

NASA JOHNSON SPACE CENTER FACILITIES ORAL HISTORY PROJECT

CLIFFORD K. DUPREE
INTERVIEWED BY JENNIFER ROSS-NAZZAL
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ROSS-NAZZAL: Today is May 5, 2009. This interview with Cliff Dupree is being conducted at JSC for the JSC Facilities Oral History Project. The interviewer is Jennifer Ross-Nazzal, assisted by Sandra Johnson. Thanks again for joining us this morning. I know it's [been] a little hectic trying to find our room. I was wondering if you could give us a short history about Building 9, what its original purpose was, and how it was changed to support the Space Shuttle program.

DUPREE: Originally, 9 North, which is the middle section of the building, was built in the mid-70s, I believe. It started out with an FFT [Full Fuselage Trainer] and a CCT [Crew Compartment Trainer], and [the FFT has] a cargo bay with a Canadian arm on it. Then around the mid to late '80s, the 9 Northwest section was added, and then in the early '90s the East section of the building was added. The West section was basically set up for [the International Space] Station. The center of the building, which is 9 North, is still set up for Shuttle. Then the East end of the building is set up for the engineering, ER [mail code for the Software, Robotics, and Simulation Division], which is basically, I guess, research and development for robotics.

ROSS-NAZZAL: Is any portion of that used for Space Shuttle?

DUPREE: They do have an arm down there, but I think it's more of a Station arm. The Canadian arm was, I guess, retired and excessed. I don't know where it went. I'm sure it wasn't destroyed or anything, because it was in this building since probably the early '80s or even before that.

ROSS-NAZZAL: Can you tell us how the Space Vehicle Mockup Facility supported the Space Shuttle Program and continues to support it to this day?

DUPREE: Well, they have the FFT, which is the Full Fuselage Trainer. They have the cockpit, the middeck, and the lower deck. They have the cargo bay. They do a lot of working with cameras from the cockpit with the cargo bay. Then the CCT is basically a cockpit for training, and then now we also have the CCTII, and it's a cockpit. It can actually go vertical. A couple of times a year, we turn it 180 degrees and we do a nose-down training, which is pretty well just a class that they go in and kind of orientate themselves inside of the cockpit in a nose-dive configuration. They don't really get in and strap down in the seats and go through it like that.

ROSS-NAZZAL: Does each mission participate in training in this building?

DUPREE: Oh, yes. You have your crew, which is training for whatever flight they're on, and then you have prime crew. They come in, the prime crew, for anything that they've missed along for their training that's required. Sometimes they have last minute training before they go into quarantine; actually, this week we do have some of those classes. That's pretty well as far as the Shuttle.

ROSS-NAZZAL: How long do these classes last, or simulations? Are they two different things?

DUPREE: Anywhere from an hour to, I would say, four or five hours. There are so many classes. I really couldn't tell you all the classes. I do know they have a class that they go in and it takes a whole day to set the wiring harnesses up inside of the middeck, and they train on that. They have what we call a bail-out class, where they practice using their sky-genie, which is kind of a hardware that rappels off the top of the trainer for emergency escape. It's an emergency escape class. They actually inflate the slide, and they slide out of the side hatch. I probably mentioned they do the camera stuff.

ROSS-NAZZAL: Is that the camera on the arm or the Hasselblad?

DUPREE: There's a camera that's in the cargo bay of the FFT. I believe there might be two of them, aft and forward of the cargo bay.

ROSS-NAZZAL: Do they practice eating or any other [activities]?

DUPREE: I think. I really don't know. I don't think they [do], as far as eating. I think maybe stowage, they do stowage type classes for packing and unpacking the stowage boxes inside of the Shuttle.

ROSS-NAZZAL: Can you tell us the difference, other than one of the CCTs can go vertical, are there any other differences between the two?

DUPREE: CCT can go vertical. The CCTII, you can actually go vertical, which would be in a launch position, and then they have the descent, which would be nose-down. You could also put the CCT on the side and turn a side hatch up or a side hatch down. We've never done that class. There's really been no need for it. Usually nose-up is the most configuration, other than just at its normal where it's like it's sitting on the runway. Other than that, pretty well nose-up would be the launch configuration. The FFT has the capability of going nose-up in a launch.

