JOHNSON SPACE CENTER ORAL HISTORY PROJECT
EDITED ORAL HISTORY TRANSCRIPT

IRENE M. PIATEK
INTERVIEWED BY SANDRA JOHNSON
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JOHNSON: Today is August 12th, 2015. This oral history session is being conducted with Irene Piatek, in Houston, Texas, as part of the JSC Oral History Project, and for JSC's Knowledge Management Office. The interviewer is Sandra Johnson, assisted by Rebecca Wright. I want to thank you for coming in to visit with us today. We really appreciate it. I want to start by talking to you about your choice of becoming an engineer in a time period when there weren't that many women in that field. How did you decide you wanted to be an engineer?

PIATEK: Well, I always loved math and science going through school. I just took as many math and science classes as I could through junior high and high school. We got a brochure mailed to the house from Purdue University [Lafayette, Indiana] about a week-long seminar for high school students to come in and learn about engineering. My parents managed to scrape up the funds to send me off to Purdue for a week, and I went. It was perfect. I could make money, which was kind of an important thing, to be able to support myself, and it melded the math and science together perfectly. That's when I decided to become an engineer, as a junior in high school.

JOHNSON: Did you know any other women engineers?

PIATEK: Nope. Well, there were other girls there, yes, but I didn't really know any other women engineers. That, to me, wasn't a consideration or anything. It was just like, well that's what I want to do, so I was going to go off and do it.

JOHNSON: We've talked to other women, and sometimes in the engineering field, they've had people—high school counselors, college counselors—that have tried to almost discourage them. Did you ever run into any of that?

PIATEK: No, although I think my mom was a little puzzled by what I wanted to go off and do. But no, I never got any discouragement. I only got positive reinforcement from the teachers I had in science in particular in high school.

JOHNSON: After you got your degree, then did you come to NASA right after that? If so, how did that happen? How did you hear about NASA?

PIATEK: I remember watching the moon landing when I was 12—Apollo 11. I said, "Someday, I'd like to work for NASA." I never imagined that that would happen, but I ended up marrying a man whose father worked here for NASA. I didn't come immediately, because I graduated in August of '79, and started in January of '80, but he sent us applications, because JSC was going through a transition back then, and it turns out they were looking for minority engineers. Women were minority engineers at the time, so I filled out the application and I got hired. That was like a dream come true.

JOHNSON: Did you have to come down to interview, or were you just hired?

PIATEK: No, I actually interviewed over the phone, because we were living in New Orleans [Louisiana] at the time.

JOHNSON: When they hired you, what did they tell you you were going to be doing, or what area did you start out in?

PIATEK: It was ED. Experiment Systems Division. The first thing they had me do was actually in the Aircraft Instrumentation Research Program, where they had WB-57s—which were the great big airplanes with the droopy wings—and they would fly over different parts of the country taking scientific photographs. My job was to write a computer program, when I first came here. They had the thing running on an old Tektronix graphics computer. They wanted to transition it to a Hewlett-Packard computer. I wrote a program that basically did the same thing on the Hewlett-Packard as they did on the Tektronix, which was to take different features from those photographs and be able to correlate those with map coordinates.

Now I'm not a computer programmer, and when I got done with that, I said, "I don't want to do that anymore. I didn't sign up to be a programmer."

JOHNSON: How did you learn to do that? As like you said, you're not a computer programmer. How did you figure out how to do that?

PIATEK: I just sat down with the manuals, and started playing around, and learning how to write machine code. I just did it.

JOHNSON: Were there other women in the area when you came in to work in that division? Were there other women in that division?

PIATEK: There weren't too many that I recall. I think it was pretty much all guys. After a year and a half of being in that division, I went to the Propulsion Power Division [EP], and at that point, that division had hired a lot more women, so there were quite a few women engineers in EP at the time. There had been a push in the 1980 timeframe to hire more women engineers, so there was an influx. Not to say that we ever became a majority.

JOHNSON: But you weren't the only one.

PIATEK: No, no.

JOHNSON: Talk about that next assignment with the Propulsion and Power Division. That was right when the [Space] Shuttle was beginning to fly at that point, in 1981.

PIATEK: Yes, yes. That was pretty exciting. I ended up in the Power Branch. I was assigned to work on the fuel cells and the cryogenic storage system. The PRSD, Power Reactant Storage and Distribution system, I think is what it stands for. I was learning that system, and I actually

worked the night shift on the second flight. That was one of the flights where the fuel cell had failed, so that mission was cut short by several days. I worked on that for a number of years.

JOHNSON: By working on the night shift, were you in the support room?

PIATEK: I was graveyard. Yes, I was in the Mission Evaluation [Control] Room, 10 p.m. to 6 a.m. shift.

JOHNSON: Were you working when they realized they had the problem?

PIATEK: No, actually I was at home asleep, and then trying to get back into the mode of working days again, because you almost skip a day because of that. I had to catch up on my sleep, and get back into work, and try to put in 40 hours. I worked the Shuttle flights from basically then, that second Shuttle mission, up through 1989. I worked the first four flights after we got back from [the Space Shuttle] *Challenger* [accident, STS-51L].

JOHNSON: Also during that time, you went back to school to get your master's degree.

PIATEK: Yes, I started the master's degree in 1980, and finished it in 1983.

JOHNSON: Did they give you time off to go class, or was this all after hours?

PIATEK: No, I did it all at night. All night classes, and a couple of Saturdays. There was one class I took on Saturdays, and most of the classes were covered by the government underneath the continuing education program, or whatever they called it. That was just something I wanted to do. I wanted to get a master's degree.

JOHNSON: As far as engineers go, is that something that most engineers have, or is it just something you personally wanted to do?

PIATEK: Well it's something I wanted to do. There's quite a number that have master's degrees, but most of them just stop at the bachelor's degree. I've even known some engineers that were lawyers, which is really weird.

JOHNSON: Maybe it's that analytical brain. It works in law as well as engineering.

PIATEK: Well, there's a lot to do with that, I think. Especially when you start reading contracts. There's a lot of that.

JOHNSON: You mentioned the *Challenger*, so let's talk about the *Challenger* accident and what your memories are around that time period. Then you, I believe after that, you went to the Program Engineering Office, but you were still there. You said you worked four missions after *Challenger*, still in that Propulsion and Power Division. Let's talk about that time period a little bit and what you remember about the accident, and what you were doing during the time that we weren't flying.

PIATEK: At the time of the accident, I was actually doing the assembly sequence, or beginning the assembly sequence things for the early Space Station Freedom. When it happened, I clearly recall, we were in Building 1 in conference room 360. Al [Allen J.] Louviere was the chair of the meeting that we were at. We didn't have the TV on at the time, because Shuttle flights at that point had sort of become routine, and we were in some intense discussions about the planning stages of that program. Someone came in and whispered into Al's ear, and he just went into dead shock. Then he announced to the rest of us what had happened. The room was full, 360's a fairly good size conference room. You could have heard a pin drop. It just went dead silent. Everybody was just in shock. After a few minutes we ended up continuing with the meeting, but I'm not so sure everybody's attention was on what was going on so much, as much as we tried.

Then after that, I was assigned to work on the electrical power distribution and control interfaces with the PRSD to re-do all FMEAs and CILs. That's Critical Items List and Failure Modes and Effects Analysis. That's what I did for the next year or so.

In fact, the funny thing about that was—Dan [Daniel M.] Germany was known as kind of a curmudgeon, to be a little bit polite, but he and I always got along really well. I never had any problem with Dan Germany. There were hoards or people going out to Downey [California] to work with all the Rockwell folks on it. For some reason, he decided that, no, he would have all the Rockwell folks come here to work with me on all the FMEAs and the CILs, which was weird. Nobody else got that—I don't know if you want to call it privilege, or circumstances, at any rate. It was a good group of people, and we worked really hard on getting that all together and presenting it to the Program Manager at the time, which was Arnie [Arnold D.] Aldrich.

JOHNSON: Do you know why you were privileged to work like that?

PIATEK: I have no idea. Dan just said, "No, I think we'll just have them all come out here." In all the years I worked at NASA, I never went out to Downey, which is weird for somebody who worked on the Shuttle and Station for so long, that I never went out to Downey. I never had to.

JOHNSON: During that time period, though, was that when you were starting your family too?

PIATEK: [My first daughter] was born in 1985. The accident happened when she was about seven months old. She was very young.

JOHNSON: Being a working, professional woman with a young child and then after *Challenger*, were your hours extended because of the accident, or were you just working normal hours?

PIATEK: No, I just basically worked normal hours. I've always been one to pretty much work eight, nine hours a day, and then go home and do that thing, and then come back and do the next eight, nine hours. I've been able to, fairly successfully, keep those two separate. That's what I've always intended to do, and I've made sure that I was able to do that. I just worked really hard. I worked eight hours when I was here, working eight hours. I didn't do the coffee club, water cooler stuff so much, or the socializing. I was hard at work, eight hours a day, so I got done what I needed to do. I planned things out so that I could get done by the deadlines that were there.

JOHNSON: You mentioned that you were also starting to work on the Space Station Freedom, some of those projects. Was that the assembly sequence team?

PIATEK: Yes.

JOHNSON: Do you want to talk about that and the systems design team during that time period?

PIATEK: It was kind of fun. We started off—let's see, Dave [David M.] Walker was the astronaut who was the lead of it. There was Keith Reiley, Dave [David J.] Homan, Dan [Daniel D.] Petersen, Phil [Phillip S.] Callen, myself, and Bill [William H.] Gerstenmaier were the core of that group that was trying to figure out how to put the Space Station together. Now originally, the Space Station Freedom was what we called "sticks and balls." Like a Tinkertoy set. There was the [William F.] Fisher and [Charles R.] Price study that came out that said, "There's no way you're ever going to be doing five space walks on a flight to put this thing together." There was a lot of study, and criticism, and what have you, of that design. I forget how exactly it happened, but we ended up in a big redesign, where we said we just can't do this, this sticks and balls design anymore. It's just going to take too much time to build. We went into the redesign, which was in January of 1990, I think.

John [W.] Aaron was Work Package Two Manager, and we sequestered ourselves. We had all the McDonnell Douglas people, and folks from other [NASA] Centers. We put together the assembly sequence. I was the one that kept track of when things were going up, and make sure we met the weight limit for the Shuttle, because we could only carry up something that was 35 to 40 feet long, and about 35 to 40,000 pounds, in order to meet the weight limits and the CG

[center of gravity] limits of the Shuttle. It seemed like every day there was a new assembly sequence. After that period in January, of course, that's when the first Iraq war happened. Then we started making jokes about Scuds [ballistic missiles], because also at that time, Bill [William B.] Lenoir [Associate Administrator for Space Flight, NASA Headquarters] came in and said, "No, there's some things that you can't do." We basically had to start over again in the middle of the whole shebang.

Once we got done with that activity, that assembly sequence that we put together stayed all the way up through the ISS [International Space Station] design came along. It didn't significantly change in that whole time. One of the fun things after that, once we got the assembly sequence settled out, one of the critical technical things was the first mission was passive. We put up the first segment and it didn't have any power or any way of controlling its attitude or anything. We had to figure out a way of capturing it with the Shuttle arm [Canadarm, Shuttle Remote Manipulator System], and then attaching it to the next segment, which then had some power and control ability.

