ORAL HISTORY TRANSCRIPT

ARNOLD W. FRUTKIN
INTERVIEWED BY REBECCA WRIGHT
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WRIGHT: Today is January 11, 2002. This oral history is being conducted with Arnold Frutkin in Washington, D.C., for the NASA Headquarters History Office. Interviewer is Rebecca Wright, assisted by Carol Butler.

Arnold Frutkin served eighteen years as director of NASA's Office of International Programs, starting his duties in 1959. [For most of that time, his title was Assistant Administrator for International Affairs.] He became Associate Administrator for External Relations in 1978 and retired from federal service in 1979. During his tenure, [guidelines for international space programs were formulated, initial projects were launched and] numerous major international space endeavors contributing to the nation's foreign policy objectives and advancement of human knowledge were [implemented].

We thank you for visiting with us today, Mr. Frutkin, and we are very interested in learning about your role as NASA's senior negotiator [in the international sector]. But let us begin by talking briefly about what led you to this job.

FRUTKIN: Right. I [had] actually had several different careers that [were] wildly unrelated, but immediately before I came to NASA, I was at the National Academy of Sciences, working in the program for the International Geophysical Year, the IGY. I had come there in about 1956 to initiate an IGY bulletin reporting monthly on the results of the IGY.

But as the program, the IGY, went on—the year was actually eighteen months, 1956 and '57—I became deputy executive director of the U.S. National IGY Committee under Hugh Odishaw, who was [the] extremely able executive director of the committee. The connection between that job and the NASA move was that the first artificial satellite program was a part of the IGY.

In the preparation by the international scientific community for the IGY, which involved observations, [coordinated observations] all around the world in a dozen different geophysical disciplines, … the [participating] scientists said that the means for putting the first artificial satellites in orbit were now available because of the advances in rocketry, and this [fact] would lend [itself] to scientific purposes, [so] they recommended that nations consider putting artificial satellites in orbit.

Well, the only two nations who could do that [at the time] were the U.S. and the Soviet Union, and I'm sure the scientists in both countries said each … should proceed or else the other … would be the only one to do it. So both countries announced …, maybe as early as '54, … that they would contribute artificial satellites for scientific purposes to the IGY—[to] make geophysical observations, [e.g. in] solar physics, cosmic rays, all sorts of things.

[Our office became] very much involved in the [internal and external] organizational relationships of the IGY on [the] whole problem of exchanging [the] data that would be expected from the satellites ([as well as] from sounding rockets, which [were being used] at the same time). … [I] represented the Academy in … meetings that the [President Dwight D.] Eisenhower administration [conducted] within government on how to handle [data, public affairs and international] problems in the Vanguard Program, which was the [name of the U.S.] satellite program for the IGY.

[In that context, I] met the people who were just setting up NASA. Hugh [L.] Dryden, who was to be the deputy administrator of NASA, and [T.] Keith Glennan, who became the administrator [were of course the principals].

In fact, when we get to the U.N. [United Nations], you might pick that up because that was my first connection. There was an issue at the time as to what [role] the U.N. should have [in future space matters]. It happened that I was asked to prepare a paper on that [subject],, and I remember I prepared a paper about thirty-five pages long on the unsuitability, as I saw it, of the U.N. to be a medium through which the U.S. [(or other countries)] would operate … space program[s]. I felt that we'd lose freedom of action, having to deal with a [large] number of countries [which] knew nothing about space science or technology, [i.e. subject a new and imperfectly understood field of national activity] to the majority vote of [an] essentially … ignorant [and highly political] congregation.

…That's how I got involved. Then, in time, [NASA] offered me the job of director [for] international [affairs]. That's how I went over there. They did [earlier] have somebody for a few months in that job who apparently was unsatisfactory to Glennan, [so he] told me …, and … I was invited over there.

WRIGHT: When you took the job in 1959, what were your duties and responsibilities? What were the expectations that you were supposed to fulfill in that new role?

FRUTKIN: I had a long talk with Glennan about that. You see, the basis for expectations was the provision in the [National Aeronautics and Space Act] that said NASA shall, in conducting its programs, cooperate with other nations and groups of nations. That was the mandate, and Keith

Glennan used to walk around with a copy of the act in his pocket, in his breast pocket, and he would take it out, and there was that mandate to have international cooperation. So he provided for an [appropriate] office….

… I came in there absolutely cold, knowing nothing about what we ought to be doing. In the first week I went over there, Dryden and Homer [E.] Newell, who was [the lead science man] for the new NASA, and I, the three of us, went abroad for about three weeks…. We visited England, France, Germany, [and] Italy, at least. We may have gone some other places, I don't remember, but those were the main places. The idea was to tell people, the likely scientific groups, that we were going to be open to cooperation, and something about on what basis we would receive proposals. That was actually a second step for getting the program off the ground.

The first step occurred before I went to NASA when I was at the Academy, at a meeting of [COSPAR, the Committee on Space Research of the IGY]. The U.S. representative from the IGY to that committee was Richard Porter, Dick Porter, from GE [General Electric Company]. He was asked by Dryden back at NASA and the Academy, the Space Science Board at the Academy, to announce that NASA would entertain proposals from other countries to launch [entire] satellites and [individual] experiments [to be conducted in satellites or] in sounding rockets and cooperate in [other related] ways that would seem sensible.

So there had been that announcement through the scientific community, and then our trip. … Dryden was a key person in both of these things, [and] I think that's why it was done that way. Dryden was the one who was sensitive to [the overall context, the scientific community, and to] what was already going on in the IGY because he was [a distinguished aeronautical scientist and he was] home secretary to the National Academy of Sciences…. He had his legs

planted firmly in this practice of relationships, this pattern of relationships in the scientific community. So [NASA] went to the right place and opened [itself] to these proposals.

Okay, that's how [the international programs] got off the dime. … Next, … I came back from those three weeks and had to sit down and figure out how we were going to handle these proposals when they came in and what guidelines should be [set up] to receive them, judge them, and move on them.

Well, there was a big break for me at that time. The Congress had just concluded [a review] of the international program of the Atomic Energy Committee, five years of experience. I just got hold of those hearings and studied them, and what I did was look for every "mistake" that the Atomic Energy agency made in its international programs. They did a fine job, and [I mean] no criticism of them whatever…. It's just that anybody who was first with a large program like that would naturally make some mistakes, and I just set down … guideline[s] to prevent [as many of] those mistakes [as possible] and also reflect my own [predilections].

For example, a … bias I had was that there was too much American money being given away to foreign countries without regard to any hard-headed test of mutual interest and practicality. So we came up with [a fundamental guideline that precluded any] exchange of cash; each side in a cooperative project would do what it could do at its own expense; the project would be considered only on the basis of mutual interest. So if somebody came to us and said, "We'd like to put up a satellite," … the question [would be], are we interested in [the science proposed]. I mean, you may be interested in the science, but are *we* interested in it? It has to be [of] mutual [interest].

The judge of the validity of mutuality of interest would not be me. I had no such competence. It would be our scientific program people in NASA. This made for a very good

relationship between my staff office and the operating offices, because I never for a moment thought of challenging their right to judge contributions [or the validity of] their participation in international programs. … It was always a joint [procedure]. I was concerned with policy and guidelines, and they were concerned with substance and program. It worked very, very well, always. We never had a problem—unless I [can] think of one later.

So let's see. We have no cash exchange. We have mutual interest. We have substantive scientific value. [Another guideline grew out of] the character of NASA as a civilian agency. We were very much concerned to protect that character and avoid the appearance or substance of a military program. The Department of Defense was responsible for military applications in space.

[This was because] one of our jobs was to project a strong image of peaceful purposes for the United States in space. We didn't want to compromise [that], so [the projects] had to be civilian in character, and this meant dealing [only] with civilian agencies abroad. We weren't going to deal with the Italian Air Force or [military] rocket development in France. We were going to deal with [civil] agencies that were concerned with science. In [some] countries, there was no such agency at that time, and so they set them up. We, in effect, inspired the creation of civilian agencies that would be dealing with their national interests in the space research.

… Another guideline was that any people sent over for training in connection with cooperative projects would be funded by their own country, not by us. They would be sponsored by an institution of the sort I've just described, [a] civilian institution, to ensure that [work was rooted] in some ongoing interest in their country and [so] that they would have something to go back to, so that they wouldn't [just] stay [on here]. That was a big problem in the atomic energy program. People came here to be trained at our expense, so they were happy to come, and they

got training without regard to whether they had a job to go back to—[which they often did not, resulting in their staying in the U.S. and contributing to a "brain drain."]

So you can see [that] there was a … string of guidelines that we laid down to avoid problems that the Atomic Energy Commission had or to achieve objectives that NASA was supposed to have in space as a civilian agency and so on.

Now, if I can back up a little here on the importance of projecting peaceful purposes. Some [sources, particularly] a colonel, … whose name I forget, and I apologize to him for [that], because he did a very good job, [show that] Eisenhower [had a very strong and I think positive] effect on the [character of the] space program…. Eisenhower came out of World War II with a strong conviction that intelligence was the great future need for military purposes, that we needed systems to acquire intelligence. When he became president, the Rand Corporation was turned loose in trying to come up with ways of acquiring intelligence through advanced technology. That … led to the U-2 program, … an aircraft program in that early period for acquiring intelligence through [surveillance]. It wasn't long before … Rand …, on a classified basis, came up with [the] notion that satellites [could] be a major source of intelligence.

Well, you can see that raised all kinds of prospective problems. One was overflight of other countries. Aircraft overflight of other countries was illegal without their permission. The U-2 was being done secretly. [But of course] the Russians knew about it. It was just the Americans who didn't know about it…. But the Russians … their radar … could see there were planes up there. … They [just] couldn't reach them [for some time]. They had no planes to fly that high, and they had no antiaircraft … [effective] at that height.

