

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

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

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

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**GENERAL JOE H. ENGLE, USAF (Retired)**

**July 15, 1998**

Interviewers: Rebecca Wright, Carol Butler, Paul Rollins

*Wright:* July 15, 1998. We're speaking with General Joe Engle with the Shuttle-Mir Oral History Project. Rebecca Wright, Carol Butler, and Paul Rollins. Good morning, and thanks for taking time out of your schedule to meet with us.

*Engle:* It's my pleasure.

*Wright:* We're here to speak with you as part of your responsibilities and role with the Shuttle-Mir Program, and we understand that you're part of the Stafford Task Force. We'd like to start with that. Would you explain some of those roles and responsibilities?

*Engle:* The task force itself was chartered initially by the Gore-Chernomyden Committee in 1994, I believe, and I'll have to check on that date, but I think it was 1994. The actual requirement or the actual impetus came when our role in the Mir mission was expanded from a one-time visit to a series of seven to ten missions. It turned out to be seven missions, but initially the flexibility was given it to be for from seven to ten missions. When, I think, the senior management and also even the administrative officials realized that there was going to be that extensive and that deep of an involvement in the operation and participation of crew members from both sides of the ocean on each other's spacecraft, there was a realization that a better understanding of each other's hardware and operation and how we operate was really needed for safety purposes.

Up until that time, the agreement was that we would worry about all the procedures and the safety and the training up to our side of the docking interface and the Russians would be responsible for everything on their side of the docking interface. That was okay for one mission, but when seven to ten missions became the mode of operation, then I think the realization for better understanding was needed, and the Gore-Chernomyden Commission, when they met, when Vice President [Albert] Gore [Jr.] and Prime Minister Chernomyden met, they felt that there needed to be a mode of communications perhaps outside of the normal program office line of communications and outside even the administration's line of communication for issues or problems or events that would come up that could benefit from a totally independent top-level type of communications capability with each other and that that vehicle should be made up of people who were knowledgeable and competent in operations and hardware of space flight and could understand each other's problems and help arrive at solutions, perhaps from a different perspective than what the program office might be looking from.

So, the Stafford Task Force was given this responsibility, and of course General Stafford was a natural for it, because he had been extremely respected in Russia's space program, primarily because of

the fact that he was the commander of the Apollo-Soyuz mission and had had a number of very good friends, very close friends, in the space business over there, and they respected him and trusted him. So General Stafford was a natural person to lead this group. His responsibilities here with the other businesses that he's associated with and his other obligations here limited the amount of time that he could devote to this and the flexibility of being able to devote, so he asked me to be essentially his deputy or his assistant and to participate in that role or in the capacity.

Of course, I was really very honored that he would ask. Tom and I have been closely associated in flying and flight tests and research since 1960, when I had applied for--I wasn't even accepted--to the test pilot school at Edwards. I was stationed at George Air Force Base, and I'd go over to test pilot school and snoop around just to see how my application was coming along and to look at the classrooms and just dream and hope. Tom was an instructor there at the time, and I remember talking with him before I was even accepted to the school, and then he was one of my instructors at the test pilot school. Of course, when I came down here to NASA at Houston and was assigned here, one of my first duties was as a support crew on Apollo 10, on his flight, his first Apollo flight. So I was working for him again, then, down here. So we've had a long, close working relationship together, and I've enjoyed every minute of it.

*Wright:* Those three decades of experience in the space flight industry helped you with the technical and the operations and the hardware side, but personally what did you have to do to prepare for this new job? Did you have to take Russian or did you already have that language as part of your expertise?

*Engle:* No, I don't speak Russian. I'm not at all proud of that. I wish that I did. I wish that I had made the effort to study Russian, to be able to converse in a social way with the Russians. I think it would mean a lot to them. It would mean a lot to me, but it would mean a lot to them, and I haven't done that. I don't think that, regardless of how much I studied Russian, because I don't speak any other foreign language, really, I don't think I would trust myself in the types of communications and the types of issues that we have to discuss. I don't trust myself to either understand well enough what our counterparts are trying to say or to be able to project what I'm trying to think. I think that the professional interpreter is an absolute must, certainly for me. Now, there are some folks here in the program who speak fluent Russian and feel very comfortable with it. I really admire them. But I don't.

But, no, the language was certainly an obstacle, particularly without an interpreter, because some of the Russians speak some English, and it's kind of embarrassing to me to see these guys who are able to speak part of my language, and I'm not able to hardly say much more than "hello" and "good afternoon," or order a beer, maybe, and something like that.

But I was prepared--I don't think I knew how to prepare to work with the Russians when we

initially went over. My professional career, as a matter of fact, was really spent in the cockpit of an F-100 on the end of a ramp with a nuclear bomb under my wing, preparing to do our part of the Cold War thing when we were engaged in that. So I had never--I don't think I'd ever conditioned myself to think about working closely with the Russians.

I certainly never expected to be in Red Square or to walk the streets of Moscow, but I think probably one of the main things that I learned and benefited from having the opportunity to do this job was to learn about the Russian culture, and it is different than our culture. Their values are different. They certainly have a different way of approaching things and rationalizing, and it's not wrong. The fact that it's different than ours doesn't make it wrong and ours right, or vice versa. Each has worked for us, and it's difficult for each of us to really just do a complete 180 and flip and practice the other's culture.