We went into the Shuttle Engineering Simulator, the SES, and did runs and runs and runs of different ways of capturing that first element. I met a lot of astronauts coming through there at the time, so that was a lot of fun. Dan [Daniel C.] Brandenstein was the best at maneuvering the Shuttle in that simulator to capture that element. He used the least amount of fuel, and the least amount of time to get things in place. It was quite interesting. It was good times.

JOHNSON: You said that that sequence went all the way up through ISS. Then once ISS was designed and was being built, then you weren't working on that anymore?

PIATEK: No, no, I wasn't working on that anymore.

JOHNSON: Is there anything else about that time period that you can remember? Any anecdotes or during that whole working team, with the System Design Team [SDT] and the assembly team?

PIATEK: The SDT was a slightly different thing. One of the things I also had responsibility for was doing the integrated drawings for the Space Station Freedom. I had a Lockheed SEAT [Science, Engineering, Analysis, and Test] contract task order doing that. This is kind of funny. The guys who were doing the drawings—I knew the sequence so well, that I knew exactly what items were on which segment, and there were times when they would make a mistake, and I'd say, "Um, guys, that's not there yet," or "You put it in the wrong place," or something.

At one point they brought me a drawing and put it on the table, and said, "Well, where's the mistake?"

I looked at it, and I said, "Well there's one there, and there's one there, there's one there." I just had it down pat, but they were trying to catch me. I said, "No, don't think so."

JOHNSON: They were testing you, right?

PIATEK: Yes, they were testing me.

WRIGHT: Irene, what kind of tools were they using then?

PIATEK: We used Hewlett-Packard [HP] computer-aided design machines. We had some extra money on the task order, and we decided to invest it in these big machines, because we were running a program called Ideas Squared, at the time, which was an integrated drawing system and analysis tool. I mean, you could put the design in there, and then figure out what attitude it would fly at, and what have you. What was challenging about that particular assignment was Huntsville [NASA Marshall Space Flight Center, Alabama] used one CAD [Computer-Aided Design] program. Glenn Research Center [Cleveland, Ohio] used another CAD program. You had Boeing—North American Rockwell, or whatever they were called at the time, because that company's changed names so many times—used a different program. We had to translate all those CAD models before we could actually stick them into the Ideas model. That was a big deal, trying to get all that done. Eventually everybody started using the same basic programs. That was challenging.

JOHNSON: The technology was changing so rapidly during that time, and since then it's amazing what they can do.

PIATEK: Yes, but we were able to use those HP computers for, I don't know, five or six years before they finally went obsolete, which is a long time, in computer world.

I knew a lot of the Work Package Two management really well, because I've worked with those guys for years, off and on, from the Shuttle Program and what have you. One time, Elric [N.] McHenry caught me in the hallway of Building 1, and he says, "I think I've got an assignment that I want you to go off and do, and I want you to go off and fix this avionics system."

I looked at him, and said, "Elric, I really don't know much about avionics systems. What are you talking about?" The Space Station Freedom had IBM working on the system-level computers, the SDPs [Standard Data Processor]. McDonnell Douglas was working on the multiplexer, demultiplexer modules, MDMs, which are used on Space Station today. The two companies did not get along, so the whole system was broken. The MDMs couldn't talk to the SDPs. Then you had firmware controllers, which are local, small computer programs that operate valves and motors and things. That whole system, nothing was in control, because the two companies couldn't talk to each other and it was just totally broken.

There were probably 50 people from various Centers, and we all spent weeks at a time out at the McDonnell Douglas facility at Huntington Beach [California]. We created a control system so that these things would work in harmony, an overarching avionics control system. For the first few weeks I was out there, I'm going, "What are you talking about?" I eventually figured it out; we spent three months doing that. Then I spent the next year basically going every day up to the McDonnell Douglas building, up on Space Center [Boulevard], what is now Boeing. I had a little cubicle, and my own computer, and I'd work with the guys every day on finalizing how all that worked together. The fault detection isolation and recovery algorithms that are used on ISS now were developed from that SDT. We basically built the command structure in that activity.

JOHNSON: In a relatively short period of time, it sounds like.

PIATEK: Yes, oh yes. We started going out there in September, and by Christmas, we had pretty much wrapped up the bulk of it. That was a lot of travel. That was two weeks there, a few days

back here, two weeks there, a few days back here. Very intense, and we were working 70-hour weeks.

JOHNSON: This was people from all the Centers that were involved in that, so you were working with people from various Centers?

PIATEK: Yes. We even had the Canoga Park [California, Rocketdyne] guys there, and of course McDonnell Douglas, and the contractor for Huntsville. Yes, I mean everybody was out there.

JOHNSON: Were they responsive to changing and to doing this, since you said they weren't working together well before this started.

PIATEK: Oh yes. Yes. Well, the IBM and McDonnell Douglas weren't, but because this was a NASA initiative, then once we figured out how we were going to do this, we were able to give technical, contractual direction to go and do that to the various contractors. That's how that generally works. Yes, we had contractors involved because they're obviously the ones who know the nuts and bolts of things, but once NASA figured out which parts of this we were going to do and how were we doing to do it, then we can give contractual direction and fix it.

WRIGHT: Can you give us some insight how a group of engineers, with the types of expertise that you have, can sit down and start to figure out where you start to figure it out?

PIATEK: Well usually, there's a statement of what the problem is. Here the problem was there was no overarching command and control architecture. Everybody knew that. Then it was just a matter of going through it and saying, "How do we want these things to operate together? What are the potential solutions for that?" Then we got in to basically diagramming the system out, and thinking about how software would control things during different phases. Even ISS has different phases of the mission.

Once we were able to do that, then you say, "Okay, during this kind of activity, we're going to call that this kind of mode. When you're in that mode, then these kinds of things have to happen." Then you build from there. That's kind of a particular example for that thing, but that's generally how you approach it. You've got a problem. What are your potential solutions? Get everybody together and figure out what your options are, and which ones are the most feasible, given all sorts of constraints. I can get into that a little more with OBSS [Orbiter Boom Sensor System].

You think about something you've got at home, like mud under your tree. Well, you could either leave it as mud under your tree, or there's other things you could do. You could plant moss. You could build a deck around it. What are your options? It's the same kind of process, and people seem to think that engineering is magic, but it's not. You do the same kinds of things in your everyday life as you do with engineering, except you have to take into account physics, but you still have time constraints. You still have dollar constraints. You have, perhaps, aesthetics. How is it going to work with the people involved? Do you want to walk on a deck or do you want to walk on moss? Do you want to walk in mud? It's the same kind of thing. There's no magic or difference, it's just you apply it differently. You're aiming at a

different result. Otherwise, it's just the process is the same. I keep telling people that, and they look at me funny. No, it's the same. You do the same things.

WRIGHT: It's just that process has to work in space. The end result of your process has to be able to work in space.

PIATEK: Yes, so there's different constraints, but when you think about building a deck. Well, okay, so how big is the deck going to be? How much do I have available to spend? When do I want the deck to be built? Do I have the right skills to build the deck? Do I want to hire out to build the deck? Hire a contractor. I hired a contractor to do my backyard. There was no way I was doing that myself.

Those are the same kinds of constraints you have in building space stuff. What's your problem? What kind of money do I have? What are my time constraints? What are the physical parameters that I have to deal with? They're a little bit different. Obviously you have to deal with the cold or the heat. You have zero gravity. Does that affect anything at all? It's the same kind of thing, you just have different parameters that constrain you, or to work with. It's not magic.

When I got into the process stuff later on, it was like, "Well, it's the process, it's magic." Guys, brushing your teeth is a process. I mean really, you think about it. "Well how are we going to train people?" You teach your kids how to brush your teeth, don't you?

JOHNSON: Break it down into steps.

PIATEK: Bingo.

JOHNSON: You were in the systems engineering office until ’99?

PIATEK: I think 1994 is when they reorganized again.

JOHNSON: Were you working with Station that whole time, as far as did you work anything with Shuttle-Mir, or any of those different programs?

PIATEK: No, I wasn’t really involved in the Shuttle-Mir activities. I did do some lunar studies with some other branches in there, but I became Deputy Branch Chief during that time, in that division. That’s also when we did the assembly and operations engineering assessment, which was after we did the Space Station Freedom assembly sequence, then it was the next layer down, of filling in the blanks. Now we’ve got these big chunks of things that are going to go up into the Shuttle. How are we going to connect them together? What kind of EVAs [extravehicular activities] is it going to take? What kind of flight attitudes are we going to have? All that stuff.

That’s where I really got to work with Bill Gerstenmaier, because he was in the MOD [Mission Operations Directorate] at the time. I was the engineering head of that study, and he was the MOD head. We worked together and put together that assessment, again, that next layer down of the engineering and operations associated with that assembly sequence.

JOHNSON: How long were you doing that?

PIATEK: That was at least six to eight months. It may have been longer. We did publish a document on it, so that was fun. That's basically when we did the whole thing at the SES with the astronauts and trying to make sure we could smack these things together and make them stick. There were times when they would bounce off, and you're just like, "Well, I guess we can't do that."

JOHNSON: A little trial and error.

PIATEK: Yes. Well one of the big concerns was if you did grab it and bring it down, would it bounce off and go skittering off into some weird direction? Did we have to have a pyrotechnic release just in case something went wrong? We found that we didn't have to do any of that. It was actually a quite successful assessment.

JOHNSON: Like you said, you were Deputy Branch Chief of the Systems and Engineering and Integration. You moved into manager for the Station Engineering Office after that, according to your resume.

PIATEK: Yes, yes. There was stuff in between there.

JOHNSON: What was happening in between that time, or were there other projects you were working on?

PIATEK: That's when we first went into EA4 [Space Shuttle/Space Station Engineering Integration Office]. John Aaron was the manager. I started working, actually, the Joint Integrated schedule. Somebody figured out that we've got this Space Station thing, and we've got this Shuttle thing, and they depend on each other, so maybe we ought to put together a group so that the schedules mesh up. That's when I got heavily involved in working schedules.

John [C.] Coggeshall, he worked for the Shuttle Program at the time. He's a wizard at doing schedules. The man was brilliant with working out flight schedules. I did that for about a year and a half, I think. Not that I enjoyed it all the time, because that's not where my talents lie, but it was a good learning experience, and it really helped me later on in my career to know that schedules really worked, and they weren't something that was just boring that somebody put up on a screen. They really are important.

JOHNSON: What was the process for determining those schedules, or any details on what you were doing during that time?

PIATEK: Well, you know, of course the Space Station was going through the development phase. Development is a rocky phase to be in, because you never know what's going to happen, and when things get delayed. It was a matter of saying, "Okay, well this is our boilerplate. Our draft." Then the Shuttle would have problems, the Station would have problems. We'd get together once a week and discuss where things were slipping to or getting ahead of things, and we would put together, "Okay, so we think on this date, we're going to get a Shuttle flight and a Space Station piece ready at the same time."

