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AN INTERVIEW WITH PAM HEINSELMAN
FOR THE
NOAA 50th ORAL HISTORY PROJECT

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Molly Graham: This is an interview with Dr. Pam Heinselman for the NOAA 50th Oral History Project. The interview is taking place on January 12, 2020, in Boston, Massachusetts. The interviewer is Molly Graham. Could you start by saying when and where you were born?

Pam Heinselman: So I was born January 31 in Kansas City, Missouri.

MG: Do you mind saying what year?

PH: 1970. Yes. So January 31, 1970, in Kansas City, Missouri.

MG: I'm curious about your family history and how they came to settle in that area. I know they didn't stay in Kansas City for very long, but what brought them there?

PH: So my family actually lived in Kansas, in Topeka, and the hospital was across the river, which took them into Missouri where I was born. But it was my dad's job that took them to Topeka.

MG: Can you tell me about your parents and their heritage?

PH: Both of them come from either Dutch or German descent. They actually met in Denver, Colorado. They went from Denver, Colorado, where they met and got married. Then went to Kansas.

MG: Do you know how they met?

PH: They actually met on a retreat for singles. It was a hiking retreat, and they met there. Their relationship blossomed from there.

MG: That's really unique.

PH: Yes, yes.

MG: What's your father's line of work? What brought him to Kansas?

PH: He was a federal employee who was doing management-type tasks. That's what brought him to that area.

MG: I think I read that he worked for the Social Security Administration.

PH: Yes, he did once he moved to Maryland. So we shortly moved from the Kansas area to Maryland when I was just under one year old because he got a job with the Social Security Administration.

MG: I know you have two siblings. Were they born before or after you?

PH: I have two brothers. The older brother, he's about two years older than me – Kurt. I have a younger brother, who was born three years after me.

MG: Tell me about where you settled in Maryland.

PH: We lived in several different places in Maryland. Initially in Reisterstown, Maryland. We lived there until I was about second-grade-ish. Then we moved to Westminster, which was a little bit further out from Woodlawn, which is where my dad worked. So then we lived there, for me, until I was eighteen, and then I went on to college.

MG: What was the reason for moving to Westminster?

PH: The primary reason was just to have a school system that my parents felt more comfortable with, and that we'd have more opportunity than living in Reisterstown.

MG: I know your mother went to work at some point for a gynecologist.

PH: Yes, that's correct.

MG: Can you tell me more about your mother? She was home with you for a little while.

PH: Yes. In our earlier years, she was home. Then she decided to go back to school when I think I was still in elementary school and middle school because she always wanted to finish a degree in English. She read a lot of books and stayed up really late at night while also taking care of three kids, and was able to finish that degree. She also had had a really big interest in nursing, but she didn't get to really follow that dream when she was a younger woman. So I think with her degree and that interest, and interacting with people in some kind of medical setting, being able to work for a GYN and being the person who brought the people into the room and took their blood pressure and talked with them really was a good fit for her.

MG: When she worked for a GYN, it was the beginning of the HIV epidemic, and it was after the sexual revolution. So I was curious if she was aware of or part of any of those movements.

PH: Not to my knowledge. I think it was more of a personal thing of wanting to help people.

MG: Can you talk more about where you grew up and share some childhood memories?

PH: So in Maryland, one of the things I really remember a lot is having access to the ocean and to the mountains because we're between the Appalachians and the Atlantic Coast. So a lot of our holiday time was spent either on the beach or hiking. Both swimming and hiking are two of my personal favorite hobbies that I do. When I go on vacation, I'm usually doing one of those two things. So that really grew out of my childhood and the interest of my mother especially. Being a swimmer, she used to teach swimming. Even when I was growing up, she taught swimming classes on occasion and had been a synchronized swimmer in high school. She really brought that swimming component to us, not only taking us to the beach but also taking us to get

swimming lessons and things like that. My parents met hiking. So together, they brought the love for the outdoors and spending time there to me. I still value that very much.

MG: Good. What stands out to you about the schools you attended growing up?

