in October of last year. He was the counterpart to our life support folks and our medical folks. Unusual, because he wasn't a very healthy man. It was kind of interesting. He was in charge of ECLSS and all of that. He smoked like a chimney and was always asleep at meetings. It was kind of strange. [Laughter] Always had this pallor. It was kind of interesting. He was their ECLSS head.

With the exception of he and, I'm trying to think if anybody else has changed over time. I don't think so. I don't think they've had any changes. Victor Blagov, who's the deputy head of their TsUP, has been the head of the ops working group. Some of these splinter groups have been created over time.

There was just an ops group at first, and then they created this on-orbit ops group that Rick Nygren, who I mentioned--he would be also a great guy to talk to, and is a great guy. He would be a good guy to talk to, because they kind of spun out of what was Gary Coen's group, which evolved to Bob Castle and to now Phil Engelauf on the ops side. They created this other group that Rick took over that worked on orbit ops, part of it. So there's some splinter groups. Some new Russians got interjected along the way, or gained additional stature along the way, because of these new groups, but fundamentally their players have stayed the same, which is a big frustration they have with us, because we churn people a lot. Ryumin always likes to bring that up when he's toasting down at the Cape, that, "Oh, here's yet another NASA manager and my friend." He likes to rub that in.

*Kelly:* How about some of the other commercial organizations? Are there any other big partners involved in the Russian side, other than Energia?

*Cremins:* On the Shuttle-Mir, or on the Phase One Program, it's really dominated by Energia, since they're kind of the prime equivalent for us. They're the prime contractor for Mir. So there's a lot of subs that they bring in for specific things--VEZDA for spacesuits, and they bring in the Institute for Biomedical Problems, which does all their kind of life sciences stuff. Then Krunichev, because sometimes Energia would be a sub to Krunichev, sometimes Krunichev is a sub to Energia. They're both huge organizations. But Krunichev subbed to them on some of the modules. They were responsible for producing Spektr and Priroda and some of the big hardware.

What are some other organizations that have been in there? I know I'm missing somebody. But they've got about five or six major subs that we've interfaced with, but primarily it's through Energia.

Then you've got GCTC, Star City, which is a sub to Energia. In the Phase One side of things, at

least, was a sub for crew training. The money we would provide to RSA for crew training goes directly to GCTC. That's a guy who I didn't mention; Alexander Alexandrov has been the head, on their side, for crew training issues since the beginning, where we've had a couple people in that job. Currently, I think it's Charlie Brown, downstairs here, who had been working for Don Puddy, who was the who did it initially. So, GCTC for crew training. So those are the major subs.

Then the Mission Control Center, which is split between Tsumash and Energia, in terms of Tsumash owns, which is Utkin, Academician Utkin's organization, owns the facilities and staffs about 50 percent of it. Then Energia basically rents it from them for Mir for doing mission control. So that's another big sub.

Utkin I didn't mention. A chunk of the 400 million established the Nicogolian/Utkin Science Technology Advisory Council, which brought in the whole Russian science and research community. So there was a whole bunch of folks that Arnold was able to bring in through those proposals, that came in through Utkin, and were peer-reviewed on the Russian side and the U.S. side. I think there was about twenty to thirty subs or direct, either PIs or direct organizations, that were part of that. So those are the main groups out there.

*Kelly:* Can you tell us a little bit about what it was like going back to the contract negotiations, what it was like negotiating with the Russians? It's a tough question.

*Cremins:* It had a lot of very high moments and a lot of very boring, tedious moments. A lot of contentious moments. The most unusual part of it was probably the letter contract we did up at Headquarters, because both sides were told, "You need to get this done by December 16th," I think was the date, because there was a Gore/Chernomyrdin meeting. So we had basically three weeks to get this thing done. We were up, and Dee Lee who was--I guess she still is now--I guess she was the head of procurement.

*McDonald:* She still is.

*Cremins:* Okay. Head of procurement up at Headquarters, we were in her kind of personal conference room there and going from eight in the morning until three in the morning every day, weekends. I think the only day we took off was Thanksgiving Day. That was very intense and, actually, in retrospect, was a lot of fun, because that was most freewheeling time. Everybody was very motivated to get something done by that deadline, including the Russian side. I mean, for us, at least we could go home to our homes. I mean, they were living in a hotel in a foreign place. So it was unusual for them and us.

But that was kind of the funnest of the period, because once we got down here we were out in a formerly classified facility that, back when we used to fly military payloads, had been a secure facility. It's literally under the ground, no windows. Not the nicest--they still do special things out there like--

*McDonald:* Does it still look like it used to look?

*Cremins:* Yes. It would be interesting to see that. Because the Russians, I mean, they went out there and the only bunker they had ever known about was Hitler's, so they didn't really like it being called "the bunker." They didn't like being out there, because it's not the nicest. It's not what you could call posh executive conference. [Laughter]

*McDonald:* Ceiling tile table thing.