Then, of course, that would be presented to management and they would have to sign off on it. It was the technical guys sitting down together and going, "Well, you know, the Space Station's running behind by a couple months because of x, y, z. We're not going to be able to make that flight, so what can we do in the meantime?" Shuttle was launching other things, too, in the beginning. They weren't just doing Space Station flights, so it was a matter of juggling things and pushing things around.

JOHNSON: I can imagine that was almost sometimes changing hour to hour, as far as the way things were falling into place.

PIATEK: It wasn't that rapid. Thank goodness.

JOHNSON: It seems there were a lot of things happening during that time period. Was that when you were working also on the Shuttle wireless video system?

PIATEK: That's when I started the wireless video.

JOHNSON: Do you want to talk about that? This was sort of revolutionary as far as freeing their hands up to do more.

PIATEK: Well it was not that in it's entirety, either. When you think about before they had the wireless video, the only way they had to communicate from the EVA person to the ground or inside the Shuttle was with voice. Trying to describe things that happened just with words was

difficult. It took a lot of extra time, because you had to be able to describe it adequately. Then the people had to visualize, or use drawings, or pictures, or something of what they were trying to talk about. Of course, if you had something that went wrong, trying to describe what went wrong, when you have a drawing that only shows what's supposed to be right. It's incredibly difficult.

The wireless video came along, and actually my turn at it was the second time around. The engineering directorate had tried to build one before, and it didn't quite work because the divisions didn't get along so well, and there was nobody in charge. I know my finger quotes aren't going to show up on the tape. Then when John Aaron took it over, he said, "Look. We're going to do it this particular way. EA4 is going to be in charge. We're going to have the project manager. The other divisions, mainly the Crew and Thermal Systems Division, and the Avionics Systems Division will support."

This really pissed off the other divisions. In fact, Walt [Walter W.] Guy, when we did the presentation to Leonard [S.] Nicholson, flat-out said—he was the Robotics Division Chief at the time, and Will [Wilbert E.] Ellis was then-Division Chief of EC [Crew and Thermal Systems Division]. Walt practically charged across the table and said to Will, "Why in the hell did you let him do this to you?" They didn't have any control of the money. The money all went through EA4, and I gave it directly to the contractor or to whomever needed the money to be able to do the job. Walt Guy is a bit of a control freak. He was one of the ones that basically caused the first round to fail, because they couldn't figure out how to structure it such that they could get the job done. Once it became centralized, under one entity and there was only one person divvying out money, then we were able to be successful.

It's always a bit of a nail biter when you fly something the first time. When the guys on the ground saw the pictures, they were just dumbstruck. EVAs, since then, have become so much easier, because now all the EVA crew has to say is, "I am showing you what is wrong. Can you see that the bolt is out of position or that I've made too many turns on the wrench or the torque wrench." Whatever's going on, you can see it. In fact, on that flight—we flew on the Space Station [Assembly Mission] 4A, which is when we deployed the solar arrays for the first time. I don't remember the STS mission number.

JOHNSON: I think it was STS-97.

PIATEK: Okay. The solar arrays, one of them didn't want to deploy correctly. That was the first time we used the wireless video system. It really helped. They were able to figure out, using visuals—actual camera shots—what was going on, and to be able to resolve the problem and get the solar array deployed. Since then, it's just been wonderful. The ground people, and the astronauts, and everybody just love using it. It was a fun project.

JOHNSON: Yes, and now thinking about it, that was only 15 years ago. It just seems like we've always had that ability.

PIATEK: Yes, and the really wonderful thing about it, if you will, is that the Space Station folks didn't want to put the system on the Space Station. One of the knockdown drag-outs I had was with the manifesting people in the ISS Program office. They said, "Well your system's a Crit 3, that means it's not needed."

I'm going, "Whoa. Time out. Criticality 3 means that if it fails, you don't stop doing what you're doing. It doesn't mean that it's not needed." I said, "I will go all the way to your program manager. I'm going to drag you with me, and you're going to tell him why he just spent $15 million on a system that you're not going to fly." That changed their minds a little bit. Oh, I was pissed. I was so angry.

JOHNSON: Well especially because it was so successful. Why wouldn't they want to use it?

PIATEK: Manifesting is a hard thing to do, and the Space Station component is not a small piece of equipment. The piece that goes outside on the truss is roughly two feet tall with the antenna on top of it and 18 inches in diameter. It weighs 120 pounds. It's not a small piece of equipment, and trying to find space, when you have limited manifest capabilities is difficult. Now, I could appreciate that, but to say they're just not going to manifest it at all is just dumb.

JOHNSON: That piece, is that to get the signal from the helmet?

PIATEK: Yes, that gets the signal from the helmet into the video system on the Space Station. Even though it's called wireless, there's still a lot of wires associated with it.

JOHNSON: There's a lot of equipment there.

PIATEK: We were working with the Rockwell Downey people on putting the antennas on the Shuttle sill, and there were seven of them on the sill. There was one on the back, and then there

were six, three on each side. It's a highly integrated system, no matter which vehicle it's on. One of the Rockwell guys made the comment one time, he says, "You know, for a wireless system, this has an awful lot of cable." You had to run wires from all the antennas to the transceiver box underneath the payload bay liner so that this thing would work. The only wireless bit is from the antennas to the EVA crew. Everything else is all wired up.

JOHNSON: Something has to receive those signals, and then it has to go somewhere.

PIATEK: They have to go somewhere.

JOHNSON: It is controlled from inside the Shuttle or the ISS.

PIATEK: Yes. The EVA crew, the only control they have is the on/off button. Every now and again, they would bump the helmet and turn it off. The guys then go, "Um, uh, we're not getting any signal. Could you push your helmet button?" You will hear that every now and again. They had just accidentally bumped into it and turned it off.

JOHNSON: How many people were working on that team, to work on that?

PIATEK: Oh, let's see. We had, probably off and on, somewhere between 70 to 100. The main components actually came out of the racecar system. There was a company in Baltimore, Maryland—Broadcast Sports—and they built this system, but to run on NASCAR cars, so they could have video of what the race was like from inside the car. We adapted that for space. It

actually came out of the sports world. It was owned at the time by a Canadian company, and they were just as pleased as punch that they had hardware flying in space. That was a big deal to them. From a PR perspective, they really cashed in on that.

WRIGHT: Did NASA approach the company, do you know?

PIATEK: Actually I think when we wrote the request for proposal for the task order for Lockheed, I think they were the ones that found them. We basically took their hardware and made it suitable for working in a vacuum and the high and cold temperatures of space.

JOHNSON: That's interesting. It's that behind-the-scenes stuff you don't always know about what happens up there.

PIATEK: When we were building the Space Station version, we were having trouble getting some components. I talked to our Lockheed project manager. I said, "Carol, where are these components?" She went back to her procurement office, tried to [find out from them where the components were]. They were getting to be a long pole in the tent. We needed to get them in so that we could keep building the system. They found out, "Well, they're on a slow boat from China." They really were. They were coming from China, and it was on a freighter somewhere, in between there and California, wherever they were supposed to be received. That can happen.

Another time we sent back a transceiver to Broadcast Sports in Baltimore, Maryland. It was sent by one of the overnight carriers. I won't tell you which one. It ended up in like, Baluchistan. We're going, "Um, uh, you need to get that back to the United States."

JOHNSON: Quickly.

PIATEK: "Yes, really, how are you going to get it through Russian customs? I don't want to know. Just get it back." Yes, that was weird.

WRIGHT: Were you there when the first picture started coming through?

PIATEK: Oh yes, yes. We actually had one of the backrooms in Building 30. They had set up so we could monitor what was going on. On that particular mission, we did have a failure of one of the helmet cameras. It turns out that there was a component in the helmet piece that needed a particular kind of electronic protection. It needed a diode in it, and we didn't put that in there. We had to go back in and rework those.

WRIGHT: It had to be pretty rewarding, to be able to get that kind of a view.

PIATEK: Yes, oh yes. It's just like, "It's working." It had its technical tribulations, too, because the voice communication from the space suit back to the vehicle used a particular set of frequencies. It had a frequency band that was set aside for it. The way that they designed that system basically consumed that whole frequency band, so we couldn't use it. We had to go through the National Telecommunications Information [Administration], NTIA, and the international frequency system to figure out how we were going to make the system work.

We picked a particular UHF frequency. I think it was 401. The military came in and said, "No, you can't use that. There's this FCC [Federal Communications Commission] thing, you can't use that." Blah, blah, blah, blah, blah. We had to work a deal where we said, "Okay. The first version of this—since none of those systems are coming online for a couple years—we'll do the 400 frequency for that long, but then give us time to change it to what is known as a spread spectrum, where it jumps around in frequency." We basically then worked between 401 and 402, or whatever the technical details were, so that we didn't stay at any one particular frequency for very long. We skipped around within a very narrow band, so we wouldn't interfere with all these other things.

That took a good six to eight months of negotiation. Cathy [Catherine C.] Sham, here at JSC, was critical, because she's the frequency manager for that. That was a bit of a challenge, because once we heard that we couldn't use that frequency, we're going, "What? Now what are we going to do?" Again, you know what, there's the problem. Now what are you going to do?

WRIGHT: It seems like there should be so many, but they're all locked down.

PIATEK: There aren't. The UHF band is particularly, and the S band is getting to be the same way. It's particularly crowded. You really have to figure out how to get what you want, or change your design, like we ended up having to do, so we wouldn't interfere with these other satellites and systems.

JOHNSON: That's the way it still works? It just bounces around?

PIATEK: That's the way it still works. In fact, the Space Station—we flew that, in what? 2002? I think the first one went up? It's still flying today. We have, knock wood, not had any failures.

JOHNSON: Has the system changed since then?

PIATEK: Nope. Still the same system.

JOHNSON: It's durable. That says a lot, considering that was thirteen years ago.

PIATEK: It's still working. Although the first time we flew it—this is a funny story. Although at the time, you wanted to tear your hair out. We worked very closely with MOD on making sure they understand how the system worked. Obviously the operators have to know how to use it. We also worked very closely with the astronauts as well. The first time we flew it on Space Station, it appeared to not work. We got the data down, and we were analyzing it. I'm looking at it, and I'm the project manager. I don't know all the technical details of this thing, but I know how it's supposed to work. I looked at the data, and I said, "You know, it almost looks like the system was working, but the operators didn't do something right."

It turns out, there was something they tried to do that they didn't tell us. The iris opening of the cameras are basically manually controlled from the control box inside, from the computer. We have a graphical user interface. It's a program that they call up and use. What they were trying to do on the Space Station was automatically open and close that iris when you transition from daylight to dark or dark to daylight. They would send a stream of "open, open, open, open, open" commands, or "close, close, close, close, close" commands, and it turned out they were

filling up the buffer on the transceiver. It couldn't react to all those "open, open, open, open, open" commands, so it appeared like it didn't work. The next time they went out in EVA and didn't do that, it worked fine.

We actually set up a test on the ground. We had at the Boeing facility, a transceiver. The big hexagonal box. We wired it in through Building 44 to the Mission Control Center, and we ran the system close-loop. It worked fine, as long as they didn't do that "open, open, open." Some of the Boeing guys are just, "See? Your system just doesn't work." I'm just like, "I think it works fine." It did. It worked fine.