So we got away with the U-2 program for quite a while before [the Soviets finally] knocked one down with Gary Powers [in] it. … NASA was the cover story for those flights.

…The U.S. said was that these were just NASA weather planes. [Still], they had no right to overfly the Soviet Union. [We] said [Powers' plane had] wandered off course…. NASA was [the cover], but nobody at NASA, except a couple of people, knew that … until … the [whole] story [eventually came out].

[According to the research on the Eisenhower-stimulated satellite reconnaissance programs, the U.S. would have] to accustom the world to overflight by satellites. NASA's peaceful civilian program could do that. I mean, if the first satellites that the world knew about were going to be peaceful scientific satellites, hopefully there would be a minimum of objection to overflight, and if the Russians were doing [the same thing], then there would be [little] basis for objection. Then when at some future date it became known that intelligence agencies were using satellites, too, [the established practice would leave little ground for protest].

There was a lot of academic [debate] about where the boundary was between air space and outer space, and [there was much talk] in the U.N. Legal Subcommittee [about it]. Actually, the world had really accepted a sort of rough boundary line between air space and outer space before the U.N. put its imprimatur on it. The U.N.'s action reflected a consensus that I believe had developed, [that outer space began where satellites could orbit—and that was higher than aircraft could fly—so a practical argument was established fro excluding satellites from national airspace sovereignty].

In any case, the U.S. strategy, I think, was extremely good. I give great credit to the Eisenhower administration…. I think they handled that extremely well. Their basic purpose was [well-conceived and] well protected—I don't think it emerged [to public view] for a long time—… and [may have] accounted [in good part] for how well in the early years NASA was protected from the Air Force.

The Air Force was a [strong] rival of NASA in the early years. There were individual generals … who [wanted in the worst way] to get their hands on [major space programs]. [Still] later, you know, … McNamara proposed that all near-Earth space activities with men would be military and NASA would handle only the distant [programs] like the Moon and [beyond]. But he never got anywhere. The reason is … [that] there were [wise heads] hardly visible in the administrations [of that time that understood the international political support of maintaining an image of peaceful purposes and activities in space]….

I think that was extremely well done. It was to the interest of the world because the reconnaissance satellites have had a lot to do with peacekeeping in the world. So it was a good thing, and I think Eisenhower doesn't get enough credit for his constructive role in space.

I think I must have answered that question.

WRIGHT: You did. And always, if you have more to offer, we'll take that as well.

FRUTKIN: Yes. Well, this … is interesting to me, and I don't know how clear it is to others…. Maybe everybody [already] knows more about it than I do.

WRIGHT: Well, please continue to share all those thoughts when you think of them.

I wanted to ask you when you were listing the guidelines that were set up that were proposed, did you have full authority to suggest those? Did you have to work with a committee? What was that process of getting those guidelines accepted?

FRUTKIN: Oh, yes. Good question. As long as Dryden lived, which was, I think, until 1965—I think he died in 1965, of cancer—I worked very closely with him. Of course, I saw the administrator [often], but Dryden was the man I worked with. I sat down and worked out my version of guidelines and took them to Dryden, and it turned out Dryden was a very simpatico guy. … We happened to have the same intellectual approach to these things. He had [similar] prejudices [to mine]. He had, of course, infinitely more experience with the scientific community. But he was perhaps the most intelligent, objective person in all my experience at NASA…. I just worked with him, and he approved these things. Once he approved something, he backed it 100 percent, so there was no trouble.

As we dealt with different offices in NASA, you'd [sometimes] run into … some initial opposition, people wouldn't see it your way, wouldn't like it, but I was backed so thoroughly that pretty soon the word got around that there was no point in arguing these matters….

WRIGHT: That had to at least give you some confidence in knowing that once you could start a project, you had a little more freedom to get it completed without a lot of bureaucracy at that time.

FRUTKIN: Well, the implementation of the project was always with the program office, not [the International Office].… We would sit side by side with the program people, and I generally had the lead in negotiating an agreement, a cooperative agreement, but the [framework of the] cooperative agreements [was] fairly simple. That was something I did. [The content, the substance, was up to the program people.]

…There was no precedent that I knew of [for such agreements]. It just seemed to me [that] what we needed was a [simple] memorandum of understanding. We'd state what the project purpose was. That was done … with our program office; … they knew what they wanted to do and could do…. Then we stated what the other side was going to do. They were going to provide a scientific instrument at their own expense. They were, [for example], going to bring it to standards of aerodynamic, magnetic, [and] electronic compatibility, say, with the rest of the system, whatever it was going to be.

If they were going to do experiments for sounding rockets, they were told what the compatibility requirements were, weight and size and [so on]. If they were going to do a satellite, it was compatibility with the launcher, [the tracking and telemetry system, etc.]. If they were going to put an experiment in one of our satellites, it had to be compatible with the other experiments in the satellite. So it was prescribed what they would do and prescribed what we would do.

…Another [major] guideline that I omitted was that these responsibilities would be implemented through a joint working group. That was something that NASA's own practice just led straight to. I mean, they were extremely good through their history in the old NACA of setting up working groups. So there would be a joint working group, and it ensured that all these compatibility requirements were met. There would be somebody from my office who would meet with the joint working group just to ensure that the guidelines were being observed and that nobody on our side was saying, "Oh, we'll pick up the tab on that," or something like that, which would violate a guideline, you see. Because Americans are too generous. "We've got the money. We'll pay for it." No, no.

Anyhow, that's the way that was done, and I just worked with Dryden, and he approved these things. I worked very closely with Homer Newell also, who later became head of space science at NASA. Earlier he reported to Abe Silverstein, who died just a few weeks ago, another extraordinarily able guy.

Does that answer that question?

WRIGHT: How many staff members did you have? This seems to be quite an amount of work to do. Did you have a number of people that worked with you to get this accomplished?

FRUTKIN: I had a secretary in the beginning, which was [in] September 1959, I think [it was that] I went there. There was one fellow named Ed Kerrigan, who was transferred to me. He had been working with the office responsible for [establishing] tracking stations. They had needed to work with the State Department to get permission to build tracking stations around the world, and he was the guy they had doing that. So he was transferred to me, because there had been no proper place for him.

Then through the years, we had to continue adding people as more of these programs developed, and I think we ended up with some thirty people. We tried to keep it down. I had some prejudices against government payrolls and bureaucracy and so on. So we tried to keep it down. But we eventually ended up with—I don't know how many foreign satellites NASA ultimately launched, but it had to be over forty, maybe fifty. I don't know. [And with other types of cooperative programs, we needed more people.]

There were [in fact] many other programs that developed, which … were non-satellite [or didn't involve activities in space itself by other partners]—like SITE [the Satellite Instructional Television Experiment], [an] Indian program, or Landsat observations and so on.

WRIGHT: Could you tell us about the process, once the nation contacted NASA and said, "We'd like to have a cooperative agreement," how that took place? Because not only did you have to cooperate with that nation, you also had to do cooperation within our government agencies as well.

FRUTKIN: Right.

WRIGHT: So could you explain what that process was and what your role was and how all those steps were taken?

FRUTKIN: Well, it differed in different cases. Should I give you some examples, different examples?

WRIGHT: That would be great.

FRUTKIN: A good early case would be the Canadian proposal. The Canadians came to us and proposed that they build a series of ionospheric research satellites, topside sounders, they were called. These satellites would ping the layers of atmosphere from above, [using] different radio frequencies to determine the character of [the] different bands in the ionosphere. Previously,

geophysical research of the ionosphere was done from the ground up by sending signals up and you got some notion of … the ionospheric layers … that reflect radio signals.

Well, the Canadians came and said they wanted to do this. [Our people] said, "We already have a program on the books to sound the ionosphere from above." So I said, "Well, let's get together and see what it is [the Canadians are] talking about, and you [our program people] see how it relates to your program."

Well, it turned out, not in my judgment, but in the judgment of the space science people at NASA, that the Canadian proposal was a more advanced and better proposal than ours. We were designing satellites to sound the ionosphere at certain fixed radio frequencies, [but] the Canadians were going to design … a swept frequency approach, [i.e., to] just sweep through a whole range of frequencies … and sound the ionosphere [at all of them]. Our people said that would be great, that's a better idea. [In addition], we made clear to our people that this meant the Canadians would be paying for that satellite program. They'd be building those satellites [at] no expense to us. We would launch them at our expense. [And, with our tracking stations, we would receive the data. Of course, that would be shared with the Canadians.]

One interesting little footnote is that satellites generally cost a lot more than launchers, so [the Canadians would] meet the preponderance of the cost of the program. There was no requirement that the expense be equal. So our [people] readily agreed. … It was a wonderful thing for their budget and, [at the same time], improved the program. … We drew up a memo along the lines I've just described. The purpose was topside sounding, … the Canadians would do this, and we would do that, [and] a joint working group [would be] set up [to implement the program].

The Canadians [provided], I don't remember exactly, but I think there were four satellites in that program over a period of years [all] worked extremely well. [It was a superb] program, and everybody was very happy about it.

[Now], to illustrate how we would handle the sort of problem that [might] come up in the middle of a program: Somewhere down the line, maybe [by] the second or third satellite. … The joint working group discovered [that] the Canadian satellite [in that case] was gaining weight. Our people, that is, the program people, were very experienced in this kind of thing and kept warning the Canadians, "You'd better go into a serious weight-reduction program or you're going to be in trouble. You won't be able to get [the satellite up on the] launcher we are to provide]." There was a top limit. [It had been agreed the satellite would be of such-and-such a weight and that we would provide, a Thor-Delta rocket to launch it.]

