

**NASA JOHNSON SPACE CENTER ORAL HISTORY PROJECT
EDITED ORAL HISTORY TRANSCRIPT**

CHARLES D. WALKER
INTERVIEWED BY JENNIFER ROSS-NAZZAL
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ROSS-NAZZAL: Today is August 26th, 2012. This interview with Charlie Walker is being conducted for the JSC Oral History Project in Houston, Texas. The interviewer is Jennifer Ross-Nazzal. Thanks again for taking some time this evening to meet with me.

WALKER: My pleasure, Jennifer. Thank you for the opportunity.

ROSS-NAZZAL: Out of the six first women astronauts, you worked pretty closely with three of them: Sally [K.] Ride, Judy [Judith A.] Resnik and [M.] Rhea Seddon, two of whom you flew with. How would you categorize those three women?

WALKER: Categorize those three women.

ROSS-NAZZAL: Or describe them.

WALKER: Yes, I understand. I'm repeating to give myself some time here to think about the answer. The first word that comes to mind is professional. Second word that comes to mind is serious. The third word that comes to mind is determined. While all those words apply with emphasis, their personalities were all different. So those characteristics manifested themselves in different ways in terms of personal characteristics and the way they interacted with people, and

the way they responded to professional challenges, the way they responded to stress situations. So that would be my answer.

ROSS-NAZZAL: I also read, according to your transcripts, that for a short time you were assigned to [STS]-51A, which Anna [L.] Fisher flew on.

WALKER: That's right.

ROSS-NAZZAL: Then you were assigned to [STS]-51G, which Shannon [W. Lucid] was assigned.

WALKER: That's correct.

ROSS-NAZZAL: Did you get a chance to know those two very well?

WALKER: No, not very well. Let me back up and say in the case of Anna Fisher no, not very well, because I wasn't virtually any more than assigned. As I remember it from this perspective in time, we had one meeting with the crew. I had one meeting with the crew. A preliminary like welcome on board, we think, and we'll wait for the trainers to tell us where we interface.

I remember that basically within days the word came to all of us that well, no, Charlie, you're going to be moved downstream to [STS-41D]. So it wasn't virtually long at all. But I'd been introduced, and so we'd see each other in the hallway, when I would be in town around the office for meetings, for training, and the like. It was just a familiarity then and a friendly hello.

In the case of Shannon, it was basically that same circumstance with regard to [51]G. A meet and greet with the crew, introduction. I was on the manifest for the mission and therefore as a crew member for a little bit longer than the case was with 51A crew. So there was more than one meeting as I remember it. I think Shannon, for that crew, was going to be my backup operator. Because when I was a payload specialist on all of the missions I flew—well, I'll say NASA because I don't know who specifically was wanting to be sure that I had an MS [Mission Specialist] backup and a trained backup. So I would train somebody on the crew to be there in case I, for whatever reason, was not able to do the basic minimum of the experiment required. It was going to be Shannon on that crew.

We never got into any training because after just talking about it and how we might go about it—I'd give her the basics of it in verbal form, I think, is what I remember, in terms of what the electrophoresis work was about—then I was reassigned on downstream again. I got to know Shannon more later. What happened later on that resulted in a little more interpersonal familiarity with her was just social interactions in and around the Center here, in which I would meet her. So it was primarily those three women.

ROSS-NAZZAL: You mentioned something that I thought was interesting too, going through the transcripts. All the women that you flew with—well, I shouldn't say that because I'm not sure about Mary [L. Cleave]. I didn't double-check that, but Judy and Rhea were your backups on the CFES [Continuous Flow Electrophoresis System]. Then you trained Sally Ride on the CFES. Which I thought was quite interesting that women were supposed to be the prime or backup operators.

WALKER: Well, just so anybody that's listening to this in the future doesn't start out by thinking, "Oh my gosh he's about to make a really interesting serious comment." I'm just making a comic comment here that of course women are the more sensitive in terms of delicate science experiments. So obviously they were chosen well.

ROSS-NAZZAL: That was the question I was thinking about.

WALKER: I do not know why. First of all it is true, as you have observed, that I trained Sally. She was designated operator by I think [Robert L.] Crippen for [STS]-7 with John [M.] Fabian as her backup. So I trained both of them on the 7 crew. Then yes, 41D and 51D, respectively Judy and Rhea were my backups and again I think appointed by the crew commanders in each of those cases. But I'm not absolutely sure of that. Well, I don't know why any of those three individuals were assigned. Again I think I know who assigned them, the crew CDRs [Commanders], but I don't know why.

ROSS-NAZZAL: Just thought that was an interesting pattern.

WALKER: It is an interesting pattern, but I can't add any insight into why it was a pattern.

ROSS-NAZZAL: You had trained Henry [W.] Hartsfield and I think you talked about working with Mike [Michael L.] Coats on the experiment. Could you compare working with the women compared to the men? Did they have a different approach to things? Or did you not notice any difference between the two? Or perhaps it was all very personality-driven: Sally, Judy, Rhea.