I think that one of the greatest benefits that we've learned is that we can compromise our cultures--not compromise the culture that we have and hold dear as our heritage, but compromise our ways of doing things in order to get a common job done. They go into space, and they do it very, very well, and we go into space and do it very, very well. We do it differently, but the two ways don't always fit perfectly, and so it takes some understanding on each other's part.

*Wright:* Was that part of the task force's responsibility, is to find ways and help those ways when they didn't fit totally together to make that happen?

*Engle:* That's exactly right. In fact, I think the purpose was realized by the folks who had set up and chartered the commission, was that there would be times when it was extremely difficult, perhaps sometimes embarrassing, perhaps sometimes restrained by contractual things, that it would be difficult for the program managers or even at the higher levels in management to openly discuss--and I don't mean that there's anything secret. I mean it's just awkward for them to talk about it because of contractual arrangements that they'd agreed to previously. But by having the Advisor Expert Council, which is the Russian counterpart of the Stafford Task Force, and having that level of communication, which consists of a number of very senior management-type people and people who are respected in their own space communities and, incidentally, by the other side's space community as well. But having those folks sitting outside the box and able to take the problem or the issue and discuss it and try to suggest an alternate solution and then go to their respective agencies and let it come in from that direction sometimes is very, very effective.

*Wright:* Were there times in the last few years that this role was more challenging than others? Were there some specific instances or situations that happened between the two nations that challenged your group more than others?

*Engle:* There have been a number of them. One that comes to mind, it was not too long ago, was when the Progress vehicle had the collision with the Mir. It was a very unfortunate thing, of course, and it was something that both sides wanted to make sure was precluded, they didn't do it again. Whatever the conditions or the elements that allowed the collision to happen, everything was done possible to avoid having that happen on the International Space Station, because we will have vehicles, unmanned vehicles, cargo vehicles coming up to resupply the International Space Station, and we could very well run into a similar scenario, particularly since those vehicles will be coming from a number of different international partners, not just the U.S., and not just Russia either, but from other international partners.

I think that the direction that the Accident Board was heading was one that is probably very--not efficient, but expedient one, that essentially put the blame entirely on the crew, because the crew was there, the crew was controlling the vehicle as it came in. When our folks started looking closely at all of the elements that were involved with it, we found that there was a number of--like in any accident, there's always more than one thing that leads you up to and causes the accident.

The maneuver, the whole test, which is what it was, really, was hastily put together. The crew was not properly trained for all the contingencies that could and, as a matter of fact, did happen. They didn't have adequate tools, really, to perform the type of tasks that they were trying to do, and the crew did make an inappropriate input into the vehicle as it approached the Mir station. The blame really needed to be--not the blame, but the reasons for the accident needed to be identified that encompassed a whole range of disciplines involved, from the Mission Control to the engineers who'd designed the mission itself, the profile itself.

The lack of a recognition of some of the more important tools necessary to conduct a rendezvous docking, a range and range rake, for example, and the attitude of the approach, using the tools that were being used, those were all things that were very obvious to us because we had historically taken a different approach to rendezvous and docking. It was one of those cases where it was particularly awkward for our operations people because they were working, they had established a good working relationship to go to the Russian operations working people and say, "We think you're doing things wrong," because there's a lot of pride involved in both nations in their accomplishments, and rightfully so.

That was an opportunity where General Stafford and his group was able to go to Russia and to spend time with primarily an academician who leads the Advisory Expert Council and is John Stafford's counterpart, and to talk very frankly and openly with him and explain to him our feelings on what all the contributing factors were to the collision. He, quite frankly, I think, was at a level of management that he had not been engrossed in the details of what went wrong and probably had not ever had to really get familiar with or conversant with all of the details of a rendezvous and a docking maneuver.

But we had an opportunity, kind of a unique opportunity, to ride back in his van with him,

General Stafford and I, with an interpreter, for three and a half hours, from the city of Resahn [phonetic], where there was a conference, back to Moscow. I must say that Tom and I were somewhat--we dominated the conversation to make sure that we could get the entire message across to Academician Utkin [phonetic, and he was in a totally receptive and listen mode and, in fact, asked a number of very intelligent questions while we were explaining where we thought the responsibilities were shared in this rather major incident.

The next day, at our final joint meeting, it was one of the most dramatic turnarounds in the Russian position of the accident cause that I have ever seen, and I think that Tom has ever seen and that a lot of folks have seen, in that Academician Utkin had, during the night, called in his team, and they consisted of the deputy directors of the various enterprises, Energia, Khrunichev, GCTC [Gagarin Crew Training Center]. Whereas the Russians were totally divided on where the cause of that accident should be, the next day, they spoke as one voice, and it was a complete endorsement of what our guys back here and what we had relayed to Academician Utkin as to where we thought things should be done differently to avoid the same kind of accident. I think, to me, that was perhaps the most dramatic single incident, single meeting, contribution that we had been able to make for some time, from the operational standpoint.

*Wright:* How was that different from the initial visit that you had when you first met this group?

*Engle:* Well, when I first met the group, of course, General Stafford asked me to go over to Russia first, to more or less--I was the hat that he threw in the door first to see if we were going to get shot or not. [Laughter]

*Wright:* Now you know your real role. [Laughter]

*Engle:* My real role is as a hat, a straw hat.

