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VOICES ORAL HISTORY ARCHIVES

IN PARTNERSHIP WITH
NOAA HERITAGE AND THE NATIONAL WEATHER SERVICE

AN INTERVIEW WITH HELEN WOOD
FOR THE
NOAA 50th ORAL HISTORY PROJECT

INTERVIEW CONDUCTED BY
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TRANSCRIPT BY
FANTASTIC TRANSCRIPTS

Molly Graham: This begins an oral history interview with Helen Wood for the NOAA Heritage Oral History Project. Today's date is November 9th, 2021. The interviewer is Molly Graham. This is a remote interview with Helen in Bethesda, Maryland, and I am in Scarborough, Maine. We talked a lot last time about your family history and your parents, and so I was curious if we could start today with where you grew up and if you could tell me a little bit about what that was like.

Helen Wood: Sure. I grew up a lot of places. My father was an Air Force officer, and the typical pattern there was every two years, you'd have a change of duty station. He wasn't typical. He had a lot of special assignments. So, born in Atlanta, Georgia, which is where my mother lived, and her family. I guess Dad was back from World War II and out of active duty for a while, so that's where they were living. Then he went back in; he got reactivated, I guess, for the Korean War and for the Berlin airlift. He didn't go to those places, but he was part of the Air Force support effort. Between his military activities and all, we ended up living in and around Georgia and Texas. He was stationed at one point at Lackland Air Force Base, which doesn't exist anymore, outside of San Antonio. So, then I guess he got an assignment to Scott Air Force Base in Illinois. I was almost two when we moved up there, or maybe I was two and a half, and that's when my brother was born. He was born at the Air Force Base hospital. So, there we were. Sometime in the year later, we went to England. He took an assignment at a Royal Air Force station in Wales, and there were no US facilities near there, so we lived in a fairly blue collar, interesting area of England called the Wirral – W-I-R-R-A-L, I think – Peninsula, which sticks up into the water right across from Liverpool. So you're kind of next to Wales and south of Liverpool, in Western England. I started school there, kindergarten, and it was pretty cool. But I got strep throat, and it turned into rheumatic fever and attacked my heart, the lining of the heart. And it was a very – it was a killer of kids at that time. So, I was in a hospital for weeks, on a ward with other children, which was kind of cool except that I hurt all over and wasn't able to go to school. So finally, they feared for my life, and my grandfather, mother's dad, was a physician who was active in the American Heart Association. So he did some research and said, "You really need to bring her back here, and we'll do the latest treatments." So, Dad resigned his commission from the Air Force, and we came back by ship to America, and moved back to where my grandparents were just outside of Atlanta. They started me on penicillin, which was all the rage, I guess, for rheumatic fever, to ward off recurrences. Nonetheless, I had a recurrence while living in Georgia, and back in the hospital, and this and that. So, in any event, they got me on penicillin, which I stayed on daily until I was sixteen. No, actually, until my daughter was born, I think. Until I was twenty-one. Because the theory back then was, if you went off of it, you would probably develop an allergy if you took it again, and there weren't many antibiotics in existence. So, just penicillin and sulfa drugs, I guess. So, my early childhood was kind of flavored by illness. Yet, in the times that I was well, it was interesting, a lot of fun, new schools, but there was always moving until I guess in – we ended up in Kansas. I guess after my illness and after recovery, then we moved to Topeka, Kansas, where Dad's parents lived, moved in with them while he went to college because he had not graduated before the war. He worked as an officer first in accounting and then in charge of the officers' club at Forbes Air Force Base in Topeka. We stayed there from around 1952 until 1960. Dad got his degree, and then he, through family connections, found out about a job opportunity in Alabama, in Huntsville, at Redstone Arsenal, working for Wernher von Braun, actually, the rocket scientist, father of our shuttle program and all that good stuff, and Apollo, I guess – you

name it. So then, we moved to northern Alabama, which was an unusual place filled with Germans who had been recruited to the US after World War II, to help us establish our space program, and Yankees, as they said, engineers and scientists from around the US, recruited there first to Redstone Arsenal for the Army Ordnance Missile Command, and then to NASA's [National Aeronautics and Space Administration] Marshall Space Center, in Huntsville. So, you had this real kind of international and national diverse background. Then you had a core of Alabama there. As soon as you stepped out of town, you were in the South. So it was a lot of interesting contrasts.

MG: Can you say a little bit more about living in the South in the 1960s? This is an interesting time in our country's history.

HW: I don't know if I've told you about this before, but when I started first grade – well, the first time, I was in Georgia, and then I had a relapse of rheumatic fever and had to pull out of school. So, I started first grade the second time in Kansas, and that was 1954, right after the pivotal legislation of *Brown vs. the Board* [*of Education*], which ruled segregation illegal. So, in Kansas, at least in my school, there weren't a lot of Black children necessarily in our neighborhoods because you had segregation in reality – living conditions – but I guess there were enough to go around because they put like one per class. I started in an integrated classroom, and the one Black child in my class was a boy. We sat alphabetically, and Billy sat behind me and would pull my pigtails. He was my good friend. So, I just thought that was normal. Went to Alabama – total segregation, even in this more international part of Alabama, you still were in the South. For me, the story that brought it home most vividly, first, that I wasn't in Kansas anymore, as Dorothy in *The Wizard of Oz* would say, was when Mom and I were driving somewhere. I was riding with Mom, and we saw two girls had fallen off a horse in this big estate and were knocked out, unconscious. So, Mom stopped and she said, "Let me go and take care of them. You go and call an ambulance. Knock on doors until someone will let you call an ambulance." So I got to a phone, called an ambulance, and their question was, "Do you need a white ambulance?" I had no idea what they were talking about. I was so flustered. I said, "We need an ambulance. These two girls are knocked out; they have fallen off a horse." They said, "Well, do you need a white ambulance?" I said, "White, red, I don't know what the choices are." Finally they said, "We'll let you speak to our supervisor." Based on the address, I guess they decided that a white ambulance would be suitable. They said, "A white ambulance." So, I still didn't know what that was about until I talked to Mom, and she said, "No, they were trying to decide if it was for the Blacks" – or Negroes as they were called then – "or for white people." So I was just beyond, in disbelief. I had a favorite teacher in junior high school, and I talked to her about it, and she said, basically, "Honey, that's the way it is here." So yes, it was pretty interesting. My high school was integrated in Alabama while I was in high school. That was the result of the Kennedys – Robert Kennedy's efforts in particular – to push back on segregation; it existed illegally. The first Black child who came to my high school was taunted, and mostly our football team would follow him around, yelling at him, and it was just horrible to see. The next year, another young Black man came to the high school, and he was a great football player. Suddenly, it was fine. He was cool and welcome because he fit into the dynamic, and I guess they went on from there. I mean, there were just a lot of eye-opening – eyes opened to inequities.

MG: Before integration in your high school, did you encounter the separate facilities? Separate water fountains and bathrooms and things like that?