*Cremins:* Yes. So we got into it with them. I think it was over about a two-month period, with a few breaks in there, two to three months, and then we went to Russia for one piece of it. A small group of us went over to Russia for about a three-week period. But the part I remember of that was the Russians, because our positions were kind of far apart, everything we thought should fit within the 400 million, they came back and said, "Well, that's going to cost you 860 million. Hope you got another 400-plus." So they felt it was in their interest to drag it out as much as possible, to try to put heat on us to move off our position.

So we went through stretches of time where we would basically sit out there. They had their little section of the building and we had our little section. We'd all be sitting in there and reading newspapers or making paper airplanes or doing whatever out there. Without the windows it was interesting, because we would work a lot of strange hours. So you'd go in the morning, and you'd come out, and the stars were out or whatever. We'd go in sometimes five in the morning when it was dark and come out when it was dark. So it was kind of a strange experience that way, but, again, fun in the sense of you had a goal and you had a good team. We had a great group of people in both cases. So that makes it fun working on efforts like that. I know you probably remember some of those things that seem crazy at the time, but were some of the funnest times as opposed to just pushing.

*McDonald:* After they're over.

*Cremins:* After they're over. As opposed to doing your normal work, a nine-to-five job. I mean, it's kind of fun to have a mission. That's what that was like. When we got into it, we got very emotional at some

points.

At one point, we had a major international incident where the head of our team gave kind of a Pearl Harbor speech to the Russians. Basically the Russians took it very personally and stormed out. I think there was a bus there. They claimed--it was one of those June 90-degree-plus days with humidity--that they had to wait out in the sun for a half hour. So that broke down the talks for a couple days. They took it up to their ambassador and then he started squawking. I mean, it turned into a major type of thing.

At one point I was told to go over and talk to Alex Krasnov about it. I think they were genuinely offended by some of the things that were said. But at the same time, I thought it was very positive overall, because we were able to get through it and get it done. They were very happy, we were very happy, when it got done finally. There were a few issues. They like to have a few issues open to what the leaders decide. So there were a couple issues that went down to the wire. A few of us went up to Headquarters, Lee and I and Frank Goldston--I think you know Frank--went up to Headquarters when Goldin and Koptev had a meeting. They resolved the last couple issues that we had out there that were contentious to the point, at least on their side, they couldn't close it without having Koptev engaged.

They're an interesting group to negotiate with, because they kind of whittle you into thinking you're making progress. They'll take a very outrageous position and then kind of walk back from that outrageous position and make you think that you're making progress, when, in fact, all they're doing is going from outrageous to maybe slightly less than outrageous, and you think you've made a great milestone. But when you look at it, and you put the numbers up on the board, and look it, it's like, well, you know, we're still about 80 percent from where we think we need to go, and they'll change their position.

But the bottom line that I found with them is they're very logical people. If you make a logical case, that they can see the rationale behind it, and you explain it to them fifteen or sixteen times, and you show there's no flexibility, as long as they think they can get one more turn out of the wrench, they'll keep things open. But that's why it's real important to show them right from the get-go generally where your boundaries are and what the underlying principles that you can't move from are. Then show where the areas are that you can negotiate. Then to just keep reiterating those underlying ones, so that they see those are really sacrosanct, versus ones that can be further worked or whatever.

*Kelly:* Sounds more like an art form.

*Cremins:* Yes, it's a kabuki. It really is. I mean, to them the process is the negotiation. So it's real important for them that the whole process works. That applies, I mean, just trying to get a protocol with them when you're over there on a--it's just a Russian thing. It works at the technical level, at the

operational level, and at the bigger negotiating table over programmatic stuff. It's the same principles applied every time.

The neat part has been how well our teams, over time, have been able to get to know each other. I mean, folks now can go in, at the technical team level, can go and spend a week doing what it might have taken three or four meetings to get done and know how to get things done now. You go in with your draft protocol with what you'd like it to say, and then you talk about that draft protocol, as opposed to sitting down and spending the time getting to hear, we've been able--"we" being all the folks working with the Russians, have been able to learn a lot about each other and to realize how to kind of economize that a little bit.

*Kelly:* In that respect, what have you learned?

*Cremins:* Well, a lot of what I just explained, you begin to see by going through it that you might not have seen going into it. I don't think I would have had the same perspective on it three years ago that I have now. I've learned that they're very, very tough people, but are at the end of the day looking for a solution. Again, if something has a deadline out here, their objective is to use as much of that time to go through that process, to get as much out of it. They're kind of similar to some people I've seen who wait until you don't make a decision until you absolutely have to make a decision. There's no rush to make a decision with the Russians. Absolutely no rush. No concept of time. We're so schedule-driven and milestone-driven, where they're much more time is kind of this general realm, and you don't know if you're here or here or here within that realm.

So that part, I think, with a lot of our folks who were--and maybe my nature and background was not to be so--I think everybody's different that way. But a lot of the engineers, or like Frank and some of the guys from the business side, were very much, "This is how things get done. You've got A and B, and then you've got C and D." And would get very frustrated for a long time with the Russians and thinking they were somehow trying to torture them, when, in fact, it's just the Russian way of doing things. I think our folks over time have learned how to work within that and at same time get their work done.