WALKER: Jennifer, I cannot, in the few seconds of thinking about that here now, I cannot come up with a substantial contrast or comparison either. The comparison was individual personality differences, not male-female differences. They're just individual personality. Some would be clearly more consciously focused on the activity than another who would give me the impression that, "Well, okay, show me what to do. Give me a challenge; show me what to do." All of them took it absolutely seriously, the training. They all, when I would test them as to what I had just trained them on, every one of them was snap-on, whether it was Henry or whether it was one of the women or whether it was John Fabian training as a backup for Sally on 7. So my point was it's personality differences in the way their mannerisms and their styles of learning and interpersonal or education environment, appearance and response to the information flow.

The appearance was different, just personal differences, not gender differences. To refer back to some of my original points, what I remember with every one of them—again talking about electrophoresis as a middeck payload operator, be it Henry on STS-4 or Sally and John on 7 and Judy and Rhea later, their approach to receiving the training, to learning about the basic science that was behind what we were trying to do was all serious, determined, curious. I'll add that in the mix. Every one of them I heard questions, which I thought were pretty insightful, were certainly inquisitive, and went way beyond what I was giving them, I thought, any indication of what was just basic necessity for the knowledge to learn. They wanted to know more.

I will say in that very regard that I think Rhea Seddon perhaps gave me a sign, or at least I interpreted in questions and her level of interest a little bit deeper level of interest. I think she had a little bit deeper level of understanding as to the biomedical background to the payload, to

the samples that we were flying, and certainly to the medical objectives of purifying pharmaceutical or medical test materials in a microgravity environment than the others that I was training.

ROSS-NAZZAL: Would you talk about working with Sally for STS-7? I think in the first interview we did or maybe it was the second you talked about them coming out to St. Louis [Missouri]. You would also bring down a simulator here. Talk about getting her ready for that flight and maybe some of her personality or any anecdotes you might remember.

WALKER: Well, it has been a number of—more than years, decades. What I remember is first of all Sally was very serious and came across with a serious attitude about okay, I hear I'm going to be doing that. I'm really curious about that and interested in it, and look forward to getting started and doing it. I'm not quoting here. I'm just paraphrasing what the attitude and the phraseology that generically seems to apply in my memory to our interaction in getting ready for training.

Our conversations and her interactions with me in the training activity tended to be—abrupt is again the word, but it was never a dismissive abrupt. It was just like she wanted to be just crisp in the questions. She appreciated crisp responses and answers. So I translate that into a very serious attitude. She was all very positive and looked on it, I believe, in a very both positive and supportive way. Nothing ever came across to me like an attitude of, “Well here's another payload I've got to learn, let's just get on with it and get it over with,” never anything like that. It was just that she was really serious. She was just serious about getting herself trained, getting herself trained for success.

In general memory, that does come forward. I don't remember specific conversations or words. But I do recall a sense of her expressing to me that she wanted to know everything she needed to know and more about this because she really wanted to see it succeed.

I'll just add that I have to believe—although I never heard this from her or from anyone else. But I just have to believe—because I guess what I'm about to say I believe is probably the case because in some ways her circumstance was similar to mine a year later. I was training her and John Fabian for 7 in the spring of '83, whereas I was myself in the spring of '84 getting ready to fly for my first flight in which I was a payload specialist, the first industry payload specialist.

In my situation, I was the first off the diving board in that capacity in that way. I know that of course she was the first woman to train to fly on a flight opportunity. She was under stress, and I know she was asked that question often and answered it in her way about well isn't there some stress about being the [first]; she wanted to succeed.

I remember that she did make it clear to me, not with so many direct words, but probably just by the serious nature of her approaching me with questions, more and more questions. She wanted to make sure she understood. She wanted to succeed. So she was doing everything possible to make sure she knew everything she needed to know and a lot more just in case the off nominals happened. What do I need to do there more than just procedures?

So she was really serious about it, totally understandable. I, as the chief engineer for the project and the chief operator on the ground and the chief trainer, I wanted to see her succeed too. We both had the same objectives from different standpoints, and it was good collaboration.

I'll add here too that John Fabian was highly supportive of her. I'm sure that any crew member of any crew that's ever flown was—is today—supportive of their fellow crewmates in

preparation for whatever any of them had to do. John was the designated backup on STS-7 so he was getting basically the same training that Sally was. Not just basically, he got exactly the same training as Sally did.

He was always there to help her understand. If she had a question, she'd ask me. If John saw some lack of communication in answer to the question or the issue, I could remember John—in a highly appropriate and instructive fashion—interjecting however it was possible to make sure that I either understood Sally's question or Sally understood my response or, as was probably more often the case, John making sure that all of us understood what the heck we were trying to say because maybe he didn't understand it exactly. So it was that kind of interaction. We were all working with each other to try to make sure that we understood exactly what was being attempted in terms of conveyance of information and training activity.

Of course I was learning from them as well. Sally was sometimes the instructor herself. When I was training Sally and John for STS-7, I had not yet been officially named by NASA as a payload specialist. But they in the Astronaut Office knew that McDonnell Douglas, my employer, had petitioned [NASA] Headquarters [Washington, DC] to anoint me as the first candidate industry commercial payload specialist.