*Wright:* I hope it was a large hat.

*Engle:* A big straw hat. Actually, I think he was not able to go at the time, but I remember it was January, and then he came over in February, but when I went over in January, the Russians had not yet really been told that we were going to have this joint independent review group, and you must realize that, in Russia, still, at that time, an dependent group was something that they really didn't quite understand or feel that there was any place in their hierarchy. They already knew how to go into space. They were already experts, and they were.

So when I went over with a small group of folks to essentially prepare the way for Tom to come

over the following month, General Stafford to come over the following month, and to more or less lay out how we were going to operate based on the Gore-Chernomyden Agreement, I was really not received with open arms. Our group, in fact, had a very, very hard time getting audiences with the appropriate people, and when we did, it was a very adversarial confrontation, really.

I remember Mr. Estrumov, who was the deputy for RSA [Russian Space Agency], didn't really want to even have a meeting, and when he did, he had a whole list of things laid out as to how we were going to operate, which was not at all in the flavor or message that we had been given. So we had to politely tell him that that really was not what we had been directed to do. There were a number of other problems and concerns.

I think the most dramatic single meeting was one final one of the week. I realized that we were not getting anywhere, and I had talked to General Stafford on the phone, I'd called him, and he said, "Don't give in, and if you don't get anywhere, just pack your bags and come on home." And I realized that we were just not making very much progress, we're going to have to get a little more pressure from somewhere to endorse our task.

I decided to have a meeting with Academician Utkin, or to request one, rather, and he is probably one of, if not the, most respected senior people in the Russian space program. He has a long, long record of accomplishment. I almost think of him, and I tell other people, I think he almost holds the respect that Werner Von Braun does in our space history because he was very instrumental in the development of some of their primary missiles, which I learned later in his office.

But Bill Vantine went into his office to sit down, and I wanted to just try to explain to him what we wanted to do and if he had ideas of how he thought it might work. He is a very, very large-statured man, big guy, with bushy hair that flows straight back. He looks like a typical college professor, and he doesn't talk, he sings. He's almost like an opera baritone when he talks. He waves his arms, and he's very dramatic. So we went into his office and we sat and waited a while, and pretty soon he came in and he sat down behind his desk. It was a T-shaped desk setup. He immediately started to look through some papers, and he obviously was not paying too much attention, which is kind of their way of doing things, making a little bit of a test to see if you're going to break and run.

He finally looked up, and he looked me right in the eye, and he said, "You want to come and tell us how to run our space program. You want to tell us whether we're doing things right or wrong." I don't remember all this verbatim, but I do remember that he said, "I was the chief designer on the SS-18 intercontinental ballistic missile." I was quite familiar with that from the days that I had been in the Air Force. He said, "We had--" and I forget the number that he said. I wish I could remember, but hundreds of SS-18 missiles with nuclear warheads "targeted on your cities." And he had a great big map behind his desk, and it was of the Soviet Union, but he had another little map of the United States. He walked over

to the map of the United States, and he started pointing, the way they talk, and he said, "We had four missiles targeted for this city and eight for this city and two for this city," and he was just continually pointing around. I was impressed, because I never really realized it had that many targeted. Then he strode back to his desk, and he sat down and just looked, waiting for me to say something.

I told him, I said, "Well, Academician Utkin, I respect that, and I certainly respect your professional capabilities to design and to build and to deploy that SS-18. It's an impressive thing." I said, "You did it for your country at a time when it was the right thing to do for your country." The map of Asia and Europe was the big, big map that he had on his wall. I walked up to the map, and I said, "At the same time that you were designing and deploying the SS-18s, I was sitting runway alert in an F-100 at Aviano," and I pointed to Aviano. I said, "I had two 450-gallon drop tanks of fuel, and my route was up through," and I traced the route up through the river valleys, because we would fly the river valleys to stay below their radar. I showed him the route in and showed him some of the missile sites that I knew about that they had, that I had to avoid going in, and showed him the airfield that was my target. I said, "I know you've been briefed on intelligence. I know you know that the F-100 wouldn't make it all the way back, so I was going to bail out in this area here, hopefully make it back." I said, "I had a Mark 20 nuclear bomb on my centerline that I was going to deploy." I said, "I was doing what I thought was right for my country just like you were doing what you thought was right." And at that point in time, I didn't know what else to say. I had run out of words. I'd run out of courage, too. [Laughter] So I went back and sat down.

I could see Bill over there squirming around. Vladimir Fishel [phonetic] was our interpreter. He was probably as cool as anybody, because he could speak the language and explain that he was going to get out of there, I know, and that we didn't know what to do. But Academician Utkin looked at me square in the eye for a long while, and then he got up, stood straight up. He's just a massive guy. He started striding slowly around his desk toward me. I didn't know whether I was going to get cold-cocked or what. And I could tell Bill was about ready to break and run.