JOHNSON: If you use it right, it works great.

PIATEK: If you use it right, it worked great. It's still working great today. I wouldn't call that a failure. There wasn't obviously enough communication between what the operators were going to do with it. They just didn't bother telling us, "Oh, we're going to keep trying to open the iris, or close the iris." It turns out that the camera system has an automatic gain control, so it automatically compensates for light to darkness things anyway. I don't think those open and close iris commands have been used very much at all, now that we understand how the system works.

JOHNSON: How the camera itself works.

PIATEK: How the camera itself works, yes. It's a Sony camera. It's a little bitty thing. It's only about three or four inches long, and half-inch in diameter, maybe? It uses a CCD [charge-coupled device].

JOHNSON: Is it the same camera, or is one of them still, and the other one video?

PIATEK: No, it's all video. It's all video. You could take a still from it, but it's real-time video. It's not HD [high definition] or anything like that. I don't know if they'll ever convert to doing something like that, but obviously they use it every time they go out. In fact, they even adapted it for use on the Russian space suit, and the Russian space suit doesn't look anything like the American space suit, but they've adapted it. I don't know how they put it on their helmet, whether they zip-tie it down, or something. It's kludged. The Russians conducted a space walk the other day, and you can see the wireless video system sitting on their helmet. They figured out how to stick it on there, and how to power it.

WRIGHT: Share it with the neighbors?

PIATEK: Yes.

JOHNSON: I saw it described in an article that it was a "situational awareness tool." I thought that was pretty interesting, that that's what it's for.

PIATEK: It is, because if it failed during EVA, they're not going to stop the EVA. It's just going to make it harder for them because now they can't see what's going on, especially if something goes wrong. On Space Station when they had to fold up the arrays in order to move that piece of truss, they could see what was going on, and why it wasn't working. They could watch the astronaut as he was way out on the end of the arm, trying to—I think they didn't zip-tie it together, so it wouldn't fold up again. Yes, it's been a remarkable system.

JOHNSON: An interesting project to get a chance to work on, too.

PIATEK: It was a lot of fun. I really enjoyed working with the people on it. That's one of the best things about working on projects like that. You work with folks—pretty intensely—for several years at a time. Then to see the fruition of what you've done. Flying is really very satisfying.

JOHNSON: It sounds like throughout your career, you were doing the same type of engineering, but like you said, you didn't know anything about avionics. Then you had to do that. You were learning things in the moment as you were working on these different teams.

Is the environment pretty conducive to that? You became a manager in the '90s. Did they send you to training to help you learn management skills, or because you're an engineer, you're supposed to be able to do management? I've heard that that doesn't necessarily work all the time.

PIATEK: Can I say it as a sarcastic laugh? No. Just because you're an engineer does not mean you can manage your way out of a paper bag.

JOHNSON: I've heard other people say that, but I just wanted to throw that out there.

PIATEK: No, there have been some really brilliant engineers, just fantastic engineers, but as managers, they just fail miserably. I won't name any names, but I've worked for some of them. They are fantastic. They can scribble equations from here and back again, but can they manage anything? No, I'm sorry to say.

Once you get selected for a management position, there's a mandatory set of training classes you have to have, so you go through all of that. In fact, when you're first selected, you're on a probation period. Not every engineer can be a manager. Not every engineer can be a project manager, either. Some of them are really good at project engineering. They're really good engineers, but then put them into a project management position where you have to keep track of schedules, and budgets, and all the icky things. I don't know if you want to call it that.

JOHNSON: Details.

PIATEK: They're necessary. They're very different from tinkering in the lab. If you can't do those things, then you can't be project manager. You have to be able to delegate, work with people, understand what they're doing. You don't have to know all the nitty gritty details as a project manger, but you have to understand how the system is supposed to work.

WRIGHT: I guess you have to accept that, too. You don't have to know all those details. I guess, sometimes it's hard, especially for someone who's worked in details, like an engineer, who has their hand on all the pieces of it, to back off and let somebody else do it.

PIATEK: I think it takes a certain personality type, or you have to be able to learn to work that way, and that's harder to do than having it innate.

JOHNSON: Do you enjoy project management?

PIATEK: Oh, I loved it. Most fun I've ever had working at NASA's been being a project manager. It's just a lot of fun.

JOHNSON: In that time period after that one, I guess it was around 2002, 2003. You were on a rotational position?

PIATEK: Yes, I spent a year over in the Space Station Program Office in OB [Vehicle Office].

JOHNSON: What were you doing over there?

PIATEK: I actually was doing risk management with the very first iteration of the IRMA risk management system. The Integrated Risk Management Application. Space Station had developed it to start figuring out how to manage risk, and I was in charge of getting the system

managers to input the risks, and all the details about the risk, and getting presented in front of the Space Station program manager.

It was a big, huge learning curve, because people were not used to that kind of structured approach to risk management, and felt it was somewhat frivolous, and not important, and why am I doing this? I can't say I didn't have the same opinion at the time, but once you go through the rationale behind things, it helps you think about where do I spend my resources—whether it's time, money, or people—relative to the problem at hand? Is this going to be a problem that's going to cause me severe heartburn down the road?

For years, the biggest Space Station risk had to do with working with the Russians. In fact, for all I know, that's still the biggest Space Station risk. The mitigation of it is day to day as to how we deal with it. Then there's the ones that, yes, we think that could happen, but it doesn't have a big impact. Or this is kind of moderate, if I just throw a little money in solving this particular part of the problem, then my chances of being successful go way up. It's a very structured approach to understanding where the problems might lie. That's what was I was doing for that year in OB.

JOHNSON: And identifying those risks.

PIATEK: Yes. Helping people understand how to use the system.

JOHNSON: Where did the identification of the risks come from? Was that a team approach?

PIATEK: At the time we were focusing on the system managers, so we were looking to them to understand, from their team, their system. The one that cropped up at the time, in particular, that I remember, is we were having problems with the water system on Space Station. There was something going on with the water system that it wasn't working right. That was a pretty big risk that they had to spend money and resources, otherwise the water system wasn't going to be working right. The filters were getting clogged up, and all sorts of bad things were happening. That was one of the things we looked at at the time.

Part of the risk management system is that once you identify the problem, then you can put together a series of solutions and a plan to attack the problem and get it resolved. Now, if you can't get it resolved all the way, then you have what's called a residual risk, so there's a remaining—I don't know exactly—but at least you can get it to the point where you can manage that remaining unknown. It's a useful way of thinking about things.

JOHNSON: When you moved into that position, and when you do move around—like you say, it was a rotational position—is that something that they're moving people into different positions to get a feel of something different, or was it because of your work history that they wanted you to do that in particular?

PIATEK: Actually, I requested it. I said, "Well let me go off and do something different for a while." For me, if I work on a project or something for two to three years, I get bored at the end of it. This is a personal thing. I'm really good at the project management. Once it starts going into operations, I lose interest. I'm gone. I have to do something else, because I'm not going to

sit behind a console and watch it work. There's other people that do that. That's not my thing. I need to be in the nitty-gritty of building it or watching it happen.

Right after that was [the Space Shuttle] *Columbia* [accident, STS-107].

JOHNSON: Let's talk about that accident, and then the OBSS that you went to after that.

PIATEK: Yes. Well, *Columbia* was February 1st of 2003. I was still in OB at the time, and that particular day, I was with my youngest daughter at a band competition. She was playing clarinet, and we were at League City Intermediate. A gal that I knew, who was also there with her child for the same event, came up to me, and she goes, "Did you just hear that *Columbia* just crashed?" I said, "Oh no, not again." As soon as I could find a computer, I watched what happened, and went, "Oh, crikey."

I finished out my time in OB, but I went back to my management in EA, and said, "I want to come back here and do Return to Flight." Everybody wanted to. With both accidents, there was palpable sadness, determination. The whole Center, you could just feel the atmosphere was different after those accidents than during normal operations. It's a very strange, strange feeling to have gone through that. Everybody wants to then be part of getting back to flying. That becomes your focus. We're going to go through the mourning.

That's maybe what I'm getting at. There was a whole sense of mourning with everybody who works here when those two things happened. Then there gets to be a mindset of, "We're going to fly again, and we're going to do everything within our power to go off and do that."

I went back to my management, and I said, "Okay, well this is fun over in OB, but this is where I belong. After that summer, when they had done the CAIB [*Columbia* Accident

Investigation Board] and then some preliminary studies as to what was possible relative to finding out if you had been hit with some kind of debris, I came back over that August, and picked up August of 2003 with OBSS.

JOHNSON: Talk about that project.

PIATEK: That project was structured a little bit differently in that the Orbiter Office wanted to have the official project manager in their office. I wasn't the project manager, but I was the Chief Systems Engineer. I didn't have to deal with budgets and schedules directly, but I dealt with everything else. Anything technical, anything with integration. I dealt with contractors on a daily basis. All of the other things that you would think somebody would have to do, I just didn't directly deal with the contracts that Orbiter Project Office had with, I guess, it was Boeing by that time, that aspect of it.

By the time I came in, we had a potential solution with putting the boom on the end of the arm. We didn't know exactly what it was going to look like. There's so many things to talk about. I actually wrote a technical paper on it. The goal was to get back to flying in six months, but once you really understood the technical aspects of things, that schedule was laughable. However, it drove us to do and make decisions along certain lines that if we had had a known schedule—the amount of time we had to do the project was basically unknown. It started out with six months, then people would come in and say, "Well, we can't do that in that time." Then it would stretch out another six months. Then it'd be another six months.

We never exactly knew that we had 18 months, or two years, or three years, or whatever, just "as fast as you can," which drives you to make certain kinds of decisions that might not be

optimal technically. The boom that we ended up using were basically parts of a spare Shuttle arm that were on hand. The contractor in Canada had them sitting in a warehouse. They're available. Would the optical, technical solution perhaps have been building a triangular truss kind of boom instead? Perhaps. We did some preliminary work on that, but because of the time expediency, we went with what was on hand. Was it the best technical solution? We don't know. You were driven to do things expediently, but not necessarily the best technically.

My little group was doing the integrated schedule. Again, schedules became very important, because we had the Canadians involved in it—MDA [MacDonald, Dettwiler and Associates Ltd.]. We had, of course, the Boeing guys with the Shuttle vehicle. We had Sandia National Labs providing one of the laser camera systems. We had another Canadian company, Neptec [Design Group], providing the other one. Then there was another group that was tagging along a little bit later that actually put an HD camera on the system. There were five or six big, different entities involved in this thing.

Again, you had the Sandia National Labs guys, who were not used to working with a schedule. They just tinker around in the lab until something works, and go, "Oh, well look at that. That's fantastic."

"Well, but guys, you need to make it fantastic in eight months, not two years from now." Trying to get a research outfit used to working to a particular schedule, it was interesting. Then again, we had the Canadians, and of course KSC [NASA Kennedy Space Center, Florida] played a big role, because they had to fit this work into the schedules and put it on to the vehicles. We had to change wiring out because the wiring wasn't adequate. The signal degraded too much. All kinds of technical issues associated with that thing.