Finally the Canadians came to us and said, "We're just too far overweight. There's nothing we can do about it, and we're going to need [a larger] Atlas launcher." Well, an Atlas launcher was … a lot more expensive than a Thor-Delta.

That's where I came in and said, "No. … The agreement was for [a] Thor-Delta [launcher]. You've got to solve the problem, not us. You're not meeting your requirements for weight restriction, [but] you're [asking] us to spend more money to take care of that [problem for you] by going to the Atlas launcher. That's not right. You've got spend the money on the weight-reduction program," which is what they didn't want to do. It was a very expensive thing to do, to redesign the satellite sufficiently to reduce the weight.

There were individuals on the Canadian side who were very upset, and I'm sure very angry at me, because we could [have provided] an Atlas launcher, but the principle of it was [that] … international agreements have got to mean something. They can't be soft-headed,

mushy things [lacking principles and standards]. [We couldn't] start down that road." So we stuck to our guns.

Now, we had people in NASA who said, "Gosh, we could give them an Atlas." I said [we have] policy and [we have] standards. No…." And Dryden backed me on that. So [the Canadians] had to spend the money [to downsize their satellite]. They spent a lot of money, and one of their people was in real trouble within their system. But it worked….

Now, I'll give you another example that I don't think has ever seen the light of day, but it seems to me it's about time that the story could be told. Very early in the program, probably 1960 …, we were doing a lot of [cooperative] sounding rocket programs … because it was an easy way for countries that had never done any space research to get into it. Instead of building a complex demanding satellite, they'd make some small instrument, put it in the nose cone of a sounding rocket that went up ninety or a hundred miles. The instrument could radio back its measurements or be brought back by other means…. We would provide the rockets, they'd provide the experiment; it was a way of helping people get into space and permit certain basic geophysical experiments to be done in many places around the world, [near the equator, the Arctic Circle, etc.]…. We were doing that with the Italians, and we did it with the Swedes and the Norwegians and so on, and they all later graduated to satellite work.

An Egyptian representative came to us at that time and proposed a sounding-rocket program. He visited … the international office, and we had someone from the Space Sciences [Office] sit with us to hear what he was proposing. He was proposing an experiment called a sodium vapor experiment. A sounding rocket would [be sent up to] release metallic sodium in powder form … into the atmosphere [where] it would vaporize. This would be done … around sunset or sunrise and … would create huge … clouds, enormous … clouds up there, as the sun,

the setting or rising sun, [turned them pink] against the dark sky…. There would be … triangulated optical installations on the ground that would photograph those clouds, [so] you could [measure] wind sheers … at [about] a hundred miles up, … something like that.

Well, we were doing that kind of thing [so] that sounded fine, but as [the gentleman] talked on, he explained that they would do these launchings simultaneously in two places. At that time Egypt was part of the United Arab Republic, which consisted of Egypt and … Syria…. They would launch from both places, [producing these great pink clouds in both]. He wanted to meet a deadline for the program which was [to be] the anniversary date of the establishment of the United Arab Republic.

Well, you see, that caused us to prick up our ears. Launching by an anniversary date, [a] political anniversary date, has nothing to do with science. That's a political objective. [In addition, we couldn't avoid noting] the geography involved. You had Egypt and Syria. What's in between them? Israel. What would [the Israelis] see? They would see these huge clouds, sodium vapor clouds. You can see them for a hundred miles or more. They would see them on both sides. It [was hard to miss the possibility of a motivation] for political intimidation of the Israelis.

[None of us had any] particular concern for Israel…. But that had nothing to do with it. It was just too political. I could [imagine] us being accused by various people [of getting way off our scientific track]. … I could [hear] newspapers saying, "…What's NASA doing lending itself to a program with obvious political overtones?"

So I had a real problem. What do you do? I didn't want to engage in a political discussion with this [man]. I thought the thing to do was [to] pursue the technical merits of the

program as far as [we] could, because [legitimate science preparations and scheduling might exclude the political overtones in the normal course of things].

So our program guy said, "Fine. We'd like to send some people out to your sites to work with you [in a] joint working group, [give your people some training, help review preparations for] the optical cameras in the [proper] places and [do] all this kind of thing through the normal range of responsibility of the working group."

He said, "Oh no, that's not necessary. Everything will be taken care of."

We said, "Oh no, we do [all these things] through joint working groups to assure [it's quality and readiness]. You [do lack] experience with this [sort of] thing. …We do, and we want to ensure that the program is successful. We do not want to be involved in programs that have not been optimized for success. We're not looking for failure; we're looking for success."

Well, he didn't want to let us go anywhere near anything in Egypt. [This] just fortified … suspicions of the program. The newspapers were carrying stories at this same time, of [ex-WWII] German rocket scientists working in Egypt on the development of rocket capabilities….

[We repeated firmly that we would work only according to our guidelines and that all preparations and [unclear] would be through our established joint working group mechanism with complete access to an open project.] …

He didn't want to do that. He said, "But you've done this for the Italians."

We said, "Yes, but through working groups [with complete access]. We've had no problem with access to Italian launch sites and so on, none whatever. They've been working very closely. We haven't had any trouble with any other country. This is an open program, not a … closed program."

He finally said, "Well, give us the rockets and we'll conduct the program ourselves."

We said, "We don't give rockets for programs that are not jointly worked out in the mutual interest."

So he said, "Well, we'll buy the rockets in this country." So he went to a rocket manufacturer to buy rockets, and then he came to us and said, "Would you authorize transportation of the rockets to Egypt on the Military Transportation Service?" which I suppose we could have done. We could have requested it.

We said, "We just don't want anything to do with it. That would be a United States service for a program in which we have no interest. It's a program within our jurisdiction, but we have no interest in it [on these terms]. [We can't] ask the U.S. to spend money sending a plane to Egypt to carry this stuff. Besides, the rockets you've ordered, two-stage rockets, a lower stage and an upper stage, have never been fired in conjunction before. That's a serious problem in rocketry. [There are real problems] of aerodynamic, … magnetic, … electronic and [other] compatibilities between upper and lower stages, and it has to be carefully worked out and [extensively] tested. It's never been done. It's unlikely to work."

They went to the State Department, and the State Department authorized the Military Transportation Service to transport [the] rockets over there, and they were [in fact] transported. We never heard another word about the program. No sodium vapor clouds, nothing. The manufacturer came in, and we asked him, "What's happened? You went over there. What sort of sites did they have?"

"We didn't go. We weren't allowed to go. The rockets were shipped without us."

So the people who knew how to handle those rockets weren't there, and we can only guess that the rockets didn't work. We can only guess that. I don't know what happened.

Anyhow, we never heard of it again. But I think it's a good example, it's one of the very few examples. We rarely ran into any political problem. I can't think of another at the moment.

But we didn't have to meet the political problems because they did not meet the guidelines for a jointly implemented program with open access, open civilian character, and so on. We didn't know but what they were military at the other end. We just didn't know….

WRIGHT: In that case you mentioned that the State Department became involved because of those circumstances. In normal procedures, were you involved with the State Department in your role?

FRUTKIN: Yes.

WRIGHT: How did that process work?

FRUTKIN: Well, we would keep them informed of these things. In this case, [I believe State questioned us and that we explained why no project materialized and why we wouldn't authorize transport of the rockets.] … I'll mention a man by the name of Robert Packard, Bob Packard, who was in the appropriate office of … State. [He] dealt with us over the years very well; [he] was just a superb collaborator. He … understood what we were trying to do and was [a] wonderful, … very fine [colleague].

But we had to deal with other offices in State which were not always understanding. If you want [to] detour to SITE or take SITE later, I can—

WRIGHT: We can do it now, if it's on your mind.

FRUTKIN: Because it's sort of relevant. You see, each time you dealt with a new country, you had to do with a new desk at State. It's no reflection on State, but anytime you deal with a new office anywhere, there's always the chance that there's going to be a difficult initial period. People don't know each other, don't trust each other, are somewhat suspicious of each other, and there's that human tendency to say no rather than yes. So you often ran into problems, and the SITE case is an illustration.

Leonard Jaffe was in charge of the applications programs [at NASA] and worked very effectively with us. He was very alert to the opportunities for international participation and understood the guidelines. He was very good about it. He came to me at one point and said, "We are working on the first satellite which will be able to broadcast TV programs directly into receivers on the ground, and it seems to me that you'd be interested in it for international applications."

Well, that was SITE, the Satellite Instructional Television Experiment. I think that's what the letters meant. I'm very bad about things like that. So, okay. I talked with them about what the satellite could do. It [would be able to] broadcast into … "home receivers" but with a sort of front-end adapter and a simple dish, a small dish similar to what we have now on DirecTV [Inc.], but not as [capable as today's version].

So I sat down and began trying to think of where in the world [SITE would most constructively be used], where [it would best] fit. You wanted big countries, and [there] seemed [to be] two big countries that would be worth considering … Brazil and India. Well, we looked

into Brazil and discovered that there [already] was a lot of television in being along the coast of Brazil and that the population back of the coast was almost nonexistent. So it was unsuited.

India was the reverse, just perfect, had virtually no television in existence and [had a] huge population spread throughout the subcontinent. So India looked like a good place to go. I should make clear that the whole point of SITE was that it could broadcast directly into home receivers, [obviating the need for an extensive] ground network of … stations to receive television from a satellite and rebroadcast it through a diffusion [system]. You could skip that whole step, go right to home receivers. So [the] infrastructure was unnecessary.