So I stood up. I figured, "If I'm going to get it, I'm going to get it standing up." [Laughter] He gave me one of these big Russian bear hugs and said something in Russian, and I turned around to Vladimir, and he said, "He said, 'It's better this way.'" I think that was one of the most dramatic and emotional one-on-one meetings with a person that I've had, certainly with the Russians, and it certainly began and generated and created a very close, deep, personal relationship that has been the basis for, I think, our being able to communicate so openly. If there's a problem--and there have been problems--Academician Utkin will pick up the phone and call, and we will do the same thing to give him a heads-up that we have a problem we're working on so that we don't have to rely on what we read in the newspapers as to what is true.



*Wright:* That must have been an overwhelming moment for you. I imagine all your past training and feelings just kind of got put in a pigeonhole and the new part of your relationship with them started.

*Engle:* Well, I think it was, yes. I don't think I appreciated it at the time. It's kind of like being out of control in a spin or something in an airplane. You concentrate on getting out of it first. The guys that stay alive concentrate on how to get out of the thing and get out of it, and then later on they may shake in their boots a little bit, and that certainly was the case there. I didn't have any idea of what was going to happen or how it was going to come out. I certainly was glad it came out the way it did, but at the time I don't think I was--I was just thinking of one step at a time.

*Wright:* Sure. What progressed from there? Did the meetings begin on a routine basis between your group and--

*Engle:* We did. General Stafford came over in February and again in March, and we had a flurry of meetings initially, and many of them in Russia and included trips down to Baikonur, to the launch site, which was an experience in itself, because it's a very desolate area and very spartan living conditions. The facilities, by virtue of the lack of funding, have not been kept up to real attractive situation or conditions, and yet the particular facilities that they need to launch vehicles from are operational. They keep them operational, keep them working. So even though we read, correctly, in the media that Baikonur is run down and the place is falling apart, that's true, but the few key and important places and facilities that they need to launch [unclear], they keep them in operating condition.

*Wright:* How was it for you personally to be at a place that you maybe have always heard of, but were not quite sure where it was and didn't know very many specifics about it, and now you're right in the midst of it?

*Engle:* Well, you're right, we didn't know where it was. In fact, on the maps, Baikonur, the Russians announced the location of their launch site, Baikonur, and it was not where it actually was on the map. It was a different location. That didn't really bother me because that wasn't one of my targets anyway. [Laughter] And Kazakhstan is such an enormous, vast, desolate--or at least the parts that I've been in are desolate area, it could move three or four hundred miles, and I'd never know the difference, and I don't think anybody would know the difference if you're there.

I was impressed. I'll tell you, it reminded me a little bit of Edwards Air Force Base, a remote desert-type environment that is remote for a reason. They're launching vehicles that sometimes are not successful so they need a big area where there are not any people around so they can drop them in the

desert and not hurt anybody. They also need an area that is secure, that they can perform tests and things that they don't want to be public domain at the time, just like we do at our remote test facilities. So, to me, Baikonur was not so much of a shock from the remote location, the fact that it was such a desolate area. It was sad to see the facilities that I know at one time were really, really great, really first class, to see them run down and deteriorating. They have some enormous facilities in Baikonur that, of course, now they don't have the money to keep. They don't have any programs going to justify them, so they're in a state of deterioration. And you hate to see that, but it's, I guess, a sign of the times.

*Wright:* Again, was that part of the responsibilities of your task force, to look at some of those facilities to see if they were safe?

*Engle:* That's correct. Yes. Yes, it was. And I think, of course, we had limited time there to look at them. They were quite open with us. We could look at anything, talk about anything we wanted to, and we saw some pretty fascinating things, and I think that our assessment was just that, that there are a lot of areas that are run down and deteriorating, and probably cannot be brought back up to operational status, but now there's no need to because they don't have programs for the missiles or whatever the equipment was they needed to launch them in these places. I don't think there's any question that deterioration, that maintenance is now, and will become even more so, a big driver, a very key concern to the Russians, as well as to us, as far as the Baikonur facilities are concerned.

*Wright:* The people that you worked with day to day, I know that every group has officials, and the people you went to see every day, maybe Baikonur or the other place that you went, how quickly did they accept you and what your task was, or did you feel that there was awkwardness that you had to overcome and build that bond as well?

*Engle:* I think after the first maybe six or eight months, we had been able to establish a relationship that included trust and respect and friendship, and we learned that that friendship and that personal relationship is imperative in the Russian culture before they really will open up and discuss technical or business issues. Certainly in our case it was. Quite frankly, the first few months was largely, in retrospect, largely was dominated by establishing that relationship, the social relationships. By "social," I don't mean wild parties, but I mean spending time with them. Once you're invited to a Russian's home for a meal, folks that know Russian culture have confirmed that that's the first sign of acceptance. You really can feel that you are making progress toward establishing a good, close relationship if you invite them to your home and they invite you to their home. I think our culture doesn't tend to put as much emphasis or as much value on that--"value," I guess, is the word-- on that as the Russian culture does. There again,

I'm not sure that they're not right.

*Wright:* Would you share with us some of your experiences of going to some of your associates' homes or being with them in what they considered their life and they let you inside that?

*Engle:* You bet. They're very family-oriented. I remember reading, being briefed over years and years, that the Russians have a very low regard for life, they're not the least bit reluctant to expend lives in order to gain some kind of a plateau. I may have gotten that impression by reading World War II accounts of the battles, and it was certainly a misconception. Certainly it's a misconception now. I don't think that there's anybody that places any more value on the family and even life than the typical Russian. You could see it when you go into their home. The families are very close. The children are the center of activity. I won't say "attention," because they don't parade them around. They don't spoil them as such, but the children are not lacking for attention or feeling, feeling loved and wanted. You can tell that very much, and the parents are not bashful to show that.