NASA probably knows more about working with the Russians now than any organization ever has, for as many people as we have working with them. It's kind of phenomenal in that way.

*Kelly:* ... apply those lessons to Station.

*Cremins:* I didn't mention the Station side, but you have a lot of people: Mark Geyer and his group, Keith Reilly, initially, and Dave Mobley really initially, who have worked bringing the Russians in from a

hardware integration standpoint, who had a lot of the same learning curve I've just described and are doing great now, I mean, Mark's team, particularly, on the vehicle side of working with their counterparts. So that's become very mature.

Where we're still struggling is on the operations and training side for Station, specifically. The Russians, again, aren't in a rush to do anything, so they focused primarily on the Mir Program, and are still focused primarily on the Mir Program, because that's an operational program. Station is this thing that's going to happen at some point, so they haven't focused as much, whereas I think part of the frustration for Station, and having been in Station, too, for a long time, it just didn't appear like the Russians were taking things serious. That they just wouldn't commit to things, like the MOU.

*McDonald:* Two I signed last week.

*Cremins:* Last week, after it's been worked since--I mean, cripes, we were-- [Laughter]

*McDonald:* Six years.

*Cremins:* Yes, six years. So I think that part, if you couldn't see what the Russian attitude was, I think could be very frustrating and was for a lot of people for a long time. On the operations side, their guys, I mean, they've got limited resources. They don't have the kind of--particularly now with the budgets. I mean, we think we got budget problems. They've got major, major national economic problems. I mean, it's phenomenal that they're able to still be fine and maintain the infrastructure the way they are, given the transformation they're having to go through nationally. If we had that kind of adversity, I think we probably would have shut down and put the "for sale" sign out in front a long time ago.

So they'd been very focused of limited resources and focusing on the things that needed attention immediately. So people working on the op side trying to get SPIPs done and trying to get the board structure established for working a lot of our issues and all, were just making real tiny progress. A lot of that was just kind of grinding along, which is now, finally, because we are getting closer to flying, there is a lot more real attention being focused on it. So I think a lot of that will correct itself. Hopefully a lot of the people and lessons that were learned on the Phase One side will be involved on the Station side. That's kind of where it's evolving.

Keith Reilly, who's in charge of mission integration over on the Station side for Randy, is trying to bring in a lot of that Phase One expertise to help out for payload processing, for doing some of his launch vehicle integration, as well as looking at how to interact with the Russian elements. So hopefully that will continue.

On the op side, MOD has a large pool of people now who have been exposed to the Russian way of doing things. Naturally, we'll kind of be shifting more and more towards the Station side of things now that Phase One starting--one's going up and the other one's coming down. We're starting to see a lot more of that resource transfer, which is the right way to do it, probably.

I know Mr. Brinkley, Randy, has gone from having to focus purely on the U.S. side of things so much. I think he probably went to Russia maybe, I don't know, but probably a couple times in the first few years; he was in the boss box. Whereas now he's going more regularly. I've noticed his whole way of dealing with the Russians has evolved incredibly. He's learned a lot. I think Rich has already talked to him. But his whole way of dealing with the Russians has evolved incredibly over the last few years, which comes from just that weekly, daily kind of butting your head up against it. By butting your head up against it, you learn.

*Kelly:* Trial by fire.

*Cremins:* Yes, I think that's really the only way you can learn it. I mean, all the courses in a NASA office, a few Russian cultural training courses, which are great and helpful, and actually a lot of what the guy says is very true, but you can't really internalize that and apply it to your way of doing things until you get in there and start dealing with them.

So I think that's the greatest thing Phase One has done, is exposed a lot of people around the Center and around NASA to actually working on an operational level with their Russian counterparts. It's going to pay off in spades for Station, where we're going to have a control center over there until 5A and have most of our astronauts, who are going to fly, spending a hell of a lot of time over there, with a lot of hardware being developed over in Russia.

*Kelly:* I think we might need to take a break now. [Tape recorder turned off.]

Well, I'll go back a little bit. I'd like to ask you more specifically what were the main events of the program and what you perceive as the highlights and accomplishments.

*Cremins:* I think the whole idea and the whole rationale behind it, that's been shared by Republicans and Democrats alike, it's been a non-political program in the sense of seeing that there was a greater good involved. I think that part, to me, the primary accomplishment is that it has done on a--and we lose sight of that work in the day-to-day stuff--but on a big-picture level, it's done probably more, or has been very integral to developing a new relationship with somebody we used to spend a trillion dollars a year trying to figure out ways to blow up [each other]. I mean, to the extent that this relatively small program

contributed to that, when we were spending \$2 billion for a B-1 bomber, we're spending peanuts compared to what we used to spend to try to that and blow them up.

The other part that's been really neat watching over time is when you get people coming in from Randy Brinkley, people that trained their whole lives -- Mike Mott, Jim Nise, Craig Stencil -- down the list, who were operators in the military environment, who are now operators and figuring out how to make this work in the space environment. I mean, it was phenomenal watching Frank Culbertson, who had been a fighter pilot, up there defending the Shuttle-Mir Program on the Hill. Just talk about turning the world upside down in a good way.