ROSS-NAZZAL: Does it really?

DUPREE: You have to separate it from the cargo bay, and you have to add some hardware to the back of the bulkhead. That part of it I don't believe is around any more. We hung onto it, I believe, up to ten years ago. With the CCTI and CCTII being able to go vertical, really wasn't any need to have that on the FFT anymore.

ROSS-NAZZAL: When the astronauts come here to train, are these integrated simulations, or are they just simulations in-house?

DUPREE: They do integrated sims with mission control in, I believe, Building 5, if I'm not mistaken.

ROSS-NAZZAL: Are these motion-base simulators or are they fixed-base?

DUPREE: Ours?

ROSS-NAZZAL: Yes.

DUPREE: Fixed base.

ROSS-NAZZAL: In here?

DUPREE: Yes.

ROSS-NAZZAL: Have there been any changes to any of the trainers since you first started working here in '82?

DUPREE: Oh, yes.

ROSS-NAZZAL: Can you tell us about those?

DUPREE: I believe the CCT, the dash was changed. I want to say they called it Met Ops [phonetic] but I'm not for sure if that's the right terminology. Clayton [H. Hamm] could tell you more of those kind of details. I do know we did some upgrades to the middeck in the FFT for structural purposes. That's pretty well an all-wood trainer, made of all just wood, so we did some upgrades for floor-loading. The CCT, we took the airlock out of it because we no longer have an internal airlock inside the trainers. So after we lost—

ROSS-NAZZAL: *Columbia*?

DUPREE: Yes, *Columbia*.

ROSS-NAZZAL: Were these trainers built in-house, or were they built by contractors?

DUPREE: CCT, I believe, was built in 9 South. FFT was built in 9 South. CCTII was contracted through Johnson Engineering. They had the, I guess you could say, the aluminum shell built, and then it was shipped to Building 220, where the Johnson Engineering contract assembled all the internal components, the wire and harnesses, the seats, all the electronics. All that was done in-house, and then it was moved over here and there was some further work done.

ROSS-NAZZAL: Are the CCTs mainly made of aluminum, or are they also made of wood like the FFT?

DUPREE: CCT is some aluminum and mostly wood. CCTII is pretty well all aluminum, the skin, everything. The primary, secondary structure is almost 100 percent aluminum.

ROSS-NAZZAL: Can you tell us about some of the other facilities like the Tile Repair Training Area and why that was established?

DUPREE: The Tile Repair had come along probably four, five years ago, after we lost [*Columbia*], and basically what that class is for is once they're in orbit, they can look for missing tiles and possibly try to go in and repair them. I don't know if they have replacement tiles, but I know they have what they call the Goo Gun, which is basically like a high-dollar caulking gun. They practice playing with the caulk or whatever kind of silicone-type material it is, so when they reenter they don't have hotspots, usually it's on the leading edge of the wing.

ROSS-NAZZAL: Now, we've seen a few people come in here with the undergarments for the spacesuits. When they're in the trainers and in this Tile Repair Area, are they wearing suits?

DUPREE: I don't think Tile Repair does suited subjects. We call them suited subjects, whether they're crew or non-crew personnel. They do in the trainers, but as far as E Wing, I've never seen them do a suited person.

ROSS-NAZZAL: Can you also tell us about the ET [External Tank] Umbilical Door Trainer?

DUPREE: About the only thing I really know about it—it's been around for, I don't know, a long time. I want to say a year or so ago, I believe there were some parts on the ET door that broke in orbit, and they came over here and took some parts off of our trainer because they were pretty well downgraded flight hardware, so they actually took the parts, flew them, and replaced them. So we no longer have the parts. I think they made some parts that would work to replace what they took, but I don't think they're to the quality of what was in there.

ROSS-NAZZAL: Do you ever have to reconfigure your facility at all for new Space Shuttle missions, or are all the trainers are pretty much set?