HW: Well, as a kid, I didn't get around that much. But yes, certainly you would see water fountains. I remember that more so in Georgia when I visited my grandparents because it was a small town. Change was resisted in the small towns. My grandfather was the county physician and started the first hospital in that town, so everyone was his patient. But even he had separate facilities in his – he owned an office building – I mean, a house, and he had separate entrances, separate facilities. I asked him, "Why did you do that?" He said, "Honey, they're more comfortable that way." In other words, if you're going to be a doctor to the people in the community, you're going to have to follow that way of doing things. I always just shook my head.

MG: Yes. How old were you when you moved to Alabama? Was that where you finished high school?

HW: Yes. I moved at twelve. I was twelve. I finished high school. I got accepted at the University of Alabama and at a small Methodist college about thirty miles away from Huntsville. Each of them offered me a scholarship, but the one at the small college was better, and I was afraid to go to the big college. I had never been down to visit, nobody was taking me for visits. It was like I was going to be on my own, so I went to the small college outside of Huntsville and went for two years. It wasn't academically challenging, so I ended up taking like an extra half-load of courses per semester and going year-round. I was ready to graduate in two and a half years. But then, my dad and mom moved to Maryland, and I came up for a visit, and had some career counseling up here, and realized that I needed to transfer to a university in order to get more rigorous education and have a better chance at good jobs. So, I left Alabama at that time.

MG: I also wanted to ask if growing up you had any lingering health impacts or effects, or if your being sick as a child impacted your schooling. Did you have to miss a lot of school?

HW: The theory in the '50s and into the '60s was, if you'd had rheumatic fever – I had a heart murmur that they attributed to rheumatic fever, to valve damage. Now it's attributed to just being a normal kind of mitral valve prolapse that a lot of young women and women have. But then, they were listening and testing so carefully, and they said, "Oh, this child needs to take it easy and couldn't take PE [physical education]. Those are the things you need to do to build strength. I had virtually no training in sports, individual or team, because I was being protected. So, I read a lot. I played the piano; I took lessons for nine years. My free time was focused more on those endeavors, and it wasn't until my late twenties that I started taking some exercise classes and started playing tennis. I said, "Wow, this is so cool." My doctors at that time were saying, "No, you really need to be building heart strength and get bone mass and muscle mass and all of this." So, yeah, it was more of a cerebral, I guess, in a way, growing up than it would have been if the philosophy then had been what it is now.

MG: Talk to me a little bit about your relationship with your brother growing up. Are you close? Did you get along well?

HW: Well, he is almost three years younger than me. And of course, I was good at everything, and therefore, he was very resentful. I just thought he was a pest. So no, we weren't close. We were brother, sister, totally different ages. We interacted as little as possible, which is probably fairly natural. I do remember when I had a friend who was a boy over, and we were practicing dancing downstairs. My brother, who was into electronics, wired up a speaker or a microphone listening device, so he could listen and spy on us. He was the pest. But he was a really bright kid, and now a very successful attorney. Now a very nice relationship. We don't talk a lot. I think he is more private than I am. For me, it's all out there. But we're close. In fact, I just came back from visiting with my brother and sister-in-law. I took the train up to the Hudson Valley and stayed with them for a few days. It was really nice.

MG: That is nice.

HW: She wants to join in. [Editor's Note: Ms. Wood is referring to her cat, who came on camera.]

MG: Your cat's going to have to sign a release, too.

HW: What do you think about that, Sally?

MG: Aww. Helen, I'm curious about some of the pop culture things that were going on in the era when you grew up. Do you remember getting a TV for the first time? What kind of music did you listen to?

HW: Yes, yes. So, the first time I remember seeing a TV was in England. A neighbor up the street had one of the little ones that are sort of round, a little round screen in a big box, and they would let me come up and watch TV with their daughter when this TV show called (*Woody Winkle*?) was on, which was sort of like our *Howdy Doody*, a children's show from the '50s back here, I later discovered. That was pretty exciting. We didn't have a TV for a long time. I guess when we moved back from England, initially we lived in the guest house behind my grandparents, and it was sort of a cabin – one bedroom, a large living room where there was room for the kids to sleep, and a little kitchen. Then, a screened-in front porch and then a sidewalk connecting the two houses. So, families stayed there a lot. There was a TV there, and we were able to watch the coronation of Queen Elizabeth II live, brought through the new transatlantic cable to America, on a grainy black-and-white TV. But initially, I don't think we had a TV in Kansas for a while, or maybe we did, but we always had black-and-white. My uncle, who lived in Huntsville, Alabama, who introduced my father to the folks who hired him at Redstone Arsenal, always had the latest and greatest. He had a color TV, and that was the first color TV I saw with any regularity was in the mid – it was in 1959, '60. I just thought it was amazing. I never knew that The Wizard of Oz had a whole color section that was actually not all in black-and-white. It was a revelation. I watched the *Mickey Mouse Club*, and things like that, but I still loved reading because you didn't have to worry about missing anything. I remember thinking well, I can set my book down and come back to it, but if you're watching television, if you are interrupted, you've miss it because it's live.

MG: Were there any particular series that you loved to read? My mom always talked about, I think, *Cherry Ames*, and *Nancy Drew*.

HW: Yeah, *Nancy Drew*, *The Hardy Boys*, because I didn't just do the girls' books. The *Bobbsey Twins* – a family with like [two] sets of twins, or something like that. By the time I was twelve, I had started reading – I went through reading all the books about horses. Then I went into science fiction, big time. I've stayed in that. That was my chance to see what could come of science and technology. Robert Heinlein, Arthur Clarke, certainly those were big ones. *I, Robot*. *The Foundation* series by [Isaac Asimov], and so on. Yea, verily, even unto this day.

MG: Well, you grew up in an era that must have been infused with these ideas of scientific innovation, the space race, and the Cold War.

HW: Yes. Certainly while I was in Kansas, the Russians launched Sputnik 1, and that created this panic in the nation about how are we going to able to hold our own against the Soviet Union, who will use this technology no doubt to destroy us. Of course, we had this very Cold War thing going on anyhow. In fact, in addition to tornado drills and fire drills, we also had atomic bomb drills in our schools. We lived within shouting distance of a Strategic Air Command base, so we had this awareness, every day, of Cold War and the vulnerability we had to being bombed. What was I going to tell you related to that? I guess I'll come back to it. But in any event, Sputnik was launched, and that meant they might be dominating space, so there was an immediate push to emphasize science and mathematics in schools. I got the benefit of that by starting algebra then, in the seventh grade, which was quite amazing. Now, it's pretty normal, but then it was considered a high school topic. I started algebra, and I was a good student. I was always a good student. I skipped the fifth grade because I always read. I read ahead and studied ahead and had the aptitude. So yes, science and technology was a push. But when we got to Alabama, their school system, believe it or not, was not as advanced. They wouldn't let me stay in algebra, for instance. But still, there was, because of the space program having a center there, a strong sense of the value of science and technology. I decided I wanted to be an engineer, but women were not engineers. Even my father, who totally supported my educational aspirations said, "Whatever you take, you've got to also get a teaching degree, so that when your husband, if he loses his job, you can go back to teaching." I'm like, "Okay." So I took education courses as well as mathematics and ended up in math. Then when I transferred to Maryland, they don't recognize any educational training from other states – no states do. So I said, "Well, that's that. Forget about teaching. If I have a husband, he'll have to take care of himself, and I'll take care of myself."

