Mr. Bob Sieck's

Oral History

Kennedy Space Center

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Roger Launius: Ok. I'm Roger Launius. We're interviewing Bob Sieck this afternoon. It's the 27th of June 2001. We're in the KSC Headquarters and we're working on the KSC history project and the oral histories associated with it. At the table with me, in addition to Mr. Sieck, are Lisa Malone and Henry Dethloff and we're going to ask Bob some questions about your background, your career, your experiences at NASA, hopefully very impressionistic, and you can wax eloquent. Actually when we talked to Forrest McCartney yesterday he just basically said, "OK, I'm going to talk," and forty minutes later we asked the next question.

Bob Sieck: Well that's all right. And I may get into some of that too. However you prefer it.

Launius: That's great. We can do it however you like. Why don't we just begin though by talking about you and, your background, when and where were you born, what were your parents doing, and so forth?

Sieck: Sure. Back at the beginning. Well, I was born in St. Louis, Missouri and I was a military brat I think as the term would be since my Dad was in the military, in the Navy. And that was at the beginning of World War II, so we moved frequently until the war was over and then settled in the Virginia area right outside of Washington, D.C. And that's where I grew up so to speak. Dad retired from the military and went to work civil service and I got involved in the things that most teenagers do. And, which was, I became a car nut. I was very interested in that. My Dad was an amateur radio

operator, so I got involved in that and still am, today still a car nut, too. And, I picked up an interest in flying when I was in my early teens and got on with the civil air patrol.

Launius: OK.

Sieck: And spent a lot of time in little airplanes doing this. I never soloed but the interest was there, so when I finally went away to college in the mid-fifties I was headed toward a career in the Air Force to go fly airplanes. And I went to school at the University of Virginia with an electrical engineering curriculum, but my goal, I was in the Air Force ROTC program, and my goal was, once I graduated from college, I was going to go fly whatever the latest airplane was that the Air Force or the military had to offer. And, I was going in that direction until in the late-fifties, they started launching those missiles and rockets from this place called Cape Canaveral down here and that looked to be a little bit more interesting than flying airplanes for Uncle Sam. So when I graduated I made an effort, I was commissioned in the Air Force, and put on my uniform, and I was ready to go serve my military obligation as everybody had to do back then.

Launius: Sure.

Sieck: If you didn't volunteer for it you got drafted. So, I thought it best to go under my own terms. And I made an effort to get on board with the Air Force Missile and Space Program down here in Cape Canaveral, which would have worked out fine

because my parents had since moved to Florida when my Dad retired and my wife's parents, who I married just after I graduated from college were also from Florida. So I thought this would be a great opportunity. I'm going to get a job with the Air Force down at this Cape Canaveral place, in this paradise of Central Florida, be close to the parents, you know this is really going to be good. Well unfortunately the Air Force didn't have any openings in the missile, rocket, space curriculum, as it were, at that time, but to their credit they gave me an option, since I had been interested in flying and I passed the flight physical I could have gone to flight school and if I got through that I could have flown airplanes. They gave me a choice of either going on to flight school, but had I done that I was reminded that I would owe the Air Force about seven years of my life…

Launius: All right.

Sieck: If I got through flight school. And the other option was meteorology and, the thing about meteorology was, they would send you to graduate school to learn about atmospheric physics and oceanography and some things that as an engineering student, I had a degree in electrical engineering, which is probably reflective of my interest in amateur radio, building all those, you know, little electrical things, that would be a fairly easy curriculum for a graduate engineer and at the end of each of my tours of duty, which would last a year, I would have the opportunity to reapply for this missile and rocket stuff…

Launius: OK, cool.

Sieck: …that was going on down here. So, I did that. And my first assignment was at Eglin Air Force Base. Once I was trained to become a meteorologist, and I participated, at that point in time we were doing a lot of work with surface to air missiles, and air to ground stuff, and air to air stuff and Eglin Air Force Base was the proving ground for that. So at least I was close to the missile and rocket stuff, although it wasn't the big stuff that they were doing down here. And after a year of that I applied again to get onboard down here at the Cape and couldn't do that. But again to the Air Force's credit we were activating Titan II ICBMs in underground silos all over the country and putting those ugly nuclear warheads on them and they needed meteorological support for all that activation activity because it included propellants as well as a lot of hazardous stuff. So, I spent a year out in Tucson, Arizona where the weather forecasting was easy, obviously, but had a lot of experience with the Titan II activation activity, which just further kindled my interest with getting on with the missile and rocket stuff down here.

Henry Dethloff: What year roughly are you in?

Sieck: Ok, now I'm in 1962, 63. And of course after the thing that really, in this period of time, just kept urging me on to get into missiles and rockets, because now we were starting to put people on top of these things. And the human space flight program was starting up and ramping up with this goal of getting to the moon, so that, I really wanted to be part of that. That looks like fun stuff and it's down in Florida where, you know, the parents live and I had already had enough experience living in Florida that it's

a great place to live and if I could just find a job there, wouldn't it be great. So after my final tour of duty in the Air Force I had the option of staying on another year and trying again. However since I had enjoyed three state-side tour of duties I was now…

Launius: They were going to ship you to Okinawa or someplace?

Sieck: No, they were going to ship me to Vietnam.

Launius: Oh, okay.

{laughter}

Sieck: And this is now 1963. And I could spend a year with the Air Force in Vietnam and at the end of that time, as isolated duty, I couldn't take my wife obviously, and was just starting a family. Then I could try again for this, well I don't like that too much. Okay, well Lt. Sieck you can go into the flight training because you're still physically fit and you showed interest in that. But again you will owe us more years of your life and oh, by the way, if you get through flight school you're going to go to Vietnam and fly airplanes or, since I had satisfied my military obligation I could leave. So after thinking about those options for a couple of milliseconds I said, "Well, I think it time to get on with the rest of my life." So I left and came down here to Florida in '63 and spent about a year working for industry, a small electronics company down in Melbourne and [then went with] the people that were developing the ground stations for

our Apollo checkout systems. And after a year of that I was finally able to get on with NASA in the summer of '64 and from there it was, you know, it was fun.

Lisa Malone: What was your first position here?

Sieck: First position here was, I was fortunate, we were just learning about the physiological effects of space flight on humans and the astronauts wore a lot of instrumentation. In fact medical instrumentation, electrocardiograms, of course blood pressure and temperature, the things that would measure their respiration rate and depth and in fact electroencephalogram too, the brain wave stuff. And we had a cadre of a couple of engineers, biomedical engineers, and I was made one of those. And with a couple of technicians and essentially our team, along with the suit technicians, and the doctors, would sensor up the astronauts before every mission and the technicians would put the harnesses on them, we would check out the quality of that data. Us engineers couldn't speak for what the data was telling us, the doctor did that, but we could tell him whether it was either good or bad data. And then they'd put the suit on and they'd get in the spacecraft and we'd go in the blockhouse and we'd see all this information in front of us and with the doctors explaining, well, this is this, this is this. And it was real interesting because I didn't have much of a background in medicine obviously, I'd been going to engineering school, but I learned a lot about the medical aspects. And you got to know all the astronauts real well because there'd be the delays and this sort of thing and you'd have problems and you get to learn a lot about a person whose standing in front of you stark naked for and an hour or so….

{laughter}

Sieck: …getting shaved and sensored up and that sort of thing, when you're looking for things to talk about. So, that was, I mean it was interesting. It was really interesting and…

Malone: Did they like to be sensored up?

Sieck: They didn't like that invasion of privacy one bit and I'm sure still don't today. Of course they don't have to wear the instrumentation today that they did back then. But they accepted it as one of the prices you pay for being an astronaut back then, which was, as you know, a very highly visible sought after, as it is today. But they were much more, there was much more focus on the astronauts as a role model and this sort of thing back then than there is today. And back then they were all test pilots with, and I don't mean this to be demeaning, but they had a test pilot mentality.

Launius: Sure.

Sieck: You know, I mean, they said, "Fine put me on top of that rocket," you know, "the scarf and the goggles and I'm going to fly today."

{laughter}

Sieck: And that was their approach and today you can talk to a lot of the astronauts. They have a different approach to this space flight thing. But they were an interesting, a really interesting group of people and fun to be around and I had a lot of fun as a medical engineer. I don't want to bore you with war stories, but I remember the one…

Launius: Oh please.

{laughter}

Sieck: …the one mission where, this is Gemini six and seven, where we're going to put two of them up at the same time, well close to the same time, and rendezvous. And this is Schirra and Stafford and we're getting close to T-0. And these guys by the way, they were cool. You'd watch their heart rate and it'd be 70 beats a minute, something like that, and they'd be, you could tell, they were just breathing nice and easy up there. Some of them would fall asleep and the doctor would tell you, "He's asleep."