The miracle of the whole thing is that we kicked off basically on October 1st of 2003 with the first SRR, System Requirements Review. We had written the requirements document in September. One of my engineering guys said, "You can't have an SRR in less than a month." I said, "Watch me." That was basically the kickoff for the whole thing, was we just call it October 1st of 2003. We flew less than two years later, in July of 2005. We were signing paperwork on Saturday, three days before we flew. Signing off the final certification paperwork on that thing, but we did it.

There were hundreds and hundreds of people involved. I don't know how many people the Canadians had working on the boom systems, how many hundreds of people Rockwell or Boeing had working on it, but there were hundreds of people all across the country working on making that thing fly. There were lots of technical challenges. I was talking about wiring and signal degradation. You've got this 50-foot arm. Then you've got another 50-foot boom on it. You start out with a 28-volt system, and its direct current, and once you get 100 feet of that thing you can drop down to as low as 21 or 22 volts. Not enough voltage to run anything out the end of the arm, so we had to figure out a way of boosting that voltage, or an alternate design concept, or something, and we found a way to do it.

We couldn't change the wiring in the arm, so we were stuck with it, and there are little, tiny wires in that arm that we were trying to use. We ended up with a hybrid system. We were able to use some AC [alternating current] off of the Shuttle to Station power converter system. We were able to tap into that and power one to the camera systems off of it, and then use all the voltage for the other system, DC [direct current].

We came up with all kinds of compromises. One of the last issues that just totally flabbergasted us is that we were down at the Cape [Canaveral, Florida], we've got the boom on

the other side of the Shuttle, then there's this Ku-band antenna that's sitting there, up in front of the Shuttle. We're going, "Um, we think we have an interference. How are we going to get the boom out without smacking into the antenna?" Oh, dear.

JOHNSON: It's the little things.

PIATEK: Little things, yes. We worked around it. We had an operational workaround. We managed, but that was one of those last minute "oh no" kinds of things. That was very challenging, both technically and managerially. There were all kinds of issues like the mounts that hold the boom down. The boom is very stiff. It's like a pencil. It has no flexibility whatsoever, because there's no joints in it. The little mechanisms that hold it down on the sill were built to accommodate an arm, which has some flex to it because it has joints in it. Well, if under certain loading conditions, if things went wrong, you could break those mechanisms. That was one of the risks that we had to figure out. How can we use this thing and not break those little mechanisms on there that hold this thing down and it doesn't become a giant pencil shooting through the aft window of the Shuttle cockpit? That would be a bad day.

JOHNSON: That's a risk.

PIATEK: That's a risk. That was one of the big ones that we had to overcome, and figure out, and analyze the heck out of it.

JOHNSON: I could imagine that was a big sigh of relief, though, once it flew.

PIATEK: The other interesting thing about that project was, the entire time we were developing it, we didn't know exactly what size hole we had to be able to see. They were still doing the testing out at Southwest Research Labs in San Antonio. We put in the requirements document we had to be able to see a quarter-inch hole, which is fairly good size. The entire time we're doing this, we're getting feedback from the guys doing the analysis going, "It's going to have to be, maybe, a hundredth of an inch hole, or two-hundredths of an inch hole," or whatever. We're going, "The camera systems, eh. Are we going to be able to do this or not?"

We did a bunch of engineering tests, and we couldn't certify it to less than a quarter of an inch, because we didn't know until a month before the flight that they had a definitive answer that it had to be two-hundredths of an inch. We did a bunch of engineering tests, to say we're pretty sure we can see this size of a hole. So we flew with an engineering evaluation, and when we used it for the first time on the Shuttle, everybody was just shocked at how well it worked. We would have been able to see a much smaller hole than what we were supposed to have been able to see. Fortunately we never saw any holes—yay. That was walking a tightrope, and saying, "We don't know what size hole we're going to be able to see, but we're going to keep building anyway." It was a mad race to the finish.

JOHNSON: It's the whole project. You didn't know how much time you were going to have. You didn't know, really, what you had to be able to see or what you had to be able to accomplish, then you have all these risks and everything. I can imagine that that was a nail biter for a couple of years there.

PIATEK: While you're going through it, you don't directly think of it that way, because you're just trying to get it done. We knew those things happened, and obviously we were very cognizant of that whole thing. It's just that we've got to get it done. People, under those kinds of circumstances, given the fact that it was because of the *Columbia* vehicle accident, people pulled together. It's amazing what can happen under those circumstances. Everybody. Again, you talk about the group that we were dealing with from coast to coast, and north to south, and internationals, and everything else. We had differences of opinion, occasionally, and some people would get a little stuck in the mud on some things, but everybody still understood that the goal is to get this thing on the vehicle and flying again. That really can help you work through team kinds of problems like that. They're not always easy.

Some of the folks would get really very stuck on some things. "We have to do it his way, because of x, y, and z." You're just like, "No, guys. We want you to expand things a little bit." They would let things that were not technical get in the way of progress sometimes. Now, they ended up performing very well. They did, actually, meet or exceed their scheduled deadlines in a lot of cases, but the process of getting there sometimes was a little bit [difficult]. "Just please, get past this issue. We know you can do it." They did.

JOHNSON: As you said, you were managing people from all over.

PIATEK: Yes, and you know, personalities. Sometimes you get a little prickly, and the stress sometimes will cause them to break a little bit. It all worked out. It was probably one of the best projects I ever worked on, because of the immense challenges associated with it, and the fact that we were able to overcome all of them, and the system worked fantastic. I've kept telling my

management that, "Okay. This is going to take about two years. Once it's done, I'm going to be looking for something else, so you'd better be looking around." I don't think they really believed me.

JOHNSON: What happened once it flew and you were looking around?

PIATEK: Well, I spent the month or so, twiddling my thumbs, in a way. That's when I wrote the history of the Orbiter Boom Sensor System. That's an SP document. You should be able to find it. Then a guy who I worked with on the wireless video system from the Orbiter Project Office had transitioned over to the Orion activity. He was on the proposal evaluation team. In fact, two of them approached me, and said, "How would you like to come work GFE [Government Furnished Equipment] in the Orion Project area?"

I said, "Well, hmm, that sounds interesting. Let's go to talk to Brian [L.] Anderson."

They said, "Let's go talk to Brian." I went and talked to Brian, and we decided that that might be a good thing, that he would like me to be on his team, and so off I went. Sometimes things happen.

JOHNSON: Explain what that was going to entail, or what you were moving into.

PIATEK: The Orion, at that time, had a pretty significant chunk of advance development work going on that was not going to be from the prime contractors. There was also some pretty significant Government Furnished Equipment activities, the parachute system being the biggest

one. They wanted to have someone come in and manage those advance development activities, and any of the other GFE, and so that's what I was being hired to do.

JOHNSON: That was during the same time period of when [President George W.] Bush announced the Vision for Space Exploration, and the CEV [Crew Exploration Vehicle]. That office actually reorged, or it became the Crew Module Office?

PIATEK: Yes. Once Skip came in—Skip [Caris A.] Hatfield came in—he reorganized and then he offered me the Crew Module Office job. I said, "Are you sure?" Not in quite those words, but yes.

JOHNSON: Do you want to talk more about what you were doing during that time period in that office?

PIATEK: There were four big advance developments at the time. One of them was actually a LOX [liquid oxygen]/methane engine. The other one was the Thermal Protection System [TPS]—the heat shield. There were the parachutes, which was the GFE. Then there was the land landing system. [NASA] Ames [Research Center, Moffett Field, California] had the TPS study. Johnson had, obviously, the parachutes. Glenn Research Center, up until the time that it was cancelled, was leading the advanced LOX/methane engine studies. Then [NASA] Langley [Research Center, Hampton, Virginia] was doing the land landing system.

We were trying to find new materials for the heat shield. What made that challenging was that both Lockheed and Boeing, who were bidding on the development of the capsule, also

had advance development materials. I spent most of my Tuesday afternoons, for about a year and a half, talking to lawyers, procurement officials, contracting officers, and technical people trying to work through conflict of interest issues relative to how we can get the best material for the heat shield.

JOHNSON: That's kind of a different aspect of your engineering job that you didn't think you would be doing.

PIATEK: Yes. I had never thought I'd talk to lawyers as much in my life as I did during that year and a half. Now, they're really great guys. There was no particular issue with them from a knowledge or personality standpoint, but just like, really? Lawyers?

We were able to work through all of that, and the interesting thing that they used on the original Apollo, AVCOAT [ablative heat shield material], initially failed the tests that we did in the heat testing facilities, the Arc-Jet [Atmospheric Reentry Materials and Structures Evaluation Facility], mainly because one of the components that was used in developing it originally no longer can be used because of EPA [Environmental Protection Agency] regulations. They tried to use the original formula, but had to change this one component, and it just disintegrated under the Arc-Jet conditions. They were able to fix it, and now that's what's being used on CEV, although it's a very labor intensive process, and we didn't really necessarily want to use it. That was the backup.

It's a liquid slurry, and it has to be hand-injected into these hexagonal cells like a honeycomb. You have to make sure there's no bubbles in it, or whatever. It's just very, very

labor intensive and very expensive. That's where that one ended up. That was about three years of development.

The land landing systems, we were looking at skids, airbags. The most promising, actually, were the airbags. Once we went away from landing on land, that project came to an end. That was interesting. Some of the land landing requirements were kind of absurd. No, really, you had to be able to withstand landing on a large animal, like a cow or a deer. You had to be able to withstand landing on a 12-inch high rock. Landing on a tree. It's just like, "What? You're absurd." There was a little short film clip that one of the Boeing guys had put together, where it was just a cartoon kind of dealing with the CEV landing, and then hitting a cow, and actually the cow became barbeque, because when you come in, it's warm. You're just bouncing around—they did all sorts of funny things with it. Yeah, engineers can have fun. My kids would always go, "Mom, you don't have any fun at work, do you?" Au contraire, let me tell you about the cow. A lot of engineers have really good senses of humor.

WRIGHT: Did you look at the studies that the Russians had done, or the land landings that they had?

PIATEK: The rockets? Yes, we had that as part of the study as well. Retrorockets. The Russians have—part of their engineering process is to over-design. They make things really very sturdy, and end up being very heavy as a result, because they don't optimize the way our engineering culture as evolved. Their systems are generally—and I'm speaking broadly here—can generally be simple, and not complicated, but being very heavy as a result. Whereas we tend to optimize things for weight because we want to put up as much as we can, so we tend to make things very

lightweight, which can also include a lot of complexity. Things like retrorockets can be very complex in our engineering culture. We looked at them, but not for very long because of the complexity, and the system actually ends up weighing more, because you have to have propellant then, and have to have tanks, and have valves, and plumbing. It adds up very quickly. The simpler is usually lighter, if you're worried about weight.

JOHNSON: What about the parachute assembly system? That was one of those four that you were talking about.