MG: That reminds me to ask about the women's movement, and if that was an influence on you and your plans?

HW: Totally. Totally. I was very sheltered, and it was only in later years I realized how sheltered and naïve I was, but maybe everyone is to some extent, kind of buying into the life pathway that you have seen emphasized around you. But the fact that there were women in science and engineering in the '60s did have a significant influence on me. I didn't get totally into the women's movement in a huge way. I didn't go out and demonstrate or anything, but I did in my own little way. I'd go braless – *woohoo*. That was extremely radical. I don't know if

I told you the story of being at the National Institute – well, the National Bureau of Standards, where I worked. I was in my twenties, and we were going to have a visit from the secretary of commerce, coming to our lab. Did I tell you this story?

MG: No.

HW: The assistant secretary for science and technology at our department was a woman with a PhD in Physics. The head of our organization said, "We need a woman in the lab," as part of this tour, just to show that we value women. Okay. Well, I worked in that lab, so it was okay for me to be there. She had a dry run, and she didn't like the way I pointed things out. So she had her aide, who was a retired colonel who had worked for her in DOD [Department of Defense], stay behind to tell me how to point to the computers, like Vanna White, like a model.

MG: That's what I was going to say.

HW: Which I found very insulting, because I worked there. The guys weren't being taught how to point to the computers. So I said to this fellow, and it was just the two of us, one on one – when he finished, I said, "I'll do the best I can, but let me ask you a question." He said, "What's that?" I said, "Is this a formal occasion?" He said, "What do you mean?" I said, "Well, if it's formal, I'll wear a bra." He almost lost it. It was very funny. He laughed. He said, "Yeah, okay. I guess you could consider it formal." And from then on, whenever he saw me, he'd say, "Ah, you came dressed formally, I see," which, today, wouldn't be allowed, but I was always kind of pushing, pushing the envelope a bit. I was the first woman in my agency, in my whole agency, to wear slacks to work. People thought I'd be asked to go home and change. But there was no way anyone was going to confront me, because yes, I was young, but I was credentialed, I was a high performer, and it just wasn't an issue. One by one, others started wearing slacks. I didn't really think about it at the time. I'd had a child, and my old clothes didn't fit, so I wore my husband's slacks to work.

MG: Was it that simple? That you wanted to wear your husband's pants. Did it feel radical showing up to work? Or did it just feel logistical or practical?

HW: I knew that no one had done it, but I did it because I wanted to be comfortable, and they fit, and I knew I looked fine. I wasn't trying to provoke anything, but yes, I knew I could, quote, get away with a lot because I performed, and my direct management wasn't going to give me a hard time because they were all very supportive. Later on, the head of the agency asked me to lead an effort to look at the condition of women and minorities in the agency, the distribution by age, education, profession, opportunities for training. At that point, we were in the early '70s, which is right after I started wearing slacks, and the affirmative action movement kind of ended up with women being pitted against Black men. It was like, "Well, who's more oppressed?" "Well, I'm more oppressed." That was an awkward period, but I got a co-lead of the effort who was a Black man, and we just forged on and pulled it all together.

MG: That's an interesting dynamic to have to navigate.

HW: Well, and at that point – a few years later, I divorced my husband. He was, and still is, a very sweet guy, but we were very, very different. He had no real interest in responsibility, just drifting along. I put him through college, and then I said, "This really isn't going anywhere," so I asked him to leave. I then tried to get my phone number in my name and my credit card in my name, and I couldn't. Hold a moment. I need to check my door.

MG: Sure. [Recording paused.]

HW: So, I could not get the telephone changed into my name without my husband's permission, and I couldn't get a credit card issued in my name without my husband's permission. His job was – he was a carpenter, a laborer, actually. I think he eventually became a carpenter. But I'm the one who had the income all of those years. When we bought a house, they didn't want to give us a mortgage – obviously before we divorced – unless I signed on the application paper that I was taking birth control and had no plans to have another child. And if I did, it was my intent to return to work, to maintain the income. I say I was kind of sheltered and oblivious, except when these instances came up. It's like, "What? This makes absolutely no sense." So, I would push for the changes, push the envelope if you will, and challenge the assumptions, but yes, I wrote that on my application to get a mortgage because that's what you had to do.

MG: Well, it sounds like even though you were sheltered, as you say, that you had a real good feminist intuition for how things should be more equitable.

HW: Oh, yes. The sheltered part was not realizing how inequitable things were because we were not a well-to-do family, but I was well taken care of. I worked through college, but it wasn't a struggle. I didn't realize how bad it was. I just got these glimmers of how inequitable things were along the way. I found out that my aunt who still lived in Alabama could not inherit property from her father without her husband's permission. This was in the '70s.

MG: How did you meet your first husband?

HW: Through a friend at work. I was in my senior year of college, and I was working at the National Bureau of Standards, hired by two women there, actually, which was kind of cool. I became friendly with some of the staff, and they introduced me to Richard. He had just been back from the Vietnam War about six months, and he was a really good dancer, and he said someday he wanted to go to college. So, I got pregnant, we got married, and I sent him to college. He did great. He got a degree in economics from Maryland, they wanted him to go to grad school, and he wanted to be a day laborer. They promoted him on the job to carpenter because he had his bachelor's degree. He stayed pretty much in that field forever, and he was happy. I wasn't, but he was. Then, years later, I met my second husband at a training program through the Civil Service Commission of the US Government for scientists and engineers who were becoming managers. It had been observed that scientists and engineers are not naturally the best managers. That's not our skill set. Stereotypically, you value those who perform and are knowledgeable in your field and who get the same motivation and reward out of achieving in this intellectual field. If anyone's different, then you may fumble a bit in trying to be an effective supervisor. So, they set up this training program to basically explain to scientists and engineers who were becoming supervisors that not everybody is the same, and not everyone gets motivated

in the same way, and that we really do need a diverse set of skills and personality types to be able to be a productive organization. It's like, "Really, wow." Even historians, right? Which turned out to be among the best computer programmers around back in the day, as you may know. So, yes, quite different.

MG: It sounds like you had a little bit more in common with your second husband.

