

NASA HEADQUARTERS NACA ORAL HISTORY PROJECT

EDITED ORAL HISTORY TRANSCRIPT

CALVIN W. WEISS
INTERVIEWED BY REBECCA WRIGHT
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WRIGHT: Today is June 6, 2014. This oral history session is being conducted with Cal Weiss at NASA's Glenn Research Center in Cleveland, Ohio, as part of the NACA [National Advisory Committee for Aeronautics] Oral History Project, sponsored by the NASA Headquarters History Office. Interviewer is Rebecca Wright, assisted by Sandra Johnson. Thanks again for coming in. You were starting to tell us about how you and your brother came to the air races when you were a child.

WEISS: That's right. I grew up here in Cleveland. I'm a product of the Cleveland public school system. When I was about eight years old, my brother, who's 10 years older than I am, brought me out here to the National Air Races. We came out via the streetcars and the buses, took us 2.5 hours, I think, to get here. I was really impressed by aviation when I was a youngster. Not so much by the airplane itself, but the beauty of it, it was more the aesthetics.

Later on, when I was in high school, I was getting some publications that I read, and I read the name "NACA." I realized that they did work in airfoils, for example, and also one of the other famous things was the cowling around the engines. I knew what airfoils were supposed to do—to increase the ability of the airplanes to fly under different conditions—and the cowling was to cool the engine. That didn't impress me as much as it just made the airplane look better, as far as I was concerned.

Those races were conducted right here, at the very spot where the Lewis [Research] Center is at the present time—or this is the Glenn [Research] Center now. I say Lewis, if you excuse me. But I knew it as the AERL, Aircraft Engine Research Laboratory, when I first was coming around. One of the things that impressed me, though, at the air races—besides the racers themselves—was Hanna Reitsch came over from Germany with three sailplanes [gliders]. They pulled these people up when something else was on the ground, because we didn't realize it until they told us to look up there. They cut them loose, and I never saw such beautiful flying of sailplanes. It continued on, and I actually took a few lessons later on in life, and made sailplane models. I enjoy sailplanes more—they look like the birds. Beautiful, sailing around, rather than the zipping around that we're doing today.

I graduated from high school. I came out and became a freshman at Baldwin-Wallace College, which is BW University now [Berea, Ohio], about 8 miles away from us here. Before I started my freshman year, the dean said to me, “You're 1-A [immediately available for military service] as far as the [World War II] draft is concerned, so I would advise you to possibly join one of the services on the basis that, of course, you wouldn't be drafted. And secondly, you might have a little longer time in the college. I can't guarantee you that, but this is a possibility.”

I was very much interested in the Navy airplanes that came here to the races. They came from an aircraft carrier, which was out on the water. That, to me, was exciting, so I joined the Navy. They gave me a year of inactive duty, and I went to Baldwin-Wallace for my freshman year. One of the best things that happened to me out there is I met my wife. We're going to be married 68 years at the end of this month.

WRIGHT: Goodness, what year was that?

WEISS: 1942 that I met her. It was 72 years ago. Man! Time flies. I finished my freshman year out there, and then I was called up in the Navy. I went right back to Baldwin-Wallace as part of the Navy V-12 [College Training] Program. I really didn't know what it was, to be honest, when I went there. But it was officer training, so I spent a year, a little more than a year, at BW, and then Columbia University [New York, New York] for four months for midshipman school.

Got out of there as an ensign and was assigned to a ship in the Pacific [Ocean], and chased it for three months, all over the Pacific, and finally got on board it. Was on it for three months, then a transfer to an LST [Landing Ship, Tank]—they were getting ready at that time, I think, for the invasion. That was in 1945. I was on that for a year. We came home, finally, thank the Lord they did drop the [atomic] bomb. I say that because it saved millions of lives, both sides, Japanese and ours. I did find out later that the [Boeing] B-29 [Superfortress] that dropped that bomb was able to do it, in many respects, because of problems that were solved right here at this Center.

Right across the street from us there is the old Altitude Wind Tunnel, and that airplane would not perform the way it was supposed to, having engine trouble. Dr. [Abraham "Abe"] Silverstein had a group, and they worked on the cowling of the engine to make sure that the air was going through the right way to cool it, and aerodynamically, that was taken care of. They worked on that there. John [H.] Collins [Jr.] worked on one that is unbelievable—the cylinders would heat up, and the exhaust valves would fail and cause the piston to fail later on. It was a heat problem, and he found that by adding 3/10 of an ounce of metal to [the top of] each of the 18 cylinders, he solved that problem. It increased the weight of the airplane by 3.5 pounds.

One other problem that they had was that the cylinders were not at the same temperature—some were hot, some were cold—and another gentleman, Mr. [Charles], Moore worked on that. They found out that the carburetion was improper. They squared that away. That engine then was running properly and it increased, I think, they said something like 12 percent of the distance it could fly, or 12 percent more of the weight that it could carry. That's a very important, very historic part. When I saw B-29s—and I saw an awful lot of them during the war—I didn't know at that time NACA was involved, but I found out later on.

After the war was over, I came back, was married, went back to college. I finished up in six months, and got a degree, Bachelor of Science. At that time, I was not interested in science. I didn't have much desire to sit down and do math problems and do physics problems or something of that nature. I was still more involved with the aesthetics of flight. I came out here for an interview, and it was real quick because Dr. Silverstein sat down with me—he wasn't the [Center] Director at the time—and he threw a math problem at me, and I couldn't begin to do the math problem. The interview was over as fast as I walked in. I met another gentleman who worked out here later on, and told him my desire. I said, "I'm interested in the art part of it, and that sort of thing," and he says, "Well, we have an illustration department out here. See what we can do." I came out and was interviewed and was accepted for the illustration department.

I came in, I couldn't tell you what the title was, other than I was a SP-3 [pay grade], with a grand total of \$1,954 per year. It was a good thing my wife was working, or we'd have been out on the street, I think. She was working at War Assets [Administration] across the field here, later on came over here to the lab [laboratory] and worked. My first days there were, of course, being oriented by the supervisor as to the hours and what have you.

At that time, it was funny, we had a whistle here that blew at 8:30, right outside here on this one building. Eighty-thirty, that was the time work started, and you had to sign in. It was like punching the clock, really. If you were late, there was a red pencil, and you signed in, in the red line, and then you have to negotiate with the supervisor whether I could stay 5 more minutes or 10 more minutes or something like that, so that I can make up the time. They blew a whistle at 4:30, also.