Generally the homes are not spartan, but they're very simple. They don't have all the luxuries that we have, the appliances and the furnitures and the appointments around the room that we are accustomed to, and yet their homes are very comfortable, very warm, and the way that you're treated when you go into a Russian home or family is so warm and friendly that you don't notice the material surroundings as much as you notice those kinds of surroundings.

I'm still pretty limited on the number of things from their menus that I can eat in Russia, because they have a very fat-intensive, cholesterol-intensive diet. I think that comes from the fact that they have a cold climate and they have to have that, but a person who's looking for a low-calorie, low-cholesterol diet has a challenge in Russia. There are some fishes and there are some breads and there are some things like that, and salads and vegetables. They're very large on vegetables. Cucumbers and tomatoes are one of the main staples in Russia.

*Wright:* When they came to visit here, did you show them Texas and things of the American culture?

*Engle:* We did. In fact, the first visit that Academician Utkin and his entire Advisory Expert Council made here, we had them over to our home over here. Mary and I had been to Russia. We had the opportunity to go on a tour with some University of Kansas alumni several years prior to that, and it was a tourist thing. We went to St. Petersburg and rode on the boat, the R\_\_\_\_\_ canal up into Moscow. One of the Russian traditions that we were exposed to was the greeting visitors with bread and salt at the door. I wouldn't have remembered, it didn't register with me, but it did with Mary. So when the group arrived at the house, she had a large, round Russian bread that she had gotten from the bakery and salt in the middle,

and we opened the door and greeted them with the salt and bread.

I wish I'd had a camera, wish I'd had that video camera, because Academician Utkin's face was something to behold. He was incredulous at first, couldn't believe it, then that warm grin, smile came over his face. He led the way, breaking bread and dipping it in salt and coming into the house. I think that they realized that we were making a full court press attempt to show them hospitality and then proceeded to have more of an American-style meal and get-together in the house with some other friends.

As far as our cultural exposure to them, I think one of the biggest, most dramatic ones was when Mr. Evy [phonetic] arranged to have them as honored guests at the rodeo, the livestock show and rodeo. In fact, Mr. Evy and General Stafford and Academician Utkin rode in the opening parade--not parade, but the opening ceremony in the rodeo performance that night, and I think they kind of like cowboys anyway. They like the Western U.S. They kind of want to visualize that they can be cowboys. Many of them buy cowboy hats and cowboy boots before they go home. I think that was an impressive thing for them.

We made a visit--we had another meeting in Russia, then, not too long after that, and, of course, their response to the rodeo--they don't have rodeos over there, and Mr. Evy wasn't on the trip, but their response was to go to the Bolshoi Ballet. I admire the arts, but I'm really not a big ballet fan. However, I was the duty representative to go to the Bolshoi and sit on the front row in the Bolshoi and watch the guys in their tights and the girls in their tutus dance around the stage for a while. I heard about that for a long time, too. [Laughter]

*Wright:* It's amazing how your repertoire just grows, doesn't it? [Laughter]

*Engle:* Sometimes not by choice.

*Wright:* By duty; is that--

*Engle:* By duty.

*Wright:* How much, in your eyes, as a tourist, was Russia different, in your eyes, as an American representative?

*Engle:* It was different. I think there are two answers to that question. One, particularly initially, the difference was one of walking into like a movie set, almost, or having a seat right in the middle of a wrap-around screen of a 1930s movie--babushkas on the street, sweeping the street with their straw brooms, and old men with pushcarts, sometimes with produce in them and sometimes with trash in them, not very many cars on the street, and those that were on the street noticeably old, run down. Not a lot of lights, no advertising, very, very spartan, the kinds of things that you imagine seeing in the old movies about

Communism in the early Communist days.

We were somewhat protected from some of that, just by the virtue that we were concentrating our time, our efforts, in their space centers and training centers out at Star City, and, quite frankly, we were staying in a hotel--actually, a German hotel--that was built for the Olympics that were held in Moscow, so we were staying at very good facilities. We would get in a bus and go to these other facilities, but in driving through the streets of Moscow--and when we did walk, just to walk around at night, I couldn't help but have the feeling that I'm in a society that's three or four decades behind. I think it's not too far from accurate.

The second part of the answer to that, though, is what has happened in the last four years since I've been going over regularly, and I see a noticeable--in fact, recently, almost from trip to trip, I see changes and increases in their apparent living standards. New buildings are going up, signs, advertising, billboards are going up. Cars really are--traffic is a real problem now in Moscow, and they're not old cars anymore. A lot of them are new cars. My impression, anyway, is that an inordinately high percentage of them are Mercedes and BMWs and Jeep Grand Cherokees and the kinds of things that we like to dream about on this side.

There is a growing number of the Russian society who is coming into wealth and feels free to spend the wealth on those kind of material things. It's not the majority of the people. The majority of the people are still very poor, very destitute, but the changes are taking place. I don't feel like I've got enough knowledge to say it's happening the way it should or the way you could expect it to or whether it should be happening in a different way, but it's happening. Things are changing.