So it was like an unstated little, "Well, this guy might be a junior member of the Astronaut Office here, and a future crew member maybe, if all of our higher-ups decide to do so." So it was an interesting interaction that we were all learning from each other. In retrospect I think back—she was helping me understand what they needed to know, because I needed to be asking those same types of questions in those same ways very likely in the near future when I was going to be trained by NASA, and maybe by other contractors, subcontractors, and the like on orbiter systems and procedures. So it was an interesting circumstance.

ROSS-NAZZAL: It's interesting that you talk about the communication styles between you. You're an engineer, correct?

WALKER: Yes.

ROSS-NAZZAL: I think John Fabian is as well.

WALKER: He's more of a scientist and an engineer. Yes science-oriented engineer, and he was a professor at the Air Force Academy [Colorado Springs, Colorado] as well.

ROSS-NAZZAL: Yes, and Sally was a physicist. So that's interesting.

WALKER: Correct, right.

ROSS-NAZZAL: How did the flight go? Any recollections of that flight or any postflight?

WALKER: STS-7?

ROSS-NAZZAL: Yes.

WALKER: Well, I was at the Cape [Canaveral, Florida] along with a small cadre of my fellow project people—engineers for the most part and technicians from St. Louis—preparing the payload in *Challenger*'s middeck on the pad up until 24 hours before flight.

Then I flew down here. So I didn't see the launch live. I was in the back room at the Mission Control Center for the flight. Now we had no direct communication with the crew. There was only one TDRS [Tracking and Data Relay Satellite] in orbit at that time, and I don't think that that TDRS had even been commissioned yet. We were still in a communications mode for that flight where it was ground station access only. So there was LOS [Loss of Signal] and AOS [Acquisition of Signal] and interim in between. So in the back room I was waiting, waiting, waiting. We were waiting for word from orbit.

Sally was, again as I had gotten to know her in the training and simulation training activities, she was as crisp and concise as any engineer would want from an individual who's got only a few seconds to say what they need to say and to maximize the content. The interaction from orbit was good in that it was informative, but there wasn't probably more information than what she needed to get down. She wouldn't emote like, "Well it looks nice," and yadda yadda yadda. It was business things. She had other things to do on orbit too, of course, as all the mission specialists did. So everybody had need to be concise in that regard.

That's the way I remember it. It was concise interaction. I didn't go back to my notes of that mission just to refresh myself as to how clean and efficient the operation of the machine itself was. I don't remember that we had any real anomalies on that mission. I think it came off very smoothly in terms of the operation of our experiment.

I don't remember that she had any real off nominal challenges to have to inquire with us about or to go to the procedures that we provided her and trained her on on orbit. So I think it

was a nominal mission as I recall it without much in the way of—or any in the way of—off nominal activities.

The results that came back were great. That was one of the most successful missions that we had.

ROSS-NAZZAL: Tell me, if you would, about being assigned to 41D. You mentioned in one of your transcripts about coming down and meeting the crew. What was the crew's reaction and Judy's reaction in particular to having a payload specialist on this flight? Do you recall?

WALKER: I can't remember who walked me into the Crew Office in Building 4 in the Astronaut Office, but it might have been Charles Chassay who was the electrophoresis payload integration manager [and] introduced me to the crew in the Crew Office. As I remember it, I think I—just in hallway introductions—had met Judy before. I think I'd met all the crew. I feel sure I'd met all the crew members before.

Introduced in the office as the crew member. I remember it was a cool introduction. Cool temperaturewise. Like, "Okay, payload specialist we're going to fly with; okay, welcome aboard." Here your question is about Judy. I don't remember specifically anyone being any cooler or any warmer than anybody else at that first meeting. I think it was all very businesslike but pretty cool introduction.

It got to be pretty quickly a small family in which I felt at home. I'm sorry. This is more about my reaction to them. It wasn't very long after that first meeting that I felt under more pressure than just learning the systems as a crew member. With that crew, and Judy as one of that crew, she was right in there in the middle of the joking, the punning, the friendly

camaraderie jabbing back and forth, chiding of each other. I got that myself, but I wasn't sure how to [react]; I knew I was a payload specialist position. Here was the MSs going at me. I knew it was, at least I thought it was, friendly all the time. I know it was in retrospect.

But I felt a little bit of pressure. Judy was one of those delivering the little pointed comments. As the years have gone on, I look back on it now feeling like I know that it was professional, just the interaction of professionals in a high energy, high activity learning group and working group keeping each other on point and on their game. I think I learned a lot from especially [Richard M.] Mullane and [Steven A.] Hawley and Judy in being a part of a fast responsive knowledgeable team and able to fend off the puns and the verbal gibes and jabs. They were all very good at that, and Judy was right in there with those two guys, with Hawley and Mullane, in terms of jokes.

Judy sometimes had some pretty risqué jokes that she'd come forward with, as well as sometimes when things didn't go well Judy had a vocabulary that one might characterize as—well, if I didn't know better, I'd think she was a sailor. Judy was one of the guys when it came to those kinds of interpersonal back-and-forths.