My first days were basically cutting mattes for pictures. The place was new, they were paving and constructing, and they got to the point of designing what should go on the walls. They had a lot of aeronautical pictures and what have you, and I was cutting. That was the first thing that I did. Then, I got a drafting table, and began working as a draftsman or an artist. What we would do is illustrate the technical reports that were being done by the scientists and the engineers here.

The organization I belonged to was the Technical Services Division, and that was the illustrators, the photo lab, the print shop, editors, typists. There was a group that stripped negatives and put them in, and we were the ones that took the raw data and the raw write-ups and made the final publication out of it. In one case, the most that I ever achieved was finally doing a drawing of a furnace that was for a materials program, where they would take metal and put it inside of a furnace and heat it up and then put stresses on it to see when it would fracture and what have you. I did the perspective drawing here, from [blueprints] that were [supplied]. I did not airbrush it—I was not that competent in that. The real illustrators did that. I was still a technical guy.

One of the other things that came up was the NACA would report to Congress every year with an annual report. Somewhere along the line, someone decided that between Langley

[Research Center, Hampton, Virginia], Ames [Research Center, Moffett Field, California], and Lewis, they would select certain reports that they felt were the ones that should be sent to Congress as an example of what they had done that year. In order to make it all look like it came from the same place, rather than three different places, we had guidelines that we had to follow as far as the lettering and what have you was concerned. I had three young ladies that I worked with, and I would give them the drawings, and basically was plotting X against Y on most of these things. I would figure out the size that it had to be to fit it in, which meant they had to letter it at a certain size, and we had guides for that. Everybody had to do hand-lettering. This was kind of tedious, but if you go back and look at the old reports, you can see that [they appeared as if done by one Center].

That was 1950 at that time, and my wife was working down here in the materials building. She was a secretary for Dr. Sid [Sidney L.] Simon, who was the head of Materials and Structures. We decided that it was about time for her to become a housewife, so on a Friday she left, and on Saturday morning we were hanging wash outside. In those days, we hung wash out. The mailman came up and handed me a letter that said, “You are being called for active duty for Korea [Korean War].”

I had stayed in the Reserves during that period to augment that \$1,954, so I was called back for two more years. Dr. [Edward R.] Sharp, who I was a great pal with—to be honest with you, I guess I can call him a pal—we were in the same driving combination. He was the Director of the laboratory, and I was an SP-3. I remember one time, coming into the back of the Ad [Administration] Building here, I let him out, and the whistle blew. I said, “If we would get that one traffic light down there on Bagley Road green in the mornings instead of red, we’d make it here on time.” The Director just stuck his head in the window and said, “Did you ever think of

leaving five minutes earlier?” Kind of put me in my place. He was instrumental in having me take people, from time to time, around the laboratory. I got to know a little bit about it.

I met John [F.] Victory, who was the secretary and the first employee of the NACA. Dr. Sharp called me over one day and he said, “Take a committee car and go down to the terminal tomorrow morning at 7:30 and meet Dr. Victory. He’s coming in on a night train. Bring him out to the laboratory because he wants to be here to start work. He will not travel during working hours. He takes the train at night so that he’ll be here, ready to start, at 8:30 in the morning.” I met him that way and I talked with him. He was quite a gentleman. If you look at the old reports, the first annual reports, you’ll see he’s got written in there the amount of money for streetcars, the amount of money for paper, the amount of money for pencils, and everything else. That was his job, to report to Congress.

I went to Korea for a year, came back [for another year on the west coast]. I came back to the lab to see what was available. I didn’t know about the old job or what was in town for me. The gentleman here, who was Jack [John D.] Brown as I remember, was the personnel man that I met. He had been in the Navy during the war and he said, “What did you do in the service?”

“Well, the last ship I was on I was the executive officer.”

He said, “Oh, you’ve had administrative work.”

“Yes, I pushed a lot of paper, that was for sure.”

He says, “I’ve got a job maybe you would like to go to.” It was the Engineering Division as an administrative assistant to the division chief. There again, handle a lot of paperwork, check job orders that would go around. We had a system where these people—first of all, they were the people that designed [the] rigs for their engineers and scientists—so that they could run their

program. They would come to you and say, “I have this to do, I need something along the line of this.” Then they would get together and build the rig.

They would have a number that was assigned to this job, and if you wanted to get something from the shop, you would get it and assign it to that number. It got to the point where people were using everybody else’s number, so one of the jobs I had was just go over and make sure that the money that was being spent on the job was really, truly the money that was [allocated for it.

Then came along another job, which was the Education Office. I didn’t even know there was such a thing, but it consisted of one man under the personnel people. My job there was twofold. First, to take the new employees that came in every Monday morning, maybe 10 to 15 of them, and I would orient them as to the laboratory. In fact, I swore them in, and I still have the paper here from [Edward H.] Chamberlin, from [NACA] Headquarters [Washington, DC], that gave me the authority to swear people in. “Raise your right hand,” and, “You do solemnly swear,” and all this. The authority is still there. Then I would go through about sick leave and annual leave, and the rules and regulations regarding what they could do here.

Then we’d go to lunch, and then in the afternoon they’d come back, and I’d give them an orientation as to what NACA was. That’s where that book, *Frontiers of Flight [The Story of NACA Research* by George W. Gray], comes in because it’s the history of NACA. I would go through that. It’s really interesting because it goes back to Dr. [Samuel P.] Langley at the Smithsonian [Institution], who in the late 1890s had built a model airplane, pretty good size, steam-powered, and he flew it down the Potomac River for about five miles. It worked, so the government gave him \$50,000, I believe it was, to build a man-carrying airplane. Well, it didn’t work. He was [launching] off a houseboat down the Potomac, and it crashed. I think two times

they tried it and it didn't work. It was something like [nine] days later, the Wright Brothers [Orville and Wilbur Wright] flew. So the Wright Brothers were really the ones that have gotten the credit for the invention of the airplane.

You would think that after that happened, a lot would have happened to push aviation in this country, and it didn't. It didn't go at all. In fact, when our fellows went over in World War I as pilots, to fly, they flew all French and British airplanes because we had none. I think the book says we had 28 airplanes in our military. Dr. [Charles D.] Walcott, who was the successor to Dr. Langley at the Smithsonian, wanted to make sure that Dr. Langley's previous work would continue. Also, he just felt that this country should do something to get aviation ahead.