DUPREE: No, the trainers are pretty well set in place, and we haven't moved any trainers in probably ten years. The way everything is set now with Station and Shuttle is pretty well the way it is. The only thing that we change, we may do upgrades, whether it's electrical or structural, for certain types of classes. We set the trainers up for whatever class it is with the hardware that we have here in the building, and it's constantly rotating. You'll set it up in the morning for one class, they'll go in and tear it down to a normal configuration, and then they will bring new hardware in for the next class.

ROSS-NAZZAL: Can you give us an example of some of the different upgrades or changes that you might make for specific classes?

DUPREE: Well, like, Met Ops [phonetic] was one of them—I believe that's the right term. Most of the upgrades that's done now, I would have to say, is pretty well in Station. The last year or so, we've slowly started backing off of any kind of structural upgrades to the Shuttle trainers.

ROSS-NAZZAL: Are there any specific Space Shuttle missions that you supported that really stand out clearly in your mind?

DUPREE: Wow!

ROSS-NAZZAL: I'm sure they're all memorable.

DUPREE: There's so many. They're all fun. They're all exciting to work on, and the different crews and the different hardware. I would have to say—I wasn't working in this building—but one of the memorable would have been when the Ku-band antennas, the first one actually came onsite. I worked in the Rigging Department, and we escorted it, unloaded it off a plane in Ellington Field [Houston, TX] and took it to Building 17, maybe. That was a long time ago. Then from there it went to Building 44 for testing. God, there's just so many. That one always sticks out because of the procedures we went through. Actually had a military escort and the whole nine yards.

ROSS-NAZZAL: You were here during STS-26. Do you have any recollections of that return to flight and training of that crew? Did that change how things were operated here in Building 9?

DUPREE: You mean when we first fired up and started flying again?

ROSS-NAZZAL: Yes.

DUPREE: Yes. God, we probably had six or seven platforms built for media throughout the building for filming, and they were pretty well here until the whole, was it 13 or 14 days, until they actually landed. So there was a lot of hype here in the building, because we had a lot of people from all over the world here to film. It was pretty exciting, yes.

ROSS-NAZZAL: Yes, I can imagine. For that flight, they also added the crew escape capability. Did that change how you trained?

DUPREE: The escape pole?

ROSS-NAZZAL: Yes.

DUPREE: Yes. I've seen them actually, what they call firing the arm, the pole. I've not been involved with a lot of the training on that. There's some pros and cons on that piece of hardware. Because, with what I know about it, there's such a small window when you can actually use that arm. You can't be going over a certain speed, you've got to be at a certain altitude, that kind of stuff. So as far as a lot of training, I've seen a couple of classes, but I'm not real familiar with it.

ROSS-NAZZAL: Earlier, you had mentioned the Canadarm, that it was here and that it has been exceeded. Can you tell us about Manipulator and Development Facility when it was here, and what it was used for?

DUPREE: When I'd first come to JSC in '82, it was on the west end of what they called 9A back then. It was the center of the building. Right now, when you go in the high bay, it's broken down into A, B, and C section. The A section back then, when it was by itself, they had the walls blacked out for night ops [operations] where they could actually do night training on that end of the building. They covered all the windows, turned out all the office lights, so literally

black in the building. You couldn't see. It has a lot to do with the lights they used, so when they're using the arm they could determine if it's going to be a sufficient amount of lighting.

Then after that, they built the B and C section. They moved the cargo bay with that arm to the C section, which is the east end of the building, and it was there for quite a few years. They used a lot of the lightweight balloons. They're, I don't want to say a Kevlar-type material, but some kind of a material, and they'd fill them with helium because the arm actually could only pick up, I want to say it was like 55 pounds. They were limited to what they could pick up with the arm. The arm that's in the building now, if you look at it, it's probably 20 times bigger than the Canadian arm, as far as in diameter of the pipe and all that, just because of the bulk you have to have here with gravity. They used to use it quite a bit, and I think there was an incident where they raised the arm and it fell. Nobody was hurt. They did a big investigation, and it sat there for several years, and then they excessed it.