PH: Well, the schools, I would say – when I was in middle school probably stands out. That's one of the times that really stands out for me. One of the reasons for that was I had my first class that had earth science in it. The teacher there was just very inspirational to me. We had classes on geology, but also on weather. It was really from that point on that I was considering either studying geology or studying weather. I think if weren't for that class, I don't know if that would have been sparked – those two interests in the natural world. But I think the weather part, in the longer term, really stuck with me because it changes every day, whereas geology, you're always looking at the past. Of course, there's a lot of value in history, but at the same time, I was very intrigued by being able to study something that's ever-evolving and also was related to a lot of the time I spent outside. So I talked about spending time at the beach and hiking. Even as a kid, I was a tomboy, so I spent a lot of time outside playing with my younger brother's friends. A lot of that involved looking at the sky. I loved looking at cloud formations. Sometimes I would just sit outside and look up there and watch the clouds go by. One of the things that intrigued me living in Maryland where it's pretty hilly in the part where I grew up is that I would see these dark clouds coming. And I would try to figure out by the feel of the air – how humid is it? – and the direction of the wind, the look of the sky, what is going to happen. Is it going to be really storming, and am I going to be seeing our trees blowing over? And waiting to see if they stand back up again, or is it something that isn't going to be that significant. It was very difficult for me to figure that out because what I learned later is that the visibility of the sky was so limited that you couldn't really see the structure of the clouds very well. I think that that component sparked my interest in weather and evolved after the eighth grade for sure.

MG: And didn't you have your own barometer?

PH: I did. I built a barometer. That was for a science project. So then I got to mark every day – it was very simple. It was just a jar, and I had a straw. I was marking whether it went up or down, and relating that to what was actually happening with the weather. That was pretty cool, too. As I got older, what I realized, and this is related to development in NOAA [National Oceanic and Atmospheric Administration] with technology, is that at that time when I was growing up, weather radar was not something that you saw on the news. Right? There was no network of weather radars. I ended up going into that. I may be skipping ahead here, but I see such a contrast between what students can see and learn now by looking out the window and actually seeing images like weather radar images and other data that are now available, and what we had when I was growing up. These technologies – it started with me; it was just something as simple as a homemade barometer, but there are so many technologies that have evolved since then that really help someone better understand storms and what's happening within them, above and beyond looking out the window.

MG: Right. I'll have you say more about those technologies, but I wanted to ask – I think I read that you were once fearful of thunderstorms.

PH: I was. I was, especially when I was in kindergarten. Yes, I have this memory of my mom picking me up. We had to walk about a block to the bus stop. One time, my mom was walking me home, and it started to rain. All these raindrops were on me. I probably wasn't properly dressed. I was getting wet. It just freaked me out, and I didn't like that. Yes, it's just funny. When storms would happen, and there'd be lightning, my room was in the back of the house, and it was really close to – we had a little forested area, and we had this really big old tree; it was probably about a hundred-year-old oak tree. I had this fear of it getting struck by lightning and something falling on my room from the tree. It's interesting to look back and see how concerned I was, how I had this fear for these things, but I also was just very tuned into watching and feeling those things. Then, over time, that fear evolved into a lot of curiosity and wanting to understand what was going on to make those things happen.

MG: I was curious if your eighth-grade science class or your at-home weather projects were helping you overcome those fears.

PH: I think so. I think so. I think the more you understand and explore something – because I also remember my mom buying me a little book that had pictures of different clouds and explained what they were. She also took me to visit what, at that time, was the World Weather Building, where they actually produced a lot of the synoptic maps and things that guide weather. I actually got to meet the people who are doing those things. So bringing it to life and making it real, and understanding what was going on definitely helped to evolve me from the – "Oh my gosh, what's going around me? Am I going to be hurt?" to "Oh my gosh, this is really cool." Yes.

MG: It sounds like your parents were very encouraging of your interests and furthering your education.

PH: Yes.

MG: What other ways did they support your interests?

PH: Yes. So my parents were always very encouraging of me reading, providing experiences, like I said, in the outdoors and finding links, and also to develop my interest and supporting me in programs that were outside of school. I remember when I was – I think it was in middle school as well. I went to – I think it was – St. Mary's [College of Maryland]. There was a school in St. Mary's, Maryland that I went to that was a creative writing class that was in the summertime. They supported me going there and doing some creative writing. Also, like I said, the trip down to the World Weather Building. Also, instilling me with the idea that I could do what I wanted to do. Because I was a woman, that didn't mean I couldn't go into science or into math or any of those kinds of things. There was always this expectation that yes, I can go to college, and [they] expected me to go to college because they knew that I could do that and that there were no limitations in terms of what I could achieve or what area I would want to go into.