He was actually the gentleman that got the NACA established, and got it through Congress. I can still remember, "to supervise and direct the scientific study of [the problems of] flight with a view to their practical solution," and conduct experiments. Gave them \$5,000 a year for five years, and there was a stipulation that if they solved all the problems, any money left over would come back to the government again. It did not go through as an NACA bill; it was a rider onto a Navy appropriation. There was one time [regarding] an appropriation—we can look [back] and say, "Well, we know something [great came out of a rider] because NACA/NASA was [established that way]."

I would give them this talk in the afternoon, [including names of] the streets that are around here named for the people who were on the initial [NACA] committees—[Samuel W.] Stratton and [David W.] Taylor and [others]. Then I would make sure that they were taken to the right places for their work.

The second part was the co-op [cooperative education] program. I would work with colleges and universities that had co-op programs. I remember University of Detroit [Mercy,

Michigan] and University of Cincinnati [Ohio] were two of them; I can't remember the others. We would say that we would invite some of their engineering students interested in this particular field to come in and work with us for a three-month period, and then go back to college, and come back and rotate with us. It was a very good program. I met some wonderful young people. One of them in particular, I think I told you about before, was Glynn [S.] Lunney. Glynn Lunney currently is Dr. Glynn Lunney, retired from Johnson Space Center in [Houston] Texas.

Glynn came to us from Detroit. Where he was living [in Cleveland] I don't know, but we gave him the word on transportation, how to get here. There was the streetcar, the inter-urban stop, down here at the Ford [Motor Company Engine] Plant [Number 1], which is about 2.5 miles from here. Then there was a bus that took you [to NACA]. Well, he missed that last bus. Glynn was a couple of hours late coming to work the first day because he had to walk over two and a half miles from the other end of the [Cleveland Hopkins International] Airport all the way down here. I always laugh, even to this day, whenever I've seen him, I said, "We questioned as to whether you would make it."

He ended up being a flight controller in the Apollo Program. I saw him in the movies that I've seen, and the pictures of them in the [Mission] Control [Center], when Apollo 13 was flying. Fred [W.] Haise [Jr.], who was one of our pilots here, who I knew, was one of the three on board. I knew Fred Haise and I knew Glynn Lunney, so there were good Lewis people there. I was pleased that he and all the rest of them did what they did because that was an unbelievable job they did.

Going back, one other thing about people I met besides Glynn and Fred—coming through when I was taking the new people in, one day I got one fellow in who was from Purdue

University [West Lafayette, Indiana]. Just graduated from Purdue, and was an ex-Navy pilot. I oriented him, swore him in, and what have you. It was Neil [A.] Armstrong. Years later, after he had been on the Moon, I met him one time at a meeting they were here at. I said, “I swore you in,” and he said, “I remember you.” I said right then, I [just went] out to the Moon and back. Those were the people I knew besides Dr. Sharp, who was just a wonderful man, and Dr. Silverstein and the rest of them. That was the personnel people.

Then, along that time, Glynn came in with a group—we put him with a group that became a nucleus for the manned space program. The people that were in Cleveland here who had some connection with that would fly down to Langley once a week. On Monday they would go down, and they’d come back on Friday. We put him with that group, and when he came back the second time, we had him someplace else. He says, “No, I want to stay with that same group, if I can.” That’s how he got into the manned program. That brought about the space program.

We used to have annual inspections. Every year, the Center would be open by private invitation to military, the universities, industry, to come and see what was being done in the field. We would have six or eight area stops around here, where the illustration department would be working their heads off, making up the props for the back of them, the wood model shop building things for them. Then buses—we had our own engineers as guides on the buses—and they would go from one place to another on a very tight schedule, and have lectures by the engineers and scientists working in these areas, telling them what was going on. That would go on for, I’d say, two or three days, and then it was open to the public or to the employees following that.

That actually went once a year, and then they went tri-annual, where every three years you would have it. That got me oriented, again, with a lot of people because of the work in the

illustration department. At one stop we had at the rocket lab, there was a satellite up on the cabinet where the fellows were giving their talk. Dr. Victory was here, going through, listening to everything, and he made them take that down. He said, “We are not authorized to be working in space, take it down.” That night Sputnik [Russian satellite] went up, and the next morning, our satellite model was back up on that again. We were in that program.

Dr. Silverstein went down to Washington [DC], and T. Keith Glennan, who was the president of Case Western Reserve University here in town, went down as the first Director of NASA. Jim [James J.] Modarelli, who was the head man in our Technical Services Division here—and incidentally, the man who designed the NASA seal—went with Dr. Silverstein to help set up programs down there. I took Jim Modarelli’s place as a temporary head of this group that I had started off with—the illustrators, the photo lab, and the rest of them. That was one way, again, I got to know more people.

After a year or so down there, they came back. And at that time, with satellites beginning to fly, we began to get all kinds of requests in here for information and tours and movies. I volunteered to join a new group, Public Affairs, which we hadn’t had before. I think under the NACA, we had one public affairs man, Walter [T.] Bonney, for the entire NACA. NACA wasn’t blowing their horn about anything. They figured, as Dr. Silverstein once said, that people who need us know who we are. Basically, I guess, we weren’t doing those flashy things that people would understand and what have you. He felt that the people that knew us, knew us, and we didn’t have to have all this folderol stuff that was going on taking us away from doing our work.

I went to Dr. [Walter T.] Olsen, who was the head of the Public Affairs at that time. He had been the director of fuels and lubes [Fuels and Combustion Division], the men that worked

on the rocket engines here at the lab, and coming up with utilizing hydrogen and oxygen as one of the [rocket] stages. They made the Centaur engine, which was really a tremendous advance in rocketry. You get into a problem with rockets. They generate so much heat, how do you keep the rocket, if you make it out of metal, from melting? Rockets are built from tubes that are made around a mandrel, and they circulate the liquid oxygen through these tubes first—liquid oxygen's like 300 degrees [Fahrenheit] below zero—and cool the engine itself before it's even fired, so that when that does fire, then the heat is transferred into this cooling system. That was the RL-10 with the Centaur engine.

One of the reasons that we got to the Moon was basically, in my mind, because of this Center. Certainly, [NASA Marshall Space Flight Center] Huntsville [Alabama] with the large rockets, but they did not have the technology of the hydrogen/oxygen [engine]. They were kerosene, which was necessary to get us up there. But once you got into space, how were you going to go from there on out to the Moon or other places, unless you put a tanker up there and transferred fuel over? With this hydrogen/oxygen and other things that were worked on here, you got more specific impulse, more bounce for the ounce as you could turn it on. That was one of the reasons we got to the Moon, I think, because of the work that was done here—with, of course, so much other work that was done all around.