When I'd come in and out of the office—I didn't have a desk in their office. In training with and working with 41D before we flew, I had a desk down the hall and around the corner. Actually at that point in time it was in another building, but they had room for me. “Walker if you're over for a briefing or whatever, there's always a chair here for you. There's a table.” That crew, the 41D crew, had a lounge chair in their office, a lounge. Nobody used that as their desk chair, but I'd plop down in that when I'd come into the office fairly often. Judy had a desk with her back to the window. I remember more than once being in the office, and I don't know whether it was between breaks or before or after meetings. The crew—I didn't have a phone

there, I didn't have a desk there as I said, but they did—they'd be signing papers or reviewing something or taking phone calls or making phone calls. I remember more than once Judy making or taking a phone call from her brother Chuck.

I'm not remembering here how much younger Chuck is than she would have been. But she was talking to him like her younger brother about both the family and about him and about his ongoing medical education. It was brother-sister conversation that I had an opportunity in there to overhear. So I just have always held and remember it, even having at the time, this observation of her as a loving caring big sister. Really cared for Chuck and I think Chuck really cared a lot for her, and that they were fairly often in communication with each other.

ROSS-NAZZAL: Any interesting anecdotes from training from that mission that you recall with Judy? You guys were on the middeck together.

WALKER: We launched, her in the seat next to the hatch and me in the middle seat on the middeck. Training situations were just another example of the really serious Judy who would crack very dry humor when the other guys would, and then she'd make a comment that might be a little blue in color when it was appropriate and any of the guys would have done the same thing. I can't really recall any explicit anecdotes that differentiated her from any one of the other crew members, especially any one of the other mission specialists. I wouldn't say she blended in with the crew, because she was an integral part of the crew. She was the 41D crew and like every other member counted on by Henry and by the others. I could see that. As important as any other member of the crew was.

She was given the responsibilities for, for instance, the remote manipulator system on the mission as well as satellite deployments. Judy was just one of the guys. I've been resisting saying that, but we're talking about the women here so some way to differentiate that as opposed to the other crew members since most of the other crew members were of course males. She was just one of the crew, yes.

ROSS-NAZZAL: Quite happy to be so from what I understand.

WALKER: Well, every indication I ever saw from her both directly or heard indirectly was that she was extremely pleased to have gotten the opportunity to be one of the Thirty-Five New Guys, the first class for the Space Shuttle program. Again I got the sense—I don't remember any specific case where there were any words spoken like this—but I certainly got the sense from her as I think I mentioned previously about Sally Ride that she was totally serious in terms of succeeding.

I will say, Jennifer, again I got a sense from working with Sally, from certainly working with Judy and working with Rhea as well that all of them did feel a sense of being watched. They knew they were the first six women in the American spaceflight program on flight duty and with spaceflight responsibilities. There was clear expectations, depending upon the circle of observer perhaps, expectations of success and maybe even expectations of failure out there. By God, they intended to succeed. They were going to do everything humanly possible on their part certainly to be sure they didn't fail.

I know that had to be a part of what came across as serious attitude about the business that they were training to do and doing it when we were there. Fulfilling the training, accomplishing the mission, deadly serious.

ROSS-NAZZAL: You participated in some of the press conferences with the crew. What was Judy's reaction to the media? I have a sense, but I'm curious what your thoughts are.

WALKER: Judy's attitude about and response to the media was one of irritation. I'll say this from again, not anything I heard from Judy explicitly but just the attitude and the tone that I remember hearing and seeing, was if she'd been asked how do you characterize the media, I think she might have used the term "the enemy." In a somewhat pejorative way I think she would have said that. I will elaborate by saying I think her attitude could have been defined as, "Well, they're out to find problems with me. They're out to second-guess me. They're out to find the blemishes and report on those rather than other things."

I note that here, Jennifer, as a human response to the perception of criticism or the perception of desire to find critical aspects, whether it's the media or whether it's the neighbor next door or whomever. I think that's the attitude she had.

I will here bring up one anecdote in that regard. I think it was the postflight press conference here at JSC, 41D postflight press conference. On stage the seating was Hank—I'm talking about stage left and right here. Hank was farthest over on stage left. I was farthest on stage right. Judy was at the end of the table on the right, again looking at the audience. Judy was next to me.

She had some note cards with specific times and numbers that had to do with mission accomplishment, when things happened in the mission, specifically things that she was responsible for. One of the things she was responsible for, and she had numbers in front of her, was the OAST [Office of Application and Space Technology] payload, which was the solar array experiment and deployment and unfurling and then retraction of that.

She had times and she had the dimensions and she had mass and she had numbers there with her, she had down in front of her. The reporter, I think he was [from the] *Houston Chronicle* [newspaper]. I think it was Carlos Byars, [and he] asked her some questions which even I sat there and thought were pretty pointed. I can't remember the specific question, but I do remember my impression. "Well, that's pretty pointed and could be thought of as a charged question."

Judy answered them, and it might have come across as a brusque answer—whatever it was. What I specifically remember then was at the end of the press conference as we were standing up and taking off our microphones, Carlos Byars rushes up to the podium, the stage. He comes right up to her next to me. He says, "Judy." He says, "Is there some reason why you have to have notes in front of you, written notes in front of you?"

I thought, "What's this guy after here?" That's just not a question that he necessarily should be asking. I just thought it was a little bit off. I remember Judy's response was something like, "I want to make sure I've got the facts right. I don't want to give you the wrong answer."