HW: Yes. He worked for NASA; he was an engineer working in the space program at Goddard Space Flight Center. He didn't talk – real quiet engineer, not very expressive. I was very career-driven and extremely joyful about my job and what I did every day and computers. I started getting into computer technology in a big way. I had just gotten my masters, in fact, in computer science, and he was more like, "Oh, you're home. Leave the job at work, blah, blah, blah." So, I left him after three years. It seemed like – my cousin who is a psychologist said that children who were raised in military families, or families where they moved a lot, seem to think if you've got a problem, you just move and start over. So, there is a tendency to be rather dismissive. "Well, I'm leaving this; I'm moving on." In fact, I was interviewed by IEEE's – do you know IEEE? *Spectrum Magazine*. I actually did tell them that I had a tendency to change houses, jobs, or husbands every two years. But, by that time, I had re-met my second husband. We had been apart for, by that time, seven years, divorced. I re-met him; our paths crossed again, and a year later, we remarried. We're still married. It's been over thirty years consecutive.

MG: That's really interesting.

HW: He talks; I listen. It was just a matter of where we were in our life journey, respective journeys, for it to come together.

MG: Yes, I think sometimes timing is the difference maker. Helen, I want to back up a little bit and ask if you had any mentors or people who were particularly influential to you in high school, as you were thinking about your next steps and your college education.

HW: Yes, the mentor in high school was my math teacher. She taught analytical geometry, which was a totally cool subject, and she had a great personality. I went to her a lot for advice as I made my decisions in college. That was really it. My mom was an artist, and even though she had worked for the government in their human resources, had worked for insurance companies and so on, and had a degree in economics, at heart, she was an artist. I didn't value or seek any mentoring from her. From my father, who was working his way up the ladder in, first, a military organization and then in NASA, which is sort of like a military organization, I did talk with him and get feedback from him throughout my whole – well, until he died – on succeeding within a system, where you don't get to forge totally new paths; you've got to work within the system to a great extent. How do you get ahead? How do you work with people? Who do you befriend" He'd say, "If you don't befriend the sergeant in the military, your back is not going to be covered. If you don't get to know the administrative personnel, secretaries and admins in your organization, you're not going to know what's going on, and you'll be hung out to dry." That kind of wisdom came later, but that was it. I had no real counseling or mentoring until I came up to Maryland to visit, and Mother introduced me to her friend who was a mathematician/programmer at the National Bureau of Standards, Eileen. Eileen invited me to

come to her office and see what she did, and then her boss, who was a retired woman Navy captain, which was fairly rare, but had been in programming, technical work back with all these computer pioneers – met me and said, "Would you like a job?" So I kind of fell into these opportunities to have role models and to see other career paths. I had planned to go to grad school in math, maybe spend a summer in Germany trying to figure out how to speak German since I hadn't done that well in college with it. I hadn't really thought about much beyond that. So I fell into a wonderful career path, an area that had lots of career opportunities for me.

MG: Again, good timing with the development of computer technology and all of that, as well. Was it the University of Alabama in Huntsville that you attended for two years?

HW: No, I attended Athens. It's Athens State University now. It was Athens College. It was a small liberal arts college owned by the Methodist Church, but not a religious school, just private, and now, it's part of their state system.

MG: Had you planned on majoring in math there?

HW: Yes, yes. I guess the math teacher discouraged me from trying to go into engineering. Of course, as a woman in mathematics, she said, "This will be a path that will give you a lot of opportunity." The school I went to didn't have engineering anyhow, so I took physics and botany and zoo and math and knocked out all of my core curriculum requirements before transferring to Maryland. Then my job sent me to grad school in computer science.

MG: Remind me again, the move to Maryland was because your family had moved there, or because you want to shift your degree focus a bit?

HW: Because my family – well, it was because I wanted to shift my degree focus. My family had moved here, and I came up to visit, thought that the region was beautiful. I had seen a lot of Kansas and northern Alabama before, but it's just a beautiful region – trees and mountains and hills and rivers and an ocean not too far away. Like I said, I met with these women at the National Bureau of Standards, who offered me a job, and it was very exciting. I also failed to mention that my father set me up with a PhD mathematician at IBM, where he worked, who gave me career advice, strongly urging me to get out of the small school in Alabama and get to a university. I checked in with the University of Maryland to see what it would take, figured I would have to sit out a semester, but that's why I did the move because I got this advice. That fact that my parents had moved here opened up the doors for that possibility. And I was really bored.

MG: In Alabama?

HW: Yes.

MG: Remind me what years all of these things happened, and when you graduated high school and went to Athens?

HW: Yes. I graduated high school in 1965. In fact, JFK was assassinated during my junior year. I guess, beginning of junior year, which would have been '63. I graduated in June of '65 – largest baby boomer class in the high school's history, six hundred, so that was pretty big. Then started college in '65, the fall. In '67, I moved up here in the summer and started work part-time that summer at the National Bureau of Standards as a mathematics aide in a program that allowed me to basically work when I worked and not work when I didn't, so I could work around the school year, during the holidays, and the like. I graduated from Maryland in '69. My daughter was born a month later. So, I was pretty busy. People say, "Well, where were you during Woodstock?" Well, I had a baby then, so I wasn't anywhere. But I just continued working at the National Bureau of Standards, and they were wonderful.

MG: I have a few questions. You brought up the assassination of John F. Kennedy, and I was just curious what that was like for you personally, and then what you observed in your community and in the country during that time.

HW: Yes. Well, let's go back to the campaign for his election. I was in Kansas at that time and they were – it wasn't Kansas. He was elected in '60, I believe. So, our school, to try to teach us about civics, was doing a mock election. I was one of two students in the whole school who would be on the campaign for Kennedy because I thought he was so cool. What could possibly be wrong with being a Catholic? The fear then was the Pope would decide on everything the President decided, and it's just extremely biased, period. So then, we go to Alabama; we've got Kennedy as President. I was very excited about that. I was aware that he was President. He was charismatic, of course. The Bay of Pigs was in there. The Cuban Missile Crisis [correction: I was by then in Alabama] I was still in Kansas. The Cuban Missile Crisis. We knew we were all going to be killed by an atomic bomb dropped on us by the Soviets because of our standing our ground and not allowing missile launchers in Cuba. So, in Alabama, because we were in northern Alabama, and like I said, if you were in the city and interacting with the children of parents who worked in the space program, you saw more Democrats, and it wasn't so much a – it wasn't just Democrat, but it was a more moderate, progressive, openness. So I remember vividly I was getting ready to go to Spanish class, when a friend, a neighbor in the hallway said, "Did you hear that Kennedy has been assassinated? He's dead." And just the profound shock that went through everyone. The next day, we all stayed home and watched everything. I feel like I was watching TV when Lee Harvey Oswald was assassinated. I don't know if I was, but I was glued to the TV, and we all were. You felt your whole life had been turned upside down. The next time I felt like that was the Space Shuttle *Challenger* explosion.

MG: Did your parents have particular political leanings, or what kinds of conversations were you having around politics at home?