I was working [in Technical Services when] they came back [from Washington], so I went over to Public Affairs. The young lady, Terry [Theresa] Horvath, and I set up what was then the Educational Services Office. We handled the letters that came in from people, the requests from teachers, tours, photographs, movies—anything and everything that the public was beginning to ask us for. That grew.

I brought along a couple of letters that we would get from the students. One of them was a piece of paper—here it is, here [demonstrates]—it’s an 8 by 10 [inch] piece that was cut down to about 2 inches, and this was typical of what we would get. Written in pencil, it says, “Gentlemen, I am a teacher at UCLA [University of California, Los Angeles]. May I have some information, please, about the space program?”

This is another one that says, “May I have some free equipment about space? We are studying in school and I have a crabby teacher who gives us E’s when we don’t bring in something. She also yells and sends us down to the principal. Then we’re in big trouble. I’m supposed to send to Washington, which is closer to me, but I thought I’d send you something, too, and maybe get something different.” These are the types of letters that we would get. We had some [publications that were] coming out of Washington, and we would send them out.

Got to be quite a problem because people were asking for tours, also. This meant that we would have to select from the groups who we felt should be coming in. I guess we would get maybe 500 people a year as the tours would come through. Based on our selection, we were turning away a lot of people. Again, Dr. Silverstein wanted work to be done. He didn’t want us to be constantly slowing down what needed to be done in our work because he felt, again, that the people who needed to know who we were would be the ones that should be here. We tried to convince them and we did, naturally. He knew the public was involved, but he just felt that his work, that it had to be done. He had a responsibility.

It got to be that everybody was so involved with this space work, it was a real punch, really. I think that this place, it was like a college campus. Something new was going on all the time, everybody was congenial, we had wonderful cooperation between people. I had certainly begun to know a lot of people from the work that I had done with the photo lab and the wood

model shop and the machine shops and these other things, so that I was able to go around and ask people for favors, and they happily would agree with us.

We started a Speakers Bureau. Both Terry and I became the first speakers from the laboratory, but that grew. The service clubs would want us at noontime, and schools would want us in the afternoon, so we began to get some other people that joined us. To make a long story short, we finally ended up with an office of I think five people total. Myself, the secretary, and three other girls. We put the requests from the general public into a contract with a small group here in town—we would supply them with the publications. We would read the letters and suggest things, and they would fill them and send them out.

Movies the same way—we had a contract up in Chicago [Illinois], and they took care of the movies that we had. Slides, that was done differently. What happened was NASA Headquarters [Washington, DC] then also set up an Educational Program Office. Jim [James V.] Bernardo was the head of that down there. Each of the Centers then—and we're seven or eight Centers, at that time—were assigned an area in the country to take care of.

We had Ohio, Indiana, Illinois, Michigan, Minnesota, and Wisconsin, which turned out to [have the most] colleges, universities and population. I had out of Washington, too, several Spacemobiles, which were small vans in which there were all kinds of models and literature. The presenter was an educator, a teacher, had been in the classroom. They would go on a schedule that we worked out ahead of time to different schools and put on assembly programs, work in the classrooms, work with the teachers. In some cases, they might be in the school system for a week, going from one school to another school to another school.

We actually put on some programs where we would go into a city for a week or two weeks in some cases, and send in speakers from the laboratory to take care of the requests that

we had, run workshops for the teachers. This was all done by qualified educators, plus the people that we could get here from the lab to go. It grew and it grew, and we had a great, big show downtown in Cleveland, took over the public auditorium in Cleveland and ran that for two weeks. Dr. Silverstein worked with the Cleveland *Plain Dealer* [newspaper] to sponsor this, and Modarelli and Headquarters filled that auditorium floor with all kinds of exhibits—globes with the satellites going around it. Some of the astronauts came up and talked.

Speaking of the astronauts, one of the other things that happened in that [wind] tunnel where we did the work with the B-29—after the tunnel had seen its [aeronautical] research [days] and the space program came along, there was one section of the tunnel that was large enough for them to put in the three-axis gimbal rig, which was a device that rotated in yaw, pitch, and roll, all three. They would put [instrumented rigs] in there and figure if a satellite [was on] auto-control, would there be some way for these instruments to recognize [a problem] and correct it? That was fine, if that was an instrument. If that was a possibility, what about an astronaut? All the seven original Mercury astronauts were up here from time to time, and I think each one of them got violently ill from rolling roll, pitch, and yaw simultaneously. That was another thing that happened up here.

And that [rig] was downtown too, they were showing parts of that. Terry and I set up a teachers' resources room down there, and handed out material. We were there for two weeks, and it was quite a show. I can still remember, the school kids would come in, and this one school group [in particular]. I think they must have been second graders, maybe first graders. The teacher led them in the front door, and they're in a single-file, and each one of them had a rope tied around them to make sure that 13 of them came in, and 13 of them came out. They were all in line with this rope tied around them. It was necessary because there were so many

people down there; it was such a large affair. When that was over, some of the equipment that was down there as far as exhibits was concerned was brought over and put in the shop over here, in the old Altitude Wind Tunnel. When we would run tours, we'd show some of this to people.

One of the other things that we did out of my office was to have a two-week workshop for teachers from Kent State University [Kent, Ohio] and Baldwin-Wallace. We did that for two years, as I recall, two sessions each year. About 30 teachers in a group would come here for two weeks. We would go through all the educational material that NASA had, and bring in speakers from the laboratory and [tour facilities]. We built model airplanes and flew those things and what have you, and set up the solar system in the whole laboratory here, with the Sun at one end, and how far the satellites would be down at the other end, with a 200-acre area. It gives people an idea of what was going on.

It got to the point where we needed something more than this. I went to Dr. Olsen, my director, and said, "Is there any way that we could take the old wind tunnel, Altitude Wind Tunnel, where we have some exhibits at the present time," and the area that had the machinery in it, "and possibly turn that into some kind of a center to have visitors come in?" We took the idea to Bruce [T.] Lundin, who was then the Director, with the gentleman who had been my initial boss when I first came in, and was now the head architect. We went in and spoke to him.