{laughter}

Sieck: You know, he's not with us anymore. But, we got close to T-0 and Titan II, a pretty reliable rocket, the engines ignited about two seconds before launch and then they shut down about a second later, in this case, and the vehicle stayed on the pad, because of some technical problem. And there's all this chatter on the net and that sort

of thing and I'm watching the heart rates of Schirra and Stafford and they're starting to go up and they're breathing deeper. Of course I know they're talking about something, I can't hear everything on the net. And the heart rate goes up and up and I asked the doctor, I said, "What's going on here. Are they scared?" And he said, "No, no. They're mad." He used a different word. He said it's finally sunk, it's sunk in, they're not going anywhere today. In fact it may be weeks before all the technical problems get sorted out and he said that's what you're seeing on these physiological parameters here. You're seeing the parameters of somebody who's really torqued.

{laughter}

Sieck: And then we turned on the right channels and I can tell you, yeah, they're pretty mad.

{laughter}

Sieck: It fits. But, I mean, that was a lot of fun and what I learned then, which was always my perception from the outside looking in at these people in NASA with this contractor team, they really got their stuff together. I mean they're good. They're good at what they do. They put a lot of emphasis on communication and teamwork and everybody's important. Whether you have a highly visible job in the blockhouse pushing buttons on launch day or whether you worked over here in Hanger S on the thermal protection shield at nighttime and in a building that didn't have any windows on it, it

doesn't matter, you're important and you're all part of this mission of putting people into space. And that was very visible throughout all the meetings I went to, all the tests I participated in, and every time that we had anything that brought the people together, everybody respected everybody else and what they did for the program. It was all, we're all, and that has transcended all these programs in my careers out here and that is one of the things I will always remember about certainly, not just Kennedy Space Center, but when we got involved with Houston and the people in Headquarters. We're all in the same mission here and we're all members of the same team, regardless of what kind of badge you wear or what kind of job you have, you are important. Which was always my perception from the outside looking in, but it was nice to get that reinforced once I got on the inside so to speak. Very rewarding, very rewarding. And the Gemini program of course played out and what was also nice back then is at the end of one program you were already starting the next program.

Launius: Right, right.

Sieck: As one phased down the other phased up and people transitioned to it and of course this was all with the goal that we were going to put somebody on the moon by the end of the decade. And that was good, but on the other hand that generated a lot of pressure. And we talk about schedule pressure today and that sort of thing. Well there's no fuzz on it at all, there was a lot of schedule pressure back then. Yes, there was an emphasis on safety, but the people felt the pressure and everybody did their best. And management worked hard not to make it a sweatshop job, to get to

the moon, but schedule pressure was always there, always there. People dealt with it in different ways. But we spent a lot of time out here. The work rules then would never, never be allowed today. Sixty, seventy hour work-weeks were common. They put cots out in the transfer…

Launius: Right.

Sieck: …isles of the VAB, so people, if they got tired, they can go take a nap for a while and go back to work. That was the norm back then. But I wouldn't refer to it as a military operation, but we were essentially at war with the calendar, the clock, the schedule, and, in a cold fashion, obviously, with the Russians because we were going to beat them. So going to the moon became not a warlike event, but it was a competitive event. We were competing in addition to competing against, or with the technology at that time, which was blooming, and a lot of the stuff were we doing was new first time stuff. So it was a competitive type of environment, which some of that's good. It brings out the best in people.

Launius: Right.

Sieck: Particularly Americans like competitive events and we had a competitive event going.

Launius: Was there a sense that you all were really making history? You were like at the center of the historical activity at the time. This…

Sieck: Well, we didn't…

Launius: …a thing to be a part of?

Sieck: It was, yeah, but not from the standpoint of well everybody is watching us and we're in the limelight or the fishbowl or that sort of thing. We knew that just like today, I mean, after each mission and you checked off the accomplishments, we were very proud of what we did. But that was enough for the team. You didn't need perks. You didn't need awards and that sort of thing. It was the self-satisfaction that you have. We did that, we did it right, we're proud of it and that was enough. In fact, back then we didn't spend a lot of time watching TV or reading newspapers anyway. I mean, we were busy. In fact I recall and we may get to that later, but one the things that nudged me to my retirement a few years ago was the HBO series that Tom Hanks put out "From the Earth to the Moon" and having watched that, and the one episode really struck me. It was 1968, I think, was the name of the episode and that was the year that we first put astronauts on top of the Saturn V to man-rate it, is the term at that time, that vehicle before we…

Launius: Right.

Sieck: …you know, started the last process before getting to the moon. And it was such a Herculean effort to get that vehicle, and in my case, what I worked on was the spacecraft ready, and it was round the clock, seven day a week type of stuff. But it wasn't until I watched that episode, "From the Earth to the Moon," because I was so busy out here working and focused right here on what I was doing that that was the same year that the Chicago Riots occurred, that Kennedy was assassinated, Martin Luther King was. And at that time I had a five year old son and a newborn and I'm sure that for some fleeting moments I recognized that other stuff was going on in the world or in my life as a family, but it was gone that quick and I was back to focused on what I was doing out here. And that was, like I say a couple of years ago after I saw that and I'm now fortunate to have grandchildren in the local area growing up. I said, "Well, I'm not going to miss that part of my grandchildren's life when they're this age, like I think I did back in 1968. Memory escapes you when you get older, but I'm sure I was so focused on what was going on out here I missed a lot of that other stuff, as it were, that was going on in the world and my own personal life. And that was one of the nudges that helped me make my decision to retire. But, that was the mode of operation, the work ethic at that point in time was you worked, worked, worked and for the most part people were happy in their work. And they were willing to put in the time, whatever it takes we're going to the moon. We enjoyed, is the right term, a lot of commitment from the community and the rest of the country and Congress. If you made mistakes that was okay. People make mistakes when they're doing brand new type of stuff and you folks are doing brand new type stuff getting somebody to the moon, so there was a lot more tolerance as it were for error or failure and risk was a lot more acceptable back

then, than it is now. In fact, case in point that Gemini VI mission that scrubbed and they found a couple of things wrong with the rocket that led to the engines shutting down, but to the credit of the program, and they sorted through that pretty quick and we flew two weeks later. Well, if that would happen today with our human-rated vehicle, how many months or even years would it be before all the investigations and boarding parties and everything else that had to be satisfied were satisfied before we were allowed to go fly again. But that was the environment back then. It was, and of course, the Apollo accident was a tragedy, there's no other way to…

Launius: Right.

Sieck: …to put it. And it was …and that was the first time it hit home to me because I was working on the Apollo Saturn V vehicle that particular night and the folks that were part of our organization, we were the Spacecraft Checkout Team. And I was working on the two unmanned spacecraft that were going to go on the Saturn V vehicles to be the test flights. And my colleagues in the office and I were out at the blockhouse at Pad 34. That same night, and I remember going home and turning on the, in fact I went to visit my wife's parents up in Central Florida and turned on the TV and watched the news and there it was, all over the news, Apollo fire, Apollo down at the Cape and goodness gracious. And at first I just didn't believe it. Everybody else said is this one of those special programs or something? And then as the aftermath of that came out and you saw that there was all the evidence there of not only workmanship, but schedule pressure and these sort of things and I related to that and I said, well, we really need to

be careful this doesn't happen again. Not only from the personal and selfish standpoint of jobs and careers and that sort of thing, but we need to get to the moon and we've already put a lot into that and the space program. I was already thinking a little bit beyond my own job and said, this is probably the wave of the future, so we got to be really careful. And it's interesting to note after, in my job as spacecraft checkout engineer, which is what I transitioned to after I finished being a biomedical systems engineer in Gemini, then I moved on Apollo and we built a team for the checkout of the command module and service module. And there was one for the lunar module also and a separate team that did the launch vehicle activity. And as the integration engineer for the team we were essentially the lead for all the tests that we ran on the spacecraft from the beginning when it showed up in the O&C Building over here to the final seconds of the launch count out at the launch pad. A lot of fun. The Apollo vehicle was more complex than the Gemini spacecraft. More systems. Still didn't automate very much stuff though. A lot of it was switch throwing by the astronauts or technicians at the pad throwing switches. There was a little bit more automation. But I always remember the Apollo 13 activity that we participated in down here in the checkout of that vehicle because we essentially were responsible for cooking the wires inside of that tank that ultimately led to the explosion. And, I remember it very vividly for a number of reasons, the night that we were doing all of tests to try to get the oxygen out of the tank. And there was a valve that had failed on board and we couldn't use the normal detanking procedure. When we had run our simulated launch count back then we loaded the vehicle with all the propellants and the cryogenics and then detanked it and then brought the crew in for the equivalent of the dry CDDT tests a day or so later. And

we couldn't get the oxygen out of this one oxygen tank that's used for power for the fuel cells because this valve had failed on board. So some of the engineers in the control room said, "Well, why don't we use the heaters to do this?" Of course this is at night, and after a few teleconferences and this sort of thing, we said, "Well, we can do that. Yeah." We got the concurrence to go ahead and we documented all the people that had concurred to this and we went on, turned on the heaters, and then after a while engineers said, "Temperature's getting kind of warm in this tank." And we then went and said, "Well, we better stop and make sure that's okay." So again we got everybody's concurrence, you know, "Press on, press on," it was, and you can detect and hear a little bit of schedule pressure and a little bit of, "Well, we think we're pretty smart so we can go ahead and do this kind of stuff." But when it was all said and done we had left the heaters on with a higher power than some of the components were rated for and we burned all the insulation off of the tanks, off the wires inside of the tanks, for the motors. And didn't find that out until so many days into the mission when, they used the motors and there was a short circuit. And by the way that could have occurred before then and fortunately it didn't, because if you look at the ten day Apollo mission there's a window of about two to three days between the earth and the moon when you're connected with the lunar module and if you had to use the lunar module as a lifeboat you could, in the situation that we had, you could activate it and get it going in time before the command module lost all of its power. Well, if that explosion occurred before that we'd of never got the crew back.