HW: They were very conservative. They were Republicans. [Dwight D.] Eisenhower was a god. And Barry Goldwater showed great possibility in their views. Dad more so than Mom. But they were still – they were military. A military family, so they were pretty conservative. I was very much in favor of rapid integration, desegregation, and more social change. But hey, I was a teenager, so I was expected to be rebellious. When my dad had a stroke in 2003, my mom by then had Alzheimer's – early Alzheimer's – and she was blind from macular degeneration. I moved them up here from Florida, and they ended up in the same nursing home, in the same

room, and Dad wanted to continue to vote for Mother in elections. He couldn't speak very well, but he could communicate what he wanted. He'd get the ballots, and then he would want to tell me who to vote for, for both of them. I did it once, and then after that, I said, "No. Mom can't vote for herself. You can't vote for her, because she doesn't understand any of this anymore. Oh, by the way, did I tell you that I've now changed you? You're a registered Democrat?" He couldn't talk much, but he went, "No," and then laughed. He wasn't, but – you know.

MG: You mentioned Kennedy's catholicism, and I never asked you if religion was a part of your growing up or your life since.

HW: My father was raised Catholic, but he didn't care. You know, he's much more agnostic. Mother was raised Methodist, and it mattered more to her, but she agreed we'd all be raised Catholic to appease Dad's mother, the Irish Catholic. When she saw that Dad didn't go to Mass, she said, "To heck with that," and so we were raised Methodist. I had my first argument with a minister in Kansas. I must have been in the sixth grade, I think. He wanted me to sign a – no, no, it was actually in the seventh grade, and it was in Alabama – one of those places. But I remember two or three arguments, one-on-one with ministers, where I felt that their logic didn't hold up. So obviously, I was pretty challenging. [He] wanted me to sign an agreement to totally abstain from alcohol my entire life. I'm like, "I'm twelve. Why would I do that?" He said, "So you won't burn in hell." "Well, no, I really don't think I'm going to do that." Well, he was disgusted with me. It was fourth grade, actually, visiting my cousin at her Presbyterian church, when I had a discussion with the minister who was talking about purgatory, and I asked about, "How could babies born in deepest, darkest Africa, who never even heard of Christianity be condemned to hell or purgatory?" He said, "Well, that's just the way it is." I said, "That makes no sense at all." So that was my approach with religion, with organized religion, is I could enjoy the fellowship, the music – I played piano for the Wednesday night programs at my Methodist church in Alabama, just loved music – but the orthodoxy, that just didn't hold water. Values, yes – live together well, be kind, those sorts of things. But, nah. So I had had enough run-ins with the Methodist minister, when Mom and Dad wanted us to – my first marriage to be to – I got married at the courthouse. They wanted me to get married at the church. So I talked to the minister, and he said, "You challenge too much. I won't marry you two." I said, "That's fine." I told Mom and Dad, and they were furious. Dad called him and said, "I've been a deacon in this church, and you will marry them." "Okay, fine. Whatever." But that was pretty much it. I've always [had] much of more scientific approach, logic approach. To me, kindness and integrity and being truthful – these things just make sense. I don't need a theology to tell me that.

MG: Did your Irish Catholic grandmother have an issue with your mother raising you in the Methodist Church?

HW: Absolutely did. She thought we were all going to Hell. It wasn't until I guess they moved into a different parish, and that priest told her that she should love my mother because she had raised the children and supported her husband, and had been an all-around good person, and Grandmother sort of apologized at that point, but that was way along the way. My mother's mother was Italian Catholic, born and initially raised in a convent orphanage, loved the Catholic Church and all of its trappings. But in Georgia, you had to be a Protestant, especially if you were married to the county physician. So she was a Methodist there.

MG: Skipping back ahead, when you transferred to Maryland, I'm curious about the differences between the two schools you attended, in terms of maybe cultural and social movements on campus. This was an interesting era for colleges.

HW: Yes. And I feel like I've sort of – I was always missing out on the mainstream of these big social movements, but first of all, back in Alabama, in the dorm, the – well, let's see. The dean of women at my school in Alabama was a former head of Girl Scouts of America, and she felt that we needed to be locked in at night, at ten o'clock. Let me get some water. You couldn't leave the dorm, or come back in. [Recording paused.]

MG: We were talking about the atmosphere on college campuses.

HW: As I said, I was in a small college under the auspices of the Methodist Church, with a dean of women who had been head of Girl Scouts of America. We were very sheltered, we were very protected, and very restricted. In a dry county – well, in a dry state at that time. So, if you wanted alcohol, you had to go to Tennessee, where it was still illegal to drink until you were twenty-one, so it made for some interesting times. I was elected – I was president of my dorm, so I was the one who arranged to get beer delivered after hours through the downstairs window. So, obviously, pushing the envelope here, even at that, in this school. In any event, when I came to Maryland and started at the university, I was a commuter, initially because we lived in Potomac and it wasn't that difficult a drive, so I drove every day to school, and I would bring my lunch and hang out in the women's lounge in the engineering building and eat my lunch alone. It was a huge campus and beautiful, but I only saw this little bitty part of it, and I was very lonely. I knew nothing about the school and the offerings, really, to speak of. But there, after a number of months, I ran into another college student, female, who had on my sorority pin, the sorority that I had joined in Athens, that was started by – the chapter was started by girls who were from New England and had come down there to school. It was out of Colby [College in] Maine, in fact, so it was a Yankee sorority. That was kind of neat. I had never wanted to stay in a sorority. I found it sort of like religion – all these arcane rules and rituals and self-governance when you don't even know about life yet. But I was so lonely, I set up a conversation. She invited me over to the sorority house. They were very welcoming. It was like, "Oh, I can be a college student again." I moved into the sorority house and I was there, I guess, for a couple of semesters, until I got pregnant and moved out – pregnant, married, and moved out. It was after I moved out that there were some anti-Vietnam War protests. In fact, they ended up having the National Guard troops on the roof of the sorority house, trying to do surveillance. I was still rather ambivalent about the Vietnam War because I had my boyfriend and a number of classmates from high school who were in Vietnam as military, and Dad was military, and I hadn't really learned that much about what was going on, but I began to be more aware at that time and going forward of the fact that we were not an exceptional country, more exceptional than any other place in the world, and that everything we did wasn't always totally correct and motivated by altruism. So a lot of eye-opening. But having said all of that, I never really got into the full life of the campus. I just had around the edge, in sort of a still protected environment where you didn't have to be back in your room by 10:00 p.m., but still, we were not in the – I didn't live in a dorm and get the full experience. So, in that respect, I think I was still very sheltered.

MG: It must have been fairly unique to be pregnant and married your senior year.

HW: Yes. Yes, it was. I was taking – unique and not unique. Obviously, I didn't stay as active in the sorority because I had other priorities. I was trying to drive through and finish my degree with a lot of coursework that was needed to make up for holes in my curriculum as a result of transferring, and I was trying to work in my free time at the National Bureau of Standards. I do remember near the end of the school year, I was taking a required physical education class. I was, I guess, by then almost seven months pregnant, trying to take bowling and archery, working around a stomach. The teaching assistants and the faculty were all very welcoming. I had a wonderful advisor who went to bat for me to get the maximum number of course credits transferred, and my life outside of school was at my job, where I had computer pioneers, mathematicians, and chemists, and all of this great stuff going on. So, I guess when I think about variety and opportunity, that's where it was for me.