Bruce said, "Yes, go ahead with it, but don't spend any more than—" and I forget what the figure was, which was immaterial because the word "exponential" comes in here someplace. We ended up building the Visitor Center, which is right across from us over here. I've got a report, so the only thing I can do is read from parts of it because I can't remember all that went on in there, as far as the sizes and the shapes and what have you. We took the place where the shop had been, and set it up with exhibits.

Jim Modarelli, again, took care of that phase of it, working with Dr. Olsen, as far as what areas should be covered. We'll get into that in a minute. He then worked contracts with people on the outside, construction people, and they built all the exhibits that went into that place. I was instrumental, working with the architects, in getting the entrance and the auditorium squared away, so that we had a place where people would come in and have programs in one area, and be able to visit the exhibits in the other area. Some of the goals that I have here—and I'm reading from a report that actually I had written here—at the end, I finally got to write a TM [Technical Memorandum]. I felt real strong because that's what all the other engineers did, you know.

Actually, we were here to cover the main contributions and the role of Lewis to illustrate how frequently technical advances related to other things other than aeronautics [or space]. We'd develop activities and show how things went through industry, information from the aeronautics industry would apply to them, to illustrate how research and development were conducted, be an information center for the collection of this historical material that was taking place, provide an opportunity for students and all ages of visitors to come in and see what we're doing, and just generally conduct programs for them to meet their needs.

The one building was 5,100 square feet in area, and that had the entrance, the lobby, the office, the auditorium, the teachers' resources room, what have you. Then, we had [the exhibits] area that was a total of 10,000 square feet, so it was a pretty good size. I wish it were still here, but because of 9/11 [terrorist attacks on September 11, 2001] it's downtown now—parts of it, anyway—at the [Great Lakes] Science Center downtown in Cleveland, next to the Rock and Roll Hall of Fame.

When you walked into [our center], we wanted to convey right away who we were. [Directly ahead was a red brick wall extending up about one-third of the way to the ceiling. On

it] was the seal of NASA, [and the words] “for the benefit of all mankind,” and also a bas-relief of Dr. [George W.] Lewis. We had been down to Langley, another gentleman and I from the illustration department, to see what they had done down there, and we [were taken with] a display that they had of model airplanes. It was United Airlines [Inc.], American Airlines [Inc.], U.S. Air Force, Navy, and what have you, all painted up in [respective colors. Here, we had a large area above the brick wall,] and it hit both of us that we ought to be able to utilize [it for our display of aircraft. We began by having it painted dark blue.]

I went out and contacted the local model people here in town, and I bought every 1:72 scale model airplane—plastic—that was available. There were 150 of them, something of that nature. I went over to the wood model shop. Here’s these people that I had known from before. [Then I] contacted a local model group, young fellows, and had them put them together. I think it cost us \$1,000 to do that. [These planes were all white. Then I said, “We want these mounted up on that wall like you were looking down at them from above,” that way showing comparative sizes and wing spreads. Again the wood model shop said, “No problem, we’ll figure that out,” which they did.

We mounted 155 of those models. When people came in, that wall was a real grabber. That’s what it looked like [demonstrates photo]. That picture has made a couple of magazines and other publications also.]

WRIGHT: A great idea.

WEISS: Yes. It was funny to be in there when somebody walked in that was a pilot, and would be with somebody else, and said, “Oh, I flew that one,” or, “I flew that one,” or, “I flew that.”

Bill [William H.] Swann, who was our chief pilot, came in and said, “How come you don’t have the Beech [Beechcraft]-18 up there?” I said, “Bill, they didn’t make a model of a Beech-18, that’s why it’s not up there.”

That was quite an eye catcher. [Also, from the ceiling,] we had a very large model of the [Space] Shuttle, hanging upside-down with the [payload bay] doors open and the [robotic] arm out, and an astronaut floating out in space. Dick [Richard] Schulke, the fellow that worked with me on those models, was very clever, and he made a model of an ancient bird, [that lived thousands of] years before Christ, and that was over here [demonstrates]. Then the Wright Brothers [model] started [the display, which continued with the models arranged by year.]

Our office was there, and then to the left of that, you went into the auditorium, and that was 150-seating auditorium in there. I made sure that when they did this, we got every kind of electronics projection material they could get, and also that it was wired so that the person who was doing the lecturing could dim the lights, run the projectors. Everything [could be operated from] down there.

Had a stage, we had models in there, and again, through the contractor—which was Oklahoma State University [Stillwater], the same people that ran the space program—I had three educators. People who had been in this classroom for a number of years—three to five years, I think, was the basics—plus several secretaries, plus a couple of technicians. It was a contract facility that worked it out. Worked out beautifully. They would do scheduling of schools coming in, and it was open seven days a week. They would be open on Saturday and Sunday for the general public.

We had another set-up here, which was a satellite station. It was mobile, was on a bus, and we had another one that was on a truck that we pulled around. We would take that out to

different places. I remember we had it at the Museum of Science and Industry in Chicago. I was up there and I was stopping people on the street saying, "Would you like to speak with somebody in Cleveland, Ohio?" They'd look at me kind of askance, and I'd say, "No, speak into this, and your voice is going to go 22,300 miles up to a satellite and back down to Cleveland." I would have somebody here, and we would talk back and forth. That was one of the things, and we'd send that around various cities.

One of the big problems that we had with the teachers was they would say to me, "I would love to be able to bring the space program into my classroom, but I don't have the information." So the main point that I had here in my mind was to make sure that the teachers had materials available to them. If they were going to have a class visit us, we would have them come in and take a look around first, and go to this room that we had upstairs that we called the teachers' resources room. I had two young ladies up there, and we stacked that with slides, movies, equipment.

As it says here in the [Technical Memorandum], they had access to 3,000 35-millimeter slides. We had that in the most beautiful little cabinet that held them all in racks, and you could pull a rack out, backlight it, and they could sit there and see the particular slides that were of interest to them. If they wanted the slide, what we would have them do was bring in a roll of film, 24 [exposures], 36, whatever it is, and pick the [slides they wanted.]. We exposed [their film and gave it back for them to develop]. That way, they took care of the slides.

We had 3,000 of those, 50 audiotapes, 130 $\frac{3}{4}$ -inch cassette video programs, hundreds of copies of reports, 16-millimeter films. We had the teachers that were here for the summer on those programs, we'd have them make sure that they would write class reports out afterwards

plus lesson plans. They were up there so [other] teachers could access the stuff. To me, that was a highlight, and I really felt that that paid off.