MG: That's important.

PH: Yes.

MG: What year did you graduate from high school?

PH: High school was 1988.

MG: What did you hope to do after graduation?

PH: At that time, I was really thinking professor even early on before graduating from college and going to school. One of the reasons for that is that from the time I was a very little girl, I was always very interested in teaching and teachers. My little brother, he became my student. In the basement, we had this chalkboard that my parents had bought me. It was a flip chalkboard. I would write on the chalkboard, and teach my younger brother the alphabet and how to add, and all these different things. I even liked to choose dresses out of the catalog for school that reminded me of teachers. Somehow, innately in me, I felt that being a teacher in some way, shape, or form was a good fit for me. So going the meteorology path, I thought professor is what that looks like.

MG: Did you look at other colleges? Maybe in-state schools?

PH: I did. I did. It was actually really interesting and frustrating at the time, actually. At that time, too, we didn't have the internet to look for schools. So you went to the library. There was this really fat book, in which you opened the pages and said, "Okay, meteorology. Where are there meteorology schools?" What I learned was that in Maryland, there were no schools that had undergraduate programs for meteorology. So they all started at the graduate level – University of Maryland, for example. So that cut Maryland out of the picture for me. So I explored Penn State. I explored Millersville University, which is also in Pennsylvania. I explored the University of North Carolina, Rutgers, and then St. Louis University. St. Louis University was the whim because I'm like, "Oh, well, I'll go check that out because I was born in Missouri. Wouldn't it be fun maybe to go to school in the state where I was born."

MG: Did you have any other connections to the area? Family members that lived there?

PH: No. No. I knew no one. I didn't know anyone there. But somehow, I felt this draw just because I think I was born there. I think there's a bit of an explorer in me. I like being in new places. In particular, there was such a large city, and I never lived in a city. I'd always grown up in neighborhoods that were suburban or even rural-ish. We had a farm behind the house where I grew up when we lived near Westminster. I think there was this draw of the unknown and experiencing that.

MG: Did it also offer the things in the outdoors that you liked, such as hiking and swimming?

PH: Well, they do have a warm season there. So, yes, you can definitely swim. On campus, there were swimming facilities. There's this very large park called Forest Park in St. Louis that has miles and miles of trails that you can explore while, at the same time, offering things like an art museum and a zoo, and all those places were free. So it was a great place to be able to get

away from studying. It was walkable, so my friends and I, if we wanted to – it was a bit of a walk, but we were young and enthusiastic, so you could walk straight from the university to Forest Park, and then explore those trails that took you into a different space.

MG: Neat. Can you talk to me a little bit more about those four years at St. Louis University, the classes you were taking, and the teachers you had?

PH: Yes. So what's interesting about St. Louis University is that even though I was in a science program, it's a very balanced curriculum. It's more of a liberal arts curriculum, if you will, even if you have a science major. So lots of art classes, history, music, things like that. I really liked the well-roundedness of that because I always had interests in a variety of things besides weather. So that was pretty cool about that. I had one professor, in particular, Dr. Moore, who's now deceased, unfortunately. But when I first started there, he was one of the first people I met and my parents met. He just had so much excitement and energy about the weather. When we were in classes with him, he would point to things out the window – "Look up there. There's a cumulus castellanus." I can never say this right. It looks like little castles bubbling up in the sky. He really brought what you see observationally to the classroom. He was a synoptic meteorologist. I remember him the most out of all the professors that I had there at that university.

MG: Did you stay in touch after you graduated?

PH: I did, yes. We stayed in touch via email. When I would go to conferences and things, I would always meet up with him and other alumni from St. Louis University, and have meals. On occasion, I would call him on the phone because he was someone you could reach out to if you had some challenges in a new position. He could help talk you through it and see some light at the end of the tunnel.

MG: Good. I think around the time you were enrolled in the program, there were equal numbers of male and female students in the department.

PH: Yes.

MG: Was that important or significant to you?

PH: It was. It really was. Because I know that that was rare. One of the reasons I probably knew that was rare was because they made such a big deal about us having equal numbers within that program. I think it gave us the opportunity to hang out with guys who can kind of be like you, but then girls who were sharing some of the same challenges or interests, so we could have our own cohort to help each other through the program.

MG: Was that unique at St. Louis University, or were atmospheric science classes becoming more representative nationally?