Launius: Right.

Sieck: If it occurred after that window we never would have got them back. If it was going to occur, it had to occur in that roughly two-day window. So I will always look at Apollo 13 as lucky 13. Lucky. Very lucky. Certainly for the crew, but from a selfish standpoint, I mean, if I had to live with the fact that I was a participant in causing that thing to blow up. I don't even want to think about it. But to the credit of the team, while the mission was still going on they had pretty much sorted out what had caused it. And fortunately, we had documented everything we'd done, we followed the rules, the procedures. We just, in hindsight, used bad judgment in leaving those heaters on that long to get all that oxygen out of the tank. But, what hit me hard about that was here we learned this lesson back on Apollo 1 that costs us the lives of three astronauts and we, just about, almost did it again. Right here, even though people did the right thing, they thought was the right thing at the time, but in hindsight the judgment was flawed. There was pressure to get that thing going, still we want to get the program over. And, so it goes. We still seem to learn the same lessons over and over again. But, Apollo was still, was a lot of fun and I, in my role as a checkout engineer I was looking forward to the Skylab missions and going on from there. And then of course the Shuttle kicked in in the early seventies and we started a project office down here in Florida to get ready for the first Shuttle mission, which we knew was going to be some years away, but you had to get started. So the program office drafted, as it were, a few of us that had a lot of experience in the other programs of human space flight and I got on with the Shuttle program in '71, '72 at KSC. Now there wasn't a lot to do then except, there were a lot of meetings and a lot of paperwork and a lot of design reviews. So, I picked up this hobby that I still have today of racing sports cars. An interesting note about that, by the

way, and this is amateur racing on road racing courses like Daytona and Sebring and the local drive, but we used a lot of the local airports also. Well, a few of the Apollo astronauts raced in the same series that I did. Now, they kept it a pretty good secret. They…

{laughter}

Sieck: . . . would come to Florida and a local car dealer down here would maintain their cars for them and they would come out to the race tracks, you know kind of in disguise, but, for the most part, these were astronauts who hadn't flown yet. And they were people like Pete Conrad and Al Worden and others, that went to the moon. But, before their missions back then we had the Apollo simulator down here at KSC, as well as one in Houston, so the astronauts would spend a lot of time down in Florida. And if it turned out that one of our amateur racing events occurred when they were down here for a couple of weeks, they'd show up at the tracks with their cars. And, I still have the results of a lot of races showing these guys. And I remember, and its interesting, I knew them out here from work, but we'd get to the racetrack and never talk about the Apollo program. And that's one of the reasons I picked up that hobby. Because it was my escape from all this other stuff that I was doing. It was probably good for me to have an opportunity and I guarantee, when you're driving a racecar you have no time to think about budgets or launch mission rules or checkout of spacecraft. You got other focuses. But it was interesting to meet the astronauts in that environment having worked with them out here. But that's how I got into the racing thing in the early

seventies. And, when we finally got the first Shuttle ready for the approach and landing test out in California we had to put together a team just like we had used in the Apollo and Gemini program, a government and contractor team to do the checkout of the Enterprise in this case, out in the high dessert. So I volunteered to go there and head up the engineering team that would do the checkout and it was a lot of fun. The Antelope Valley, high dessert as it were in the mid-seventies was a good place to live. The work was fun. It was one of these, again not a lot of focus, not a lot of visibility, which was just fine. You were allowed to pretty much make your own rules and do your own thing and we had a lot of fun and learned a lot with the checkout and processing of the first Shuttle Orbiter for those two years that they did perform what we referred to as the drop test, the approach and landing test out in the desert. And built a core for a team that would later come back here and do the processing for the first Shuttle mission, which was an effort likened to getting to the moon, except all of the focus was on the one vehicle, the Orbiter. And of course the facilities that had been modified from Apollo to Shuttle to get all that stuff ready and checked out and the computers and a lot of learning curve on software stuff since this was the first time we really used automation to check out and fly one of these vehicles. The computers, even the launch vehicle computers on the previous programs had less computing power than this watch. The stuff for the Shuttle was, and still is, sophisticated. It may not have the speed and the memory capability that today's computers have, but for its time, back in the late seventies, early eighties, it was sophisticated. So a lot of learning at the expense of getting the first Shuttle on orbit as it were. And we had to learn how it worked and how all this other equipment worked and that took time before we finally cut through that

learning process and got comfortable enough with the first Shuttle to commit it to go fly. But the effort was again a lot like going to the moon. A lot of long days, long nights, long weeks, that sort of thing. But again we, the team, as they've always done, but we're doing this for the right reasons. In the long run this is going to pay off. What we didn't know and I wouldn't say that we had fooled ourselves, but we had this goal to fly a fleet of four Orbiters, each Orbiter we thought we could fly it four times a year. And that was, I mean admittedly that was the advertising brochure back in the seventies that helped sell it, but we had thought we could probably do that. Once we got accustomed to its idiosyncrasies and got all the stuff fixed, there's no reason it shouldn't be like a car, that finally gets about ten thousand miles on it. All the bugs are out of it and it ought to last for a hundred to two hundred thousand miles. Well, as we all know the Shuttle didn't turn out that way. It wasn't built, unfortunately, to be as maintenance friendly as we wanted it to. When we had a participation role in the initial design reviews we tried to get the program to put more accommodations in there to enhance the ground turnaround processing activity and we felt frustrated because it was always like we got on board too late. All of our ideas, they would say, "That's fine, but it's either going to take more time and we got to reengineer things to do that or it's going to cost more money and money's a problem or it's going to add more weight and it already weighs too much." So, unfortunately, we were stifled, if that's the right word, frustrated in getting some of the accommodations in the design that would have helped this processing and flight rate capability, so it goes. I mean there were other priorities at the time so fine, we'll do the best we can with what you build and deliver. And as history has shown, the best you can do is a couple of flights per year per Orbiter and that's

about it, but, that's because, the way the design, that's the way it ended up, so it goes. But STS-1 was, we still had our expectations after that, we'll get better at this, and we'll develop a flight rate, I'm not sure what it will be, it won't be 24 flights a year, maybe, but maybe somewhere between 12 and 24, we'll see, we'll do the best we can. And that's the direction we were going until Challenger occurred. Before Challenger I had in my Shuttle role, in STS-1 I had a really great job on STS-1. We had the launch countdown procedures, the engineering team did the best they could to automate all of this stuff and I worked with a team of engineers and test conductors and built this package of software called the ground launch sequencer. And it's what was used to manage all of the critical parameters from the Vehicle and the ground in the last twenty minutes of the launch count and automate the procedures as best you can. But we built software that looked at all the measurements, sent all the commands, and measured all the responses and there's a lot of activity that goes on there. And the good thing about it was, it was a forcing function for me to learn all about all the aspects of the Shuttle, the Boosters, the ground systems, that sort of thing. So it again was back to this learning curve thing at the expensive of getting the thing on orbit we all learned a lot. But I built up this great knowledge of what it took to launch the Shuttle and of all the people, the team, that were participants in it. So that when I went on to my next job, which was the processing director for launch and landing operations. Which along with it went the job of being launch director, I was comfortable that well I got a pretty good handle on this stuff having developed a lot of the procedures and the software and knowing all of the people. And, so I was pretty comfortable with that job. Then prior to Challenger got

promoted and, as you know, in the government that means you get a job with more administrative woes and headaches.