ROSS-NAZZAL: Sounds reasonable.

WALKER: Afterwards I was thinking about it. Here I'm now going to say I don't remember Judy saying anything further about it, but that's one specific situation that I recall which accentuated my general impression of her sense and feeling about the press, about the media. If that had been me I think that would have bolstered my impression in that regard of the press. Again maybe it did. I was asked by Carlos Byars myself as the first payload specialist. He would ask me questions in his reporting. I don't remember him asking me, or I don't remember hearing him asking anybody else questions with those kinds of sharp edges to them.

ROSS-NAZZAL: I did want to ask you. What do you think of Mike Mullane's book [*Riding Rockets: The Outrageous Tales of a Space Shuttle Astronaut*] and his summary of the 41D crew and mission? Do you take it with a grain of salt? Or do you think he did a pretty accurate job?

WALKER: I got to tell you, Jennifer, I scanned the book. I did not read the book in detail. I scanned portions of it. I don't think I scanned much of his follow-on or his later mission reporting or comments. But 41D, my sense, my remembrance—it's been some years since I did even that scanning of the book—was that I was interested to see the way he saw things, and I can't discount or contradict what he saw, because he was a part of the crew day in day out. I was there during training. Certainly during the Class 8 candidate training, the crew selection, the crew training before I got involved, I wasn't there. So I have no insight into how accurate or otherwise those points are.

With regard to 41D, well, let me just say it. In terms of interpersonal relationships, I had no observations or sense that things were any different than the way he reported them in that book.

ROSS-NAZZAL: In one of the previous interviews you talked about being involved somewhat in the crew relationship in terms of going to social events or crew dinners. Did you ever spend time at Judy's house? I understand she was a gourmet cook from some of the articles that I've read.

WALKER: Well, I've heard that, and in fact I think I remember her bringing a delectable or two, usually a dessert maybe, into the office. She and Marsha [S.] Ivins would go back and forth about that because Marsha would prepare great brownies as well. But no, I never was invited to or went to Judy's house. Don't remember even where she lived. I never visited there. The only crew houses that I think I visited in 41 crew was Hank's, Coats's, and that's it. So no, not much in the way of interaction, involvement. The social interactions we had were when we were at something at the Gilruth [Center] or as a crew or at another reception maybe that was training-related. A social thing again at a bar or a restaurant out here in the Clear Lake-Nassau Bay area, but not generally at a home.

ROSS-NAZZAL: There's two key big events regarding Judy on this flight, and one is the breakdown of the waste collection system [WCS], and the other is the story about her hair getting caught in the IMAX camera. What are your recollections of those two events?

WALKER: Well, my recollections are pretty clear about both of them. First of all the waste management system, I don't characterize it as a breakdown, because what happened was this was the maiden flight of *Discovery*. NASA and the integrator of the orbiter, Rockwell, had changed

the design on the water dump nozzle on the port side of the orbiter, near the hatch, on the outside.

They changed the design. When we were utilizing it in orbit, as it turns out, some of the water was floating close by the nozzle there in the cold of space and froze and attached itself to the ceramic right around the nozzle, and it built up.

So it was a nozzle design characteristic that was not useful. Well, that became evident within a couple of three days when pressure telemetry from the water flow started showing a backpressure. There was too much pressure there as the water was getting out, and it was changing, getting greater and greater as time went on with every water dump. So the ground radioed up and said, "We got something happening there. We don't know what. Can you take a look at it with the arm, the RMS [Remote Manipulator System]?" Hank and Judy did, maneuvered the arm around, saw whoa, what is that? Icicle. We watched it grow with a water dump. It literally would grow. Great video showing this.

The waste management system inside the orbiter was working fine, but that ice was something that we couldn't have because it could have caused physical damage if it had separated and hit a wing or hit a tail or pod during reentry. So we were told to stop dumping water. Well, that meant the tank inside was going to fill up from both urine as well as from the even greater amounts of water that was formed by the fuel cells.

So quickly the tank was filling up inside. The ground radioed up on, I forget, it was like day three saying, "Well, the bad news is you're going to have to stop putting liquid in the tank." So the waste management system, the WCS, from a user standpoint was still working just fine, but we couldn't put water down it. I can remember the response immediately was, after we

heard that from the ground, “Well, now what are we going to do. Obviously we’ve got to pee. We’ve got to urinate. So where’s that going to go?”

That was the generic question. Judy would pipe up and say, “Yes, and what about me?” She says, “My situation is a little different than you guys, and we don’t even know how either one of us are going to handle this.”

So the banter went back and forth. “Well, how do we deal with this?” The ground gave us the suggestion that there were some old Apollo, some unused—obviously unused—Apollo waste collection bags in a secondary storage area back behind a locker that we took off, got into that storage area, found them. Sure enough they were there.

That got Judy even more, shall we say, energized about this question, because it was pretty clear how guys might use this bag, but how was Judy going to use it?

I can remember a good deal of conversation. Mullane and Hawley, I’ll offer just generally to say they had some interesting ideas which they put forward in a jocular fashion. Judy was not humored about it.