PH: It was very unique for that time.

MG: At your university?

PH: Yes. Compared to other universities because there were other universities that I went to later that did not have many females within them, or even in the workplace when I started working. There were not very many females compared to the male population.

MG: What was your major at St. Louis University?

PH: It was in meteorology in the Department of Earth and Atmospheric Sciences.

MG: Is there anything else that you want to share about your college experience and what you focused your coursework on? Anything else that stands out to you?

PH: Two things that also stand out – one is that we had an intermural softball team that was comprised of the ladies and guys who were in the department. That was really a fun time. It gave us an opportunity to do something together. Actually, along that line – this is triggering a memory – every fall, we also had a fall picnic kind of thing that we kicked the year off with. We would play softball there, too, and have sandwiches from Amighetti's, which was a really great Italian sandwich shop. That was always a really cool thing. I think the camaraderie that was in that
group through these different types of activities that we did was really great and, I think, formative for me. Another thing that was also related to the department is I was involved in our – I'm not sure if it was National Weather Association or if it was the American Meteorological Society, but we had a little unit with student members and people in the external community. I don't remember if I was president or vice-president, but I was involved in the leadership of that group and helping to plan activities and some of the speakers that we had. I think that was also very formative for me because it helped me develop some leadership skills, while at the same time, getting exposure to others who were in our community, the National Weather Service and other groups. Those are two things, besides all the time I spent in Forest Park taking a break from studies. [laughter] There's maybe one other thing I would mention was that I lived in the dorms the entire time as an undergrad. In my building, in the entrance to the building, there was a piano that sat there. You could play it anytime you wanted to. I grew up also taking piano lessons and became good enough to be able to accompany the choir, the chorus, and play for some of the musicals and things like that. Playing the piano was also a love for me, and it helped me solve problems. So if I got stuck on a math problem, I knew if I went out in the lobby and I played the piano for a while, I could come back, and then I'd probably be able to figure it out. So just having accessibility to that piano in the entrance to our dorm – I spent a lot of time playing on that piano, and also met a lot of people because then they would come over and listen and introduce themselves. That's another strong memory for me during that time.

MG: Is that something you've maintained in your life? Playing the piano to help solve problems?

PH: Yes. Yes. Actually, when I moved to different places after I got out of school, I actually had this really old piano that I could afford. I would enlist some of my male colleagues to help bring it up to second-floor apartments, for example. When I earned my PhD, my present to

myself was a Clavinova piano – it's like a digital piano – because that would fit in my home. So it's always had a role in my life.

MG: Neat. And probably makes you fun at parties.

PH: [laughter] My brother is more fun at parties than me with the piano because he plays by ear. I'm more have to play by reading music. So he's a true entertainer.

MG: That's fun. Was it something you had in your household growing up? Were your parents musical?

PH: They were not very musical, but I think my dad had taken lessons. I think at that time, having your kids grow up and learn to play the piano was – it was the thing to do. It was much more popular than it is today, perhaps. I think they wanted that for us. I remember my first piano lesson, I took [in] either first or second grade – especially after we moved to Westminster, I became very serious about playing the piano. I was in lots of recitals and things like that. Like I said, it was a way to get lost in something different that felt so creative because you can put your own – even though there's notes to follow, you can put your own interpretation and feeling into the music. That's something that I've always enjoyed.

MG: Now I'm curious about the music you listened to in college. Who were your favorite bands and artists?

PH: Oh, gosh. There were a lot of different ones. I always liked pop music, and I used to listen to the countdown or the Top 40, things like that. I loved dance music, so I was also always into dance. I taught aerobics when I was in college. I've always also been a gym rat, if you will, and have loved dancing to music. But I've also always loved classical music and music that's very piano-focused. So George Winston, for example. He makes beautiful renditions or compositions of music that describe different times of nature, like December in his album *December* and *Autumn* and [*Winter into Spring*], and things like that. So I've always loved listening to music like that. But getting back to the pop side, I think at that time, who was popular was Bruce Hornsby and the Range, and he's always had a lot – piano is a big part of his music. So I would listen to that a lot. My younger brother and I – actually, when I had an internship in Maryland when I was in college, he and I got together and went to a place in Columbia – I can't remember the name of the – Merriweather Post Pavilion – ha, there you go. Wahoo! So we went there and saw them in concert, Bruce Hornsby and the Range. It was a really cool thing for he and I to share together because he also liked the piano, but he liked to play from ear because he was so talented in that way.