*Wright:* You've mentioned to us about the people being warm and friendly once you've gotten to know them, but would you give those characteristics when you're trying to negotiate a stubborn point that people don't want to compromise on, that you find the compromise to come quickly and evenly, or did you have some negotiations between your group and the counterparts to settle an issue?

*Engle:* No, we have negotiations. We have times when it's very hard to come to an agreement on something, just like, I'm sure, when you talked with a lot of the other program folks, that they find the same thing. One of the characteristics is that they're very good at negotiating. They're better than we are at negotiating, in my opinion, and that puts us at a disadvantage or them at an advantage, I'm not sure which.

I think that one of the things that we've tried to do--many times the rationale behind an initial position that the Russians take doesn't appear to be the real reason; it appears that there's another agenda that they're really looking for but they're using a different reason for taking a stand. I'm never sure

whether that is all a cultural thing, a deliberate cultural thing on their part, which it may be, whether maybe some of that is lost or at least changed a little in the translation as it comes from their position to our position, but sometimes the actual facts are so far apart that it's hard to think at all of it as translation.

They have a different way of negotiating, and it's not always the same high-ground ethical position that we like to think we take all the time. Within our task force, we have tried very hard not to be deceptive, not to hide things from them, but to be very open, because, frankly, we don't have the kinds of things on the table that the program managers do. They really have some hard-core things. We can afford to take the higher ground, I think, sometimes. It's a nice thing to be able to hide behind that or to jump behind that curtain and say we're thinking on the high ground.

On the other hand, I must say that I recognize up front that a lot of times we don't have things at stake on the table that program managers do. But we've tried very hard never to be deceptive and to always be up front and to always lay things out just as we see them, even when we know that they have another agenda going. And we try to make sure that they understand that--and sometimes we like to let them know that we understand that that's not the real reason, but we want to continue to talk about the real problem or the real rationale or the real concerns and put the other emotional or put the other agendas aside and come to a conclusion within the task force and the council. I honestly think that we have made, and are continuing to make, real progress there. I certainly feel a lot more comfortable with our being able to carry on a very frank, open discussion on sensitive subjects with the Russians. We have for quite some time. But I think it's getting better every day. Every time we have a meeting, every time we communicate, I think it gets better.

*Wright:* Is there an example that you could share with us of one of the negotiations that illustrates some of the characteristics that you were just explaining to us?

*Engle:* Yes, there are a whole bunch. I think the most recent one had to do with the selection of a Russian cosmonaut to fly on one of the assembly missions for the International Space Station, and the rationale--the Russians had selected an individual who had certain capabilities, but not the type of talent or capability that would be ideal for this particular mission. He happened to be a medical doctor, and the rationale that the Russians were presenting to us was that there were potentially dangerous breathing hazards in ingressing some of the modules and that it would be mandatory for a doctor to be on board to observe the crew to identify any symptoms that they might have for either stagnant pockets of gas that had carbon monoxide build-ups or toxic material in the air. It was a very strong argument that they were presenting, so it was a concern.

Their rationale was that, "There's a real safety concern. We have to have a doctor on board. It

has to be this individual." I think they knew that we realized that that wasn't the real reason that they had selected this guy and they didn't want to go back and have to select somebody else. So, rather than argue with them about the capabilities or the skills of the particular individual versus those that were required, we tackled the breathing-air safety concerns in the vehicle, which were not the real reason. Therefore, when they realized that we were taking their reason and we were going to go look at it from a technical and an operational standpoint, they realized that that wasn't going to stand up, then they were very straightforward and we were able to come to an agreement about it.

I think the Progress collision with the Mir was probably another example, although maybe not as clear as that, but that was another good example of their arrival at a solution. It wasn't the real reason for the accident. It was a convenient one to use at the time, and if we had accepted it, then it would have gone away, and everything would have been okay. There are a number of things like that.

*Wright:* The task force charter has continued to evolve. Do you see it continually moving into a broader direction for the ISS, or do you think it will maybe come back even more to specific boundaries now?

*Engle:* It will change. I don't know that it will expand in volume or in stature at all. It will change, certainly, because the nature of the ISS assembly flights is a little different than it was when we were going aboard the Mir, which was a station that was already in place and established, essentially in place, although they did add modules.

No, I think the characteristics of what we do, the details of what we do, will change somewhat, but I think that the basic charter, the basic contribution that the task force and the advisory council can give are going to remain basically the same, and that is this alternate body of people who are accomplished and respected in the space community being able to look at a problem outside the bounds of the program constraints and to be able to make those responses and recommendations back to the program.

*Wright:* The Shuttle-Mir Program as a whole, what are your feelings of the benefits that it has created for the new manned space flight? Do you feel like it was well worth everything that the two nations put together during this last four or five years to help us in the future?

*Engle:* Well, other people have said it much better, much more eloquently than I can; I think Frank was one of them and Randy was one. Randy Brinkley and Frank Culbertson have said that it would almost be impossible to conceive trying to press on with this International Space Station assembly without having the benefit of the experience of the Shuttle-Mir Program. We really learned a lot.