I came forward with the idea of using used socks in the bag. That that might help everybody’s circumstance here. I won’t elaborate any more than that. We’ll leave it to the listener’s imagination, since this is a generic human function. So we can all imagine in zero gravity how this might work.

But as an absorbent in this bag, which was just a plastic collection flexible container. Now the crew on those early Shuttle flights, we had a change of underwear, meaning T-shirts, underpants and socks, every day. Put them into the dirty laundry bag—dirty underwear including socks from each day.

So I said, "Socks are cotton. They're really absorbent. Why don't we put those in the bags before we use the bags?" Well, it turned out to be the idea we used. For the interested listener, there are some official photographs in the NASA photo library of us lined up at the WCS like a chorus line holding these bags with socks in them. There's no photographs that obviously document the use of them, the way they were prepared to be used. They functioned well, but I do remember the first time Judy went into the WCS, pulled the curtains, we could hear her verbal commentary. "Well, I don't know if this is going to work. Oh well, I guess this is working. Oh, I think this is working. Oh, good, it works better than I thought."

That was an interesting circumstance. We went about our daily lives for I guess about two days before the ground and Hank Hartsfield here seeing this problem outside with the icicle took the commander's position. He said, "Well, what do we do with that?" There was every idea, an EVA [Extravehicular Activity]. Hawley and Mullane volunteered over and over again to go outside on the first unscheduled spacewalk and knock that thing off. Right away, by the ground, that was voted down. [There was] just no structure to do that, no plans, no program, no specific training on their part, too dangerous. It took two days to figure out how we could use the remote manipulator system and knock the icicle off. That's what we did. So it was two days of activity in that regard with regard to shall we say personal water disposal.

ROSS-NAZZAL: What are your recollections of the camera?

WALKER: Well, the camera thing. I've only recently been made aware by a couple of other crewmates of mine on that flight that at the time Judy asked them—and I do not remember her asking me—to not talk about that.

I haven't talked much about it. Obviously I did bring it up in the oral history. But to repeat in summary form, it was a satellite deployment, and the IMAX camera on board for I think the second time on a Shuttle mission—this was the second time it was on board. It was to document a satellite deployment. The IMAX camera was a big darn thing. We called it our sixth and a half crew member, because the mass and the size of it and storage, it literally was about half a person in size.

Anyway, at that time the belt drive that moved the film very quickly through the camera—I don't remember—it was something like 60 frames a second or something. The belt drive was not totally contained. It wasn't completely protected from the outside.

The camera operator was Mike Coats. I think Coatsy was moving the camera toward the window. Judy's hair—she very much liked to just let it float in a black cloud of iridescent hair surrounding her head, and it would bob around of course as her head would move. Some hair strands got caught in the belt of the camera and yanked some hair out of her head. She let out both a scream and some other expletives.

She wasn't at all happy with that. It had to have hurt of course. Again with her expletives about that, which were on no tape anywhere, it stopped the camera, and it took a little while to disengage the hair from the camera drive. Took her I'm sure some hours for the pain to leave her scalp. That had to have been of course when she asked the guys up on the flight deck—I was down on the middeck. I just heard this and floated up. I didn't see it firsthand, but it was perfectly clear from just the audible within the two levels of the crew compartment what had happened. Something serious had happened. She told those guys upstairs, "Don't say anything about this." I don't remember hearing that. So Judy, if you're listening, I apologize. I let it out.

ROSS-NAZZAL: That's okay. I think Steve Hawley was the first; he told us a few years ago.

WALKER: Oh good.

ROSS-NAZZAL: So yes. You're not the first. Any other anecdotes you recall from that flight about Judy and her salty sense of humor.

WALKER: No, no, nothing else to add, other than just an emphasis on the fact that she was happy as can be to get to fly. She loved flying both aircraft, second seat, T-38, and on board Shuttle and was just an excellent serious disciplined and very very knowledgeable, really smart crew member.

ROSS-NAZZAL: Do you feel like you grew pretty close to Judy on that flight?

WALKER: I think so. I think we all got to know each other and appreciate each other's strengths and weaknesses and senses of humor. Just as a working family, I think we all got close. I wasn't as close to them as they were to each other, again because I was just an itinerant who came into the crew environment late in the training process, within six months before we ended up flying. First launch attempt in June of '84, and we'd been training together for maybe four or five months by that time, but with the delay to August, more time training together, more time to get to know each other.

So it was comfortable. From my standpoint I wasn't a close family crew member, but I was accepted by them. With Judy, a good relationship for sure, and one that, of course, with her loss and with the loss of the *Challenger* [STS-51L] crew, I got a lot closer and a lot warmer sense of her in retrospect and with her loss appreciating that great loss to both her family as well as to the world. I think she would have and could have certainly done much much more for both human spaceflight and spaceflight operations. She would have added a lot more to that in the years ahead.

ROSS-NAZZAL: On your next flight you talked about how close you were as a crew, that that was just such a unique crew to be on. Can you talk about Rhea's role in that sense of—I don't know how you might describe it—togetherness?