Well, we were already dealing with a space committee in India under a man named Vikram Sarabhai [on] sounding rocket programs. I called Vikram Sarabhai and said, "Would you be interested in … Indian participation in this?" Well, I knew the man very well. He was a very superior person, came of one of the two wealthiest families in India and had been educated as a physicist at [University of] Cambridge [England]. [He was], I think, a very fine person, [now dead]. He was very much interested. …He was the sort of person … dedicated to doing [things like this] for his country.

Before I called him, I went through our State contact to the India desk. [There I] met somebody I'd never known. [I] explained … what we wanted to propose to the Indians. … And he said, "No, you can't do that."

I said, "Why?"

"Well, we have for some years been trying to establish a Voice of America program in India with Voice of America broadcasting [stations] in India, and the Indians won't let us do that."

So I said, "Oh, well, that's completely distinguishable from this, because we don't want to build anything on Indian soil, in the first place. Secondly, the Voice of America wants to broadcast American programs, [which they probably view as] propaganda, good or bad, in India. We don't want to broadcast any American programs. According to our concept of this thing, all we would do, … after we have used the satellite for American purposes for a year, [is] nudge it along the equator till it looks at India. Then India can use a ground station which it will build with its own money, broadcast its own programs, which must be educational programs, up to the satellite, and the satellite will diffuse [them] down to the receivers."

"The Indians won't let you do that."

I said, "I think they will let us do it."

"No, you can't go to them."

I said, "Why don't we let <u>them</u> say no?"

This guy just didn't want to do it. He was the prisoner of his vest, which was buttoned all the way up. I felt that was just an ignorant, obstructionist viewpoint.

… I called Vikram Sarabhai and said, "Vikram, this is something we think you'd be interested in. Would you be interested in it?"

"Of course. Yes."

So I said, "Write me a letter proposing Indian participation in the SITE program which is being prepared."

He said, "Sure." So he wrote me a letter and said, "In accordance with your suggestion, we would like—."

I called him up and said, "No, Vikram. Write another letter that doesn't refer to my phone call."

So he wrote another letter. Now India had proposed [participation]. There could be no further objection from the State Department. We went right ahead with it. It was enormously successful.

[Actually this] was a remarkable instance of how much in the U.S. interests such a program [can be], because India had one year, under our agreement, one year that they could use that satellite. They built their ground station. They broadcast their own programs, which they designed and which we watched very carefully when they were being developed, because we wanted to be sure that they weren't going to do anything that would upset America for any reason. No political criticisms, no political news programs. There were wonderful [educational] programs which I could tell you about sometime, not [to] take the tape [now] for that, but [there] were some wonderful things.

When they finished the year, they said, "Could you please extend the availability of the satellite [to] us for another year?"

Well, [we] knew they were going to ask that. … And we were all prepared. We … said, "No. The agreement said one year. That was a year out of the life expectancy of a U.S. satellite. We're going to move that satellite back and use it for more U.S. programs. That's it."

They were very upset. They tried political pressure and so on. We refused. We said, "It was an agreement for one year and just don't lean on us to do this." Okay, we took the satellite back. [What was the consequence? India] contracted with Ford Aerospace for a commercial satellite to continue their programs, and they contracted for a number of Ford Aerospace satellites over the years to do that…. I think they're still doing that, but I'm not sure. … The point is: this program not only was an educational lift to India and demonstrated what such a

satellite could do, but it brought money back into the United States, commercial contracts for satellites for a number of years.

I think it was an extraordinary program, and that's how [such] a program was handled. Each program was … different, but here was one where we invited participation because we thought people would be interested and it would work well, and we knew that they would have to continue commercially once they got started….

There are some other very good examples like that, but you go ahead with any questions you have.

WRIGHT: Do you have any more of the opposite, where you had suggestions from countries to enter into agreements that you just knew were not the right thing for the United States to do?

FRUTKIN: No. As I said, that Egyptian thing was almost unique. I mean, there may have been something. I can't think of anything. If when I review the transcript I think of something, I'll add it or tell you about it or whatever you want to do with it.

WRIGHT: I'd like to talk to you about the tracking stations and your role in securing those areas.

FRUTKIN: Yes, there were some interesting stories about that, too. Actually, … I had nothing whatever to do with procuring the [sites for the] first tracking stations abroad, because that was done when I was [still] over at the IGY [and] before NASA was created. [Those stations were set up during] the IGY program [by the Navy's contractors. After the U.S.] announced, in '54, I

believe, that we would launch a satellite, … the administration gave that responsibility to the Naval Research Laboratory or … the Office of Naval Research, [whichever]….

…It was [named] the Vanguard Program…. To launch [the] small Vanguard satellites, … they had to set up tracking stations for it, and they did that through a contractor, I believe it was [the] Bendix [Corporation], … [working with] the State Department.

They got permission to build stations at various places, [generally accommodating] countries. … The first stations were down [island chains] in the Caribbean, [either] British or U.S. …, and then [in] South Africa, … Australia and the Pacific islands. I don't remember exactly where those initial stations were. [They were] all established by the time I got to NASA.

One of the first things I had to do at NASA was [to complete obtaining sites for a] new tracking network for the first U.S. manned flight program, Mercury. [The earlier tracking network was designed for unmanned satellites. The new manned satellites required] additional stations and much more capable [ones] with very large … dishes, radio dishes. [Sites were planned for] Zanzibar [Africa], Spain, [Mexico], at least one additional dish in Australia [Woomera], and I forget [where] others may have been….

In fact, I sat down at my desk maybe the first day and … looked at the project manual for Mercury, and as I looked to see how the flight was going to be managed, the thought that came into my head was, "My god, they really mean to do this." [Laughs] I mean, that was the fall of 1959 or maybe it was '60. …It was very early [on], and [I at least] hadn't … been [quite] able to absorb the notion of man in space.

Mexico was … very interesting. …Australia, South Africa, Zanzibar looked like no problem. Zanzibar was then a British [responsibility]. They were no problem. But [the] State Department told us that Mexico would never allow a U.S. facility on Mexican soil, that nothing

like that had been accommodated in Mexico since General [John J.] Pershing [was ordered to invade] Mexico in—1919 [1916]? … [The Mexicans had] never forgiven us and [State said they] wouldn't allow [a tracking station on Mexican soil].

Well, we felt [our interest was entirely new and different] and I felt confident we could sell it if we could get to the Mexicans. [But State was reluctant even to try.]

Well, I went to Glennan, [the first NASA Administrator], and told him we were having serious trouble. … He made the breakthrough suggestion. He said, "President Eisenhower's brother, Milton [S.] Eisenhower, is president of Johns Hopkins University [Baltimore, Maryland]. Why don't you go up and see him. He has good contacts in Mexico."

So I called, made an appointment, went up to see Milton Eisenhower, who was a marvelous man, wonderful man, and told him our problem.

He said, "Well, let me see what I can do." He said, "The president of the University of Mexico [Universidad Nacional Autonoma do Mexico] is a close friend of mine, and the brother of the president of the University of Mexico is the president of Mexico."

In no time we had an invitation from the Mexicans to come and talk with them and explain what we wanted. [They agreed to] do everything they could to accommodate us. …What I think the State Department failed to appreciate at that point was that space had a mystique that appealed to people all over the world; it [seemed] like a wonderful, exciting, benign thing. The peaceful purposes meant it was no problem. Well, we had a superb collaboration with Mexico. They did everything they could to help us.

Now, this leads to a related thing. Our embassy began to send us little news clippings from Mexican newspapers, leftist newspapers. There was a strong communist [movement] in Mexico, and they were saying that the station that was being built was a Trojan horse, that there

were guns hidden under the floor of the station—all kinds of absolutely absurd stuff. We talked with the Mexicans about it, and they said they could handle [it. And they did.]

But at the same time, something broke in Zanzibar. … The Air Force began building a tracking station in Zanzibar, too. There was a [small but influential] communist element [also] in Zanzibar, … then within the Arab community…. The two large population [groups] in Zanzibar [were] the blacks … called Afro-Shirazi because they [claimed] ancestry from ancient Persia— … and the [Arabs] … (Zanzibar [had been] a center of the slave trade).

There were noises in Zanzibar of hostility toward these U.S. stations, and I told the State Department that I thought it was very dangerous to set up an Air Force station in the same small island with NASA because [the AF station's presence was] sure to [invite dangerous antagonism, which] would rub off on us….

It got … bad [enough that] I wrote memos, written memos, to State saying [we were] going to have serious trouble and risk losing both stations if [they didn't] get the Air Force station off that island. Well, [it seems that] a contractor employee for the [Air Force] station talked loosely on the beach … one day … to a young lady who turned out to be some sort of undercover operator…. There was a big fuss in Zanzibar, and the Air Force had to [abandon] its station. [The hostile elements then] threatened our station.

They announced that as of a Sunday coming up there was going to be a huge demonstration. 200,000 people [would go] out to the NASA station to force it off the island. Well, the whole island population was 240,000, so I knew they wouldn't have 200,000, but I was afraid they might have a lot.

I went to Glennan and said, "I'm very worried about this. If there's a demonstration there and they're able to force us off the island, … it will lend [new] support to the [opposition group] in Mexico and we may be forced out of [there, too]; and the whole network may be in trouble."

He said, "Well, what are you going to do?"

I said, "Well, the only thing I can think of doing is going out there and talk to people and see if we can get them to be reasonable."

So on a Thursday, that Thursday, I left for Zanzibar, [taking] with me a guy from the Mercury program out of Houston who knew the program. I … knew what my political objective was, but he knew the program. His name was Warren [J.] North, an extremely good guy, very good guy. He had tried to qualify as an astronaut [but] didn't make it….

So we, the two of us, went out there together, not knowing really exactly how we were going to operate, but we were going to meet a USIA [United States Information Agency] guy there. The consulate was not on Zanzibar, [but he was to come up from Dar-es-Salam in] Tanganyika….