My next-door neighbor is, bless his heart, is a very right-wing guy, and he still has a hard time

accepting the fact that we're working with the Russians and that his concept is one that he gets out of the paper, newspaper headlines, where we're pouring money in, there's a technology transfer going one direction. I was very happy to remind him that there's a knowledge transfer that we're getting, an operational knowledge and an operational procedural knowledge that we have gained and are continuing to gain from the Russians in the operation of long-duration vehicle, which we're going to be the foster parent of when we build the International Space Station.

We would have, and probably will to some extent, but we would have embarrassed ourselves tremendously in some of our operational techniques that we were actually accustomed to using because of the Space Shuttle-type operation, the quick up-and-down operation, "Bring it back if something's wrong." You can't do that with a station. Long-duration space flight and the operation and maintenance of a space facility is going to be on orbit, and you can't bring down, and you can't go up to it conveniently whenever you want to. The lessons that we've learned from the Russians and the Mir, in my opinion, are absolutely invaluable. They'll pay back in platinum.

I think the Russians even learned from the Shuttle-Mir experience, because I don't think Mir would have stayed up as long as it has had we not been part of this program and supported the program. I think Mir probably would have been abandoned and de-orbited a number of years ago before it became so old, before they saw some of the failures in the systems that have happened in recent years. But the very nature of having those failures happened and learning how to accommodate for them, how to fix them, and how to live with them in some cases, are lessons that we would not have learned and they would not have learned, and they have made that comment, too. So I think although we learned a great deal more about long-duration space flight, I think they learned some about aging spacecraft.

*Wright:* Do you have one specific or one significant contribution that you feel that you or the task force has been able to accomplish that might have made a difference in this program?

*Engle:* I sure don't personally, no. I feel lucky as snuff just to get to be part of this team that I'm working on. I think that, again, as I said before, that the most unique contribution that the task force and the commission have been able to give to the program and give to the two nations, really, is that additional line of communication, that additional vehicle, to work the sensitive, awkward problems that come up, that would get worked. They would get solved. They would have to. Many of them would have to be solved. The task force and the commission have possibly provided a little expediency in some of those cases, and sometimes saving a little time, getting the solution a little bit early. It's hard to tell what that's worth, but I think that that has got to be probably the most significant single contribution that we've given.



I think that, again, having guys like Academician Utkin and General Stafford as the leads, the figureheads, if you will, the point on the spear, gives both countries a sense of confidence that if and when the situations arise, they do have somebody and they do have an avenue, that they can toss the problem on *that table, and if it won't get solved, at least it will get discussed openly and very frankly.*

*Wright:* My last question before I ask my associates if they have any for you is, you spent almost four years doing what you do. Why is it important that we take the next step and keep moving toward more space exploration?

*Engle:* Well, maybe you said it right there, really, that if we're going to continue space exploration, human space exploration, it's extremely important that each program that we undertake, that we do, that we do it correctly, we do it safely, that we do it correctly and as completely and with as much return for people--I hate the corny phrases like "humankind" and all that--but for people all over the world. And, gosh, the benefits that we have already gotten from space flight are absolutely enormous. We wouldn't be able to operate the way we do today if it weren't for the technologies that were developed, maybe for different reasons, but the technologies that were there, that industry has been able to pick up and hand back to us as usable tools that we use in our everyday life.

The thing that I think that in this profession that we learn and accept is that the things that we are going to do, the stones that we turn over today or this week, probably are not going to be able to have direct application for a number of years. It's going to take a long time, some of them ten, maybe fifteen years, but that technology and that experience eventually will be applied, and it's just a long lead time sometimes. Sometimes it's not, but sometimes it takes a long time. So the things that we've doing today that we think maybe are not too significant or not too applicable, and certainly many of our critics think are not applicable, we've already seen that all we have to do is wait a little while until somebody's able to make it a worthwhile tool for everybody to use.

*Wright:* Let me ask Carol and Paul if they have any questions. Paul?

*Rollins:* How many trips did you take to Russia? Did you ever count?

*Engle:* None of us really counted them up. I would guess twelve or fifteen, maybe.

*Rollins:* How did you like the Russian winters?

*Engle:* Well, you know, I didn't mind them.

*Rollins:* Is that because you grew up in Kansas?

*Engle:* No, it wasn't the growing up in Kansas so much, I don't think, although there may be a little similarity there, because it's pretty flat over there in Moscow and the wind blows and there's snow on the ground. But it's a dry cold, and, to be honest, most of the times I was there in the winter, the wind wasn't blowing really bad. So it was cold, the temperature was cold, but it was not uncomfortable. You could get out and walk around the streets at night. It was dry. There was snow on the ground, but it was a crunchy snow.

I wouldn't want to live in Russia. I'm not looking to buy my retirement home on the Moscow River--don't get me wrong--but I have never really been to Russia at a time when the weather was a very distasteful factor. Now, Baikonur was pretty windy and cold when we were down there, but that's up on the steppes, and that really did get cold down there. I certainly wouldn't want to retire at Baikonur.

*Wright:* Now that you've had this experience and still have experience with the Russians and this whole project, are you glad you threw your hat in that door the first time General Stafford--

*Engle:* Oh, yes, you bet. You betcha. Again, I didn't throw my hat in; it was General Stafford that threw my hat in.

*Wright:* Let's get that clear. [Laughter]

*Rollins:* Good thing your head wasn't in it.