{laughter}

Sieck: And the fun factor starts, it goes down a little bit. And that's the job, Director of Shuttle processing, I had whenever Challenger occurred. And of course, that again was one of those, back to Apollo 13 and Apollo 1, you know lessons learned, when you look at it in hindsight. Although Kennedy Space Center did nothing that caused that accident to happen and there were a number of things of coincidence that had been on our side that we wouldn't have lost the vehicle. But there was a number of things that we were doing that, and in hindsight, and that's not the right way to do it, cause it can lead to this sort of thing. So I volunteered at that time to take the job of launch director again which could be perceived to be a step down the totem pole, but we restructured the program after that and did the right thing. Isolated the launch director, the Shuttle launch director job, from any position that required other management overhead, like worrying about budgets and contracts in a large organization, administrative stuff. And the focus of launch director for STS-26 and still is today is to make sure that the team is ready and the vehicle's ready and all of the procedures and ground equipment are ready to go execute this three days of activity leading up to a mission. And that was a lot of fun, it was a great job, probably the best job as I go back through all my years with NASA, probably the best job I ever had, because I had total support of all of the, certainly the people at Kennedy Space Center

and the management team here, but throughout the program. And I didn't have any of the woes that go with the high-level management job. It's like having a full deck of cards and all of the wild cards too. And people were responsive and, of course the team, I had a lot of fun in working all the simulations and training with the team to get everybody back together again so that we could go do what we had done well in the past. The biggest challenge in that was this tremendous guilt factor that prevailed everybody on the team throughout the agency. And to overcome that and get people confident again that they do good work. And we will do this again and we will fly this machine again and it will be safe to go fly it again. We'll focus on that and we will get there. But that was one of, people have asked me what the biggest challenge was in STS-26, was really getting the team back together again and in addition to getting the work done, the products, the procedures, the software rewritten. But getting the team in the same role that you want any competitive team when they go into an event is confident. They're going to pull this off. The hardware that they tested is ready to go, the procedures that they wrote are going to work just fine, the software that they developed for this, if that was the case, is just fine, and their training record is such that they ought to feel good about it. In addition to the normal work for processing, that was probably the biggest challenge in getting back to flying.

Launius: General McCartney told us that the number one problem when he arrived after Challenger was morale. He had the world's best team here and they were just in the doldrums.

Sieck: Yeah.

Launius: Feeling that they were guilty of something and actually they had a lot of help being pointed…

Sieck: Well, yeah, the media. I mean, they were relentless and they were constant and we were definitely in the fishbowl then, once we got, the hardware got down here. And everything we did was visible and often distorted. And that wore on people also. But, from my standpoint, the process of getting ready for that was just, I mean that was, if I look at any events through all the years, that period of time, of getting ready for STS-26 and then the launches after that as launch director was probably the best, the most fun. And because, in addition to the way the job was structured, you couldn't help but to have fun, but it allowed me to spend a lot of time with the people out there, the people. And you mentioned Forrest McCartney, as managers of this center go he was probably, the ultimate in terms of a people person. He made sure that he had his fingers on the pulse of the people at all times and we would often go out there together. You know, it would be one of these, "Well, what are you doing right now, Bob?" "Well, nothing, but I got a meeting in fifteen minutes." "Well, fine. You turn that over to someone and we're going to go visit the whatever crew out in some quantus hut that doesn't have windows, that hasn't seen management in we don't know how long, but we're going to go visit them." And then we'll go visit these people, so you got to know everybody and all it did was reinforce, yeah this, we have a great team, just as we did back in the Gemini program and before. They just need to be

reminded that management knows that they're there and they are doing a good job and they're a valued member of the team.

Dethloff: So you felt more, more committed and excited by Shuttle activities than you did by the Apollo?

Sieck: In the process of rebuilding after Challenger and those missions, yes, because I was so incredibly busy on Apollo and I had this responsibility which was about this finite in terms of the work going on. So a lot of the other stuff going on, out there, I mean, it was lost to me. I knew the people were there and doing good work but I had this. Well, as launch director, I had this.

Dethloff: You could see the whole world.

Sieck: . . . and I had time to digest it.

Launius: Yeah.

Sieck: And the work was fun. It was fun.

Malone: So you were launch director for, was it fifty or at least, Shuttle flights?

Sieck: About a dozen of them before Challenger, before I got promoted and then another forty some after Challenger, before I got promoted.

Malone: So you have overseen more than any other launch director, for Shuttle.

Sieck: It would probably add up that way, yeah.

Malone: Can you remember any specific stories…

Sieck: Stories.

Malone: …as launch director.

Sieck: Well, let's see … since the launch director job is pretty easy, really, when you get in the last couple of hours of launch count because the team out there with their procedures and software, they're going to tell you if anything is no go. And if they say something's no go, it's pretty straightforward, you're not going to go fly until you go fix it. If something's broken. One of the few things there's judgment left in is the weather call and the weather situation. And this goes back to my training as a meteorologist, once I had left the Air Force, other than, you say, "Well, that looks like it's going to be a pretty good thundershower," and that sort of thing. You know, putting my own windage to what the local weather forecaster would say I didn't put a lot of respectability, I guess you would say, into my meteorology training until I got the job as launch director

because when everything is straightforward, but, you know, this is Florida weather, it's dynamic, it changes frequently. And, of course, everybody has an opinion on weather.

Launius: Sure.

Sieck: And the rules are written, they've transcended over the last twenty years to be more specific, but they were kind of general in nature, which would allow you to have judgment. There were some things that were pretty straightforward, the wind of this velocity or a ceiling of that, but beyond that, you could exercise judgment. So you could get a consensus with the flight director and the meteorologist who's providing the forecast and launch director you could work weather situations that required judgment. And that's when my meteorology training paid off, because I never wanted to launch if it would have been an unsafe thing to do. But with my knowledge of the weather rules and meteorology I would see situations where I would think this is really good enough. And now if we can just get everybody else on the same page, that this is really good enough, we could safely go fly, today. Even though the person flying the profiler with the Shuttle training aircraft would say, "Well I see some more clouds building over here." And then that would send some negative wave to somebody else saying, "Whoops, sounds like it's getting worse," you know and this. So to work those kind of issues, and I did those for a number of launches, to end up with a decision or a consensus with the meteorologist and the flight director and the mission management team, integration manager, that look, this is really good enough based on this, this, this. The meteorologist is telling us this. The history says this is what'll happen when these

conditions occur. So this is really good enough and if you wait for it to get better it could get worse, so why aren't we flying today? You know, and I don't remember the specific STS numbers, but I recall a dialogue like that a number of times when we ended up flying when, I wouldn't say somebody else would've done it different than I did, but, if it had been worked differently the decision may have been to stay on the ground and, in hindsight, some people would have kicked themselves the next day, saying "We could have got off the ground safely yesterday."

Malone: With ninety percent forecast given sometime, we would still press with the countdown and we'd get go. We launched many times.

Sieck: We would, we did that. The meteorologist is in a bad position because they have to give a percentage probability on whether or not you can go fly. And there's a lot of conditions with the weather in Florida that, yeah, you could have a ceiling below the limit that allows you. But if you have just a few changes in temperature, or pressure, or wind, that ceiling that would forecast would go away under certain conditions. And in situations like that it was always my mentality to say well, not that I'm an eternal optimist, but it won't take much of a change in the large-scale meteorological conditions in this area for that pessimistic forecast to end up being a pretty good day to go fly. So in those situations we'd say, "Well, we'll go ahead and tank anyway," and of course there would be them that would say, "Well, you're putting another cycle on the launch team, the External Tank, and you're going to spend all this money for propellants. Why are you going ahead in the face of this forecast by a person who gets paid to provide

you a service Sieck?" I'd say, "Well, but my take on this is yeah, but if you look at the big picture of things it wouldn't take much of a change to make it better. Everything else is in readiness, so there's no downside to trying to do this today." And, I don't know how many times it played out, but I remember, I never went home after launch kicking myself saying, "You shouldn't have tried to do that today Sieck." Never did, the only one being Challenger which, although I wasn't launch director for, but, like a lot of others that day, if I had followed my gut, I should, this is out of family, if that's the right term, you know, we could have stood down another day, course it may have caught up with us later, the fact that the design of the booster wasn't robust enough to handle all the conditions it could see. But, whatever, but that's the only one. The rest of them, no, no, you and the team, you did the right thing. But the meteorology training did come into play, because when the forecasters, I would get a dialogue going with the forecasters and I'd either feel confident with what we were hearing, I'd say, or I'd say "Well, go check this, this, and this and revisit your forecast."