We had—if I can find it real fast, here—the teachers’ resources room, we copied 15,964 35-millimeter slides in one year, 135 audiotapes, 642 videotapes, loaned 116 60-millimeter films, and we had one series entitled *NASA Aeronautics and Space Reports*. One educator from Elkhart, Indiana, spent two days in the resources room, left with 1,259 35-millimeter slides, 12 audiotapes, 31 videotapes, and supplementary material. She took it back to the audiovisual center for the Elkhart school system. We felt that the Visitor Center was really doing something of some value for these people.

We also would bring in classes on Saturday, and set up programs. I talked with Garth [A.] Hull, who was my counterpart out at [NASA] Ames [Research Center, Moffett Field, California], and he brought in a classroom of kids, students from the [San Francisco] Bay Area there, and I had a classroom here. These youngsters talked back and forth using the satellite about what youngsters would talk about—not just their classroom stuff, but what the youngsters were wearing and the movies they were seeing—and they were having a great time speaking back and forth. It actually happened with elementary schools. We had them in there, too.

WRIGHT: Mr. Weiss, why do you think it was so important at that time to connect these young students to what NASA was doing?

WEISS: One of the reasons was that they demanded it, really. As soon as NASA came along, bang, we started sending this material. Teachers were coming to us, “How about models?” Youngsters that are just excited about these astronauts. I’d go out and give talks, as Terry did,

and [established] the Speakers Bureau—we ended up with I think 30 to 40, and I think the Speakers Bureau is still in function today.

A simple question—I was out giving a talk at one of them, and the parents were there and the youngsters were there, and one youngster in the question period said, “How do you eat, how do you sleep, how do you go to the bathroom?” Mother put her hand over the little boy’s mouth, and I said, “No, wait a minute. If you’re going to go out into space, those are three very important points that I would like to know.” That was the interest.

The youngsters were interested in it, and the one thing that was the culmination of it, as far as I was concerned—it was a Saturday, and the fellow who was our head man there at the Center was standing there watching what was going on. He said he had a tug on his pants, and he looked down, and a little kid said, “Do you remember me? I was here Wednesday. I brought my dad with me.” That put me right up here. It still gets me because that’s what it was all about. The teachers were just excited about coming in and doing that. I think we did a good job as far as telling people who NASA was.

I had 35 years of service, including the military, then I hit 55 and I said, “I’m not going any farther. Now I’m going out, and I’m going to learn how to fly sailplanes like I saw Hanna Reitsch fly.” I got involved because of the models and what have you, and my love of sailplanes—got involved a little bit with the [National] Soaring Museum in Elmira, New York. Met the Schweizers [brothers Paul, William, and Ernest Schweizer], who built more sailplanes in this country than anybody else. I worked on an exhibit that they had up there. It was funny because they built models—Paul Schweizer actually came down and looked at our set of models here because he was building [an exhibit of] sailplanes, and wanted to know what ours had been

and what it was like. I built four [models for his exhibit]. I think he's got pretty close to 70 models up there.

One of the fellows that was also building came up to me and said, "You probably don't remember me, but I wrote you a letter." He had been a student over here at Berea, and he was building a rocket. He wrote me a letter having to do something with the design of it.

I said, "What did I tell you to do?"

He said, "You told me to paint it green and bury it, which I did."

I said, "Did you bury it?"

He said, well, he didn't fly it, that was for sure. He was an engineer working for Schweizer. I don't know whether I had any connection with that or not, but he went on to college and I met him up there [in Elmira].

I did some artwork, and [have several] pictures hanging there. I joined the Experimental Aircraft Association [Oshkosh, Wisconsin] and went up there a couple of times [to see] exhibits that they had. Went with the Smithsonian to Europe, on a trip to the various aircraft museums in England and France, and we ended up at the Paris Air Show. It was funny because I was retired, and I was walking down the concourse at the Paris Air Show with the other people, and coming the other way was Bruce [T.] Lundin, the Director that had been here. He looked at me, he said, "What are you doing here?"

I said, "I paid my way. What are you doing here?"

I had the chance to be with the family. I have two wonderful daughters. One of them's a retired schoolteacher and the other one's a registered nurse. Wonderful grandchildren, and four great-grandchildren, and we have a great time together. I took my two grandchildren, when they were small—they're both parents now—we had a house trailer, and I took them up to the

Experimental Aircraft Association [Fly In]. We went up through Northern Michigan [on the way home]. We have a good relationship with the grandkids and the rest of the family.

We've just had a wonderful time. This was like a college campus—the people were great, they worked together, and I just had a wonderful time. I've had a wonderful life. I started out liking aviation, I stayed in it all my life, and I worked with wonderful people. We still get together, there's six of us that get together every Thursday for lunch. Howard [T.] Wine, the first fellow that was here, in fact, I saw him yesterday. He said, "Wait till you get over there. Boy, you sit in a nice chair, they give you the microphone and just let you go."

WRIGHT: It's a good thing we didn't change the furniture out then!

WEISS: Well, it's a great program really. I'm glad it's being done.

WRIGHT: We are, too. Let me ask you a quick question. In going back all those years to NACA, because you were here and then it transitioned—tell us about the atmosphere, once Sputnik went up and how it changed, or if it changed?

WEISS: I think there was a sense of urgency. I think there was more of a feeling of, "Boy, you've got something to do. NASA is now in a race with the Russians." Although I remember Jim [James E.] Webb, who was the head of NASA at the time, gave us all a talk one time, over in the auditorium. He pointed out, "We are not in the race, event for event, with the Russians." Maybe we weren't, maybe we were, I have no idea.

I think there was a sense of we have something we better do, and we better do it right. People were looking up to us, and it was the hottest thing that was coming down. If you walked down the street or people ask you who you worked for, you work for NASA, I think that was pretty important for a lot of people. Some people, of course, it meant nothing to. Here, I think there was a sense of urgency, to do it and to get it done.

Certainly, Dr. Silverstein was a fantastic leader. People should experience working for a gentleman like that. I saw him in meetings, for example, where he would listen to two different sides on how a facility should be built. I think some of the other people that are here would say he had a kind of a vision of looking at something and saying it's going to work or it's not going to work, that other people might not have had. He would listen to these two different sides, and then he would say, "Do you have anything more to say?"

"No."

"Do you have anything more to say?"

"No."

He said, "All right, we're going to do it this way."

This fellow said, "But—"

He said, "You had your chance. We're going to do it this way." That's the way it was done. You respected what he said, and he was a great guy.