PIATEK: Yes. The parachutes have been used on the test flights that we've had already. The PA-1 test that happened out at White Sands [Test Facility, New Mexico] and the first one that they launched out of Kennedy a couple years ago. Those were the parachutes that we developed here at JSC, with parachute companies out in California. They do a lot of test flights on the parachute systems out at Yuma [U.S. Army Yuma Proving Ground, Arizona], so we have a contract with the military to use their bases and airplanes to throw the sleds out the backs of the airplanes and watch the parachutes go out. It's really very neat.

WRIGHT: Have you been out there for the testing then?

PIATEK: No, I was never able to go out there for the testing. I've only seen the videos of it.

JOHNSON: Was there anything else during that? I think we talked about three of them. What was the fourth one you mentioned?

PIATEK: The fourth one the LOX/methane. That ended up getting cancelled in January of 2006, shortly after we started, because of budget issues. [NASA] Headquarters [Washington, DC] decided that they didn't want to spend money on that aspect of things, which was a huge disappointment to a lot of people. That's, unfortunately, the business of this side of space. We don't spend money in space. We spend money on Earth. There's no Walmart on the Moon yet.

JOHNSON: No, not yet.

PIATEK: They might be able to figure it out. Elon Musk is working on it really hard. One of the interesting things about when we were doing the crew module, was—obviously that was after *Columbia*—and they had done a medical study of what happened to the crew. That is highly sensitive information, and only a limited amount of people have been able to see the results of that report. I was able to see the results of that report, only to help us understand how we could make it safer for the crew. I was also the manager of the crew module. Obviously I had responsibility for everything that goes inside the capsule, which one of things was the seats. I had to understand, as the manager of that, what happened during *Columbia* and what could be done to mitigate what happened to the crew in case of an accident. That was very emotionally taxing, to understand truly what happened to those people when *Columbia* disintegrated. It was very sad.

When we were taking a break, we talked about NASCAR some. NASCAR also has what's called the head and neck system, where they have a way of attaching the helmet to the structure of the car, so that you don't have the head snapping back and forth or side to side.

That's one of the things that was being considered to help keep the crew safe in the capsule, is some way of stabilizing the head.

JOHNSON: Was it adopted, or was something similar done?

PIATEK: I don't know. I don't know, because I had left the program by the time those decisions were being made.

JOHNSON: As you mentioned, after a couple of years, you were moving on again.

PIATEK: Actually, when Skip Hatfield was relieved of his management duties, then Mark [S.] Geyer came in, and he basically tossed everybody out on their ear, and I was one of them. That wasn't of my own volition. I had to move. I was told, "You're gone."

WRIGHT: Is that when Constellation was cancelled?

PIATEK: This was before that.

JOHNSON: That would have been around the 2008 time period? When you went to the next position?

PIATEK: Yes. It was pretty close. That was, personally, very distressing, but having Constellation being cancelled at nearly the same time just threw the whole monkey wrench into things. It was just unbelievably ungodly.

WRIGHT: Bad year all the way around, wasn't it?

PIATEK: It really was. I'm glad that the design and development is proceeding, but it was not a personally happy time, to say the least.

JOHNSON: I could imagine that it was a little stressful. You moved into the assistant to the manager of the Program Engineering and Integration Office? Do you want to talk about some of your experiences working there for a couple of years?

PIATEK: It was just a hodgepodge of things. I'm trying to remember what. That was when—I guess one of the biggest things that came out of that was working on developing an online project management education tool. Another guy I worked with, we developed the Engineering Directorate Athena. It's an online handbook. It takes the engineering project management work instruction, and adds to it. It's a lot of other information. Being a project manager's not just about knowing the technical stuff. It's all these other things you have to keep track of. We tried to provide a lot of that background information in Athena. It's taken a while for the Engineering Directorate to really start using it, but it has become quite the helpful tool now, after several years. I worked on that, and that was pretty cool. It's got a lot of information in it. It's basically, part of my brain got dumped into the computer.

That was probably the biggest thing. I worked on some of the chief engineer work. The technical excellence and technical authority. It hasn't even succeeded today, because it's such a difficult task, but JSC has a technical authority for Engineering, Safety and Mission Assurance [S&MA], and Medical. The goal was to take those three things and write a JSC directive or policy from the Center Director level, saying, "This is how we're going to do technical authority here as JSC." Each directorate, Safety and Mission Assurance, Health, or the Space and Life Sciences—or whatever they're calling themselves these days—and Engineering, had written separate documents describing technical authority and technical excellence in their specific fields, but there wasn't a Center-level document. To this day, I don't think there is, because we can't get everybody to agree on what that means. We still have three separate documents for the three directorates.

I tried to work on that, and I thought I had a pretty good solution, but one of the folks who was working on it from the Science Directorate, she had been diagnosed with cancer and passed away. They were kind of flummoxed for a while with trying to find somebody to replace her, and then continue to work, so it just fell apart for a while. Then they ended up writing their own, and here we sit with three separate documents.

That was frustrating, and even trying to figure out the lines of authority in tech authority was difficult, because NASA has—how can I explain this? Engineers are not always good writers. Lawyers are not always good writers. Engineers and lawyers don't always use technical editors to help them write well. A lot of our documents are written by people who mean well, but who can't write their way out of a paper bag. You end up trying to interpret some of these documents that come out of Headquarters, or come out of engineering circles, and you're going, "What in the hell are they talking about?" No, I'm serious. There have been a couple of

documents that have come out of Headquarters, and I read a sentence in there, that of course is a paragraph long, and you go, "This is nonsense. What the hell does this mean?"

JOHNSON: A comma would help, right?

PIATEK: A period. A semi-colon. Something. That's what makes it really difficult sometimes and trying to take documents from Headquarters or other areas from people who, like I said, mean well, who know what they want to write, but when it gets put on paper, whether it's because of committee writing, or inability to communicate simply and elegantly, you end up with stuff that you can't understand and can't figure out how to take it and put it into a structure such that you can make proper use of it, even though you want to. But you have to, because of the way that Headquarters is the top of the heap, and what they say you're supposed to do. Sometimes you can't, because you can't understand what the heck it is they're trying to say.

The whole [NASA Procedures and Guidelines] 7120 series of documents from Headquarters is like that. You read it, and you go, "What in the world are you talking about?" What is your intent?" I've had arguments until I'm blue in the face with project management relative to how you do the government furnished equipment stuff, the GFE, versus what 7120 says. Well, 7120 is the God, right? It's the Bible. You have to interpret it, because we actually have to build real stuff. It's all very vague, and high level, and this, that, and the other thing, and by the time the rubber meets the road, you've got to have something. What the 7120 says isn't specific enough to really get things done. It's not, in some cases, applicable. This is where the arguments come in, because they talk about program and project. Well, to a lot of people that

means like Space Station Program, the CEV Program, or the Orbiter Project. You know, the big programs and projects.

Then you try to apply it to building a better toothbrush, or building a wireless video system, and you go, "This doesn't apply."

But, you'll get people tell you that, "Yes it does. You have to do it this way."

"But I can't. It's not possible." You get into whole arguments because of unclear communication like that, and trying to interpret things. Trying to meet what's going on with that. When we wrote JSC 7120.3, which is the intermediate between [EA-WI-]023 and the 7120 documents from Headquarters, I had a lot of discussions with the guy who wrote that in engineering. I said, "Look. You can't do it that way because it's not possible." You have to broaden things out, make it a little bit more vague. You can't take that vagueness and broadness and try to apply it down to lower levels. We had a lot of discussions on how to interpret that thing properly so we could do the work we do at JSC successfully, and still meet the intent of what the Headquarters' documents says. That's very difficult to do. Then when it's a JSC-level document, you have to get everybody and their brother at JSC to sign off on it. That includes the folks in the COD [Center Operations Directorate], MOD, Space and Life Sciences. Everybody has to agree to it. IRD [Information Resources Directorate]. They have restrictions from other documents at Headquarters. If you're going to build a new computer system, or whatever they define that as, if it's over a million dollars, you have to get Headquarters' approval. Well how in the heck do you write that into a JSC document? There's all sorts of weirdnesses that happen when you try to take something from Headquarters and apply it down to the more real world.

JOHNSON: Some of the challenges of documentation, that's for sure.

PIATEK: Yes.

JOHNSON: You moved into the more GFE documentation, configuration management?

PIATEK: Not the configuration management so much as rewriting 023, which is the governing document in the Engineering Directorate for how you do GFE projects. The original version came out in 1998, I'll say, '99. It was a mishmash of handbook kinds of stuff, and process kinds of stuff, and it was very specific to Shuttle, or very specific to Space Station. It was kind of a hodgepodge. It was a second attempt, as JSC 61100 [Project Management Guide] was the first one, and it was a handbook. Then, of course, we all got sucked into QMS [Quality Management System], so you don't want me to get started on that. A lot of things became work instructions, and that was one of them; 61100 was turned into 023, and again, it was written by committee. We all know what happens when things get written by committee. Then it went through little tiny modifications over the years.

Even when it first came out, I looked at it and said, "Well this is garbage." It was written badly, and didn't really address everything that it needed to. It wasn't really a process document. It was, again, this mishmash of handbook stuff and process. Even the process flows in it weren't accurate. I then had the opportunity to fix it, and I did. I re-wrote it from head to toe. It looks totally different. I took out all the handbook stuff, and that's when we put it into Athena, and put all that good information in there, and we did process flows that really reflected process, and described the process. It is now a process document; a true process document, as opposed to something that was a hodgepodge.

That's very difficult. I can write. I'm one of those few engineers that can write well. I'm not bragging. I am stating a fact. People will tell you that. I've had all kinds of technical editors say, "You're amazing. You actually know how to write." Yes, yes I do. Thank you. Not that it doesn't need help now and again. Whenever you're writing something, you think of it in terms of your background, and your experiences, and the way you think about things. That doesn't always translate to somebody else understanding it, so it's always good to have somebody else read it, and question you, and say, "I don't understand what this means. Can you rephrase it so it means what you want it to mean?" That's very good interaction with somebody else—a technical editor—that I've taken a great deal of advantage of.

We were talking about writing that documentation, but it helps if you know your audience, too. You were talking about the technical editor helping you do that.

WRIGHT: You also mentioned you had a document that talked about process, and explained process, and so that was a benefit to the new people coming in, you have to assume. It gave you all that common ground to work with inside of engineering.

PIATEK: It does. Now, there are people that look at it and go, "Well, this isn't how I do business." But process, it's a template. There are pieces sometimes of the template that you don't need to use, so part of the education process of a project manager is knowing that, "Okay, so I see this flow chart, but this part of it doesn't really apply to me, so I don't have to do that." You'll find some engineers that are by the book. If it's written down, they've got to do it. No, no, no you don't. You don't have to do it that way. We tried to put some of that—a lot of it into

Athena—and some of it into 023. It says, "If this, then you don't have to do that, you can go off to step whatever." We tried to point out that this is a totally tailorable or configurable process. If it doesn't apply to you, if it doesn't fit your kind of project, then don't do that.