Dethloff: As Launch Director are you interacting very closely with say with contractors and other centers at the same time that you're…

Sieck: The interaction is, it's two way, one is to the launch team. Launch director job is really to integrate what the launch team is doing at that moment by executing their procedures and that's a government and contractor team, with the external world. And the external world includes the Houston flight control center, the meteorologists, the range safety and the Mission Management Team. The Mission Management Team is

responsible for essentially the design and all, and the requirements for all of the stuff that's flying as well as the stuff on the ground that it takes to get it off the ground. From a developer's standpoint, they authenticate that everything they're responsible for is ready to go fly. And they handle some pretty tough problems that can affect the launch team. You have a problem with a component and a vendor out, thousands of miles away from the Kennedy Space Center. Well, it's the Mission Management Team's responsibility to work that issue and if it requires, during this process of launch count and inspection or a test on a similar component that's installed on the Shuttle, well the launch director's responsibility is to integrate that stuff with the launch team. Or sometimes they handle stuff that they don't have to, but they. . . I remember one time when the tire manufacturer, in the launch count, sent a notice to the project manager responsible for the Orbiter that they had found a problem with a lot of tires, a lot, a tire lot back at the vendor. And they didn't know whether this "blem" as it were would affect the performance of the tire. But be advised that the tires installed on that Orbiter came out of the same lot as those that they found the problem with and we just wanted to share that with you, NASA. Warm regards.

Malone: Was that during the countdown?

Sieck: That was during launch count. So, I mean, that's the kind of stuff that gets handed to this Mission Management Team. And they'll make the launch team aware of it through the launch director and say, "Hey, we're massaging this. We're working this. And just to be advised, we don't know whether it is or is not a constraint, but you need

to know about it, Mr. Launch Director. You need to know about it." And it may or may not become a factor in what you do as the launch count proceeds. So there's always, I mean, in this business you're opportunity is the next phone call away.

Dethloff: Basically, it's the launch director's finger that's on the button.

Sieck: It's the Launch Director can, when everybody else has. . . I think the best way to put it, a lot of people out there have no go buttons. And if somebody presses their no go button you don't fly until you clear the air on that issue or you go fix the problem. But when everybody else is go, the Launch Director can be no go. It's not today. And there was a couple of times when I did that. Say, "Well, the weather, you know, this, it's not a technical problem," but again back to weather, weather situations. Well, the weather is fine, that's good right now and will probably be good for the next half hour. But, we can wait here a few more minutes, if not, we've already sat here long enough, our 24 hour recycle capability is eroding the more we stay here, so we're going to call it a day. We're going home today. We're not going to go fly. So I did it. That's really the best way to put it, the Launch Director you could say has the final authority, but would not override a no go input from either the launch team or the Mission Management Team or any of the other interfaces. You just don't do that. Not in this business. But you can be no go when everybody else is go and you can require more, and the hardest thing to do, the hardest thing…

Launius: She's giving us a five minutes sign.

Sieck: A five minute, okay.

Launius: Go ahead.

Sieck: While this is on my mind. The hardest thing to do is say no when a member of the team, particularly the launch team, if you got some equipment problems out at the launch pad or something like that and they may have reached into their bag of tricks and say, "Hey, you, let us send a red crew out there and we'll try this, this, this, and this and maybe we can get this thing running and we can go fly again." Because everybody has got this tunnel vision there that we all came to work this day or this night to safely get that off the ground and that's expected of us and I think I got a good idea that may help us go do that. Well, you have to develop a sense that, in some cases we're working an issue too hard. And the best thing to do, because we're all caught up in the manner of the moment, we got this tunnel vision to try to go fly, the best way to work this problem is to stand down, go sleep on it, and then see if this idea that you came up with, while the clock is ticking and you're under this pressure, whether this idea will still pass muster 24 hours from now. So thank you for your suggestion and your thoughts and your hard work, but we're not going to do it. We're not going to do it. We're going to stand down, spend some more time looking at it before we do an activity that would be nonstandard for launch count, potentially involve hazards for personnel safety and that sort of thing. That's the hardest thing to do as launch director, to say no.

Launius: Ok, why don't we take a break at this point and Nancy will swap out the tapes and stand up and stretch your legs if you need to.

Sieck: Well, I'll do that.

{tape change}

Sieck: The command service module and lunar module checkout teams were over here in the O&C building in the control rooms that, are now, well, they used to do the site work over there for payloads, I'm not sure what's in there now. But we would do all of our testing, regardless of where the command service module or lunar module, those were our home control rooms, all the checkout. We did a lot of checkout in that building when the vehicle was in the VAB, the VAB and launch pad, that's where we did our testing from. And of course, no windows, so you couldn't see the launch and of course you had to be there. For the launch count we had black and white TV sets, eight inch, at all the consoles. So you could tell when, and of course we had the information and all of the instrumentation as well as the communications and closed circuit TV. So you could tell when you launched and that sort of thing. But I was in that control room for every Apollo launch with the exception of Apollo 11. For Apollo 11, I was the backup command service module engineer so I was going to be able to watch the launch. Now I had a couple of options, I could have brought my family out to KSC…or it was my discretion where I wanted, now if they'd scrubbed the launch I would've had to go back in that night and do my shift while the lead came in. I decided, well, I lived in Titusville.

No problem, we'll just get in the car and with my car pass we will go out to the Kennedy Space Center. Not a chance. I got a half a mile from my home in Titusville, population 50,000 maybe at the time. There must have been, I'm exaggerating, there was hundreds of thousands of people in Titusville. The highways were grid-locked. Now obviously I waited too late to go, but it was interesting, there was no cars moving on US 1. My house was about two miles from US 1 and I drove a mile and then had to park the car and we walked the rest of the way down to the riverfront. There were tents pitched in the medians of US 1. There were cars, all the north and southbound lanes were closed. No cars were moving. And there were just thousands of people lining the bank waiting for this event. And of course we walked down there with the rest of the thousands of people and watched history. And, I noticed all of the people would ask us where we were from, whatever. I'd say here. Well have you got anything we can take back with us as a souvenir? People were pulling up plugs of grass. And I got. . . anything just as a remembrance that they were there and watched Apollo 11. And I got to thinking of these piles of procedures that were sitting out here at the Space Center. In fact, my own launch count procedure which was five thousand pages long, which right after the launch you threw away, didn't even recycle paper back then, and I was thinking, if I had just brought that home with me I could have sold every page of that for…

{laughter}

Sieck: …who knows how much a page and the page that had the actual lift off on it, I could have had a raffle there. There's no telling how much money I could have made out of that.

Dethloff: What a story.

{more laughter}

Sieck: When I saw these people pulling up plugs of grass and whatever, that's the first thing that came to mind. I said, "what an opportunity I missed." But I did get to see the launch. That was great.

Dethloff: That's good.

Sieck: Well let's see. Where were we? We were in the…

Launius: Well, we were talking about Shuttle. But we can go back and talk a little more about Apollo. I mean, it was history making obviously, Apollo 11 and everyone was excited about it. What was the reaction here at the Cape as that mission took off and as it successfully completed? I mean, was this a sense of relief, pride and joy, was there a little bit of a letdown maybe that you'd actually now accomplished this great task you'd all been working for?

Sieck: I think it was, there was a mix of all of that, because we knew that that mission marked the beginning of the end, so to speak. And there would be more missions to the Moon and they'd be fun, but everybody knew that would just get us closer to the end of the program. And there wasn't, we didn't have like in the previous programs, we didn't have another big program that people knew they were going to transition into…

Launius: Okay.

Sieck: …that involved human space flight or exploration. So I'm sure with the contractor people particularly and, I sensed that in my relationships with them, they saw it more of the beginning of the end than some of us who knew that well, there'll be something after this. We don't know what it is, but we're going to be a participant in it. And of course the contractors didn't have that kind of security. But, for the near term, I mean, it was euphoria. Oh boy, this is great and of course technology is not the same today. I mean then as it was today, today it's a lot more, but I was looking forward to seeing those, the events that would then transpire later with the television coverage. And by the way, the local radio stations back then. . . there was no NASA channel or NASA Select you could go to, but the local radio station in Titusville, which was a music station, whenever an Apollo mission was going on, unless the crew was asleep, they piped in the air to ground from Houston for the whole duration of the mission. So you could turn the radio on at any time, unless it was during a sleep cycle and then it was music, and you hear the dialogue of what was going on, which I thought was great. But

I mentioned Apollo 13 and I had forgotten this and, it became a matter of course before bedtime every night I'd turn on the radio and see what was going on, if I could glean out what was going in the mission. I had the scorecard of course, of where the mission was in terms of the sequence of events and that sort of thing and I always checked that and I'd turn on the radio. And I don't know whether it was obviously coincidence, but I'd turn on the radio and it was ten seconds later when I heard Lovell say, "Houston, we've got a problem." It couldn't have, it was less than a minute and my wife and I still remember that today. And, so obviously I kept it on and, like everybody else, initially I thought, oh, well this is an instrumentation problem, it's not a real problem. Not that we thought our spacecraft was invincible, but it was, I mean, we just couldn't believe the problem of that magnitude was occurring until they went on and on and on and on, and obviously. And I think I stayed up all night listening to it. Then of course the next day the phones started ringing about well, we need to pull together some teams of people to help them with the crew systems, equipment, and that sort of thing, which was one of the major things. I'm not sure who all you're talking to but most of the work and the effort obviously was done in Houston with the flight team. But they did rely on us for an accurate assessment of everything that was stowed on the command module that could possibly be used to help them, use the spacecraft as a lifeboat to get them back home again. That was, we did participate in that. But the Apollo, after Apollo 11 though it was still, every mission, it's just like today in the Shuttle program, that was a great mission, but as the pilot would say, "That's runway behind you. That's just numbers on a scorecard. What matters is the next mission." And the next mission was always the most important one. And sure we were disappointed to see Apollo 18, 19, and 20 get

scrubbed, another story. The Saturn V facility out here, by the way, is a great exhibit and…

Launius: Yeah, they did a fine job with that.