The people were all, from the top down—I had one fellow, when we were building the Visitor Center, who was a supervisor for electricians, as I remember. He came over and he said, "Cal, we have to pull men off the job. There's research coming along, and I've been told that I have to do something there."

I said, "Well, okay, find me after."

He walked away, he got about 6 feet away, he turned around he said, “Damn it, we should have had this place a long time ago. [I’ll figure out something,” and he did]. That was the cooperation I got.

WRIGHT: I know you were here and then you had to leave, and you came back. Do you feel some of the same lessons or philosophy that the NACA personnel had before you left still carried over to help build what the NASA culture had?

WEISS: I’m not so sure, in my mind, that NACA had the urgency or knew what the urgency was at that time. We were doing a program that had to advance flight. I was not privy to how much of it was military, how much of it had to be done because the military needed this or needed that, other than that B-29 that I read about in the book. I think when the space program came around, it was like somebody shot a hypodermic needle in you. You had a goal that everybody knew. Here was aeronautics—no space, just aeronautics—and now you had something that the nation knew about, the world knew about. I think that was a big shot in the arm, to be honest with you.

WRIGHT: I know you mentioned guidelines for writing the reports, but it was a time that America felt, or maybe some of the leaders felt, that we were in a race. The information was protected, so that the Russians didn’t know what we were doing. Did you have that over your head when you were preparing materials to send to the public? Did someone have to check your information?

WEISS: I didn't. I wasn't in that area at the time. I don't know how they did that. The reports were classified as technical note or a technical report, and there were various security associated with these. A TN [Technical Note] and a TM—when you talk to these other engineers, maybe they could tell you.

WRIGHT: In your case, the information that you shared with the public and the teachers, it was all of a level that was just—

WEISS: That was all general.

WRIGHT: Did you get to put those materials together?

WEISS: It was mostly done by Headquarters. There were a few things that we printed out of Lewis. When I retired, in fact, prior to the retirement party—the Wright Brothers had flown in 1903, and I forget what the occasion was, 75th anniversary of flight. I guess that's what it was. I had 30 or 40,000 of these things run off, which was a picture of the Wright Brothers [standing next to their famous airplane]. Anybody came in the door, they were handed one. We put them in everything that went out.

When I retired, there was still quite a stack of them left, [which I found in the briefcase gift I received. They gave me one framed and signed, “Cal – Best wishes to a dear friend – Will and Orv. Thanks for the push!” It's hanging over my desk today]. They gave me [the briefcase] to travel because when I left here—it was funny, the last day I was here, as I was cleaning up my desk there was a telephone call, and it was the local Cuyahoga Community College [Cleveland].

There was a woman there that was setting up a program for elders, and she said, “Is there anybody there that could come and help us teach about aeronautics and space?”

I said, “You’re talking to him right now.” I left and went there, and I taught there for 10 years.

Getting back to this suitcase, they gave me the suitcase. I opened it up, and here were all the pictures of the Wright Brothers that were left over.

WRIGHT: “And take these with you.”

WEISS: I could take these with me and pass them out when I go someplace.

WRIGHT: I know that you mentioned that you used to have the inspections, so did you have big open houses and were you involved in coordinating that?

WEISS: Not too much. I was from the standpoint of the illustration, when that first started out, because we made all the exhibits. The stages were set up, and in many cases the engineers would be talking about something and you’d have a big board with lettering and pictures on it, and they would slide it to the next one. We had done all the lettering and what have you, and the sliding always ruined the lettering, so we were always there at night. One night we were here till two o’clock in the morning, redoing the lettering so they would be ready for the next thing.

WRIGHT: Sure is different now, where you just print things out and tell them what size, right?

WEISS: Yes, you hit your iPhone, it's right there. Everybody worked at it and everybody worked together. I was not part of the tours going around, that was usually engineers or scientists.

You know, we've got two drop towers here. You take a specimen of something. "How is it going to act in space?" For example, a candle. Will a candle still burn in space under zero gravity? I don't know why you would want to know that, except about fires in space. You dug this hole out here, it's 500 feet deep—this is the one group that I worked with years ago, and they designed the facility.

It takes about 10 seconds, as I recall, to drop [an experiment] from the top to the bottom. During that period of time, the Earth moves, and they had to build that tower with enough of a slant in it so that as that thing went down, it did not hit the walls. There was a lot of things you never think about, but they did it, they designed it here. And contractors, of course, built it. They did a lot of zero gravity [research]. They may still be doing it, I don't know. That was exciting. To me it was, anyway.

WRIGHT: Yes, very simple things, but not simple to find out.

WEISS: Yes, you don't think about it. Water—what happens to water? Just the simple things that we consider every day. Now you don't have gravity, what happens? That's what they're doing up there right now in the Spacelabs [reusable laboratory flown on the Space Shuttle] that are flying around, all with basic experiments.

Some of the astronauts would come here. During the teacher workshops that I had, I was instrumental in getting astronauts to come up and talk to them. We had [Bruce] McCandless [II].

He was a Navy gentleman, and it was hotter than sin when he was here. He had his suit coat on and buttoned up. He was spic and span and very, very good. Paul [J.] Weitz, who was in the Skylab [space station]—the big, big tank that they ran around in the inside. He was from Pennsylvania. He was here, a real nice guy.

These fellows, if you brought an astronaut in to sit down with the teachers and started to talk to them just like I'm talking with you today, it meant something. The astronauts enjoyed doing it, too. They were in the circuit that whoever got a call that week or that month, off they went. They'd come flying in here in their [Northrop] T-38s [Talon aircraft] and we'd meet them. You got to be with people who were up here, but yet, you found out when you spoke with them that they were just common people.

WRIGHT: And they shared the same excitement of space, didn't they?

WEISS: Yes, and they had the same excitement that you'd want to have. It was great. It was, as I said, like a college campus. I came to work, and I still think about this place—it was either it was going to be exciting or real exciting, as far as work was concerned. And the people—you'll meet some of them.

Sol [Solomon] Weiss, you're going to see Sol Weiss. Sol was a [Consolidated] B-24 [Liberator aircraft] pilot in the war. We had a young lady, very gullible young lady, in the photo lab believing he was my father because we had the same name. We got in there one day—I happened to walk in when he was there, and we started a senseless conversation that meant absolutely nothing. In fact, we didn't have it planned. It was about the family, what have you. When he left, she said, "You shouldn't talk to your father that way."

I said, “Well, if you ever saw the way he treated my mother, you wouldn’t say that.” We laughed about that forever.