The same thing on the Russian side. We've got people who used to couldn't talk to us. When I started working Russian stuff twelve, fifteen years ago, I mean, there was very few Russians that were allowed to even travel to this country. I mean, now we fill up the hotels around here with Russians. The people we're filling them up with were all people working classified programs and working sensitive programs on their side, and now our guys sit down and pick apart guidance and navigation control systems that used to be top secret. Now our guys are sitting down comparing lines of code with each other. So that part is pretty phenomenal in terms of an accomplishment standpoint.

I'm not real good at selling all the research and all that stuff, but there's plenty of benefit that we've gotten by being able to fly long duration, that we wouldn't have been able to get otherwise. We've had this Station program for how many years? I mean, longer than we've been in NASA. A lot longer, probably. Right? When did Station begin, Freedom?

*McDonald:* '84.

*Cremins:* '84 was the start. So I mean, we've had a Space Station--

*McDonald:* We did other things before that, but '84.

*Cremins:* So to actually be up there working in a Space Station for over two years now continuously is a phenomenal accomplishment, too, and what we've learned about them. Mike Foale and some of the folks up there have been able to experience and learn, again, in a real environment, not a hypothetical environment, is exploration that's going to help us get behind the Earth orbit. So I mean, that's an incredible accomplishment, too.

But I guess major milestones, the initiation that Bush got under way with I guess what was at that time the Shuttle-Mir Program, just the three flights of '60, '63, and '71, the excitement around those first few flights, and the attention those got, to help refocus the country on doing something positive with the

Russians, I think was a major milestone.

Bringing the Russians into the Space Station Program, things Dole and I were involved with back during the Crystal City days, I think was a phenomenal milestone. Unprecedented. I mean, working on that level. We had worked with international partners before, but it's been an astronaut here, a payload there, plans to do this. But to actually try to integrate two human space flight programs, which that activity did, the Crystal City activity started, I think was a phenomenal milestone.

Then each one of the flights has been different and has been unusual in its own way, or special in its own way. You might want to talk to Mike [Foale] about his experiences. He's a real eloquent guy. He's a big-picture guy, as well as somebody who's been there and operated. You've got a lot of people who could really probably give you a lot of different dimensions to that question about milestones that they would see.

Personally, getting the contract thing signed and seeing that implemented to the point where we're well over three-quarters of the way through it, and it runs itself now, basically, whereas early on and same on the technical side, it's a lot more normal operations being dealt with at the right levels, as opposed to things have to be--Team Zero's for Phase One, they used to be a lot more contentious. They used to have a lot more global issues than now, where it's primarily worked at lower levels and the Team Zero is more or less what Ryumin said it should be all along, it's more a rubber stamp-type of form, with exception. Like I said, each mission's been unique, so there have been some pretty serious levels of excitement.

Probably a real big milestone was this past summer with the decision to keep flying, even after the collision and the fire, and what that did for our relationship, which I think on a lot of levels political, psychological, a lot of levels, will pay off in the future, the fact that we stayed committed to working with them at probably their darkest hour on that Station. The character and class that Mike Foale and others that were out there on the point of that and Frank Culbertson showed, I think, reflected well for everybody, for the country. So that was probably a key milestone, too, is the decision in the face of a lot of negativity and a lot of cynicism and a lot of shortsightedness, in my opinion. A lot of that that was being generated around that and a lot of the "kick the dog while he's down" perspective.

Frankly, a lot of people think being on space should be like living in a deluxe apartment, where you've got a chauffeur, and they want your clothes pressed and all that, and not recognizing what exploration's about, which I think people like Mike and others, who articulate it so well about, compared to the other problems that are going on Earth with pick your country, Rwanda or Middle East or wherever, how insignificant really those personal problems are when you look at in a bigger picture, and yet how important it is to do that hard work and to work through those things, and not just quit when the going gets

a little tough.

This summer was probably the biggest milestone in the program. Everything else had gone pretty smooth up until then from an operational standpoint.

*Kelly:* Can you tell me a little bit about what NASA learned in working and integrating with Russia, especially after those catastrophic events?

*Cremins:* Frank and Jim VanLaak and Jim Nise and others would be better equipped to answer that. But probably what that showed both sides was that full and open exchange of information is in everyone's benefit. I mean, when we started out, up until that time, it's been a slow process, particularly for the Russians, to share information, because it's just not in their nature. They feel from a propriety standpoint, as well as from a--just in the past, everything was classified, a lot more so than NASA ever was. But even NASA has a culture of not being very sharing in information. But, I mean, they've got it in spades.

I think the summer, the managers there, Ryumin and others, with us basically being our joint, and selling our program jointly to our public, they saw the real value of full and open exchange of information on their Station. It had developed incrementally over time, but it was an exponential increase in that information during that time frame, which hopefully will pay off in the Station environment when we're flying together, that we're going to need that kind of free and open exchange of information for both our benefits.