Sieck: …monument, oh yeah, to the Apollo program. And I remember going to the grand opening of that big gala and a lot of the Apollo astronauts were there and I was talking with Dick Gordon, and we were reminiscing about the Apollo program. I said, "Well, this is," he said "what", I said "What do you think of this as a facility that commemorates the Apollo program?" because he had flown as a command module pilot with, back on, well, I don't remember the number.

Launius: Yeah, it was Apollo 12

Sieck: 12, that's right, yeah, Conrad, Gordon, and Bean. And he said, "Well, its fine, Bob, except for one thing." I said, "What's that?" and he pointed up to the Saturn V and said, "That was going to be my rocket."

Launius: Yeah.

{laughter}

Sieck: "I was going to be commander of Apollo 18 and that was going to be my ticket to go walk on the moon. And it got scrubbed."

Launius: Yeah. In terms of Shuttle. Let's talk a little bit about that. You were the flight director for fifty some missions as Lisa mentioned earlier. Can you take us through the process that you go through in terms of launching the vehicle. You've got people around you that you're talking to all the time. Roughly, how many people are we talking about?

Sieck: Sure.

Launius: And what kinds of jobs are they doing? I assume they're looking at various systems.

Sieck: The process actually starts, the team that launches the Shuttle, the engineers for the most part are the same ones that process the Orbiter through all of its test cycle and then the solid rocket boosters, when they get integrated with it, and the tank, and then of course that goes out to the launch pad. You really have essentially those same people follow that campaign, that hardware is a good way to put it, through that period of time which can last anywhere from a couple of months to well a long time. So as Launch Director what I would do is stay in close touch with all of these people and through the process of readiness reviews you would stay abreast of what the issues were associated with the systems and what challenges that they may be in terms of

nonstandard work or something out of the ordinary that they're gonna have to do either in the rest of the processing of the Orbiter or the Vehicle Assembly Building or at out the launch pad. So you stay, you're not the team lead as it were, but you're recognized as a participant in an activity which is gonna take the benefits of all of this work that's going on before it and carve out this last three days of this campaign as a launch countdown. Now you have a buildup process associated with that in addition to all the work that gets done in processing the vehicle with a countdown demonstration test that occurs a couple of weeks before the launch. And that's a dress rehearsal and the tradition of that goes all the way back to the Gemini and Mercury Programs did the same thing. And that's the purpose of that. And that's a Launch Director led activity as it were. The purpose of that is that the team, you're confident that the team is qualified to do the work. But it's kind of a time out from all of this other activity that these engineers and technicians have to deal with. It's a reminder that well in a couple of weeks you're gonna do this, this really critical task. You work up, and I mean all this other work is very important but this is a reminder that it's a human space flight program. There are risks with it. It's important that this processing team get reacquainted with the people that are gonna fly in the machine and be thinking about this activity that's going to occur in roughly two weeks, which is the pinnacle as it were, of all this other effort that you've got going. And the Launch Director, so that, that's really like a mock launch count, so you go through the same activity with a safed vehicle that you would the last day, last half a day of launch countdown. But the Launch Director's responsibility through all the rest of this is not only to make sure you maintain that communication with the team, but there's things that are occurring to the vehicle or the requirements vehicle that can

affect the launch count. And you want to get those dispositioned, if that's the right technical term, well in advance. Be it a launch commit criteria change that needs to get through the program, whether it's a change to the launch count procedures, or the software, or the equipment out at the launch pad because of something that's happened either to the vehicle or other equipment well before you get out there. So you're constantly in this, your job as Launch Director is to constantly think ahead to that last three days of activity and see what effect, if any, all this other work that's going on in this campaign would affect. And to get that through the system of approvals or fabricating equipment or whatever it takes just as soon as possible so that when the campaign is finished with the exception of the last three days, it's an easy transition to go from the final work that's done at the launch pad into this block of time that we've fenced off and called the launch count process. In addition to that launch countdown demonstration test, there's a flight readiness review and that's again from a Launch Director's standpoint, we've always had a tradition, the Launch Director gives a briefing in there. That's a chance for the Launch Director to get, if he or she hasn't had a lot of interaction with the mission management team, to get reacquainted with the management team. That's the other side of this influence we talked about before that may affect what goes on in launch count. That's to get the Launch Director, get on a first-name basis and that's why it's important I think and always will be, that flight readiness reviews be a face-to-face meeting because you have to be able to communicate with these people in a boardroom atmosphere if you're gonna communicate with them over a headset when you're into the short straw environment of a launch countdown.

Sieck: So, there's a process that goes on in the flight readiness review that involves the Launch Director, and then there's a training, a simulated launch count, which is pure training, where, the same as they do in Houston, a lot of the time, you have …..

PART II START.

Sieck: . . . a group of people that come up with diabolical failures and they embed them in software and you go out in the control room and you make all the displays look like you're in a launch count and you inject failures in that and see how well the team handles them. And that again is another Launch Director activity. So it's a busy process. And we built the Launch Director responsibility that way again after Challenger. When my bosses, and you mentioned Forrest McCartney, ensured that everybody on the government contractor management team knew the Launch Director, so there would be no hesitation and no impediments to good communication between the management team and the Launch Director. That was important when we were rebuilding the team and changing all the requirements, rules, and a lot of the hardware and software in the return to flight, but its just as important today when it would be perceived that things are more of routine nature, very important.

Launius: You were talking earlier about acceptance of risk as being very much a part of the Apollo program. You understood it. Clearly there is an acceptance of risk today, although they may different and minimized and I think . . .

Sieck: Sure.

Launius: . . . we have now, at least, a very mature system in which most people know what's going to happen most of the time. But the public perception seems to be different and Dick Smith earlier today elaborated on that. Forrest McCartney's done so and a variety of other people with less acceptance of risk. Does that affect the way in which you undertook your activities as Launch Director at all?

Sieck: I don't think it did. Because regardless of the public perception, my experience has been everybody gives their job, their work, their effort, a hundred to a hundred and ten percent, because they want to turn out quality products. Whether that product is a piece of hardware, a procedure, or software program, or a tile bonded on the vehicle, whatever, or a clean window for the Orbiter. And they're going to give it that effort regardless of the public perception or the media attention that this program gets. And it's one of the challenges, we talked about challenges before, you want this confidence in the people. You want them to have confidence, because you don't want them afraid of making a mistake. You want them confident that they won't make a mistake and that takes constant management involvement with the work force out there to reinforce these people. And, to stay close enough so if the workers need better tools, a tool can be anything, but if they need better tools or they need more resources that you as management can hear that message or see that message and do what you get paid for as a manager to make sure that that worker can continue to do what he or she gets paid for as a worker out here. And that's a fine line but to me that has always been

a forcing function for management to stay closely involved with the work force. Not to remind them that they have to do a good job and that there's risks in this business, but to remind them of their importance and how important it is for them to treat this work as a mission as opposed to just a job. And it's been my experience that that's the way most of the people out here feel about the work that they do. It is not to them just a job, but they're on a mission. And sure there are risks, and they know there are risks. But you don't want them afraid of doing something because they may do it wrong. And you want them, if they're not comfortable with the work they're doing, you want them to call time out and say, hey get another expert in here or I need to go back and review the procedure some more before I execute this, or something like that. That's fine, you want them to do that, but you want this to be a fun place to work. You want people to whistle when they go to work and whistle when they leave and it's your job as management to make sure that that is the environment that they work in.

Launius: Right. A lot of the Shuttle missions now to the Space Station have very short launch windows. How does a Flight Director deal with that perhaps differently than they may have in the past or any differently at all? I don't know.

Sieck: After five minutes in the launch count and counting whether you're going to Space Station or you had a laboratory mission where you have a two and a half hour window probably. It's kind of immaterial because technical constraints preclude you from holding anymore than. . .

Launius: OK.

Sieck: . . . four or five minutes anyway.

Launius: All right.

Sieck: So all it really affects is that activity that occurs prior to T-minus five and counting. And when we structured the launch count back on STS-1 we put this ten minute hold in at T-minus nine minutes. And by the way, we did it, as the trivial item for the day, we did it at T-minus nine minutes because we didn't want people confusing a ten minute hold at T-minus ten. Because if we put a longer hold in at T-minus ten we didn't want people to get those two numbers confused.

Launius: OK.