MG: You started this position part-time in 1967, when you came to the University of Maryland. Tell me a little bit more about Eileen. What was her role? How did she know your mother?

HW: So, Eileen Carr – she and her husband had lived in Huntsville, Alabama. Mother knew Eileen through the American Association – no.

MG: American Association for University Women?

HW: American Association of University Women.

MG: Yes.

HW: Yes. AAUW. So, when Mom came up here, Eileen was already up here, and they connected. Eileen had offered to show me around when I came up. She was a programmer, a Fortran programmer, and working on a project that we later figured out Fortran wasn't particularly well suited for, and that was text processing – trying to take bibliographic information and automate it so that we could – we had one of the few computer literature library – computer libraries around. If you wanted to read any magazine, or any journal, or any book that dealt with topics in computer science, we had it. We needed to manage our collection. That's what Eileen was doing, and that's what I ended up going into initially, which was interesting to a point. I would have preferred to work in other more research applications in the years ahead. Her boss, like I said, was a retired Navy captain, a woman, who had been involved in programming early on, knew Grace Hopper, the first creator of a compiler and considered the mother of COBOL [Common Business Oriented Language], which is not entirely true. I knew too many people had too much inside knowledge maybe to be able to even hold a good conversation. So, yes, that was the connection. So, it was women networking I attribute to my career path.

MG: You took a break from that position when your daughter was born. How long of a break did you take?

HW: Let me break again for a second.

MG: Sure. [Recording paused.]

HW: We can restart. I had my daughter in July, after graduation. At that time, just again, a social cultural background, you were required to attend your graduation unless you explicitly got permission to miss it. That was a requirement for your degree. I applied to be excused from graduation and the reason was I would be nine months pregnant, and they said, "Granted." I continued to work until about five weeks before my daughter was born. But at that time, you were required to leave work when you were pregnant on the order of two months before because you were considered too fragile to be in the workplace. This was the government. I was a government employee. So personnel kept asking me what was my due date, and I kept being vague until I was so uncomfortable that I knew I really had to leave. I went on sick leave, which means I got about one week of pay. I was the sole breadwinner, and I had no income until I went back to work. My husband worked. At that point, he was going to the University of Maryland and working part-time as a carpenter, or as a laborer and also at an electronics store. We lived with my parents most of the time, in fact, back then, to make ends meet. I did go back to work as soon as they would let me. By then, they knew when my daughter was born, so I wasn't supposed to go back for six weeks. You were just so regulated. It was really, really quite wrong. But I did; I went back as soon as I could, and I never stopped from that point forward. I was fortunate that even when my husband and I divorced – my first husband and I – his mother had been caring for our daughter after day care and then after school, and she was going to move back to Frederick, but she stayed in the area until I finished graduate school, so that she could help take care of her granddaughter, even though her son and I were split. Just a lovely, lovely woman.

MG: Yes, so nice to have that support.

HW: Yes.

MG: Tell me a little bit about this time period and becoming a mother for the first time.

HW: First and only. Bonding was difficult for me, because I had a difficult childbirth, had a colicky baby, and then was trying not to – well, I guess it was a while before I went back to grad school. But I was trying to work, and I was stretched and stressed. So, trying to do everything and make a marriage – find satisfaction in a marriage that wasn't going anywhere. So, it was tough. But my career was going well, my colleagues were great, my mom and dad were in the area, my in-laws, and so I did have a good support system. That certainly helped a lot. My daughter, once she got through her – her colic was from a milk allergy, lactose allergy, and once she got through that and we got her on oat milk, I guess it was – poor baby – then she began to thrive and things got a lot easier. She was the love of my life. The brightest, the best – what can I say?

MG: Were you living in College Park at this time?

HW: Never lived in College Park, no. Except for those two semesters or so in the sorority house. After I got married, we moved in with my parents in Potomac. Then right before, I

guess, right – not long before my daughter was born, we got an apartment in Gaithersburg, near my work and stayed there until we bought a townhome with my parents' help. This was where, you know, I had to sign the mortgage application that I didn't plan to become pregnant again and was taking steps to make that the case. We bought a little townhouse in Montgomery Village, which is not far from my job in Gaithersburg. I stayed there through my divorce and until I married my second husband, Jim, in 1977.

MG: Were you feeling any pressure from any parts of your life to not return to work at that point?

HW: No. No. If anyone didn't want me to – I had no choice. I had the career and I had the drive, and I couldn't wait to get back to work. I simply couldn't wait to get back to work, so it was never a question. The only thing I regretted was that I didn't try to breastfeed, which would have made my daughter's early months so much healthier and easier for her. But there was no way to do that and work. At that time, you just couldn't; there was just no choice. So, no, I felt well supported.

MG: Good.

HW: My husband was like, "Well, whatever. Whatever you want to do. I'll be here working as a day laborer." My parents and my in-laws were there to help. No one was going to get in my way, basically.

MG: No, they wouldn't stand a chance, it sounds like.

HW: No.

MG: Helen, can you talk a little bit about how your career unfolded at the National Bureau of Standards, up until the point where you went back to school? What was your purview there?

HW: Yes, let's see. I started as a programmer, working in this area of text processing. I got bored pretty quickly. I was a supervisor; that was cool. I had some young people working for me. I moved up. Every time there was a promotion eligibility, I was promoted. I got more pay than most people at my level because I was in a shortage category of mathematician, so that was helpful. But I was bored; I wasn't learning anything new. Our unit was short on funds, and we were invited to go and help another part of the organization that was short on staff. My boss, the retired Navy captain, asked me to send one of the young men working for me to that position. I said, "I've got a better idea. Let me go, and then he can do my job." She said, "Well, when that job's up, coming back, we don't know what we'll have for you." I said, "That's okay." I realized later that was a bold move. But I knew I'd be fine. I knew I'd find something. That put me into a whole different field in computing. In understanding the fundamentals of computing, I was working to automate the testing of jet engine fuel controls for the Air Force. They wanted a way to do this that was more standardized and that didn't require them to pay any company that they bought a jet engine from to create a specialized environment. This idea of only being able to go to a Chevy dealer or a Ford dealer to have them service your vehicles because only they knew how the insides of the engines worked. It was fascinating, and I loved it. That's what

fueled my interest in going to grad school in computer science. So, as that job was winding down and I knew I didn't want to go back to the other one, I found another opening in the computer network and security part of the National Bureau of Standards, of the Computer Sciences Institute, and they hired me right away. I finished up. I told them I wanted the jet engine job, published a paper, gave talks – that was fun – and then started getting involved in professional association conferences and volunteered to be an organizer. I learned a lot about working with scientists and engineers who were volunteers. I started growing in that way, and they sent me to grad school. Like I said, my mother-in-law took care of my daughter in the evenings while I went to grad school at night. After a year or so of going at night to grad school, I realized I really needed to not be working all day and going to school at night. I was divorced. It was hard even with the help I had, and so I asked a couple of the guys I worked with if they would consider becoming adjunct faculty at American University where I was in grad school, so that they could supervise independent study, and they did. I don't know how I came up with this idea, but from then on, I didn't have to go to night school, and I did all of my programming on the ARPANET [Advanced Research Projects Agency Network], which was a precursor to the Internet. So, I would devise a program and run it at MIT, or at Stanford, wherever they had the tools I needed because we were part of this Department of Defense funded and National Science Foundation funded research network. That all came together at just a wonderful time – the beginning of computer networking, being able to get a more in-depth knowledge of computing, and beginning to develop as a computer professional and reach out, get more experiences through the profession itself.