The way the document is written now, is that it starts out with categorizing projects as small, simple things like we're going to fly a toothbrush, or a new iPhone, all the way up to building big, ugly things like iLIDS [International Low Impact Docking System], or parachutes, or something like a wireless video system, an OBSS, and in between. We've got four or five layers, and they say, well if you're doing this kind of a project, you only need to do this level of documentation, this simple kind of thing here. If you're getting more complex and bigger and uglier, then you have to do more. You have to have more documentation. You have to have more specific documentation. We've tried to go in and write it in such a way that it is more obviously tailorable or configurable to the kinds of projects that people do. A lot of folks have found that to be helpful.

JOHNSON: Yes, it sounds like it would be very useful if you can convince them it's not literal. You don't have to do everything.

PIATEK: Yes. Well, some of the most literal people actually work S&MA. I don't know how many times that I've had to talk to an S&MA guys and say, "Look. Here, let me read your own document to you. I will tell you what I think it means."

We had that problem on OBSS. The people tried to classify it as a Crit 1 system, meaning that if it broke, you had to cancel the mission. It's like no, it's an emergency system. Read your own document. If it breaks, it's only a detection system. You have other means of

figuring out what's going on, so no. It's not Crit 1. We can have a mixture of Crit 1, and Crit 2, and Crit 3 components in this system. That took a while to get people convinced of that. It changed the way that you did your certification. There were some folks, "Oh, no, it's Crit 1." No. The wing leading edge is Crit 1.

JOHNSON: Let's step back, get some perspective.

PIATEK: Yes, you have to kind of go through the logic chain with them. "Oh, okay. I get it now."

JOHNSON: I imagine there's all kinds of engineers.

PIATEK: Well, there are. I did the 4D assessment stuff for a long time through CEV, and then again in Engineering to some extent. You do find out that there's people who are very people-oriented. You have to make the people happy. Then there are people like me, who we get totally task-focused. Yes, we know there are people out there, but we don't care how they feel. I'm exaggerating to a degree. Then there are engineers who are so detailed-oriented you can't get them out of their equations to save their lives. Then there's the folks—there's another category that I can't remember what it is right off hand, but again, it's a more people-oriented side of things. Most of the people at JSC might surprise you—or maybe not—that they're all detail-oriented. There are times when I've have had to sit up in front of meetings and listen to presentations and go, "Oh, okay, so your point is x?" They're going through all this detail, and I've snoozed off long ago.

JOHNSON: Let's get to the bottom line.

PIATEK: Get to the bottom line. What's your answer? I don't necessarily care all the details of how you got there. To the person presenting, it's very important that you know all that tedious stuff. You have to be able to work with the different kinds of people and how they function, and not try to offend them.

JOHNSON: I would think that's part of being a good project manager, too, is understanding your team and being able to work with all kinds of people. I can imagine a lot of people aren't able to do that.

PIATEK: No, there are some who are not so good at that.

JOHNSON: You mentioned iLIDS. That project was actually something that you started working on, and then was cancelled while you were working as a project manager. Do you want to talk about that for a minute, and the process, which is maybe not pleasant, but it is something that has to be done when a project is cancelled. You have to shut it down, or it has to be transitioned.

PIATEK: There's so many painful things with that project. The technology is really very good. The guys who worked on that did a fantastic job of developing new technology for docking systems so you don't have to bang into things, so you don't have to have hard structures and big load paths to carry the load when you bang into things. It's a very gentle, very elegant system.

There's some complexity involved in it, in doing it that way. It's a software-controlled system. There are some people here, who shall remain nameless, who didn't like those aspects of things. He was constantly picking on the GFE development and forcing, from what I considered to be the wrong point in time, the Boeing and the GFE world to work together so that you could transition the mechanism to Boeing or whomever to be able to use the design. It was a bad pairing the way it was structured from the get go.

We had a lot of problems with technically and functionally integrating with Boeing from a paperwork standpoint. There are huge differences in the way that Boeing does business versus the way JSC does business. Talking about fundamentals, from the way a drawing is structured. The way the requirements document is structured. The way that Boeing does business with its subcontractors, and what it uses for it's processes relative to buying hardware, versus how we buy hardware for GFE. Those things were just totally incompatible.

When it was decided—I'm not sure exactly when this happened. It was before I came on as project manager—but when it was decided that the government engineering would do the development but Boeing would build the mechanisms is when the heartburn began, because of these significant differences in the way the two outfits did business. That caused delays, and schedule issues, and just a simple thing on a drawing would cause major heartburn for Boeing, because they didn't do it that way, and they couldn't understand why we were able to do it that way. It just caused contract issues. It was a nightmare. It wasn't the technical engineering things of it that were the root of the problem. It was this forced marriage at the wrong point in time between the GFE and the Boeings, trying to get this thing off the ground. It caused a lot of schedule delays, and finger-pointing, and acrimony, and it was just a big, big mess.

Again, there was a perceived issue relative to "could the thing even work at all?" from the customer relative to its complexity, and the fact that it was software-controlled and not hardware-controlled. The Space Station Program decided to do a series of studies to try to find a simpler mechanism. When that came up when I was project manager, we knew we were doomed, that iLIDS was going to be cancelled, because there was no way that we could overcome the difficulties of the environment in which we were working relative to the contractual issues, and the drawing issues, and everything else with Boeing, and trying to make simpler mechanism. We actually did come up with a simpler mechanism, but by that point, the atmosphere was so poisoned, and cantankerous, and just nasty, that there was no way that we were not going to get cancelled, despite our best efforts.

We actually built a soft-capture mechanism that we tested in Building 9, in the 6 DOF [degree of freedom] facility that worked beautifully, but that was not enough to convince the customer that it was a reasonable, workable solution because of everything that had happened before. It's a very bad situation. We did transition, and so I think everything on the GFE side is archived. Boeing is building a different mechanism. I'm not even really sure what it is right now.

JOHNSON: Were there concerns because it was computer-controlled, that that would fail?

PIATEK: That was part of it, but I think most of it had to do with the fact that the GFE stuff was perceived as not being able to keep schedule without understanding what was going on with the Boeing side of the house. I feel like I'm disparaging someone, but the perception was that Boeing could do no wrong, so it was all GFE's problems. The project manager on the ISS, he

understood, but his boss did not. There was no convincing him otherwise. That's just perception of what happened. I can't give you all the details. I don't know all the details. It was very painful, and we did relinquish it, reluctantly, and without really fighting for it, if you will. It's still there, so it could be resurrected at some point in time.

There was also an effort going on at the same time trying to develop an international docking standard. That's still ongoing. That would be a kind of a top-level blueprint for how you might build something like that, so it's a high-level of requirements kinds of things, relative to how fast you should come in, what kind of forces you should have, relative to contact and dimensions, and all that kind of thing. That's still going on.

JOHNSON: What did you do after that transition and shutting that down before you retired?

PIATEK: Well, given the budget situation, the Engineering Directorate—I think as part of a centered initiative—started looking at ways that we could save money. I got involved in an efficiency activity. We looked at, across the board, engineering documentation and processes, and ways we could streamline that side of the house. We came up with quite a number of good suggestions relative to that, and the Engineering Directorate has been off implementing those. In fact, the last rewrite of 023 incorporated two other documents that we were able to cancel. Again, so we can consolidate things, and make things more efficient. That was fun to work on. I actually talked to the guys at IRD on several occasions that were responsible for the Google implementation of the JSC search. We basically told them that it sucked. They said, "Yes, we know." It's just very difficult to use, and they knew that.

I think now, that there's an initiative to go and redo that search engine going on. We said, "If you type in a document like 023, you can't find it." Well, it turns out that both in—and we didn't know this—but in all of the Microsoft Office applications, and in PDF, you can tag things. There's a screen that comes up that you can put in the author, you can put in the actual title, you can put in the whatever, and that's what that search engine looks for. If you have that information filled in in that, then if you typed in 023, it would pop us first thing. Well 99 percent of the people here at JSC don't know that.

JOHNSON: They don't know what metadata is, and that's what it's looking for is all that metadata.

PIATEK: Yes, and nobody knows to put that data in there, so naturally the search engine's going to fail. The guys said, "Well, we tried; we wrote a user's guide." Really? Does anybody know it? Well, no, apparently. We were looking for a way of creating a way to search for project management documents for the Engineering Directorate so that we didn't have to develop one ourselves, and that's why we got to talking to IRD, trying to make everybody's life a little easier. Well, eventually that might happen. We'll just have to wait and see. That was kind of fun to work on, and actually see it being implemented.

There were a lot of skeptics about, "Well, just because you get rid of a document doesn't mean that you're saving any money." Well, they don't understand that there's a whole infrastructure behind keeping a document current. You have to have a document manager. You have to have somebody that looks at it periodically to see if there's any updates needed. You have to do the updates. You have to get the updates approved. There's this whole behind the

scenes thing that happens, that most people just go, "I don't understand that." It costs money. The fewer documents you have—and we were able to get rid of some we just didn't absolutely need anymore; they'd become obsolete for whatever reason—the less money you spend on that kind of thing. You don't lose any information, necessarily, but you don't spend as much money on upkeep for it.

JOHNSON: That's true. It's a process people don't understand.

PIATEK: Yes. They don't.

JOHNSON: You've worked as a project manager in different management situations. Is there anything—as far as your management style—you credit or do you have a mentor or any of your mangers that you've worked for that you thought that that was something you would pattern your style after, or is it something that's just evolved through your career?

PIATEK: I think it's just an evolution. Now, I have to credit some of the management that I had for giving me particular assignments, like the scheduling when I talked about the Joint Integration Schedule. When I was first assigned that, I said, "You've got to be kidding. Eh, blech, nasty, nasty schedules." But, that turned out to be one of the things that turned out to be extremely useful later on in my career. Doing budgets. I've done budgets and contract budget analysis since practically the first day I walked into the Propulsion and Power Division, because I was a contract monitor for a number of years on some small contracts. Again, that was very useful. I learned a lot from the Budget Office people, when I was working with the costing

analysis, and trending, and what have you. They were extremely helpful people. You just pick up things along the way.

JOHNSON: I noticed on your resume you mentioned that one of the things you did, you mentored and counseled employees for professional career development, work/life issues, balancing all of that with your job performance. Why were you doing that? Was that something you were assigned to do, or is it something you just evolved into doing because you were good at it yourself?

PIATEK: Well, part of it is being a branch chief. You get younger people underneath you, and they're looking for guidance. That's basically where I started with it, is providing them with some guidance based on my own experiences. I even tell my kids this; the only person that's responsible for your career is you. There really isn't going to be anybody out there who's going to lead the way, who's going to break your path for you. You have to do that yourself. You can ask for help. Sometimes you just get lucky. Some things fall your way. Sometimes they don't. You are the one who's responsible for your career. That just came from being a branch chief. I've done it with contractor people, I've done it with my kids, I've done it with employees, just whoever came to me with questions, I would just do it.

JOHNSON: I know the whole work/life balance question now is so different, and with having a woman as the Director of JSC, and that's important to her. When you started, as you said, you worked eight or nine hours, and you went home and you kept things separate, and you did that. I know, sometimes we've talked to women and that was a difficult process, because they were

having children, and getting time off, and those kinds of things. That's changed so much over the years. Is that part of what you talked to people about is how to handle those things? As things were changing, have you observed a lot of those changes, especially for women in the engineering field and some of the things that you've worked on?