ROSS-NAZZAL: So now they use the other facility?

DUPREE: The other arm, you mean?

ROSS-NAZZAL: Yes.

DUPREE: Yes, they do. They have some lightweight helium-filled type modules. They practice. I guess these balloons are the size of, say, a lab or a node, and they practice sticking it in the cargo bay. They have a cargo bay on the east end that's mounted on its side, doesn't have any

doors, but they just practice putting it inside. They actually have a little cupola down there, which is like six windows and a window on the top, that they sit in and they operate the arm.

ROSS-NAZZAL: Interesting. Do you have any recollections of a time when this facility was used when a mission was up and there was a problem, and you guys were called on to help remedy the situation?

DUPREE: I would have to say I know there was one, and I can't tell you the mission it was. The Shuttle hatch—they could not open for whatever reason it was, and in the middle of the night they came over here to Building 9. We opened it for them, and then engineers actually went in and went through our hatch step by step and wrote basically a step by step procedure for the astronauts until they got to exactly what was wrong with it. They figured it out, and they communicated to them the steps they needed to take to actually be able to open the hatch.

Then there was one a few years ago, they came to the building to look at, I want to say, one of the blankets that is on the Station. They went through the blankets, the materials, and I don't actually know why they were doing it or what it was for. But they figured out what they needed to, and then they were gone. So they do come in and out during missions or flights, and of course if it's a Station issue it could be any time.

ROSS-NAZZAL: Is that fairly common for the Space Shuttle Program?

DUPREE: I wouldn't say a whole lot. It seems like if you tried to average it out, that I know about, maybe every other year you get something that's really highly profiled and they need to

come in the building and figure out a problem. So as far as training, there is other reasons they use the trainers. It depends on what it is. The fidelity of the hardware they're wanting to use. We may not have that fidelity, depending on what it is.

ROSS-NAZZAL: Earlier, you had mentioned the Department of Defense [DoD]. I was curious what problems or difficulties you might have had with classified flights and how you dealt with that. How did you deal with working with the military?

DUPREE: Are you talking about with the Ku-band antenna?

ROSS-NAZZAL: No, working with the military. Early on the in the Space Shuttle program, we had a number of DoD flights. Did that create any problems for you, being that we were a civilian agency and very open?

DUPREE: Not for me, because I went through the actual paperwork to be badged for the buildings. Back then I was in the Rigging Department and I had to go into Building 5, Building 30, Building 9, and do different jobs. [Did] it affect me? No, not really.

ROSS-NAZZAL: What about the operations in this facility? Was that a complication in terms of doing classes or running simulations?

DUPREE: For DoD?

ROSS-NAZZAL: Yes.

DUPREE: I wasn't in this building at that time. Probably Steve [Stephen J.] Elliot could tell you. I don't remember DoD affecting the training in the building, but I wouldn't swear to it.

ROSS-NAZZAL: Sure, I understand that. Who have been some of the main contractors who have supported the building since you've been working here?

DUPREE: I want to say before my time it was Bendix, then it was Johnson Engineering, SPACEHAB, and now Raytheon which is an umbrella contract. Basically you have Raytheon as the prime, and there's five or six subcontracts to them.

ROSS-NAZZAL: How many people currently work in the facility as compared to when you first started?

DUPREE: In this building? To support Shuttle and Station training, I want to say there's like between 70 and 75 people that's housed in the building. There may be more people that support the contract. You know, you have offsite people, your admin people, people in your shipping and receiving department. So actually housed in the building, there's around 70.

ROSS-NAZZAL: When there's a simulation going on, how many people are working those simulations or classes?

DUPREE: It could be anywhere from two to four technicians to set the class up, and then you have, it could be one, two, or six crew members, the instructors and the staff that actually works with the instructors. You may have suit techs [technicians]. If you're going to have suits involved, you have suit techs. There could be four to six suit techs. Depending on how many astronauts you have, pretty well you have a person, I believe, one per suit assigned, and they actually help whatever astronaut they're assigned to, or suited subject.