MG: When was it that you were working on ARPANET?

HW: That would have been in '75, '76, '77, '78.

MG: That's what you were working on at the same time you were going to graduate school?

HW: Yes. Yes. Which is how I was able then to do my projects for grad school, without having to drive down to northwest DC and load a stack of punch cards into a computer there. It was really great. My thesis was on computer network security, passwords, which were very new. Passwords, imagine that. Using a password for access to a computer. We had an early text processing computer that we had gotten, I guess from Palo Alto, XEROX Palo Alto Research [Center], and these various places that were working in text processing. Anyhow, we had a system that allowed me to type in my thesis and then format it any way I wanted to. So I did right justification, so it would look really neat, and the library at the university rejected it because we had never had a thesis or dissertation right justified. So, I had to reprint it, and to do that, the system had to be working, and it wasn't working all the time. Oh, God, it was such a nightmare that I nearly had to delay my degree because of meeting the library's requirements for printing out on the proper paper with the proper format. It was just funny.

MG: Can you just say for the record what ARPANET was and how it was a precursor to what we know as the Internet now?

HW: Yes. The impetus for the ARPANET was the desire by our Defense Department to have communications survive in the event of a nuclear attack that would take out our communications.

So, the scientists who were behind it were – well, there were three or four that were really the key. They came up with this technique of breaking up your communications. Instead of having to have a connection between any two points, like for a telephone call or for a computer to talk to a computer, you'd have a line, right? It would be dedicated just for you. Well, if that line went out, you were out of luck. Well, imagine if you have connections all over the nation. What if you took your conversation or your computer traffic and you broke it up into little bitty pieces, and you sent it out in all directions and then they get to, through some path – they might hit a dead end, back up, go through another path, until they got to the target destination, reassembled themselves in the proper order, and you have resilient communications. That was the impetus – resiliency. The ability to sustain communications, even if parts of the nation were in blackout. Well, so the funding source – the initial funding source was the Advanced Research Projects Agency of the Department of Defense, ARPA. It's now called DARPA, Defense Advanced Research Projects Agency. A number of universities got grants to work on the design and development of this concept. The National Bureau of Standards because we had a lot of early computing pioneers working in this esoteric area called timesharing, where you could actually connect from a terminal to a computer in Philadelphia and share the resources with a researcher somewhere else, they saw an opportunity and got some of the funding. So that's how we got into it. Then, over time, we helped – the unit I was in – develop techniques that some were used to move – some of them were used as a basis of decisions like password use across the ARPANET, how we would differentiate between files moving around. You could move a whole file, wow, as a file, and let it break up and reassemble, and not just as a stream of information that, when it came to the other end, nobody knew what to do with it. So, yes, so that was it.

MG: How were you trained on ARPANET? Was that something you studied in school?

HW: No. No. That was all on the job. You know, I worked at a lab that was developing techniques to monitor traffic on the ARPANET to see where it was going, how fast it was getting there, performance monitoring without interfering with the traffic itself, developing security techniques to see what worked best, trying to figure out how to move databases around, or to even do a search across multiple computers. Imagine that, right? I was right in there with the folks who were learning on the job and developing on the job. Then, in conferences we would be a part of, you had your researchers from Stanford, MIT, Carnegie Mellon, Yale, you name it – Wisconsin – who were also developing techniques and so we learned from each other. It was just a heyday for network development, computer networking development. Even coining the phrase "computer networking" was in that era. Like, wow, networking with computers. I guess we should call it that.

MG: Was this when you were starting to realize the massive power that computers would have?

HW: Yes, absolutely. Absolutely. I worked on a project that was with the Department of Defense, trying to figure out how to have a veteran's medical records follow them around, [and] be able to be assembled for multiple hospitals in the VA system. Well, if you can do that, you can do so many things. Then moving into electronic information, so that if you developed a new submarine or a jet fighter, or a tank, you didn't have to carry, literally, all paper copies of all the maintenance manuals with you and keep the pages up to date as every change in subcomponent was made. You could do that electronically and have them be in a standard format. We were

developing the methodology and the standard formats to make this possible. Well, then anything is possible. So, my focus in grad school, even though my thesis was on network security, my passion was artificial intelligence because it was just being developed. I've been a life-long science fiction fan, and I wanted to understand the underpinnings of artificial intelligence. So that was great fun. That was more my book-learning, if you will.

MG: I think I read that it was illegal to send a personal message through ARPANET in the beginning. But it must have been the precursor to email.

HW: Yes, there was texting, which we would call it text now. You could just send a message from computer to computer, and I would get messages saying, "Does anybody know the password or the access path to get into this program that's running at Stanford?" So those were your early pirates who were trying to pursue unauthorized access. It wasn't so much that it was illegal. You were on a Department of Defense system, and it was created for a purpose. If you tried to use it for personal gain, then that was not acceptable. But to be frank, there wasn't a whole lot of capacity that was being stolen in that way. It was more like life. You're learning, "Well, once you unleash this or open it up, what are its characteristics?" Ah, vulnerable to being used for inappropriate purposes, vulnerable to unauthorized access. We need to develop a way to deal with this. So it was a bit of the wild, wild West that then began to have some structure imposed on it.

MG: It's so interesting. Did your role –

HW: When I came to NOAA [National Oceanic Atmospheric Administration] – I just wanted to say – when I moved to NOAA they did not have email. And you didn't have remote access to anything from your office. You had typewriters. Maybe smart typewriters. They had text machines, or fax machines, and you could do – so you could send – not faxes – what do you call it? – you could send text messages. I can't even think of the name now. But I found a group of oceanographers who were part of an ocean email network. They let me in, so I could regain access to, then, the Internet, and maintain at least my professional connections. Which was an authorized part of my job, to maintain my credentials and my knowledge, to stay active in our professional association. Gradually, we went from – that agency moved into the more modern Internet era. But it was difficult because of the fear that if you allowed any of your weather forecasting systems to be touched by the Internet, they might get contaminated. You know, damaged, who knows? Bad data would go out. They couldn't afford to risk it.

MG: Did your role in research on ARPANET end when you finished your graduate degree?