He saw me one day, walking down the hall, and he had the same jacket on that I had, and he walked up to me, he felt it, and he said, “I don’t know where you got yours, but mine was cheaper.” There were three Weisses: Rosemary Weiss was there, she was Catholic; Sol, of course, was Jewish; and I’m Protestant. We were the Weiss Family. Sol was a great fellow, to this day.

At lunchtime—we would break for lunch later on—and Modarelli and [J.] Irving Pinkel, who was instrumental in lots of things, but [especially] the crash fire program—Ed [Edmond E.] Bisson, who was in bearings—we used to kid him because we’d bring in a little roller bearing about this big [demonstrates] and say, “It started this big and it’s now worked down to this, and he still hasn’t found out how to make it work.” We would get together at noon and just talk about what’s happening around here and whatever, socially. We had picnics at the lab that were for the entire lab or for sections that would come out, have baseball teams and golf teams.

WRIGHT: It’s so interesting that so many of you still refer to it as “the lab,” as it’s a laboratory. Not a Center of activity, but a laboratory for research.

WEISS: Yes, we always call it the lab. I think they called it the clubhouse, or something. We’d get funny names we’d call it, just for the fun.

WRIGHT: Sandra, did you have some questions that you wanted to ask?

JOHNSON: I was just going to ask, since you were with the Public Relations and setting up the educational resources, did you ever work with any of the other NASA Centers, in setting that up?

WEISS: We kind of did our own thing because everybody was a little different. We couldn't quite compete with the Cape [Canaveral, Florida], with [all their] possibilities. Now, I guess, it's quite something that's down there. We were kind of independent. We had guidance from Headquarters, but the public affairs people there had nothing to say as to what I did as far as this Visitor Center was concerned. They were very interested in it after it was up and very interested in what was going on, particularly the teachers' resources room. Of all the things we did, that I did, all the people that I talked to over all those years, I think it kind of just came together. It was like I was in a training program to build that thing, when it finally came around. The teachers' resources room to me was tops because I had something that the other Centers did not have.

JOHNSON: Did they ever come to you and ask you later how you did that?

WEISS: I left, I don't know. I don't know what happened after that. In fact, I think most of the others were terminated there at about the same time. I don't really know. The other Centers, the people that were there, I was the only one of the Centers who was not an educator. I was one of the "unwashed," as the term went at the time. The rest of them were all people that had been teachers or had been on the Spacemobile program, and then took over a job at the Centers. So they came at it from a little different angle than I came at it.

JOHNSON: Did you travel to the other Centers?

WEISS: On occasion we would have meetings. I went to Langley—I guess I went to most all of them, Johnson, yes. It was fun because having been NACA before, and the other fellows had not, we'd get to some of these meetings and there'd be some other NACA people up there. I know Mike [Michael J.] Vaccaro, who had been our personnel man here, went down to [NASA] Goddard [Space Flight Center, Greenbelt, Maryland] after. He went to Headquarters first, something like that.

The whole group of us were together, and he was giving us a talk on something, and he'd say, "Isn't that right, Cal?" I'm like, "Oh, yes, that's right." The rest of them would wonder, "Hmm." That happened a few times. I went down to Houston, and the fellow who was going to be our speaker for the morning was Glynn Lunney. I got to introduce Glynn Lunney. Here again, Cal Weiss knew somebody that was from before.

WRIGHT: Were you tempted to go, "And he's on time?"

WEISS: Yes, yes. We were at one of the meetings down in Headquarters and Fred Haise was going to be the speaker. That's before he went up [on a space mission]. I flew with him a couple of [times when he was one of our pilots here]. I knew him pretty well, and he came into the office up there and I said, "Are you going over to the meeting?" He said yes, so we went over to the meeting. It was in a restaurant. We were sitting at the bar, having a little drink, and in comes Jimmy Bernardo, who was looking for the astronaut. He's looking all around, and I said, "Jim, I'd like you to meet Fred Haise."

“You know Fred Haise, too?” I got to know a lot of people because I had been NACA. That’s the only reason.

WRIGHT: It’s a special bond.

WEISS: It was, it was a special bond. Today, those six fellows that we have—when Howard Wine came, he said, “Wait till you go up. The rigmarole you have to go through to get through that front gate now is something else.” I can remember the time when we had the first guardhouses out there, and they had an arm that went up and down. It went up and the car went through, and [then] it came down. One time Dr. Sharp came around the corner and they didn’t lift it, and he went right through it. Then, he stopped and read them out about when the Director comes through here, that gate better be open.

We had a Farm House [Administrative Services Building]. When this place first started with the 200 acres, all that was here was this parking lot for the National Air Races, [and the] Farm House, down at the corner, and that was the [only] building. They built a hangar first, and everybody worked out of the hangar—I was not here at that time—until they got the other buildings. That Farm House was right at the end of a runway. When I was in the Education Office, when the new people came in, many an airplane came right over the top. You could look up at your desk and look out, here he comes. Several hundred feet above you, but to look out and see this thing whipping at you. They finally moved [the Farm House] up here, so that it was away from the [runway].

WRIGHT: No wonder you were happy, you got airplanes surrounding you everywhere you were.

WEISS: Oh, I loved it. One of my offices right in the corner of the hangar was here, so I had the pilots up above me. We had a good time.

WRIGHT: You didn't have to wonder when the T-38s were here, did you?

WEISS: No, it was wonderful. I can't regret it, not at all.

WRIGHT: Was there anything else you'd like to share with us?

WEISS: I don't know. I said if anybody ever wanted to know about the NACA, this book, *Frontiers of Flights*, by Gray—that orientation program that I used to give everybody, it all came out of here, out of the first part of it.

WRIGHT: That's great. Why did you feel like it was good for people to understand the history of where they were about to work?

WEISS: Oh, that's true of anything. [You can't get ahead without knowing where you've been.] You better know who you're working for, as far as I'm concerned. They should be proud of what this organization was doing, because I think we were different, in a way. You're working for your country. [NACA had only one] public affairs man in the whole [agency]. We weren't out there blowing our horn, as to we've done this, we've done that, we've done that. Silverstein would say, "The people that want to know us, know us." The industry. These people worked

here, and I think that was the feeling, that we were doing something important whether people knew about it or not. But when the space program came along, blow your horn.

WRIGHT: That's right, and then they found out more about what you had done.

WEISS: Yes, or try to answer all that was going on. It was great.

WRIGHT: Thank you. We appreciate you giving up your morning for us.

[End of interview]