ROSS-NAZZAL: Do you know when JSC began transitioning from the Apollo crew training to Space Shuttle crew training? Has anyone talked to you about that? I know you started in '82.

DUPREE: No. I want to say it was in the early '70s or mid '70s, but no, I was in high school then. (laughter)

ROSS-NAZZAL: I figured. I just thought I would ask. I think I've hit most of my questions. Other than the people that you mentioned earlier, Ronny [Ronald L.] Newman, Clayton Hamm, and Steve Elliot, are there any other people, you think, that we might talk to about the history of the building or the trainers themselves?

DUPREE: Depends on what depth you want to get into the trainers. I'm going to say Steve started in the building in, I think it was the late '70s, late, late '70s, which he'd come from another building. He's pretty well gone through every phase all the way up to manager, from technician to facilities to supervisor to manager. He's pretty well run the whole course of this building, so he would be probably the most knowledgeable. There may be a few other people

that, if you want to get into the detail of setting classes up, that would be a lot more knowledgeable than me.

ROSS-NAZZAL: I did think of a few other questions. You mentioned that in the mid to late '80s, that 9 Northwest was added. Can you give us a little bit more detail about that? I'm just looking at my notes here. You also mentioned that there were other changes made to the building. Can you explain why those changes were made?

DUPREE: Well, 9B was added, or the west end, was added for the Station. It started out very low fidelity trainers. Not even trainers. They were really mockups. Some people still call the trainers mockups. I prefer to call them trainers, but some people you will hear call them mockups. Station started out, they actually installed a system that kind of represented the structure of Station, and it had an elevated platform on it with an arm. That was around for a few years, and then it went away. They brought in a lunar habitat back in the '80s. It was like three or four levels. It was around for a few years, mostly evaluations. The Hubble [Space] Telescope was actually fully assembled in the building. It was approximately 50 feet high, full-scale. Now we have part of that in the building, and that's where most of the training is. It's on the Hubble doors. The astronauts train on the Hubble doors. As far as the building, there's been quite a few mods [modifications] over the years. The Space Center Houston Catwalk, for one, was added for tourists.

ROSS-NAZZAL: When was that added?

DUPREE: God, I want to say it was in the early '90s. No, maybe it was the mid '90s, because early '90s, the 9C, the east section, was built, and it was shortly after that.

ROSS-NAZZAL: What was 9C built for?

DUPREE: I really don't know why it was built. I think they were heading in one direction, and engineering, ER ended up in there for research and development of robotic arms or robots, period. Other than that, that I can really remember, it was mostly structural stuff that's, you know, cranes being worked on or upgraded or that type of stuff.

ROSS-NAZZAL: One other question I had for you. Do you have any documents or memos or letters or just general information about the facility that we could get copies of or scan for the historical record, so people can learn more about the facility itself?

DUPREE: You're talking about as far as old documents that I have?

ROSS-NAZZAL: Yes.

DUPREE: Steve Elliot would be the one to talk to, because I don't know of any. Because, like I said, I've only been on this contract for about 15 years. As far as going back further than that, I can't think of any right off. There may be some here. I think there's some old drawings of the FFT, old drawings of the CCT.

ROSS-NAZZAL: Those would be great.

DUPREE: And the CCTII.

ROSS-NAZZAL: Those would be fantastic, if we could get copies.

DUPREE: You'd have to just talk to him. Now as far as facility drawings, you could probably go to COD [Center Operations Directorate]. I don't know how far back they keep drawings. They should have drawings of the original building, and then each phase of the add-ons.

ROSS-NAZZAL: Do you know who the contractors were that did these add-ons and modifications to the building?

DUPREE: No. But if you went to COD, they could probably tell you.

ROSS-NAZZAL: Yes, I'm sure they probably have that in the records. This was relatively painless, I hope.

DUPREE: Oh, yes.

ROSS-NAZZAL: I appreciate your time today.

DUPREE: No problem.

ROSS-NAZZAL: Thank you very much.

[End of interview]