HW: Not exactly. When I finished my graduate degree, I was still working at the National Bureau of Standards. That would have been '79, I guess. Is that when I got my degree? Maybe I got my degree in '77. That's right. I worked another twelve years at the Bureau of Standards, but I had moved into management positions. By the time I left, I was in the senior executive service, which is the highest level of a non-political career, and was the deputy director for the whole computer sciences institute. But along the way, I went to different divisions, got exposed to database systems and more into programming language standardization, and then hardware,

media capabilities, so my knowledge of computers and computing broadened as my responsibilities – as I moved up the chain, but my hands-on, of course, declined.

MG: How did you take to those leadership positions?

HW: Unlike a sort of a canonical scientist or engineer, I loved them. You can tell I'm an extrovert. I love to communicate. I loved to champion the work of the scientists and engineers, and I was good at it. You know, I could translate what they were doing into the packaging or the words to convey the importance to the mission and win resources for them. I loved it. So, the higher you go, the more management responsibility you get. Yes, the farther away from the hands on you get, but the broader the reach, and I was exposed to more and more concepts, ideas, parts of the profession, and I constantly would be asking for – "Give me a tutorial on this. I want to understand what your issues are." I was just sucking it up and learning. Yes, it was great.

MG: In these leadership positions, you must have had the opportunity to steer the ship, so to speak, and direct areas of focus. Can you talk a little bit about what that looked like?

HW: At the Bureau of Standards, or later in my career?

MG: At the Bureau of Standards.

HW: Okay. So, I rose up to the higher levels of management there. I knew that there were areas that were of great personal interest to individuals, but that were not promising for a larger benefit to government or society. But it really wasn't for me alone to say, we need to get out of this area, so I put a lot of effort into working with our, what were called, visiting committees, teams of external scientists and engineers and managers who would review our programs and give us feedback. I was very, very pleased that we got – first, we got lousy marks for being spread too thin, and can't really have any impact in any area, and you're working on a number of dead ends, to you've done a self-assessment, you've taken the feedback from us and others under advisement, and you seem to have realigned into the high priority focus areas – computer security, database management, interoperability, computer graphics interoperability, but not getting too much into the weeds of anything unique. At that point, I started getting bored again, because it's like you're working on refinement and strengthening of a program, but then what do you do? Then you do assessment, refinement, strengthening, and it just keeps going on. I wanted something new, so that's when the opportunity came to move to NOAA, National Oceanic and Atmospheric Administration, as you know, and get into a totally different application area.

MG: Up to this point, were you seeing more women entering the workforce and doing work in computing? Or was it still fairly male-dominated?

HW: Plenty. There were a lot of women in the early days in computing. Women and minorities were better represented, more proportionate to the population – not at the higher levels, not at management levels, very rare. I was quite often in a room with forty men and maybe one other woman. In fact, I published a couple of papers at the National Computer Conference on women and minorities in computing, and they weren't original works; they were really a synthesis of

studies conducted by the National Science Foundation and others to collect data. At that point in time, which was the '80s, I guess early '80s, it seemed like the sky was the limit for women and minorities in these fields because there was such a shortage of talent in the field, of people going into the field. Not just through university programs but working in industry as well. If you were interested, you got in. I alluded to historians. The word off the press was, historians, psychology majors, and philosophy majors, go after them for computer programming because – and musicians – because they're logical and take well to the field, and you can train them, and they will really produce. But then supply side, I guess – well, the field matured and the numbers started declining. Certainly at the manager level, never really could sustain outside of government. In government, and especially in the civil side government, you would see more women at senior levels in science and engineering than you would certainly in industry.

MG: Something you mentioned earlier, and I wanted to make sure I asked about it, was you said the *Challenger* explosion in '86 was a big moment for you, too. Can you say a little bit about what you remember?

HW: Yes. I always felt like I grew up with the space program because Dad worked with Wernher von Braun, and we were in Huntsville, Alabama, where they did the testing, supported development testing of the engines that were used for the Apollo program. My daughter was born – I was in labor during the Apollo 11 moon landing, and in labor, and labor, and labor, and then I was knocked out and delivering, I guess, when the lunar module reconnected, redocked with the command module, and everybody got to come home. So, it was a big part of me, I felt. I'm sure a lot of people felt that way, but I just felt it head to toes. I remember driving – by this point in time, I guess I was the most senior position I got at the Bureau of Standards, and I was on the phone talking to Tom Pyke, another person who was a mentor, actually, for many years, who had left the agency and gone to NOAA. He's the one who hired me at NOAA a year or so later. Maybe he was still at the agency, actually. The time isn't clear in my mind, but it was around then that he left. Anyhow, he called to ask if I'd heard the news. I was driving back to the office from somewhere, and I hadn't heard the news on the radio. So, did he call, or did I come in? Maybe I came in and found out. I just remember this feeling of the floor has fallen out. We're vulnerable. It was a Significant Emotional Event, S-E-E, one of those that marks your life.

MG: Well, I think around now is a good time to take a break because we won't get into your whole NOAA career in the next ten minutes, but I don't want to end on that note. So I'm wondering if there is anything else that stands out to you up to this point, when you transitioned to NOAA?

HW: Stands out to me? My years at the National Bureau of Standards were amazing, rapid growth. I had the right mix of skills, including communication skills at the time in a still-young field. So, I totally benefitted from being in that unique environment. I just fell into it, I feel like, and I felt as I left, so incredibly privileged to have been there, working with those incredibly talented people and in an agency filled with Nobel Prize winners, physicists, chemists, you name it. I felt so connected. I'm still a member of their alumni association because I want to see who died. I want to see who's retired. I want to know what their big issues are because it felt like I was in with people working with fundamentals of science and measurement. Computer science

was kind of a – we were more tolerated there; we were not their mainstream, but still I was there. But it was a great first half of my career.

MG: This will be my last question, I guess. Why were you ready to leave the agency? Why were you ready to leave the National Bureau of Standards?

HW: Well, I had been there for twenty years, since I was a – twenty-one years, actually – GS-4 math aide until I was senior executive service – deputy director. I did not have a PhD, didn't plan to go for a PhD, so I was – and as I said, computing was sort of like mathematics; you're viewed by the rest of the organization as a tool, not as fundamental science. So, you weren't mainstream. And I just needed a change. So, the opportunity to go to NOAA was just – the timing couldn't have been better.

MG: Good. Well, I'm really excited to hear about that chapter. I think we have one more session in us, if you don't mind. I'm really enjoying this conversation, so selfishly I'm glad it's going to continue.

HW: Thank you so much. I'm tired. You've really allowed me to revisit wonderful memories.

MG: Well, thank you for taking me along for the ride. This has been enjoyable for me. I'll let you go and let you rest. Thank you so much for the time you've spent with me so far. Let me turn off the recording real quick.

----------END OF INTERVIEW----------

Reviewed by Molly Graham 2/9/2022
Reviewed by Helen Wood 2/12/2022
Reviewed by Molly Graham 3/2/2022