WALKER: Well, Rhea's personality in that crew environment and with me as one of the crew, with our working relationship where she was trained to be my operations backup—and of course she was the medical officer as well. I had volunteered on that flight where the first echocardiograph was flown. She was the operator of the cardiograph so I was a medical subject on that flight.

We worked together not only on the electrophoresis thing but I was as her test subject as were at least three of the other crew members, including herself, for that same echocardiograph experiment. We had maybe more working relationship in preparation for flight duties than I'd had in the previous flight.

Rhea, let me put it, she was calmer and milder in all of her interactions. I'll characterize it this way. You go into a doctor's office, and the physician is just very calm, deliberative for the

most part. The communications, the interrogatives and the statements are all—not monotone—but there’s not a great up and downswing in terms of amplitude. I don’t know whether that was her personality from the time she was knee high to a bean sprout or whether she learned this kind of interpersonal approach as a physician or not, but that’s the way she came across.

Yet she had a sense of humor in that. She could crack a good joke along with everybody else and appreciated the jokes. Again my characterization, she was like that cousin that you like to be around because they have a good sense of humor and there was never any real mood swings present. Just always fun to be with and pleasant to be with, and somebody smart you always wanted to have around when you had a problem or something, to help you through the problem and the like. She was one smart lady.

Those personality differences as I’ve enumerated are what really stand out in my mind as a comparison with the other women that I knew in that first Shuttle class.

ROSS-NAZZAL: Do you think some of that had to do also with the fact that she was married and had children at the time?

WALKER: Was Rhea married and had children at that time?

ROSS-NAZZAL: Yes, I think she married Hoot right after STS-1.

WALKER: After 1. Okay. I’d forgotten that. I’d forgotten what timing, when she had the kids. I guess they had at least one child by the time we were training to fly for 51D. I don’t know. It was in the background. I guess as I’m indicating here, it doesn’t stand out in recollection as

being anything really remarkable at all one way or the other. I didn't even remember it clearly to be the case.

ROSS-NAZZAL: Talk to me about that electrocardiogram that you participated in. I think you and Jake [Garn] participated in that.

WALKER: Yes, Jake. From recollection, it was myself, it was Jake Garn, and it was Rhea herself. She was a test subject for herself. Being a physician, she knew exactly how to maneuver the sensing head end of the cardiograph to, even with yourself, much less with another individual, view the heart.

ROSS-NAZZAL: Yes. That's talent.

WALKER: Well, really no different than a cardiograph here on Earth, except you don't have to lie down for it up there. We'd back up to the locker faces on the aft starboard side of the middeck. In fact the cardiograph was in a locker location on the aft starboard side of the middeck just below the ladder access up to the flight deck. So we would loop an arm around a rung of the ladder, and we had to be as immobile as we could get ourselves so that the only motion for her to be able to detect and to record—it was I think electronic digital hard drive storage of images. So the only motion when she was trying to record an image was from her hand motion of the sensor. So we had to immobilize ourselves and stay as steady as we could in zero gravity, basically pushing ourselves back against the wall and against that ladder.

Okay, when it was time to do that, on her schedule, we'd take a shirt off and she'd lubricate the head of the device so it was nice smooth electrical contact or sonic contact with the skin. Maneuver around, get the picture, get that picture. It was just very businesslike. Now when she did this to herself, she'd say, "Okay guys, now don't look." She'd put the probe down her blouse—or the top. Mostly I think it was just T-shirt at the time or sport shirt and would cardiograph her heart and record it doing everything herself, when she was her own subject.

So it was a neutral experiment in that regard, just very straightforward procedures and outcome. Dr. John [B.] Charles was the PI [Principal Investigator] on the ground. John is still with the agency, and I think still here at JSC.

ROSS-NAZZAL: Yes, he's still here.

WALKER: I remember I asked John for pictures of my heart afterwards. I wanted to have that for my archive. Never got those. Oh well.

ROSS-NAZZAL: Have to follow up tomorrow when you get a chance. I think Jeff [Jeffrey A.] Hoffman had mentioned that Rhea slept in the airlock. Was that the case with Judy?

WALKER: As there was IMAX pictures, because again we had IMAX on 41D. One of the things we documented with IMAX was crew activities, including food preparation, a crew meal in the middeck, sleeping arrangement. Judy slept in a sleeping bag bungee-corded to the starboard middeck bulkhead or wall, but Rhea wanted a little more quiet and privacy. So she hung her

sleeping bag in the airlock, as did Mary Cleave on my third flight I think. Rhea did want a little more privacy in sleeping.

ROSS-NAZZAL: Yes, I just found that interesting.

WALKER: Just as interesting to me—I think the commanders on every one of my flights, they felt like they just wanted to sleep in the command seat upstairs. At least one of the mission specialists on every one of my flights made it a very firm point to make sure that they got what they considered to be the prime sleeping spot in stringing a sleeping bag across the aft flight deck so they could go to sleep and wake up looking out the overhead windows at the Earth. Most everybody had choices. I didn't have a choice. I had a sleeping bag right next to my electrophoresis device because it was running 24/7, or it was supposed to. Actually there was a beeper that was a signal audio input that I jacked into with an earpiece in my ear every night. So I didn't have any choice, but most of the rest of them did. That's what Rhea and Judy selected.