…It took [a] long time to fly out to Zanzibar in those days. (We flew on an early version of the *Comet* for part of that trip [before *Comets* began to fall] apart in the skies….)

Anyhow, we got to Zanzibar, [the] young guy from USIA had done a super job. [The very poor general population was organized in small] men's clubs. They would meet, … smoke, … and [listen] to a little radio, [and discuss the] news…. [Our USIA man] just had us go around from one to another [of these clubs] to talk about what Mercury was and show them how open it was and all the good things the tracking station would do for them. It would bring in construction money, … we would buy all our supplies locally, and we would hire maintenance people locally, and anybody who qualified [for] work in the station in … electronics, we would

hire [him also]. We didn't have to have only Americans and so on and so on. I think we did very well. Warren North was a very appealing young guy, and I think together we did okay talking to these people.

[But] we had to … speak to the [leaders, too]. On the Saturday, [the] day before [the protest march] was to happen, we went down to speak to a man named Ali Musin, … head of the Arab party. [He, as expected, was] extremely hostile. …We [had to go down to] the local kasbah and I worried for our safety.

[Though] he was very hostile, but he gave me the most intelligent response I ever had to [any argument that]: "Look. Our station's completely open. You can go in there at any time to satisfy yourself as to what's going on." He said, "I might as well ask a donkey to go through my desk," … a very clever answer and probably correct….

Then we went to see the [leader] of the Black party, the Afro-Shirazi party. He was an ex-longshoreman [named Karume] with scars [on] his face, … ritual scars plus whatever other scars he happened to add to them. He spoke no English, but he had somebody interpreting. We didn't seem to be getting anywhere, [and I felt quite] desperate. [I knew that] the next day … maybe 20,000 people would go out to the station [to] demonstrate. For the safety of our people, we'd have to pull them out.

[So] I said, "Look. … Your people, I understand, are the truck drivers. [Tomorrow], you're going to provide the trucks and drive all these demonstrators ten miles out into the country to the station. You're going to do all that and make the demonstration possible…. Who do you think is going to get [the] credit for driving us off the island? The Arab party is going to get the credit. You're not going to get the credit."

You could just see lights dawning in this [guy's mind]. He talked to [his interpreter] at some length, and then … he said, "You two tomorrow be at such-and-such a (big, open) park. Be there to show your film and talk to the people, and we will have our people there."

Well, we had won—at least for the time being—because, instead of his people driving the Arabs out there [to the station], they were going to be listening to us in the evening. That's what happened. He had [about] 4,000 people squatting in the dust on [a] huge [sort of] playground…. Our USIA guy … set up a big screen right in the middle. If you project on a screen like that, you can see the picture from both sides.

So we showed Mercury films and showed the little monkey, Ham, flying in space. Oh, they ought that was marvelous. We talked to them, and we answered all their questions. [The result was that] we stayed on the island for three years, which was all we needed. But [later], when [the station site agreement] came up [for] renewal, there was a revolution [in progress] there. Ali Musin was killed, the Black Karume took over, and they asked us to leave the island. But by that time [the program people had developed other tracking arrangements so that the loss was not serious].

[Karume] asked us if we would leave a generator … for him. We recognized the situation. He [personally] wasn't against us; it was the forces there. So we left a generator. [Sometime] thereafter, a [young American] consular official, … later … Secretary of Defense, [Frank Carlucci, was visiting the island. There was a riot during his visit], and he was knifed. But he controlled himself [did not panic, helped calm] the crowd … down. He did an incredible job. He told us later that when some of the local politicians [verbally] attacked NASA, [Karume stood up and] said, "Don't attack NASA. They never did anything to us. They were very good here, and there's no reason to attack them, and they've left us that generator."

[Karume himself was] assassinated some years later. He [had become] vice president of Tanzania, [when] Zanzibar was joined to Tanganyika, … under [Julius Kambarage] Nyerere….

[You can see that establishing the manned flight network had its moments.]

WRIGHT: Yes. Before we start anymore, we're going to take a break for just a minute, be able to change out tape so we don't miss anything you have to say.

FRUTKIN: Okay. [Tape change]

In my experience, when we went to State to say we [wanted] to set up a tracking station in such-and-such a place, … they [often] said [that we'd] have to [provide the host country some major benefit, e.g.] a deep water port [in one case]. They're going to ask for (e.g.) a deep water port. They've been after us for [that] for a long time."

[Apart from the fact that such considerations might total] hundreds of millions of dollars, [my feeling was that we should give nothing—] … not even … pay rent for the land. …Our story [was] that if we [came] in, we [would] spend money locally to construct the station, [to meet local] needs … for maintenance—like oil to run generators and so on and so on. We [would] need to hire a lot of local maintenance people. We [would be] willing to train local people on the operation of the station and employ them if they [qualified]. So we [were] going to [bring significant] advantage [with us], plus the intangibles, [such as] identification with the space station [program].

…We developed a way of approaching these things. We [didn't] tell [a] country that we [needed] a station there. What we [said was], "We plan to put a station in your part of the world, somewhere in … your neighborhood of countries, wherever we get [suitable] cooperation."

Each country [knew] that if it [didn't] agree, another country [might do so] and [so] get all those advantages, local money spent and so on. We never had any trouble…. I think that State just didn't have the right approach to these things—[at least at that time].

WRIGHT: Did you have specific ideas or create definite guidelines of what you needed from those countries when you established those stations? Did they have to provide or did the United States pay for everything that was there? Was it more a cooperative agreement?

FRUTKIN: No. No. It was not cooperative. They were just accommodating our requirement. But we felt that in implementing our requirement, we were bringing lots of advantages to them [that] they would be glad to have it—[as indeed] they always were….

WRIGHT: What responsibility did NASA have once the station was established?

FRUTKIN: Well, we just operated our station. …Actually, the people who did the operation were quite wonderful people, generally speaking. I mean, [one or another might] get us in [minor] trouble locally. But generally speaking, they were very good. The station personnel would do lots of local things, like improve something at the local hospital or upgrade the local communications to meet our standards so that we could use them. So they did a lot of things sort of on their own that they could do because they were capable of doing it and because they had [a] generous attitude.

WRIGHT: If issues came about where the local operations folks did cause problems locally, did you have to get back involved again or did another part of NASA take care of those issues? Do you have an example of one of those?

FRUTKIN: Well, I don't have a good memory for such cases. I know there were some. My belief is that the tracking office people were extremely good and responsible at that, and they would handle it, do whatever was necessary to handle it very well. That's my best sort of memory of how it went. I don't recall my having to get into something like that.

We had some [irritations—not in the tracking network but] with one or two of our interpreters [dealing with the Soviets. Some] became too friendly or … brought in books from the outside that the Soviets didn't want in their country. We felt it was not our role to bring in forbidden books. If one of our interpreters … brought in [such] a book in a pocketbook, that [might risk] our whole operation, so we would stop that kind of thing.

One of our people saw an anti-American poster on a visit to a monastery in the Soviet Union, [of course] back during [the height of] the cold war. It was a nasty anti-American poster. He just [lost his temper] then and there. (I was not present.) He … chewed [out] the local people who, as I [was told], included some of the monks at the monastery….

[After], I was told about it, [I rebuked him strongly] in the presence of his boss, … Bob [Robert R.] Gilruth…. I told him he was not being paid to go over there at NASA's expense to express his political views. He was there to do a particular job and do it as well as he could and it was not up to us as individuals to create risks to [entire projects] for no purpose except [to vent] personal feelings. But he didn't have anything to say. …It was stupid. You have to remember what you're there for.

WRIGHT: The formal agreements that you set with these countries, were the provisions very detailed or were they somewhat open?

FRUTKIN: All our agreements were very simple…. They would make such-and-such land available. We would entirely at our own expense build [a] station. There would be no charges. We would undertake to train local people, if that was agreed. We would buy certain types of provisions locally. It was really very simple once you decide you're not going to get into [the] business of what kind of blackmail, [like a deep-water port] you [were] going to pay for the accommodation…. I was very much against any of that kind of thing, and we were able to work out ways to get away from it.

[The notion of] letting countries know that if they don't want to be cooperative, you'll go somewhere else is a big help. I might tell you about the first communications satellite [arrangements] because that illustrated [my point. It] was back, I think in 1960. Abe Silverstein was head of [the unmanned flight] program at that time. He came [to me] and said, "We're going to be putting up the first [synchronous] communications satellite, and we want to demonstrate it intercontinentally. We'd like a station in Europe, somewhere in Europe, and we have $5 million in the budget to build the station."

I said, "Abe, put your money away. We'll get you a station free." We wrote letters to the British Post Office [BPO]. There had been talk around about communications satellites coming, so we knew [who might be interested. Besides] the British Post Office, [we wrote also to the] responsible … French agency, [called CNET]…. We [described the coming] program [and said] we're going to want to demonstrate it internationally. We could do this with a country that was

willing to provide at its own expense [a ground] station at the other end in Europe somewhere. We're planning to be in London and Paris in … two weeks' time, … and we'd like to visit you.

So London knew we were going to [be talking in] Paris, and Paris knew we were going to [be talking in] London. I drafted an agreement … according to [the] program requirements …—[Len Jaffe was in charge of the project]—cleared it with Glennan, went [with Jaffe] to Europe, and within one week we had two agreements signed [with both BPO and CNET].

[Per these agreements], the British built their own … hundred-foot dish at Goonhilly Downs [England], … high up on the cliffs in Cornwall. (Years later I sailed by there with some friends in a sailboat coming from France and saw the dish up there. It was marvelous.)