Sieck: So this group of people that helped build this software program back on STS-1, we converged on T-minus nine minutes as a hold plan. It's the equivalent of the two minute, the time out at the two minute point in a professional football game.

Launius: OK.

Sieck: Everybody can, you know, relax. No planned work, go back, leaf through your procedure, think about the parameters that you're responsible for. Is there

anything that's happening there that makes you a little bit uneasy? Gives you time to think about it, talk about it with the rest of your colleagues at the console. Take a breath, standup, stretch, whatever, because we're now going to go into this period of time where your ability to hold is constrained. And after T-minus nine the first few minutes after that, we structured it so nothing happens, we don't do any work. All that happens is a lot of software programs get executed and start messaging, managing all these measurements that are instrumentation measurements that are coming into the control room from the ground equipment and the flight equipment. And again, we purposely did that because if there were any glitches with all this software transaction that's going on we wanted people to have time to sort them out without walking on top of any other work that was going on. So that was our strategy, but our mentality set up was, you get everything out of the way by T-minus nine minutes. You do all your polls and your final check on the weather and this sort of thing and any speeches or whatever else you have to do, because from nine minutes on down you're either going to fly within the next fifteen minutes or see you tomorrow, at some later date. So, the pressure and actually, technically you could go down to T-minus five and hold there for quite a period of time except for these tight window things, but we've been building the mentality every since STS-1 that after T-minus nine and counting you don't have much of a window to shoot for. And that's essentially the way we structured it and we like people to identify their problems early and get them out of the way early and for the most part that's the way it works. Something breaks late in the count and, a short window, you won't have time to fix it. So it goes. It just wasn't your day. Just wasn't your day, but that's ok.

Launius: All right. Questions Henry?

Dethloff: What about the directors, the management structure, did that change a lot? You were here a long time right in the middle of things.

Sieck: Well, when I was at the journeyman engineer level I didn't pay much attention. . .

Dethloff: Sure.

Sieck: . . . to what happened further up on the organization chart. At Kennedy Space Center, the program made a lot of changes after Challenger, but here at Kennedy, except for what's happened after I left, the structure maintained pretty much. It looked the same from one program to the other. You had your organizations that were responsible for the operations, the program of the moment type of thing. And you had your organizations that were responsible for keeping all this infrastructure going out here. Which is a big task. By the way, it's a big center. I mean, and I'm sure you've heard from the Center Directors. And while I'm thinking of it I would make the point that today. . . I think back over all the programs over all the years and people have asked, "Well, obviously, the real heyday was the Apollo program and you people were top notch then." And I'd say, "No, I would give credit to the people that are doing the job the best today. And if I look through all these programs that I've been involved in, the people that have the highest degree of difficulty to overcome today and are performing,

probably get a higher report card than anybody else, are the people that are working the Shuttle and the payloads today." And you say, "Well, why do you say that?" Well, if I think back to the heyday of Apollo, for instance, which is one people refer to as glory days, well, they're glory because of, what was the term, the guns and butter environment we had back then. But we had more people back then. It was almost thirty thousand people out here at this space center. How much today, twelve, thirteen thousand? We had unlimited resources. We had tremendous support from all around the country and as I mentioned before, tolerance for risk. If you made a mistake, well, hey, we know you're trying so we'll continue to support you. All the hardware was brand new. The facilities were brand new. Everything we launched was brand new, factory-fresh new. The technology, the complexity back then was simple compared to today. I mean this is high tech stuff we process and fly today and back then it looked like I mean, people thought a rocket engine was a high tech thing, but in retrospect to the main engines we fly today, which have gears in there that turn at eighty thousand rpm and some of that stuff back then was simple compared to today. And we do it with fewer people. So when you think of the degree of difficulty, and who is achieving the most, I would give the nod to the folks that are doing the work today. They fly more often, with older hardware, with fewer resources, with less support, and commitment than those previous programs enjoyed, really.

Dethloff: How about your directors? Can you. . .

Sieck: Directors? Who stands out?

Dethloff: Yeah.

Sieck: Well, they were all, everybody's different and the terms goes, make's their own wake. I never had a lot of interaction with our first director, Dr. Debus, other than a few awards and I know he would look at my name, Sieck, now that's German isn't it, but we never had any conversations, although I knew some of the people that were on his staff pretty well cause they lived over in Titusville. I didn't really get to know any of the directors well until Dick Smith came on. And all of them were different. If I would characterize his management style, he was more detached from the operations than certainly those who came after him, but a great person, a great gentleman, and I'll never forget, I'll always be grateful to him. When he worked this diplomatic trip to China, back in the mid-eighties and took me and three others from his staff with him. The trip of a lifetime, we went all over China. We visited places where foreigners were never allowed to be before.

Dethloff: That was exciting.

Sieck: And you can imagine the reaction of some of these natives seeing a foreigner. I mean it—be like looking at an alien. Beamed into this room. . . .

{laughter}

Sieck: . . . and people just dropped what they had and stared at us. Phenomenal. But we got to go to the launch facilities. We were the first foreigner's allowed in the Xichang launch facilities, but a great trip. But a real gentleman, and took the burden of the Challenger thing as well as could be expected, as anybody could. I mean he was the right person to have when that tragedy had occurred. We were fortunate to have him onboard. Very fortunate. Forrest McCartney, the consummate people person. And as you know, he was determined that his door would be open to everybody that walked in and he was determined that whoever walked in he would have met them before. I don't think there's a workplace out here that he didn't get into while he was director. And he will admit that he had his problems understanding NASA coming from the Air Force and we would often commiserate about that, "Sieck, tell me, why NASA does it this way? What is going on here?" But a real gentleman and obviously a real people person. After him Crippen, of course, one of the heroes of the Shuttle program. I still stay in contact with him and he worked Washington probably better than anybody we've ever had down here, cause he had come from that environment and again he was the right person. And Forrest was the right person to rebuild this center after Challenger, and Crip was the right person to work all of that stuff that goes inside the beltway in the early nineties when all of the stuff was looming with budgets and that sort of thing. And then came Jay Honeycutt, and when the lead center transition occurred over to Johnson and the power base that went there because of his ties with Johnson he was the right person to have here at the time, definitely the right one that got us through that. And now Roy Bridges, with this transition to more of a development approach to what KSC has done so well over the years. He's, as a

visionary goes, he's probably the best we ever had here to go work that. So, as I look back over it, we always had the right person at the right time. And I got along well with all of them. Like I said, the ones before Dick Smith, I was so far down on the totem pole I didn't have any interaction, much if any, other than the occasional briefing. But the ones I've known since then, right on.

Dethloff: That's a good thumbnail sketch of KSC history, right there too.

Malone: Did you have any other mentors or folks that you kind of considered as, as heroes.

Sieck: I had. . .

Malone: . . . along your career here?

Sieck: Well, I had the person whose management style I probably admired the most was Rocco Petrone, who was Launch Director in Apollo. And he was another one that made an effort to understand what everybody did who worked in the launch team. But I always appreciated, he would have debriefings after every activity, that he would personally chair and he made it a point, and these were public, I mean the whole team would be there, hundreds of people. And he'd go around the room and point out, "Now, here's what you did real well." "And, you folks over there ought to take note of that because this is the way that ought to be done and you did, when you did this and this

and this, that was exactly the right thing to do." And he would usually hit every organization and every responsibility with an atta-boy or an atta-girl. And then he'd go around and tell you in your face at the same meeting, now here's what you can do to improve. And he would catch everybody there also and then dismiss the meeting.

Malone: We heard they were long meetings.

Sieck: And they were long meetings, but they were, as meetings go, they were productive because you were always on the edge of your seat to see not just who would get fingered so afterwards you can say, "Hey gotcha," but what message he was going to give whenever he fingered that person or that organization. And he wouldn't get personal about it, he was really talking about the function and the responsibility of the organization, that person's organization that that person represented. But that was good, a good management style. My operations mentor in all these years was George Page. Of course the STS-1 launch, and I met him for the first time in the Gemini program in a blockhouse when I made the mistake of taking my lunch in there and when things got quiet at one point and my biomedical console was right in front of the test conductor console. And I hadn't been introduced to the man before, and I'd only been onboard a couple of weeks, or something like that. And I got hungry so I took my little brown bag up and put it on the console, got the apple out and made a big crunch and he just launched from the console behind me.

{laughter}

Sieck: "What are you doing?" That's when I met George Page.

{laughter}

Sieck: But to his credit, when I said, "Well, I'm sorry sir," of course I was beat down into something this size and I didn't know the rules, but as soon as I said that he backed off. "OK, you weren't just flaunting the rules, you didn't know the rules, that's a problem for your lead engineer and your boss and I'm going to get to them."

{laughter}

Launius: And the rule was you didn't eat at the console?

Sieck: Yeah, oh yeah, yeah.

Malone: And it's still that way.