MG: Neat. I also wanted to ask – you must have been a good student because you got an academic scholarship to St. Louis University.

PH: I did. Yes, I've always taken school seriously and have wanted to excel. That's always been a drive in me. I take a lot of joy in learning new things, and I still do now. I think that was a big driver for me.

MG: It must have helped financially to have a scholarship.

PH: Yes. Oh, yes. Going to a private school with that scholarship ended up being cheaper than if I had gone to an out-of-state school. I was happy in that choice because, like I said, I got that financial help, I got to meet a whole new group of people, and experience living in a city, which was something totally new to me, and I think somewhat frightening to my parents. [laughter]

MG: Were they worried about you?

PH: Yes. Yes, because at that time, the school – it had a number of buildings around it that perhaps weren't that well-occupied. There were some areas nearby the university that weren't all that great. So I fully understand that type of feeling. Of course, I was always careful, but I wasn't really afraid. They had on campus – if you were at the library late at night, they had someone who would walk you back to the dorms. So they had things in place to help you with that. But I think it gave me more exposure to the real world than where I grew up, and also access to things like the Fox Theatre, [which] was right down the street. I got to go to the symphony very easily. Instead of having to drive from Westminster to Baltimore or Washington, D.C., it was right down the street for me. They had student tickets that were really cheap. A long-term friend of mine was really into organ music, and he was part of this organ society. They had this Wurlitzer organ at the Fox Theatre. Usually, it was hidden, so they could bring it up out of the floor. One time, he got hooked in there so I could come and play it and be there all by myself with the guy who led the use of the organ. So I brought my *Phantom of the Opera* music with me. I was able to sit – he has this picture of me sitting at the Wurlitzer organ, and it's so ornate. I looked so tiny sitting [laughter] at this huge organ, but it was such a great experience to then get to do that on this instrument that was just so fantastic, not only from an historical standpoint but from a sound standpoint, and being in this very ornate theater. I don't think I would have the cultural experiences that I got there if I had gone to some of the other places that I was looking at.

MG: That sounds like such a cool experience. Do you know how he arranged that?

PH: Well, he was part of a society, the Organ Music Society. So he had an "in" and just plugged me into that so I could have that experience, which was very special and still memorable.

MG: Can you tell me more about the curriculum and the weather technology that you were learning about at that time?

PH: Okay. So at that time, there were – well, weather maps were a big deal. We had this whole wall that was covered with weather maps, and of course, a lot of those were generated by soundings that are put out still, even today twice a day. Those give you observations around the whole country, vertical profiles of the atmosphere, so you can see where are the highs and lows, and what are the temperatures at different levels in the atmosphere that aid forecasting. But at that time, there are also some new models that had come out. I want to say maybe the NAM [North American Mesoscale Forecast System] was one at that time. I know definitely the LFM [limited-area fine-mesh model]. So there were some models that today don't look very

sophisticated, but they were model forecasts that were starting to come out, as well as satellite meteorology was something that was really starting to come out then. We could look at some of those observations, along with other ones. So we got some exposure to those and learning how to relate those to forecasting and what was happening in the environment. One of the unique things about being there at that time is that there was an experiment that was focused on winter weather. So they had this opportunity for students to be up in the middle of the night, and go to the top of our garage, one of the parking garages, and we would release soundings from those. It was really cool to be part of data collection as a student and know that you were contributing to new understanding that was happening in science.

MG: That's so neat. And you had a couple of summer internships I wanted to ask you about. One was in Norman. You'll have to remind me –

PH: The National Severe Storms Laboratory [NSSL]. Yes, that was my first internship. That was really cool because it was my first time in Oklahoma. I didn't really quite know what Oklahoma was like at that time. I got to go there with one of my school friends. The two of us went down together for that. It was really cool because you got to choose what kind of project you wanted to be on. You got to know some of the scientists who were there because they gave seminars, and we were all invited to go to those seminars. They had some teaching activities, where they were teaching in more detail some of the things we're learning about in school, like analyzing synoptic maps and things like that. There were also opportunities to do fun things. So a lot of the grad students, we got to hang out with them and play volleyball, and just hang out and get to know students who were from a different place and were studying different kinds of things than perhaps we were studying at St. Louis University.