The French wanted to beat the British and didn't think they could do it building [a] dish themselves, so they bought [an antenna] from this country. They paid $14 million for [horn antenna (in lieu of a dish)] like the one that AT&T [American Telephone and Telegraph Company] had in Andover, Maine…. So we saved Abe Silverstein's $5 million and brought $14 million into the country.

Other countries heard about [this and wanted to participate]. The Germans, the Bundespost [Germany's postal service] built a dish. There were, all in all, I think thirteen countries that got in on that program eventually…. Len Jaffe established a joint working group among all those countries to coordinate these experiments. That group became the nucleus of Intelsat. That's where it all came from. I mean, Intelsat would have happened anyhow, but that's the way it [did happen]. It was very good.

Oh, … an interesting [sidelight]. …There were a number of [interests] at that time vying for the inside track for communications satellites. NASA wanted to do the experiments. AT&T was [giving the global impression that it was] going to be doing all this. Foreigners were

confused as to who was going to do the program—should they deal with AT&T or should they deal with NASA and that kind of thing.

I suggested we invite an AT&T representative to come with us when we went to London and Paris so that when we were [conducting] the negotiations, he would be sitting there quietly and it would be very clear who was doing what and that there was no issue about it. Because we had AT&T, we felt we should also invite ITT [International Telephone and Telegraph Company]. So we had both of them there, vice-presidents from both companies, and there was no issue about ambiguous auspices or authority.

WRIGHT: Other areas and organizations that you worked with, you mentioned some, but we haven't talked yet about the United Nations. So how did their views or purposes work or not work with the ones that NASA had?

FRUTKIN: Yes. In the very first days when NASA had the mandate to cooperate with other nations and groups of nations, I don't know the legislative history of those words. This is one reason I want to talk with Eileen Galloway. But it's clear to me that when somebody [added] "groups of nations" [to "nations"], they meant some of the … institutional international organizations like the U.N. [and perhaps] NATO [North Atlantic Treaty Organization]. Different people had different concepts [as] to how we should operate.

Senator [Henry Martin] Jackson, at that time, "Scoop" Jackson, was an outspoken advocate of dealing through NATO…. That appeared to a lot of people, including me, as inconsistent with the notion of peaceful purposes. NATO was a military organization then. It was the height of the cold war. I mean, you [would be] inviting [the Soviets to set up] a

Komintern space program—[not the best start for programs ostensibly aimed at peaceful purposes].

Now, … the U.N., … was different. [It certainly projected] peaceful purposes, and on the surface it [appeared] to be a totally sensible possibility. The Secretary of State at the time was [John F.] Dulles, and he was pushing for involving the U.N. in some way, and apparently before I came to NASA when I was still at the IGY, the State Department gave the brand-new NASA some kind of a proposition that they deal in some way through the United Nations.

Dryden at NASA … wanted that analyzed pretty carefully. He was, I think, not too excited about it. Apparently the [man] they had, … my predecessor, was not quite up to doing that. So Dryden asked Hugh Odishaw, who was [executive director] of the U.S. IGY Committee, … if he could get it looked at. [Odishaw] asked me to do it.

[I tried to think through the proposition and then wrote a] thirty-[some] page memo…. I don't remember it [in detail]. I don't have [a] copy of it…. I told you what the burden of it was, that it just seemed totally unwise, at that early stage in NASA's mission to achieve primacy for the U.S. in space, to burden NASA with an obligation to work through or with the United Nations, … dealing with dozens and dozens of other countries through a bureaucracy, … [only one or two of them] having the least clue about, [let alone experience of], space technology or having thought through … the political ramifications [at a time where the UN was split right through by the Cold War]. So it seemed to me terribly unwise thing [to try to work through the UN at the time]. I'm sure I would have listed the pros as well as the cons, but I think it was pretty clear where the burden was.

Anyhow, NASA was not [so] burdened with that thing. [The UN] did go ahead and develop [its] Committee on the Peaceful Uses of Outer Space [COPUOS], which from [the US]

point of view, would be a benign organization [in that] it had no role, [no] operational role in space.

Now, much later, there were some people in the U.N. who were looking for a role for the U.N. in space. Particularly there was a [man] in UNESCO [United Nations Educational, Scientific, and Cultural Organization], who came up with a proposal for a tracking network, a U.N. tracking network for satellites. He came and talked to me about it…. Well, I thought it was a crackpot idea, [and] I said [that was no need for it. Both the US and USSR had] all the tracking stations we [needed]. It represents an enormous investment. "Do you know how much a tracking station costs?"

"No."

"Do you know how much a tracking station network costs?"

"No."

"Well, it's a lot. …Our tracking [operations are as open as possible], but the Soviets' are not. You wouldn't get [operating or scientific data] for the Russians, and where would [you] put [the network]—alongside the existing tracking stations?"

He said, "No, around the equator."

"Well, [an equatorial network wouldn't begin to meet the many requirements for satellites in a variety of orbits]." Well, [the idea] never went anywhere, but … it shows you what the U.N. [problems] was.

[What the UN] got to be [in space] was—in the Scientific and Technical Subcommittee [of COPUOS]—a show-and-tell organization, which is pretty good. I would give credit to Dulles or the State Department people for getting that set up because in the end that worked out very much to our advantage. What I mean by show-and-tell is that … [a] pattern developed

[according to which country] was a member of the Scientific and Technical Subcommittee … would tell what it was doing in space. …There were only two countries that had completely independent programs, the U.S. and the U.S.S.R. All the other countries that had anything to say were saying essentially [what they were] doing with the U.S. [(NASA)] in cooperative programs.

… Nobody was talking about cooperation with the Soviet Union because they weren't cooperating with anyone. [Of course, in time] it began to be so embarrassing that [the Soviets] developed … "cooperation" within Eastern Europe, their own satellite countries, but that was so [politically] transparent.

[It all] worked very much to our advantage and kept putting pressure on the Soviets to cooperate more. That was one of the devices, or at least proved to be a device for pressuring the Soviets to [become] more forthcoming. That, and some other factors, eventually forced them to cooperate.

WRIGHT: What was your specific involvement with COPUOS or the United Nations?

FRUTKIN: Well, except in the first year or so when Dryden was effectively the U.S. representative and I was with him as an assistant, after that I was effectively the U.S. representative in the parent committee and in the Scientific and Technical Subcommittee until I stopped doing it entirely. But I did it for a number of years. Paul Dembling and then [S. Neil] Hosenball [of NASA], were the … representatives … in the Legal Subcommittee [of COPUOS]. I mentioned that [one of the US ambassadors] from the U.S. mission would usually open the parent committee meeting and then give way to me.

[The] staff of the U.S. mission was extremely active in this, particularly … Peter Thatcher, a very, very good man…. He was … support [and guidance] for our participation, very, very good. That worked very well. But in my view, [the main benefit was the show-and-tell function].

WRIGHT: Did the United States delegation on these committees ever come to you looking for information or guidance that only your team could provide? Were they looking for anything specific on maybe how to deal with specific countries or if they had some specific ideas they were looking for some assistance from you?

FRUTKIN: [Eventually we were the US Delegation.]

WRIGHT: Maybe some of the principles that they were working on or some the treaties that they were working on at the time.

FRUTKIN: Oh, yes. Oh, yes. I mean, I don't think [the mission] did a thing on the treaties without dealing with Dembling and Hosenball…. If something they wanted to do in a treaty would cause a problem [to the US space program, in NASA's view], we'd be very quick to speak up, and [it] would not [be pressed] it, if it was a real problem. I don't think that much presented a problem, but it might have been, I just don't remember. Hosenball might give you a much better answer than I could on that.

But, no, we were in touch with Peter Thatcher regularly because there'd be some ongoing business within the [UN] committees and [the mission would] want to know [what we were]

proposing to do or say [about it], and that worked very well, very congenial. In fact, a fellow who was my deputy at NASA for some years left and became a member of the permanent staff of the Committee on the Peaceful Uses of Outer Space—Marvin Robinson … became a member up there. But we didn't deal much with him. We dealt with our own mission, because he [became] an international civil servant and [we] didn't want any conflict of interest there.

WRIGHT: I made a note earlier that you said when we got to this area we were going to talk a little more about your definition of space and boundaries and where that came with how the United States looked at where the boundaries were for space and how all that came about.

FRUTKIN: Well, there was … a lot of [talk] around the world about a "boundary" between air space and outer space; … it was important because of [the] overflight question. The U.S. policy was to achieve free overflight [in space].

[For example], Theodore von Karman, [an] aeronautical scientist, … was one of the active people in trying to come to a definition. But my feeling is that people were focusing on trying to [define] a boundary [to] accommodate the fact of [satellites orbiting] in outer space. They came up with [a] rationale. I am not competent to say how valid it is, but it's been accepted in the world. It almost comes to [saying] that the height at which a satellite can orbit is by definition in outer space. It is, I don't know, roughly a hundred miles. When [the satellite's orbit decays] below that [level], they go in [fairly quickly]. So I'm not being too enlightening on that, but I'm saying that the legal work accommodated the reality.

WRIGHT: Your job also took you I believe for a small span of time working with Dr. Homer [E.] Newell on NASA planning problems.

FRUTKIN: I cannot remember anything about that. I know I did it. Let's say I spent some time working with Homer Newell. I'm not even clear on what I was working on in memory. …There was a staff that had worked with Bob [Robert C.] Seamans, and it involved Wyatt, DeMarquis [D.] Wyatt, D. D. Wyatt, and another man [or two]…. They were doing … management analysis on programs for Seamans, as I thought. Now, Seamans left, and Newell got more into that area. He asked me, he or whoever was the administrator at the time, I honestly don't remember—did you have dates on it?