In order for us to be able to sell the program here, and them to be able to sell it back there, we both need to be able to say we know a hell of a lot about what we're each doing. That's probably the biggest benefit that came out of that. But Frank probably is the right guy, or Jim VanLaak, to answer that one officially.

*Kelly:* There are no official--

*Cremins:* Okay. [Laughter]

*Kelly:* So don't worry about that. You mentioned a few of the things that you were really involved in. For instance, in getting the contract negotiated. But can you tell me a little bit more about what you specifically did throughout the program?

*Cremins:* I guess it's kind of like Doyle's [McDonald] job has been along--you know, kind of duties-as-assigned type of thing. Early on, when I first came in, I had had experience prior to joining NASA working

with Soviets and in kind of understanding their--I'd done a lot of research on their space and defense infrastructure prior to joining NASA. So, early on, I was kind of an advisor, more or less, when I came to Headquarters, to Guy [Gardner] and to others in the NASA management, just from a background perspective, on who we were dealing with and where the genesis of some positions and that type of thing might come from. That kind of evolved into the contract activity, which was pretty intense for a year or so, and then evolved into, as Jim's [Nise] deputy, being involved in some of the day-to-day meeting stuff, as applicable. But that never was really the--Jim would do more of that and I would do more--again, because the contract negotiation part took so long. That really consumed a good portion of my time with the Phase One Program.

Then also, we've tried to provide a bridge between Phase One and the Station Program all along in terms of connecting the right people and trying to bring Station to be more aware of what was going on in Phase One and vice versa, and make sure that those lessons and experiences were being shared across the board, has been something I've focused on for Jim. So that's been the main areas.

I continue to do the assessment side of things, as well, from tracking their infrastructure and their progress. So I guess those would be the main areas. Then ongoing with the contract implementation side, it has so many users trying to keep all that on track, which has become less and less a job as time went on. Early on, there was a lot more of the trying to herd cats or negotiate between our folks, where now people really know how to use it and know what to do with their counterpart. So there's a lot less of that that needs to go on.

With the exception, I mean, we've made some major mods. We've added a few more flights. Last year, because service module was in trouble, we did some rephrasing of payments in the contract to help out on service modules. So I started getting more and more involved on the Phase Two side, with tracking service module and tracking the Russian segment progress, which I still do now for Randy and others.

So it's kind of evolved. Rather than just the Phase One side, it's kind of evolved into more Russia in general.

*Kelly:* Can you tell me a little bit about your work in bridging the two phases together?

*Cremins:* Well, that's really a people thing, because sometimes people just don't realize what other people are doing. Sometimes people lock horns because they're looking at it in their way, versus how someone else might look at it. So a big part of it, and Jim, when we first came down here, some folks wanted us to be over here [in the JSC institution]. Jim resisted that, wanted to stay in the program, because he felt it was

important, even after Holloway took over the program, he thought it was important to keep a presence in Space Station. Because going back to kind of what the genesis and reason from a NASA perspective, not the foreign policy, from NASA perspective, why Space Station was important was as this kind of stepping stone--or Phase One was important, was a stepping stone into Phase Two and Three. So Jim thought it was real important we stay there and stay on track of what was going on in Station. And vice versa, stay real involved on the Phase One side, to make sure, at a management level, that Randy and the department-head level, was aware of what was going on on the Phase One side, and to the extent that Randy wanted to have an impact on that, to make one.

Then from events that go on, like EVA, or at the custom or support room over in TSUP, in terms of getting the right people on the Station side to be aware and plugged in into those forums, so somebody working EVA over here on the Station side, knowing that, and getting engaged with the appropriate people on the Phase One side for key events. So we tried real hard to do a lot of that connectivity. But again, it's an uphill thing, because everybody thinks the job they're doing in one place is more important than looking at something else that someone may be doing. That applies to both programs. It's probably a human-nature thing more than anything. Your piece of the world. You got all your actions coming in, and that's where you're looking. You don't really think you have time to look out beyond that and see what else you might be able to learn or whatever.

*Kelly:* That also happened, I think, between the Gemini and Apollo Programs.

*Cremins:* Oh, is that right? Is that what you guys heard?

*Kelly:* That seems very similar in that respect. What were some of the other difficulties in integrating with the Russians?

*Cremins:* Technically it seemed all along that at the technical level, once the barriers came down, people were speaking more or less the same language, whereas at a program management or at an integration level, have different agendas. Part of it is, with NASA with all the different agendas we have in NASA, ranging from personal to organizational to programmatic, it's nothing compared to trying to deal with a country that's got its own set of objectives. Then all those other things filter down into organizationally you've got these differences that they used to never have. I mean, [Russians] used to speak with one voice. But now, because we're interacting with them so deeply, and because their whole country is changing, a lot of their organizations and their relationships are changing. So I think that's been real challenging for us, because it's a moving target.