PIATEK: Well, maybe I've just been oblivious, but I personally have never had any issue with taking time off to take care of my kids, leaving when I needed to. That just hasn't ever really come up. I don't have an answer for why it's happened that way to me, but it's just never been an issue. I don't know how I would respond to somebody who is having issues with it, because I don't understand the problem. It would take a lot of talking to figure out, well why are you having this problem? I don't know personally of any women—and I've known a lot of the women engineers—that have had that kind of issue. I think that over time, it has become not an issue, because people are aware of it.

In fact, the culture at JSC has probably changed significantly since Apollo. That's when it was basically guys. There were women here, women who worked out here, who were not secretaries or admins [administrative support]. You had the computers [female mathematicians]. I happen to know some of them. They were in a race to space. They did work long hours. There was a lot of divorce. There was a lot of domestic issues outside of work because of the incredible number of hours. I think the culture here at JSC changed because of that. They recognized that we're just burning people out. We're causing too many problems, so the culture changed.

I probably—and most of the women I know—came in around that time, that that culture was changing. The work has always been intense, don't get me wrong, but spending the hours is

not seen as a badge of anything anymore. You get your work done, you meet your schedules, then that is not an issue. Although I did have one person try to tell me that I needed to stay late in order to get x, y, z done. I said, "No. It'll get done when it gets done, and it'll be done on time, and it'll be done well. Go away. Leave me alone."

JOHNSON: Looking back over your career, can you think of anything that you consider to be one of your most challenging aspects, or an event, or a project?

PIATEK: Everything has been challenging. Doing the OBSS has probably been the most because of the technical issues, the schedule issues, the environment they were working on, and the reasons why we were doing it. Starting up the CEV, when I started in there, we were trying to run a project at the same time that we were trying to build a program office with its infrastructure. We didn't have a way to write a CR [change request]. Here we're trying to write CRs, just like we're trying to make a change. Well wait a minute, we don't have a system to make a change. It was hitting the ground running, and trying to do all that. From overall, I'd have to say it was OBSS.

JOHNSON: Is there anything you're most proud of?

PIATEK: I think wireless video, frankly. I mean, OBSS was useful in that it proved that we could do that, and that we didn't find anything, thank God, but wireless video's probably been the most useful project that I was involved in.

JOHNSON: Yes, and still being used.

PIATEK: It's still being used today, and I expect that whatever suits or whatever EVA equipment is built in the future, they're going to put cameras on it. They're not going to go cameraless anymore. It may be only for situational awareness, but by God, a picture's worth a thousand words.

WRIGHT: A big change from when you walked in the door to what's happening now at JSC is there's a female Director of Engineering. I believe you've worked with Lauri [N.] Hansen in the past.

PIATEK: Yes.

WRIGHT: That's a big change, and of course, as you mentioned, there's been more females involved, and just a lot of different work situations. Are there other changes? You've talked about some of the culture, we've talked a little bit about technology, but if you were looking back, some of the things that you've seen the evolution of, the progression that you feel might have made a great impact on how engineering field within space exploration or at JSC has been able to advance, and been able to get their work done so much more whether efficiently, or comprehensively? Are there technology tools and the different way that you do communication? Any of those types of those things that you can think of that have made significant impacts on how you were able to get your work done? I'm sure it was all the reorgs that you went through.

PIATEK: Oh yes, yes. All the reorgs. I started in [Building] 15, moved to 45, came back to 15, went to 13. Yes, nevermind.

WRIGHT: Talk about the difference of how you communicated when you first came here to how you end up communicating when you left. Email seemed to make such a big difference on how people started talking to each other.

PIATEK: Well, the only thing we had back in 1980 was shoe leather and telephone. You either walk down the hall to talk somebody, or you called them on the phone. There wasn't any other way to communicate. In the mid-to-late '80s, then the *baby* email started, and now of course that's the ubiquitous way of doing it. If you call somebody on the phone, they're likely to go, "What? Somebody wants to talk to me?" That is still the best way to communicate, is to talk to somebody, whether it's in person, over the telephone, or maybe with Skype or some kind of audiovisual kind of thing, is still the best way. Email is okay for short things, but it is not the most effective way of communicating. Face-to-face is the best, because that way you get those visual cues back from who you're talking to. Like you're nodding at me. If I was on the phone with you, or an email—in fact, so many miscommunications could happen because of email or text messaging because you can't read the emotion behind it. You don't know where their emphasis was trying to be, or they wrote something and it could be totally misinterpreted because a slip happened between the brain and the fingers, and that happens a lot. Still the best way is face-to-face. In fact, I've found that to be the most effective communications.

WRIGHT: Then working internally—I think the first one I remember you mentioning was about Bill Gerstenmaier—you and Bill had worked together on a project, but another project, he was now representing MOD and you were still working representing Engineering. How were you able to bridge different ideas or different agendas to get to a common goal when you were working internally with different directorates, and you all had to figure out how to move something forward? MOD's got a different way of looking at things than COD, than Engineering, but yet, so many of these projects, you were pulling so many of the different aspects, even within those groups. Was it difficult? Do they all think like engineers?

PIATEK: Well, there is some "engineers think alike" kind of deal going on.

WRIGHT: A lot of them do have that basic engineering language.

PIATEK: Right, but I think what best illustrates is what happened with OBSS. Here we have this ginormous group of people, from all walks of life, and different countries and what have you. The reason why I think we got off to such a great start was, when we wrote the first requirements document and had that SRR [systems requirements review] back in October, everybody knew right from the get-go what they were expected to do. If you set that expectation, or have that set of information available, people can buy into that. They can understand it. They can question it. You can talk to them about it. Set those goals and expectations early. It doesn't even have to be early—it can change along the way—but you have to have that kind of communication going, so that you know, "Okay, so I understand MOD is focused on operations, but is there something in Engineering that we can do to help the operations and vice versa?"

The miscommunication that happened with the Station wireless video—we had no idea that the guys were going to send all those weird commands. They just didn't tell us. We could have told them, "No, you're going to overflow the buffer. It's not going to work." It all goes to setting the groundwork.

WRIGHT: Where does accountability and quality control work, as far as when you're developing that process? As you're working through a process and you're moving forward, and you really know those processes and the flow charts. I was told once by a great engineer that there's those three pieces. It was the cost, and it was the margin, and the technical content.

PIATEK: Cost, schedule, technical, yes. That's the three-legged stool. Every engineer knows that.

WRIGHT: I learned that one. I can't tell you anything else, but I can tell you that. What gets to stop the project? What piece of accountability? When you were in charge of those projects, when you knew something wasn't working the way it was supposed to, how did you know when to stop and say, "Look guys, we need to stop and look at this?" Is that just from experience of growing and knowing that all those aren't balancing out that you need?

PIATEK: A lot of it is experience. Some of it's gut instinct. I had a contract with an outfit in Cleveland years and years ago. It was a technology development. It had to do with advanced fuel cells and electrolysis. I could tell, based on their performance, and the technical reports that I got back, and the meetings I had with them and what have you, I said, "This is going nowhere.

They're flushing water down the drain because they don't have a clue how to fix this problem." It wasn't anything that they particularly said, but by analyzing the data, and understanding what they were saying, I went back to my management and said, "Guys, we're throwing money down the drain. This is not going to succeed." They said, "Oh, well, we're just going to keep going with it anyway." Sure enough, it didn't succeed.

I guess a little bit—or maybe a lot of it—is really looking at the data and understanding what you're seeing. There was one point in this contract—we had spent x amount of money, and they were supposed to have achieved a certain set of tasks by that point and spent that amount of money. This is basic EVM [Earned Value Management], which I hate. It's a baby way of looking at it, in that they didn't get to those tasks by that time for that amount of money, and I said, "Fred, what happened?" He said, "Well, we ran into a problem." If I hadn't analyzed the data that I was seeing from the cost data and their technical reports, I would have been clueless. I wouldn't have known that there might be a problem. That's part of what project management is all about—you have to look at the data that you get and understand it so that you can find problems. You just have to be able to ask the question. "Hey Fred, what happened?"

WRIGHT: It's that communication again.

JOHNSON: Is there anything we haven't talked about?

PIATEK: Probably. Thirty-five years. I've got a lot of stories.

JOHNSON: Anything that you want to mention while we're still on that we haven't talked about? Any anecdotes, or stories, or anything?

WRIGHT: Did you ever want to leave? This was your dream job, but at some point, you decided that maybe this isn't where you wanted to be?

PIATEK: Yes, right here at the end. JSC is fumbling around right now, frankly. Particularly the Engineering Directorate. We've been so focused on doing big projects—big projects like Space Station, and Shuttle, and what have you—that work isn't there right now. In this cost-cutting mode, and trying to change our focus into more research and development kinds of things from the Engineering Directorate. All they've got is Space Station, which only takes a few number of people, so I think the whole Center—this is just my opinion—is just trying to find the next one. Until Congress and the President and what have you get their act together, I don't think that's going to change. It's very frustrating from my perspective because I love doing projects, and they're not there right now. I was just doing filler work, as far as I was concerned. Yes, I was doing good stuff, necessary work, but it wasn't satisfying. It was just time to go. As Henry [O.] Pohl said, "When it's not fun anymore, you might as well retire." It just wasn't fun anymore.

WRIGHT: Earlier you talked about John Aaron, and Arnie Aldrich, and now Henry Pohl; the Apollo guys that left that legacy, and you walked right into it.

PIATEK: Oh, yes. Yes, I knew all those guys. Jay [H.] Greene—had my run-ins with Jay. John [F.] Muratore, that was a fun one. One thing, I guess, just from a personal perspective, is that I

am an introvert by nature. I get tired of people after a while, so that's when I want to go home, and just crawl into my corner, and be by myself, and recharge. I tell people that at work, and I have a very different aspect to my personality when I'm at work, and dealing with people, and building projects, and working. They go, "You're a what? No."

It is possible for introverts to be extremely effective in what they do. You don't have to be an extrovert to be successful. Unfortunately most of the world are extroverts, and they don't believe us. That's one of the things that I've found, is that I'm an "I." I'm not an "E." I can still utilize everything that I know and be very effective, but at the end of the day, it's like "No, I don't want to deal with you anymore."

WRIGHT: That's probably why you remained as sane as you did. That and the needlepoint, right?

PIATEK: Yes, that's what's in here [pointing at bag].

JOHNSON: You have to have that other part of your life to go back to.

PIATEK: That's right. You have to have something outside of work. I've known far too many people that all they know is work. In fact, there was a woman I ran into a few weeks ago, she's worked at JSC for 40-some-odd years. She's afraid to retire because she doesn't know what she's going to do. That's all she's ever done is work. She's got children, but she's never developed any outside interests. To me, that's really sad. That's not balance in life.

JOHNSON: Yes, it goes back to that whole work/life balance. You have to have a balance.

PIATEK: There have been people who literally died at their desks because they don't have any outside anything to do. I don't care whether it's gardening or whatever. You need to have something outside of work.

JOHNSON: Well thank you very much for coming in today and talking to us. We appreciate it.

PIATEK: You're welcome. Anytime.

[End of interview]