ROSS-NAZZAL: Any interesting anecdotes from training or the flight about Rhea? You talked about her using the bone saw in space when she was creating that flyswatter.

WALKER: Yes, and I did not know there was a bone saw on board. I don't remember in the training that ever coming up until we needed to build that tool for what we all looked forward to as the successful recovery of operation of that SYNCOM on 51D. When it came to sawing pieces of spare aluminum bars and rods apart, Rhea was the one that offered that there was a bone saw in the emergency medical kit. She says, "I sure know how to use a bone saw, so I can

do that.” Well, she wielded that very effectively, very efficiently. I think it was probably Dave [S. David] Griggs that handled the vacuum to make sure that no aluminum pieces got away from the sawed aluminum as she was sawing it and got free into the cabin. He was wielding the vacuum to suck those up. I think she made the comment at the time as to how she was gratified at being able to use her medical training on orbit, and even more gratified that she didn’t have to do so with a live person.

ROSS-NAZZAL: The only other question that I had thought about was your relationship with the *Challenger* Science Center. You seemed to have a strong relationship with the Resnik family after the passing of Judy. I was just curious how that came about.

WALKER: Well, in retrospect thinking about it, I’m not absolutely sure how that happened myself, except that what occurs to me thinking back on it is that I got to meet certainly Judy’s parents, although her mother and she and the rest of the family were fairly estranged at the time she flew—her natural mother. Her father had remarried. Judy’s stepmother and father, I’d become acquainted with them just in the family meetings. I had become familiar with Chuck as well.

Then after she was lost, the *Challenger* crew was lost, I don’t know. It was just a friendly familiarity that seemed to be there when I met with the family. I can remember that that was probably augmented by the fact that all of the 41D crew went to the family home outside of Cleveland [Ohio] in Akron [Ohio] for her memorial service in her hometown community after *Challenger* was lost.

I again through that interaction got a greater familiarity with the family. It seemed like, as I recall, just a natural affinity that developed. Then after some months the families had decided that they were going to come together to support the *Challenger* Learning Centers for Space Science Education, and that the formal organization of it would be headquartered in the Washington, DC area. Chuck Resnik was physically the closest of the family members to that locale. So Chuck would come down from Baltimore area to DC, just less than an hour's drive, for family meetings there to help with the organization, to be part of the organization activities.

I think Chuck and I met a time or two when he was down for that. Now I, I think probably basically through Chuck, had gotten to know June Scobee too. So I was asked to be on the advisory board of the *Challenger* Centers. Then later I was on the board of directors as well. It was just a friendly, familiar, and comfortable growing relationship that developed. I really don't recall anything other than just that. It was just a feeling between us all that seemed right and comfortable. I was always very pleased that they would call on me and ask me to represent [them].

That didn't happen often. The most memorable part of that was being asked to represent the family specifically when the Astronaut Memorial Foundation, a separate organization in Florida—and this started really with some businessmen and community leaders in the Orlando and Titusville and Cocoa Beach area that wanted to put in place a memorial at the Kennedy Space Center Visitor Complex. At the time that they had put that together and I had actually been invited to be on the founding board of that memorial foundation, when it came time to dedicate the memorial itself, which was done in—I think I'm remembering right—probably 1989 with the Vice President of the United States being at the dedication. At the time that we broke

ground before that dedication itself, the family members were invited to come and be a part of the groundbreaking.

I don't remember specifics as to why anyone from the Resnik family couldn't or chose not to be there. I feel like probably Chuck was just so involved with his medical practice that it might not have been possible for him to break free at that particular date. I got a call from him, and he asked if I wouldn't represent the family there because there was a specific part of the ceremony where a family member from each of the astronauts who had been lost and were being recognized by name in the memorial at that time—I think there were 14 that had been lost at that point in time—a family member was to take an action to place a star on a plaque.

Nobody from the Resnik family was going to be able to do that. I was asked to do that because I was both a friend of the family as well as obviously a crew member, a crewmate of Judy's on her first flight. To me it was a very touching request. I was touched by it. I was very very pleased and certainly honored to have done so.

ROSS-NAZZAL: Yes, I thought that was an interesting story that you had told. I think I've exhausted all my questions. The only other thought that I had was as I work on the project is there anybody you think that I should talk to that's really important. Obviously there are crewmates.

WALKER: Well, crewmates and maybe family members. Of course Hoot comes to mind with regard to Rhea. I don't know, Bill [William F.] Fisher with regard to Anna. Let's see. I can only think maybe of women who were part of the second selection, Class 9, because I have to

believe they were all fairly close with the first six. Those are the suggestions that I can think of right off. If anything else comes to mind I'll be in touch.

ROSS-NAZZAL: Any other comments about the women?

WALKER: No. I think I've elaborated certainly more than I thought I was going to recall, as I was thinking in advance of this conversation, after your invitation to do so. I was feeling a drought of memories. You've managed to bring more out than I thought I had left in me.

ROSS-NAZZAL: Well, I certainly appreciate you taking some time, and enjoyed hearing your anecdotes and recollections.

WALKER: Thank you, Jennifer.

ROSS-NAZZAL: Thanks, Charlie.

[End of interview]