The other part of that is, we've got one set of objectives of what we're trying to accomplish. Overall, we probably share objectives, but they've got a different set of priorities and a different timetable of getting to those. I mean, this whole thing about the Mir, when's the Mir going to de-orbit, is a good example of that. I mean, we've got our objectives, which is we want to get Station flying and we want to move away from that era in a reasonable, logical manner, where they've got different motivations and different organizations in their country, and different motivations. So I think that part's a little bit, probably, harder and more challenging, but actually at the end of the day probably more fun than doing things within the NASA family.

That's probably the biggest challenge integration-wise, because I think technically, you know, we may disagree and the exchange of data, the amount of data required, the amount of trying to agree on what the joint requirement ought to be for a certain system or a certain test, or whatever, will differ. So we've had a lot of differences that I'm not trying to gloss over. But I think on a macro level, the one I mentioned is probably the biggest one overall that's affected us. But all those little ones at the system level add up, but we seem to be able to get through those eventually. It just takes a lot of time, like we were talking about.

There again, they're always on a different time. I've never seen the Russians in a big hurry, with the exception of the docking module. I mean, they can produce hardware like no one's business, given resources. The docking module they produced from an envelope in Crystal City to delivery to us in under a year, for \$25 million. So I mean, they can be very--

*McDonald:* We'd still be in Phase Two.

*Cremins:* Yes, we'd still be in Phase Two talking about what the hell we want to be building. [Laughter] I mean, that was pretty phenomenal. I think we were all real impressed on that. They chunk hardware out like no one's business. The FGB, you look at that piece of hardware, and what they were able to do on that in a short period of time. Even the service module. Last year, I went over there in November, the shell was there, but there was nothing integrated into the vehicle. When we went back this November, the amount of change that occurred, you know, they had an electrical analog vehicle completed. They had the propulsion unit pretty much completed. They were integrating probably 70 percent of the flight hardware. That was in a year.

Well, I kind of diverted from your initial question. I think there have been hurdles at the technical level, but, overall, trying to deal with another country with a different set of--not necessarily all the same agendas as you has probably been the biggest challenge.

*Kelly:* Have you had to counter some of those yourself?

*Cremins:* Well, in terms of myself, in the sense that I'm part of the team, and as a part of the team you provide inputs and are involved in that. I've seen it on the contract side very closely and more personally than I have in some of the decisions that people that get paid the big bucks, like Randy or Frank or Mr. Goldin or Mr. Abbey have to make. But as part of the team, you make inputs to that.

So that's been neat watching that evolve, as everybody's different in what they're interested in. I mean, watching those dynamics, to me, is interesting. Maybe I've been aware of it just because I'm interested in it. Somebody else would probably be more interested in what decision was made on the thermal control system at that point in time that needed to get resolved. They might see that as being the biggest thing.

*McDonald:* I just find it interesting that you used "George Abbey" and "dynamics" in the same sentence.  
[Laughter]

*Cremins:* [Laughter] You can't ever, as Doyle--his hand is particularly on this. Well, in everything, but on the Russian thing, the invisible hand is always there. That's been interesting to watch, too, because it's very much a Russian way of doing business.

*Kelly:* That's interesting. Can I ask whether or not you think that there might be any benefits between the relationship of the U.S. and the Russians, that some of the other space agencies will benefit from?

*Cremins:* You mean something like ESA or whoever?

*Kelly:* Or NASDA.

*Cremins:* Hopefully they'll benefit. It was interesting early on because our whole Code I--and this is kind of a personal off-the-record observation, but Code I, when I first came to NASA under, I guess it was Peggy at the time.

*McDonald:* Fenorelli.

*Cremins:* Fenorelli. Was very much geared to cooperation with the Europeans, primarily. This Russian thing kind of got thrust right in the middle of that and upset a lot of apple carts, both within NASA and within our relations with our other partners, the way that was done. It was inevitable it was going to upset apple carts, going in the front door with it was probably the best way to go. I mean, if we'd talked about

doing it, we'd probably still be talking about doing it; we wouldn't have done it.

It was interesting, because you almost had more support for the program at the administration level than you did within NASA originally. Originally, there was kind of camps within NASA. If you went around, there's probably still people that probably think, "What the hell we dealing with those godless commies for? I spent my whole life trying to protect America against them, now we've got them coming in, in the droves, living in Clear Lake. What the hell are we doing?" I'm sure there's plenty of people out there who still feel way.

Hopefully, the other partners see now the benefit and see now that we've basically saved--I think people realize we've saved the space program, at least the human space flight side of it by working. I believe that. I mean, we were two votes away from losing the program before we brought the Russians in. So I think folks see the benefit to it, to us working with them. I think they probably have mixed feelings though, the partners, because it's kind of diluted their role with us and our dependence on them, you know, because before all the political, it was kind of like NATO, we were all dependent on them politically as a group, whereas now we're much more dependent on the Russians than we are with the Europeans or anybody else. So I think they probably have mixed feelings on our involvement with them.