Sieck: And it's still, yeah. No. But he was my operations mentor and my technical mentor was, in spacecraft, of course that was where I worked at these, was Ted Sasseen. And we would have these problems in some of our major tests and whatever and we'd be sloop-shouldered and say, "We've tried everything we can. There's no way out of this, we're going to have to scrub or destack the vehicle or something like that." And he'd come through with, "Well, have you thought about this?

Have you thought about that? Have you thought about that?" You know. And he'd just be sitting back there listening on the headset, absorbing all this, and he'd come up with these, to me at the time, brilliant suggestions to go try and pulled many a technical issue out of the hat so to speak. Certainly in the Apollo program and early Shuttle where we had a lot of technical challenges. Those are probably a lot of the people I worked with, the names go into the hundreds, and I've always said, people have asked, "Well, how big is your launch team?" You know, well fine. You look in the control room and you have maybe a hundred and fifty to two hundred people on consoles and then you got the backup room with again that many and you've got your crews that work the pad, which is a couple of hundred people, but, as I mentioned before, the launch process really starts when the Orbiter lands from the previous mission.

Launius: Right, right.

Sieck: So these people that are doing work back in the processing facilities or working on a software program in a building that doesn't have windows. Their products are just as important as what you do on launch day with a couple of hundred people that are pressing buttons in that highly visible environment. Just, they're all important. So how big's the launch team? It's thousands. Cause it takes all that effort to launch it, not just that last three days or that last nine minutes. Takes all of it.

Malone: Did you have any particular traditions on launch days?

Sieck: I. . .

Launius: I know where this is going.

Sieck: Well, two things about the launch count when Forrest McCartney and I were walking through the control room before launch count, before, in fact before the STS-26, and we were making sure everything was tidy and that sort of thing. He said, "Bob, there's one thing this control room is missing." "What's that?" He said, "The flag. You don't have an American flag in this facility which is part of the national resource." And back in those days when the Center Director made a recommendation, I mean you. So the next day, in fact we made it a tradition, it happened to be the next day was RSS rollback. So I talked to the test conductors after we finished that little walk through, I said, "You get an American flag out here and we're going to hang that thing up at RSS rollback for STS-26 and for every launch after that and that's going to be our tradition. The flag goes up until the end of the mission." But that's a tradition and I found myself checking it every time, because I knew that Forrest, when he came into the control room on launch day, was going to look up there at the windows and see if that flag was hanging there and it better be hanging there. But I always visited the crew families during launch count and the tradition of them being in the Launch Control Center, I think, is a good thing. But I always made it a point to visit them. And after I got home after launch count, when I could finally think again and focus on something other than what was right there we established a tradition, very early in my days as Launch Director, that I would cook dinner for the family. Now the kids were younger in the early

days so they were living at home, but even now that they went on to their own lives, but after launch they knew, okay, Dad's cooking dinner tonight, so grab the kids together, get in the car, we're having dinner up in Titusville, because Dad's cooking. Just as a way to get reacquainted with the family after I know a number of days of only looking beyond this with what I was doing.

Malone: There were, it seems to me that clipping of ties was a tradition over there for someone new.

Sieck: Yes, I don't think that started on my shift and of course the consummate tradition is the beans, which goes way back. And I was probably one of those guilty of getting the beans thing expanded because I would look forward in those long launch counts of going up, even though I wasn't in the test conductor office in the early STSs. As an engineer I knew they had the beans up there because of my relationship with Norm Carlson and all the test conductors and I'm sure I would eat more than my share of beans. So it got to the point where well you'd better make more of these you know. And that's a good tradition and still is, as it lives today.

Malone: Well, having spent early days of space down here in Florida and spent your career down here through many programs, what would you expect for the national space program like in the next twenty years? Do you expect that we're still trying?

Sieck: I think, yeah well, we still lack that goal beyond low earth orbit for putting people. We keep going back to Mars and I'm always in hopes that we'll find something there. But for the time being because of the limited resources and limited support we get, making low earth orbit as routine and safe as possible is probably as big a challenge as we're up to. Now I'm also one of those that believes we're not alone in space and somewhere out there, there is some form of life that is foreign to us, but it's there. And we ought to go look for it. I wish we had more resources to go look for it. The space program, is a function of the economy. When there's a lot of money out there and people are feeling good about the future, they are willing to spend in investments that don't have a near term tangible return. Unfortunately, that's not the environment in the country today or in the world, so money is tight, and when money is tight people don't think about investments in the future and exploration of space. But I think that we can't wait for it either, you know, something to come, to beam into us or something, or pick up something, some kind of indication that other life is out there. We need to go look for it. And you say, "What's in it for us, Sieck? Why should we do that?" Well, what may be in it for us is what we've already found in the investments we've already made in the space program in all the years that I've been in it. There is so much tremendous spin-off that has enhanced the quality of life on earth and probably prolonged quality life on earth as we know it. That the process of trying to go to that star, or whatever it is, or find out what the source of that beam is, even if it's not life that, in the process of getting there we will benefit so much, life on earth as we know it, that it will be worth the expense. That's my belief.

Launius: A couple of final comments or questions. We've been flying the Shuttle for twenty years, more than a hundred missions. What's your overall assessment of the Shuttle and its performance and its role in our society?

Sieck: It's the right way to get people and big payloads into space probably for a couple of more decades. Its proven it's a reliable vehicle. We know what to expect from it. The challenge is, it's aging and things don't mature with age, they just get older, particularly when its complex machinery, so we need to invest in it for useful life for another couple of decades. And that'll take some time, it'll take some money, but it's worth doing and it'll fly safely. And you say, "Well, you mean we can never have another Challenger accident?" Well I know the numbers say there are risks with flying in space, but I would think the redundancy that's built into the Shuttle today and the safety requirements, and the safety sensitivity that exists in the program will keep us flying safely. We may have that day when we have to come home early or something like that because of a problem with a Shuttle, but I think again the redundancy and robustness of the vehicle will get the crew back safely. So we ought to invest in it. I don't see anything coming along the line unless again you get back to this discussion about the country and the world getting rich again and willing to invest a lot of money that doesn't have a near term tangible return. I don't see a replacement vehicle coming as viable as the Shuttle is. I'm with the aerospace safety advisory panel. One of the things that made getting on that panel made retiring easy because I felt that while I still had something left up here I could help maybe with some of the things that the panel

ought to review. And it was also admittedly a little self-serving because it was a forcing function to keep me connected with the people in the program. . .

Launius: Sure.

Sieck: . . .that I've enjoyed working with for so long, so that helped my retirement. But the safety panel, the point is, the theme of last year's report was investing in the Shuttle and the Shuttle infrastructure for the long term. And not just the flight vehicle, the visible thing, but all of the ground facilities, not just here in Florida, but in Houston and at Stennis and elsewhere. You need to put money into that stuff too because it's going to be required for the life of the Shuttle and we think the life of the Shuttle is a couple of more decades. And it'll be safe useful life. It is the right tool to use for this low earth orbit stuff and any other opportunities that require a human interface and large payload capability. So it's a good investment, but you got to invest in it if you want it to last safely. . .

Launius: Right.

Sieck: . . . that long. Got to do that.

Launius: If you had any advice to give to a young engineer who might want to work in aerospace, what would it be?

Sieck: What field to go into? I think robotics. Even with humans, they're going to need tools and if you look at what has happened with robotics just in the last five years you can imagine what's going to happen in the next fifteen or twenty-five years. I think this biotechnology. . . I think we'll get back to more of the human interface stuff again and I think that's a viable, and I'm not sure what curriculums are associated with our environmental challenges, as it were. But I think it's going to become more and more apparent to people that preserving what we have on earth, whatever it takes to do that, is going to become more of a priority as the years dwell on and we continue to use up the resources. I'm not sure what curriculum that would be or what type of sciences it would be but something along those lines is going to be in demand. It's going to be in demand.

Launius: Any final thoughts or, or comments that you'd like to make.

Sieck: I think we covered it.

Launius: OK. Lisa or Henry, do you have any other questions? Well, I want to thank you for being with us this afternoon. This has been wonderful.

Sieck: Well, I enjoyed it.

Launius: Thanks so much.

Malone: Very good.

Sieck: I'm anxious to see the product of all of these interviews and discussions.

Launius: You bet.

Sieck: It should be interesting. I hope somebody, someday will write a book about, I know that my friends in Houston have written books about the war stories and the whatever. There's a lot of those at KSC also, but just telling the story of the history of KSC as long it's not too technical, would make, I mean, it would make good reading. It really would.

Launius: That's one of the plans. That's a big part.

Sieck: I mean, it should, it should be a best seller. Really.

Launius: Okay, well thank you so much.

Sieck: Ok, enjoyed it.

Dethloff: Thank you.

Sieck: Good luck.

Malone: Thanks.

Sieck: I hope you're successful.