MG: What was the focus of that internship?

PH: The purpose of that was to get some experience doing research projects. What was really interesting about that for me, in retrospect, was that they had different descriptions of projects that you could choose from. One of them was hands-on. To me, hands-on meant dealing with observations. I was really interested in radar data actually at that time, and National Severe Storms Laboratory is the place that was really an incubator for studying radar, and understanding the signatures associated with them, and bringing that into the network that we have today. When I checked that I wanted to do something hands-on, that's what I thought I was going to be doing. It turned out that that's not what I got to do at all. [laughter] So, instead, I ended up working with field meters. So hands-on really meant working with soldering and electronics and things like that, which really was not my forte. But it ended up being interesting. I didn't really get to do a research project because it was really just interacting with these instruments, and then going out and collecting data with them. So from that perspective, it was a little bit disappointing for me because my good friend who came down with me got to look at the radar data, and I was very jealous. But what I did learn is what it's like to go out in the field and collect data when it's really stormy outside. The goal was to bring these electric field meters, which then take observations of lightning. I think some of them also had instrumentation that collected information about precipitation size, the size of different particles, and things like that. So what we would do is we'd put on this rain gear. It was all yellow, your typical yellow raingear. It was all way too big for me because I was even teenier then than I am now. It was

built for men. So there's an example of the male-dominated workforce. So it was huge on me, but I wore it, got boots on, all of that, and then we would get in this truck. I got to help blow the balloon that was – it's the same kind of balloon that carries sondes up every day, but we were carrying these electronic field meters and different kinds of instruments. So I got to blow that up, wrap it up in Velcro, put it in the back of a truck. Then we'd get in the truck, and we had these cameras on top of the truck that then could see the clouds and things like that. So then we'd be looking at those as we drove towards our destination where there were storms expected, usually, I think, meso-convective systems – a lot of electric activity and heavy precipitation. We were actually looking to be in places where you could get struck by lightning, which, in retrospect, is a little bit funny to me. But we would find our location, and then the guy in charge would have to go and talk to the people who own the property, and say, "Is it okay if we plant our vehicle here and launch balloons." Usually, that went just fine. Then we'd go out in the pouring rain. Oftentimes, I was the person who got to pull the Velcro strip and then watch the balloon going into the atmosphere. So I think my learning about what fieldwork looks like and the nuances of that I learned quite a bit, but I didn't get to do the data analysis type project that I really wanted and what I understood as hands-on. I think that was one of the experiences where you learn that how you describe something isn't necessarily how someone else does. Kind of like when you look at a painting and someone may see something totally different than what you see. I wished I'd asked some questions. So that also fueled my understanding. I always asked a lot of questions in class. I'm like, "Always ask questions because then you know better what you're getting yourself into." [laughter]

MG: Did you come to enjoy this kind of work?

PH: I did enjoy it. The part going out into the field, I really did enjoy that a lot because I got to see the cloud formations. There, unlike Maryland, it's so flat by comparison that you can really see the structure of storms. Just being part of that excitement of getting to the location and having storms form that you want to see form, things like that, was very exciting. I learned a lot through my observations of that time. So very deeply appreciative of that, and I also met a lot of people who taught me things and who really I still know today and who have played a large role in my career. One of them is Harold Brooks, who's in my unit now. Who would have thought he and I would be in the same unit? I'm now officially his boss. But he was one of the people who really inspired me during that time. I know he gave some talks and things like that. So there are all these personal relationships that were built at that time that have been really great relationships that also helped me be successful in my career.

MG: Did you have a sense then that you would come back to work at the National Severe Storms Laboratory?

PH: At that time, no. Actually, no. I didn't think that I would be back there, although I'd had a great time, and seen storms like I've never seen before. It just really wasn't on my radar screen, so to speak.

MG: Was any of it scary to you like thunder and lightning storms were when you were a child or had you overcome that?

PH: No, I'd overcome that. I actually thought it was really exciting. Even today, when there's a thunderstorm, my husband and I have great disagreements about this because I like to have the blinds up, and I want to look. I want to be right next to the window and watch the lightning. He's not so much a fan of lightning, having grown up in Florida, seeing some deaths associated with that, like on the golf course and other things. So we have to balance my love of seeing it firsthand and his desire to be away from it. But yes, I love to observe those things from a safe place firsthand.