But they're learning a lot from the Russians. At the same time, the French continue to go up there. They got a guy, the Europeans have a guy up there now. So they continue to benefit from working with the Russians, but it's more on a country-by-country, or a European to Russia or--

*McDonald:* Not as part of the partnership.

*Cremins:* Not really as part of the partnership yet. It will probably evolve, because we've really dealt with it much more bilaterally than we have as a group, with the exception of now with the IGA all being signed.

But once we start operating, it will probably evolve. The Japanese, that's a tougher one, because they've got a much different political view than we do, that's just starting to evolve. They had a longstanding, I guess, not feud, but their own little cold war with Russia, that's just starting to evolve.

So hopefully with time that will all benefit everybody. I'd say initially it was probably more the other way, at least from a group perspective. One on one, Europeans are getting a lot out of Mir. I've been involved directly with the Russians before we got this program going, a lot more so than NASA was. Germany and France particularly.

*Kelly:* You make a really good point there, saying how it's done bilaterally as opposed to multilaterally.

*Cremins:* Right now. Right now, with a few exceptions like with these intergovernmental agreements

being signed. But even that, we negotiated that pretty much on a--the piece of that I was involved with Barry Waddell and Melanie and those guys, with the balance of contributions, which basically opened up the door to allow the agreement to be signed. That was done purely bilaterally. That kind of irked the other partners, because we kind of were keeping our cards all to ourselves, and they were kind of keeping them at arm's length for those negotiations, which were also done partly out at the bunker. So they were happy to come back and face the bunker again. [Laughter] Krusnov was like, "I'll come to Houston, but just not the bunker." So eventually got it out of McDonnell-Douglas Building back there, which was a little nicer for them. [Laughter]

*Kelly:* It had windows.

*Cremins:* It had windows, yes. [Laughter]

*McDonald:* It was above ground.

*Cremins:* And it was above ground. [Laughter]

*Kelly:* You mentioned a little bit about congressional involvement in this whole program. Can you touch a little bit about what their specific involvement has been?

*Cremins:* Not without using some expletives. [Laughter] No, I shouldn't say that. I remember before I even came to NASA, where I was in another agency, the Space Station in particular was very contentious and very dull. I think it was probably more contentious politically than it's been since we brought the Russians in. Well, before the Russians. I think Congress has been a lot more hands-off with us ever since we brought the Russians in, with a few exceptions, Sessenbrenner primarily being the exception, and lately now more with the discussion over whether we've got our priorities straight between human space flight and doing advanced technology, like Rorbacher and some of those folks would like to see us be doing.

But I think the work on particularly the Phase One, actually doing something in space and having a place to go, a port of call, has probably, with the exception of this past summer, has probably helped keep the Shuttle Program, too, off the skyline, because it's been a very visible program, very much tied to the President. From a bipartisan foreign policy point of view, I think it's probably helped politically and congressionally in that way. More in that we haven't been getting a lot of--it helps when you don't have a lot of congressional help with your program. [Laughter]

*McDonald:* The best thing you can hope for is the phone doesn't ring. [Laughter]

*Cremins:* Frank did a phenomenal job this summer, and Mike from orbit, and then once he came home, of selling and keeping and getting it back on track. Keeping it in perspective, and making that interest kind of peak back off, where now it hasn't been in the papers since--unfortunately. I think it could have a lot more positive attention on it, other than when the air-conditioning system breaks down. But that's the nature--

*McDonald:* Or the [project] goes down. That's all you ever hear.

*Cremins:* That's all you ever hear publicly, and that's all Congress ever really picks up on. But I think, fundamentally, because they haven't really bugged us, I think there's plenty of people out there who we don't hear from who think it's a good program. I think a large part of that is because we're dealing with the Russians.

*Kelly:* If you were the media, then what would you want them to focus on, as far as the positive aspects of our relationship?

*Cremins:* Well, I think a couple of things that we've already hit on, like going from a trillion-dollar defense budget to a relatively small, expenditure-wise, at least, a relatively small program, which has allowed us on both sides to capture--I gave you a few examples of people and Bill knows this whole litany, including Dinkle and others, who had spent their whole lives preparing to fight these guys, are now on the point of the spear trying to work with them and figure out how to work with them. I think that's a pretty neat story, which you don't hear a lot about. If anything, you hear about it negatively, that NASA's becoming a more military organization, which is something, because, in fact, what we're doing, it's converting ourselves into an exploration program.

Then the other part you don't really hear that much about is the connection between what we're doing on orbit, and what we're learning, and what we're doing together, that's going to provide a bridge to building a Mars mission, which you can't do just sitting on the ground doing viewgraphs and doing technology development. You need to be learning, which over two-plus years continuous in orbit, Russians and Americans together, is a pretty phenomenal story that you don't hear a lot about. I mean, you do every now and then. We do get the message out somewhat for kids and all to realize that, I mean, even for us, I think we all got involved because it was an exciting program. It is future-oriented, which so few things are. So I think that message could get out a lot more effectively.