WRIGHT: I don't believe I do, but maybe if we visit again I can send you some information and we can try that find that.

FRUTKIN: He asked me to come over and help on what it [was] they were doing, but I don't remember exactly what they were doing. I do know that it didn't work out. It did not work out, and I honestly don't know the reasons.

…Wyatt had been doing this job himself. Whatever the job was, he had been doing it himself, and he did not take kindly to my coming in from outside with no real background in it. I had no background in financial management at all or program management, none…. I don't know exactly how we resolved it, but I'd have to say that it was a mistake to put me there, that I did not have the background for it, and probably everybody was happy [with] my going back to the international [arena].

WRIGHT: Speaking of which, one of your accomplishments was the negotiations with the Soviets regarding Apollo-Soyuz [Test Project, ASTP].

FRUTKIN: Yes.

WRIGHT: We'd like to start with that, and you can tell us how far back that those negotiations started and what your role was to help.

FRUTKIN: Do you want to talk generally about cooperation with the Soviets, or do you want to talk about the Apollo-Soyuz thing?

WRIGHT: Let's start with the general negotiation.

FRUTKIN: The general?

WRIGHT: Yes.

FRUTKIN: Back during the IGY, before NASA was established, the international IGY apparatus that dealt with rockets and satellites was called … COSPAR, [the] Committee on Space Research. [Recognizing that both the US and the Soviet union had committed to launching satellites]…. [COSPAR] wanted to arrange for the usual exchange of [scientific] information between the two. [As] in all the other areas of geophysics, the data was to be exchanged. It was

[understood] that the frequencies on which the data would be telemetered down to Earth would be given to each side. Our frequencies were given, [but] there was always a great problem with the Soviets. … There were arguments about it [but there was] no real cooperation [so far as satellites were concerned].

When NASA was established, Dryden had obviously been given direction, … pretty [clearly] from the White House, to see what he could do about getting the Soviets to cooperate. We would talk with them on the side at [the] U.N. meetings when they were set up and before that at any other meetings like the International Astronautics Federation and the AAS, the American Astronautical Society…. At those [functions], the Russians would attend, we would attend, and we would meet privately on the side.

In the first years, [in] the very first period, the Russians would say, "Well, we can't cooperate until there's complete and total disarmament." So it meant no cooperation. A little later, they began to say, … "We're open to cooperation, but it has to proceed step by step." That was a specific line they used over and over, "step by step." We would say, Dr. Dryden would say, "Okay, what's the first step? We're ready to take the first step," [but] they would never define or agree to [define] a first step.

…At a certain point early on, like … '61, in the [President John F.] Kennedy administration, [the Soviet side did agree] to try to develop some cooperation—[by which was meant exchanges of scientific results]. Meteorology [is a good example]. Weather photographs from space, from satellites, [were to be exchanged]. The key for … [understanding this] is that this early cooperation was [at] arm's length. [In] and each area, [there] was an exchange of [results] with no integrated involvement of either side in the other's work. [Again, take] the meteorological case. We would have to set up dedicated communication lines [between]

Washington [D.C.] [and] Moscow to exchange this weather data. We [assumed—and proposed—that we would] share the cost of the line. [The Soviets] said, "No, we'll pay for it to our border and you pay [for it from there to your] border." We said, "We'd [there] be paying for [most of the cost] of the line … and you'd be paying for [very little of it]." I [felt we should not budge from an equal division of the costs]. They made a great fuss about that. In fact, [they] insisted that Dryden refer [our] answer back to Washington—we were in Geneva [Switzerland], … at the time—[to see if] Washington [would back him. I didn't think Dryden should indulge them, compromising his authority but he did. Of course, we were backed, the Soviets gave in and we shared the cost equally. But you can se the attitude of the Soviet side.]

Now, we got to a [point later] where even [this level] began to fall away. … [The Soviet side] stopped answering letters. They ignored things…. It irritated me greatly because I felt … it was undignified, … a lack of self-respect, for us to pursue them under those circumstances, [as we were asked to do]. I began to compile a dossier, [listing every] date when we attempted to communicate with them [and their failures to respond]. We'd communicate again, [citing] the first effort and the fact that it [had] not been answered. I had a couple of pages of this absolute proof that when they talked about cooperation in the U.N. or anywhere else, they were [grossly misrepresenting the facts].

At a meeting in Cloudcroft, New Mexico, [at] one of the astronautical societies, I [was scheduled] to deliver a paper. I read … off [the record of correspondence] with the Soviets, who were supposed to be dealing with us. It included exchanges of data of manned flight [that were supposed to be occurring]. …Gazenko, [their representative, a] very nice guy [personally], was in the front row. [I didn't soft-pedal their dismal record at all. Gazenko] came up afterwards practically squeaking with indignation. "How could you do this to us?"

I said, "Is it true or isn't it true?"

"Yes, it's true, but there are reasons for it."

I said, "Yes, I'm sure there are reasons for it. I know you wouldn't do this on your own, but this is the fact, and you can't tell everybody that you're cooperating when you're [actually not doing so."

It all changed within weeks. Holding their feet to the fire really worked.

[The big] change from an arm's-length program to a program that really engaged the [two] sides [in common, interdependent activities] came with Apollo-Soyuz. That got started in the [President Richard M.] Nixon administration…. One day [Thomas O.] Paine, … then the administrator, called me in and said, "We want to come up with [some significant cooperative effort] with the Soviets." He had in mind … something that [would involve one side] launching a manned capsule of [the other]. There were some other people [present], program people. We all agreed that [would not be] a viable proposal to the Soviets, because if they [launched] our capsule, [we risked a widespread impression that] we had to go to them because we didn't have the launch power [(though of course, we did). Even more important, we could not expect access to] … enough information to satisfy [our] safety requirements and [meet] the standards that our program people [would] want. [The Soviet side would feel the same reluctance to be seen as dependent on us for a launching].

[I felt any project, to be viable, had to have] the appearance of equality. [The Soviets wouldn't] buy it unless they look equal in space to us. They're not any longer [but] they'd like to look equal. That's what [could] induce them into this…. Everybody agreed it would be have to be something like that. I believe it was [I who suggested] a docking in space. That led to the Apollo-Soyuz thing.

Now, Why did Paine call us in to say we [had] to come up with something? I am [morally certain] that he had just come back from the White House and that the Nixon administration, [Secretary of State Henry A.] Kissinger, had pushed him to … come up with something [highly visible in cooperation with the Soviets]. I think that's how it started, because Kissinger turned out, after this, in my own experience, to be [the] strong force within the White House pushing Apollo-Soyuz.

Paine [asked us to] come up with a [docking] proposal, and he wrote a letter [along the lines we discussed]. I probably drafted it. [I] don't honestly remember, but almost certainly I would have drafted it—and I don't remember to whom it was addressed, but I'm guessing [it was] [Mstislav Vsevolodovich] Keldysh, … head of the Soviet Academy. …That's the way it would have worked. [Eventually], a meeting [was arranged].

By the time we met, Paine had left and George [M.] Low was the acting administrator. … [Bob] Gilruth was made head of the delegation [to Moscow]. I was … in charge of … policy and the negotiation. … Gilruth had a young guy on his staff with us. (I'm sure there were more than just the three of us, but I don't remember who else.) The young guy was Glynn [S.] Lunney, who turned out to be an absolutely super, super person for this job, … technically and managerially and personally. The Soviets loved him. He could get them to do things that they didn't know they wanted to do. He was just very, very good.

So we had that first meeting and agreed on the broad outlines of an Apollo-Soyuz thing which would have to be [worked out] in detail [by joint working groups]. I remember we came back and had a press conference. Low asked me to handle the press conference; he did not appear. … The story made the front page of the *New York Times* in the right-hand column, and

you [can] always refer to that. Any researcher who wants to see the next day's [report] on that first Apollo-Soyuz [press conference]—it's a lengthy story—[can find it all there].

Lunney and [a Soviet engineer named Bushuyev] who Lunney always called "the "Professor" [Konstantin Davydovich Bushuyev]," … were heads of the joint working group apparatus. There were a number of joint working [(sub-)]groups on different aspects of the program and [apparently] all did a very good job.

Early on, after one of the early meetings fleshing out the details of the program in the negotiations, Lunney called me and said [he was] very worried … because the Soviets [were unwilling] to set up a direct telephone [link] between their manned space program [in Star City] and ours in Houston." Lunney said, "We must have that. It must be possible for the guys … at the working level on this [project] to call each other any time they run into a question or a problem [so they can] get it straightened out [promptly] or we'll never get there." He said, "It just won't work [otherwise]."

I knew he was right. First of all, I trusted him, and [second], it just made sense that for such a demanding [project] where you had to have interfaces [of all sorts] and coordinated launchings and parameters for the rendezvous and [so on, that], you had to be able to resolve issues [directly and promptly], and the Russians weren't agreeing to it.

So I said, "I agree with you. I'll talk to George Low." I went to George Low and told him the story and said, "I'm sure Lunney's right and it's got to be set up."

He said, "What [do you suggest]?"

I said, "I think you and Lunney and I ought to go to Moscow and sit down with these people and tell them this [channel] has to be set up or else we'll have to go back to the White House and tell them that we think the project has to be dropped." That's what we did. We went

back [to Moscow], and that's what was said, and the Soviets caved in. [The link] was set up. [You] see, they were worried about calls coming in at any time when they might not be around to monitor them, [when] they wouldn't know what was being said by their people…. I'm sure that was their concern.

[A telephone protocol] was set up on some rational basis so calls [could] come in, I think, [everyday but I believe between fixed hours] in the morning [and] afternoon…. I don't remember exactly, but there was something that [fully] accommodated Lunney's concerns [yet] had the appearance of some rationale or organization for the Soviet side, but they caved. The project went ahead, and it went ahead very, very well.