MG: A year later, you had an internship back in Maryland. I was curious about that.

PH: Yes. That's really interesting. I was at the Climate Diagnostic Center, which is in the World Weather Building, which my mom had taken me to explore when I was a younger person still going to school. That one really rang true with me in terms of doing the kind of work experience that I wanted to gain because I was doing coding. I was doing Fortran coding, and that was probably around the time I had taken that course or maybe right before. I was taking global-type data; it was maybe snowfall data and temperature data, and I was doing programming to understand the relationships between those two datasets. I really enjoyed that, although, at times, it was somewhat difficult. I had some really great mentors there as well, but I really enjoyed doing that kind of work. Again, we had a really great cohort. The students were staying at the University of Maryland on campus in the apartments that were for seniors. So they were pretty nice. We each had our own room, and we had a kitchen. At that time, we had a state car that we got to use to get around. So I actually felt like that was a better fit for me at the time. I really liked the people that I saw around there and I was working with. Not that I didn't like people at the Severe Storms Lab as well, but I think the work that I got to do, I could see a fit for me there.

MG: Did you ever apply for a position there?

PH: No. No, I didn't. But I did think, after that point, that I wanted to go more of a climate route than a severe storms route. My journey through my career has had a lot of changes based on my experience.

MG: A year later, you would go to graduate school, where your focus was climate science.

PH: Yes, I was looking at ENSO [El Niño-Southern Oscillation], looking at El Niño and the sea surface temperatures that were in the Indian Ocean that were associated to different cycles related to El Niño and La Niña. I actually enjoyed that quite a bit, too, and became very knowledgeable about those things. So then that experience there drove me to want to go on and get a PhD that was actually focused on climate. So if you're ready to go there, I can go there.

MG: Sure. But I wanted to ask what made you want to stay on at St. Louis University for your master's degree.

PH: Yes. So I think, for me, I knew I had a place there. They wanted to continue to support me. I had a GRA [graduate research assistant] offer – actually, I had a TA [teaching assistant] offer. I didn't do GRA, but I had a teaching assistant offer. I knew that I wanted to get some

experience teaching. They had a new professor there who was focused on climate-type studies; it was Dr. [Charles] Graves, who had just started there at that time. It was an opportunity to study an area that was of interest to me, but also lead some classes – I lead an introductory class that was about soundings and how do you interpret sounding characteristics and some basics on maps, synoptic maps and things like that. So it gave me an opportunity to get teaching experience and see how I liked that in a real-world capacity while also doing some research in an area of interest.

MG: I know that there were equal numbers of female students in your department, but did you have any female professors?

PH: No.

MG: Did that change later on, when you went back for your PhD?

PH: When I went to the University of Illinois – so I went to the University of Illinois for one semester, and actually, my advisor there was a female. I think she was the only female in that department, and I think she was new. So that was when I had my first experience with a female in meteorological science up to that point in time.

MG: How come you only stayed for one semester?

PH: Burnout. [laughter] Yes. I think because of all the internships I had had in the summer and all the energy I had put into school, I ended up being tired and didn't really feel like I had the energy to continue. I also chose climate dynamics, thinking that would be a good fit for me. As I got more and more into reading the literature, the interest wasn't there that I thought would be there, given my experience before that. So I was like, "Oh, maybe this is not where I need to be right now." At that time, I started looking for opportunities to gain some work experience. So I did that while I was going to school, and I ended up finding an opportunity before the end of the semester. I actually changed advisors during that time because I'm like, "No, this is not right for me." I changed advisors to polar meteorology, thinking that perhaps that would be of greater interest to me. It was really interesting. I really liked the professor who was there, but I realized that it wasn't just the topic. Like I said, it was also burnout. If you're going to get a PhD, you really need to have the energy and the dedication to want to do that at that time. I realized that I didn't have that. It was time to gain some real-world experience, if you will, and get a job and do something different for a while.

MG: So what was that process like, applying for jobs? I know you ended up in Oklahoma almost right away.