I'm not sure how much of that is the press' fault and how much of that--we've talked about this--how much of that is our fault and how we do business, and making it exciting. I've heard Peggy Wilhide, she actually sounds pretty refreshing in that way, the new PAO person, in terms of going after it, getting

the word out and not waiting, in terms of the press, as opposed to Congress, not waiting for the phone to ring, but getting out there. They're going to get Dave Wolf out on "Letterman" and some other things.

*McDonald:* It's great.

*Kelly:* It is great.

*Cremins:* It's not just the press's fault. It's easy to beat up on the press, but you also have to sell, too. So anyway, I think, those things.

*Kelly:* That's a very good point. I don't know if you have any questions.

*McDonald:* I want to ask a couple. We're going to be sitting here and put this in a box. This is the real question. I don't think you have to start with Bush. I was going to start later than that, but I think you're right. I think you have to start with Bush and show the story through that. But I think basically, the themes--I'm trying to repeat to you what I think your themes are. You know, we are spending money on this program, but we have to keep everything in perspective.

Then another theme is, we're going to spend our entire careers, and our children are going to spend their entire lives, in LEO, unless we do something, the basic fundamental research. You could treat this almost like Bell Labs. This is fundamental research that has to be done. Can't be done analytically. Can't be done in 1-G environment.

Another theme is, this is too big to really do by ourselves. If we're going to do it in a global manner, we've got to operate in a global manner.

*Cremins:* And what better place to start than with the Russians, getting those two programs together. Then the European contribution and the Japanese and whoever else wants to join. It's a lot more meaningful if you've got a real catalyst moving forward, which our two programs is.

*McDonald:* To me, that's the three major themes that are coming out of the way you look at it. Then all the engineering and the technical piece, that's all supporting data that supports that. But they support those three themes.

If I were looking at a closure point, it would be the transfer of this knowledge to Space Station, as well as making the public aware of it. But I mean, to transfer this knowledge somewhere, both on the operational side and into the public where everybody understands it.

*Cremins:* And beyond.

*McDonald:* And beyond, but that's the next step.

*Cremins:* That's the next step.

*McDonald:* That's the concluding chapter, is we didn't just go do this; we took full advantage of it, both inside the agency and as a way of dealing with our former enemies. Less is bigger than just the Space Station.

*Cremins:* Absolutely. That makes it more exciting, I think, too, for kids, if they saw it that way.

*McDonald:* I mean, again, it's not just space.

*Cremins:* Yes, it's connected to everything. It's connected to everything we're doing in terms of technology development, into the type of country we're able--and we're not living--we don't have air raid drills anymore where you go under your desk. I mean, there is a future now. There is a future and this is a key piece of it.

*McDonald:* Like every day wondering whether your kids are going to get nuked.

*Cremins:* Get nuked or whatever.

*McDonald:* Absolutely.

*Cremins:* For the minimal paltry amount that--for that kind of future to be opened up to people.

*McDonald:* We aren't selling things to Saddam Hussein.

*Cremins:* Yes, I think that part is kind of the neat part. Bush should get some credit for it and Clinton should get a lot of credit for it, because they both saw it. I think Reagan even saw it, but he got--this may even go back a little bit to Reagan. I'm trying to remember. But he did that whole thing with Reykjavik, with trying to do SDI "Let's all get rid of our missiles" thing. I'm pretty sure NASA looked at it in maybe like, '84 or so, or maybe it was even earlier. There was the Afghanistan invasion in like '79 that killed some things that were growing in this direction. Then there was the Nicholson thing, him getting shot and killed in East Germany, I guess. I forget what year that was.

But now we're at such a point, I mean, you don't even--little minor things--minor? Big things, like our current situation in Iraq, you don't see anybody threatening to pull the plug on this right now. You

know what I mean?

*Kelly:* Right.

*Cremins:* It's kind of gotten to a point where it's got his own life force. It's not purely a political program anymore. Or maybe it's so much of a political program in terms of our relationship, that it would be hard to pull. I don't know which one it is, the chicken or the egg.

*McDonald:* A lot of it, I think, is that people don't look at it as highly political, so it doesn't get radar screened.

*Cremins:* Because we're operating. It's down here, it's being done with--

*McDonald:* Just operating, we're doing work. They're not talking about closing their borders either.

*Cremins:* I think if you talk, if you guys get some time, Mike [Foale]--I keep saying Mike, because I think he would be a great one to talk to. But from a Lewis and Clark, or Lewis and Ivan, perspective of being on the frontier, and Dave Wolf's letters. I don't know if you guys got a hold of those, those letters.

*McDonald:* Yes.

*Cremins:* I mean, those are great at showing kind of that you learn by being out on the frontier, and what it's like being on the frontier. And that is the new frontier. I mean, that's NASA explores the space frontier, for kids and all. I think to those that aren't just, got their slide rulers out, and are interested in it from a--you know, the pocket protector crowd that are interested in it, too, from an excitement standpoint. Dave's letter were phenomenal in that way. Yes, but I think you hit it on the head, Bill.

*Kelly:* That's great. Do you have anything else you want to add, or some other relative points?

*Cremins:* Not unless you got any more questions.

[End of interview]