Now, there's one further episode that relates to Apollo-Soyuz that will illustrate some things about it. Somewhere during the program, Zbigniew Brzezinski, wrote a letter to one of the newspapers. He was not then in office. This was in the Nixon administration and before [President James Earl] Carter came in. He wrote a letter saying that Apollo-Soyuz was a technological giveaway, and it was a shame that we were conducting such a … program.

I sat down and wrote him a letter which [stated] what the situation [was with respect to his charge]. First of all, our [space] program was [already] a substantially open program. The Soviets' was a substantially closed program. So in any relationship between the two of them, it [was more] likely we'd learn … more [about their program] than they'd learn [about ours], and that, of course, was the [actual] case. We went to Star City [Zvezdny Gorodok, U.S.S.R.]. We saw their rendezvous and docking apparatus and how primitive it was. We saw lots of [such] things. In the course of [the] program, we [also] went to one of the [Soviet] launch sites. We were the first Westerners, other than [President of France Charles] de Gaulle, who was like that

goat looking into my desk. But we went to the launch site. [In general, the project] was clearly more [revealing] for us than for the Soviets.

Second, the only significant technological interchange in the program was the docking device. When the [joint] working group sat down and looked at what was required for the compatible docking [exercise, they looked at] our system, our docking device, and they [looked at the Soviets'. Our people argued that] theirs was better. It was safer. [You] see, ours was a portable thing that [had to be] stored away somewhere, and [taken out for use and put back afterwards. It had to be manhandled into position for use]. In theory you could rip a flight suit or [damage] something. But [their docking device] was designed later and better in the sense that it was hinged [and folded into place or removed] very nicely. Nobody had to drag [it] down like a barbed ironing board and poke it around. … So it was agreed that we would use <u>their</u> docking device. To permit that, we had to build one like it, so [the Soviets] gave us [their] blueprints. They gave us the blueprints for the docking device, [it was] the most substantial technological interchange in the program, and it went from them to us.

Now, in addition to that, they accommodated us in [a third] way. …In the first concept, there was to be an additional piece of hardware … to be put between the two capsules when they rendezvoused and docked. It was a decompression chamber, … necessary because in our Apollo capsule, the atmospheric pressure inside was five pounds per square inch [while] in theirs it was fifteen pounds per square inch. We had a pure oxygen atmosphere at five pounds. They had nitrogen and oxygen at fifteen pounds. You couldn't go from one to the other without [risking] getting [the] bends…. So you'd [have to] have a decompression device—a big complication to the program. [It] would … cost [a] lot of money, not only to design and build, but to provide for carrying it up and installing it and all that stuff.

So the Russians [volunteered to use their capsule itself] as the decompression chamber. [They would] decompress before [anyone moved] from one capsule to the other inside. [They would] just sit there [for a couple of hours while decompressing] down to five pounds. Well, that was a very nice accommodation, … again on the Soviet side. It was at some risk to them because now they would have to bleed off the nitrogen and [get] down to five pounds of pure oxygen, which [would increase] the fire hazard.

So they [asked] to us, [if we could give them] samples of the beta cloth from [our] flight suits. [They would] make up [their] our own flight suits. Well, we wanted to give them the beta cloth so they could do that, but [our] export authorities, in their wisdom …, said we couldn't do it. The Soviets [therefore] had to develop their own fire-retardant cloth, and they sent us a piece of it. The guys at Houston—[this is not any opinion—the guys at Houston told me it was better than ours. They improved on ours, and we had a sample of it.

[Another] thing [the] Soviets asked us for [was] a low light intensity video camera so they could broadcast video scenes from their capsule. … We had the kind of [video] camera that you can buy today anywhere, but in those days you couldn't, and it could take pictures in very low light [inside the capsule] and [relay] TV [to] Earth. [Again], we were not permitted to send [the Soviet side] a camera that they could use, so they had the develop their own camera. I'm told it was not as good as ours, but it worked, so they solved the problem, and they probably learned something while doing it.

[All this] was the substance of my letter to Brzezinski. I feel it demolished his [uninformed], presumptuous and [very] biased letter. He thanked me for my letter and [continued making the same allegations. If he had simply and honestly said he was opposed to cooperating with the Soviet Union because of its human rights violations, that would have been

perfectly reasonable. But it appears he made unfounded charges without revealing his real considerations.]

[Of course, we were directed to do this program. And it was very well done.] Whether it was worth doing is another big question, and I'm not sure of the answer to that. We did it because we were told to do it [by the White House]….

Now, I hope it's come through that I'm not soft-headed about dealing with other people—[like] if you knew your neighbor better you'd like him. I never believed that. If you knew your neighbor better, you might conclude that he [was] a worse son of a bitch than you [suspected]. I mean, those [notions] are just soft-headed.

But nevertheless, I think there were some [very] good things about Apollo-Soyuz. For one thing, about one hundred technicians on each side were involved, and those technicians traveled from Star City outside Moscow to Houston and from Houston to Star City, and they met [and worked with] each other [over an extended period]. They were invited home to family dinners. Their people stayed in our motels. I saw [them] come down to breakfast at my motel and how they got along with our waitresses—[who] thought they were great fun. They were interesting. Houston is such a dull place, and here you have these interesting Soviets. The Soviets fell in love with maple syrup and took all they could home. [They] bought stuff in the supermarkets. They saw what this country was really like, not what they were told it was like, a hundred of them. They were [one] hundred elite people. …Not just ordinary people. [They'd] go home, and spread [it all] out through their families and their [extended families]…. So I think that must have had a big ripple effect in the Soviet Union. I really do.

It also humanized the individual Soviet person for our people. After all, they were human beings, and they were pretty good. They had [just] been misled by their government…. So that is the story on Apollo-Soyuz.

Now, oh, there's one footnote. It [seemed] so logical to continue … because [the project] was so successful. It seemed to me the thing to do next would be to move [on] into a space station. But that was a huge undertaking at the height of the cold war with the Soviet Union, and it had to be done in such a way that we weren't transferring technology and [so that neither side had anything to fear from it].

…The very first step toward a space station would be the concept, [so we would] have an agreement which [provided] for trying to agree on a concept. We would talk with each other about a concept for a space station. If we could agree on a concept, only then would we move to a second phase, which would be the design phase. Only if you could agree on a design would you begin to move toward [developing] a bench model of some sort [and so on through all the established developmental phases toward a completed product].

Well, … working closely with [our people] at Houston, we developed a draft agreement and negotiated with the Soviets to the point where they [actually] signed it. There was a signed agreement from them for a joint space station program, but with this careful, limited step-by-step [procedure according to which] you would never proceed from one [phase] to the … next … unless there was complete comfort and satisfaction in the prior [phase].

…[By this] time, there [had been an] election [and] Carter [was] coming in. … I told [James C.] Fletcher, who was then the administrator, that I felt we … would have to consult with the new administration [before signing the agreement] because there [was] no point in …

confronting them with [a fait accompli] that they might not want. I don't know whether I knew Brzezinski was going to be [national security advisor] or not then. I just don't remember.

Anyhow, [Fletcher] was interested in signing it, but we held off. When the new administration came in, I called the White House, and they said, "Don't sign it…. Scrap it." I felt pretty embarrassed, because we [had] led the Soviets into it and then we couldn't follow through, but there [could be] no argument about it. The administration had the right to call it. They didn't want to do it, and certainly Brzezinski, who [had by] then materialized as the president's national security advisor [would oppose it]. But they gave it no hearing, just no hearing.

Now, maybe it was not a good idea. Maybe it was premature. But if the Soviets were willing to get into it, I think it was not premature. That was the story, [and] there was no more about [cooperation in a space station for years]—until the modern, the more recent stuff, and I know nothing about that. …I [do] know … that in my time there would have been no program under which millions of dollars would have been given to the Soviets to carry out their side of joint operations in space. I don't know, what was it, $400 million?

WRIGHT: Forty million. Are you talking about Shuttle-Mir? Are you talking about current ISS [International Space Station]?

FRUTKIN: No, all the joint operations in their capsule. We put men up there. It was a lot of money, anyhow. But [there] wouldn't have been a dime in my time. … Now, I admit that we were working during the cold war and [that it's] different [now], but it would not have happened. I don't believe in that kind of dollar cooperation. I mean dollar-paid cooperation. You don't pay

people to cooperate with you. If it had been insisted on, I would have resigned…. I would not have been identified with that kind of thing.

WRIGHT: Well, there's so much more that you did that we would like to talk to you about, but our time for the day is here.

FRUTKIN: Goodness sake.

WRIGHT: We don't want to keep you from your other appointments.

FRUTKIN: Yes. I'm going to call my luncheon date right now, if I can.

WRIGHT: You certainly can, and we'll just close for today. Then maybe we can have a chance to visit again in the future, but thank you for today.

FRUTKIN: You're very welcome. One reason I have been so willing to speak at length and cooperate is I have just been asked by Kathy [Kathryn C.] Thornton. Do you know [her]?

WRIGHT: Yes.

FRUTKIN: She lives in Charlottesville [Virginia]. She teaches at the University of Virginia. She's just asked me to give a course. It's going to be on the international space program. It's just a few lectures [in] an institute for senior citizens that [is] identified with the University of

Virginia. So I'm going to do that next year. [I've done an outline of] just a couple of pages … and thought this would be [a] useful rehearsal.

WRIGHT: Good. You'll have a transcript of this, so you'll be able to use it for everything.

FRUTKIN: Yes.

WRIGHT: Thank you a lot for today, and we hope to see you again in the future.

[End of Interview]