*Engle:* [Laughter] That's right. No, I'm very glad, very grateful for the opportunity. In fact, I've learned a lot, met and gotten to develop friendships, close friendships, with a lot of very, very--in my opinion, very class people from a part of the world that I would never have made the initiative. I would have had a different opinion of it entirely if it hadn't been for the chance to work with this program.

*Wright:* When you were explaining that it looked like a 1930s movie set on the outside, but it must have been something of a mind change when you walked in and talked to these experts in the field that were so technically expert, but on the outside of the walls, it was something completely different from what you found on the inside.

*Engle:* Well, there certainly was a difference. I think the knowledge gained from my previous career, I was prepared for the fact that there were two classes. There was the technically elite class, and they were rewarded, if not by paychecks, certainly by benefits--apartments, nice apartments to live in, accommodations, places to vacation. You could see a little bit of that carry over initially when we went over there. But on the streets, it was entirely a different story. Unfortunately now, the technical experts

are not benefiting from what wealth is coming in, what income is coming in to the Russian folks. As you know, many of them have been paid for a number of months, and the pay that they do get is a paltry sum compared with some of the other--and they're having the same problems that we briefly saw in this country a number of years ago. The young people aren't interested in going into the engineering and technical fields because they can't make a living in those fields. They're going into the business fields and other areas where the money is flowing right now. So it doesn't bode well for the long-range technical, or, I think, the long-range economy, in my opinion.

*Wright:* Do you think your days of poking around at test pilot school was well worth where you are right now?

*Engle:* Absolutely. [Laughter] Absolutely. In fact, I'd give anything to go back and do it again.

*Wright:* We thank you for your time. Is there anything you want to add that you can think of that we didn't cover?

*Engle:* Can't think of a thing. You've been very thorough. Thank you.

*Wright:* You have, too. Thanks so much for your time.

*Engle:* You bet.

[Tape off. Begins again . . . ]

*Engle:* One of the humorous incidents that happened, I mentioned to you that General Stafford sent me over in January to inform all of the Russian partners, or the people we were going to be working with, what we were going to be doing. He came over in February, and we started making the rounds to meet the various folks. Well, the first person that we were meeting with was Academician Utkin in his office at Snymosh [phonetic]. Then we were going to go from there to TsUP, to the Mission Control Center, and observe a docking of one of the Progress supply vehicles to the Mir Station, and they were going to let us watch the docking from the Control Center.

General Stafford, of course, had been over there to all of these places during his Apollo-Soyuz training, in getting ready for the flights, but at that time, of course, it was a whole different environment and atmosphere between the two countries, and very, very deep Communist Soviet-controlled space program. Everything was very secretive.

We were in Academician Utkin's office, and talking and doing our polite exchange of greetings. Tom was getting nervous because we knew what time they had told us that the Progress was going to

dock, and Tom kind of wanted to see the docking. He was looking at his watch and fidgeting, and he leaned over to me and said, "We're not going to see this docking. We're not going to get there in time." And he kept saying that, and he said, "Well, it's too late now. We're not going to make it."

And Academician Utkin kept on serving us tea and talking and being very polite, very cordial. Tom, you could tell, was kind of irritated, because although he knew what his duty was, was to talk to Academician Utkin, he also wanted to see this docking real bad.

Finally, Academician Utkin looked at his watch and said, through the interpreter, that perhaps we should start toward the Mission Control Center so we could observe the docking. Tom, by that time, was already, "We're not going to see the docking. We're probably going to see a rerun. They'll replay it for us." And he was mumbling and grumbling away.

So we walked out of Utkin's office and turned left and walked down this hallway, kind of a bridgeway between two buildings, into the next building. Tom was mumbling and grumbling. He says, "First we're going to be late. Now we're walking all this distance just to get to the cars." And he opened the door at the other end, opened it up and here was Mission Control. Tom said, "Those sons of bitches!" And he's just mad as could be.

I said, "What's the matter, Tom?"

He said, "When I was over here in Apollo-Soyuz, we were at Snymosh and we went to the Mission Control, we walked out of Snymosh and they drove us around for three hours around Russia to get to Mission Control." They didn't want them to know that the two were right close together.

[Laughter] I don't think he's ever gotten over that. I think he still doesn't totally trust those guys.

[Laughter]

*Wright:* I think we can understand why he has that feeling. [Laughter] They didn't do anything like that to you, did they? You were right on top of everything.

*Engle:* I didn't know any different. Tom hadn't told me that when they went from Snymosh to the Mission Control, they put them in these cars, these limousines, and they drove them around for three and a half hours, then drove up to the front door of Mission Control Center. And it was all the same building.

[Laughter]

*Wright:* Did the Russians play practical jokes on people?

*Engle:* No, I don't think that Utkin--well, I mean, I don't think he knew the details. He certainly probably didn't think that it didn't even occur to him that Tom had done that or remembered, but that was one thing that stuck in Tom's mind, was how far away the Mission Control was from the Snymosh. He knew we

weren't going to make it; we were going to see the rerun. [Laughter]

*Wright:* So how was the docking?

*Engle:* It worked great. It worked great, but Tom was still mumbling about that. [Laughter]

*Wright:* Thank you for sharing that with us.

[End of interview]