PH: I did. I did, yes. So, my friend Kelly, who had gone to the internship at the National Severe Storms [Laboratory] with, she knew I was looking for a job. She had seen an announcement at NSSL for a master's-level coding person to build algorithms using weather radar data. So she threw me that way. Up to now, you wouldn't think I had any experience with weather radar data, but I actually did because I forgot to tell you about one of the things I did when I was – I think it was during my master's degree. Yes, during the master's degree

program, I also worked for Dr. Lin and did some radar work with him. I was doing that on the side in addition to doing my research with Dr. Graves. So based on that experience, I was starting to think, "Maybe I'm more interested in severe storms." So it was an interesting flip-flop because I had gone from severe storms to maybe, no, this climate thing is really cool, and thinking, "Well, you know, I've always had an interest in storms as a child. Maybe this is a good opportunity for me to get back there." I applied and was flown there. It was funny because when I flew there, I thought I was going to be coming back the same day because I didn't want to miss class. But it ended up being really foggy, so I had to spend the night, and then I had to let my teachers know, "Oh, I won't be in class …" [laughter] But the interview for that went really well, and that's one of the places where my relationships with people there paid off because besides doing well in school and having worked on radar data on a side project, they knew that I was a hard worker and that I liked to work in a team and things like that. That opened the door for me to have my first job as a master's level research associate. So that lined up very well where I could finish my semester at the University of Illinois and then move to Oklahoma. I started in early January in that new position. It was through the Cooperative Institute for Mesoscale Meteorological Studies [CIMMS] that I had that first position.

MG: Can you talk a little bit about the relationship between CIMMS and the National Severe Storm Laboratory?

PH: Yes. That's still a working relationship to this day. It was around before I got there. Just a few years ago, we celebrated the fortieth anniversary of that institute, which is CIMMS for short. CIMSS is a cooperative institute for NOAA. We have different cooperative institutes around the country. This one, of course, is mostly focused on mesoscale and severe storm type research. So they're collocated. They were in Norman. At that time, they weren't at the exact same facility, but it was a way to hire research scientists and associates to help accomplish NOAA's mission and expand that capability above and beyond the federal workforce, which you always have base funding for that. The funding doesn't usually provide the capability to do the scope of research that is required to best fulfill the mission. So this was an opportunity to be affiliated with NSSL, working through this cooperative institute.

MG: Right. And can you say more about the work you were doing there?

PH: At that time?

MG: Yes.

PH: Yes. So, at that time – let's see. So this was the mid-'90s, '95. The Weather Radar Network that we now have had just happened. So it was the nation's first network of radars that had Doppler capability. So this network was installed in the early '90s. It's called the WSR-88D, so the Weather Surveillance Radar, 1988, D being Doppler. It was actually disseminated and implemented in the field in the early to mid-'90s. I think it was around '96, perhaps when the last radar was installed. Like I said earlier, there was a lot of research that happened at NSSL that brought that network into a reality. So the lab, in cooperation with this institute, was doing algorithm development that took this weather radar data, and looked for signatures that were precursors to things like hail, to the development of supercells and tornados and even just

identifying a storm as an object, and then being able to compute different attributes associated with that storm. What I was hired to do was to work with an algorithm that was called SCIT [Storm Cell and Identification Tracking], which is essentially a storm identification algorithm, and helping to verify the performance of that algorithm. That was my job, which then grew into using some of the attributes. I was looking at things like storm longevity. Can we track things like the maximum intensity of reflectivity or the size of the storm? Different attributes that we were computing through coding with the radar data to then see is this going to be a long-lived storm, or is it going to be a short-lived storm? So essentially, using the data, doing programming to identify potential relationships that could be useful to a forecaster. At that time, there was also a new display system. It was called WATADS [WSR-88D Algorithm Testing & Display System] at that time, and it became WDSSII [Warning Decision Support System - Integrated Information], but essentially, it was a display system that enabled the forecaster to receive all the information about these storm attributes. So there are tables that had the intensity of circulations and storm attributes and allowed them to zoom in and zoom out, and look at weather radar data. The group I was in was taking that to different offices around the country, and training them on it, and receiving feedback from them on the use of that technology as a forecast tool, in particular, in the issuance of warnings. So that was a really cool way to see a connection between the development of new tools that were happening at the laboratory and with this cooperative institute and then the application in an actual National Weather Service offices. Then taking what was learned there and bringing it back into the development process so that those tools could better suit the needs of the forecasters.

MG: When you talked about the Doppler being disseminated and installed throughout the country, what does that mean? What was being installed?

PH: Prior to that, the United States did not have as dense a network of radars. There were some around, but I think they were mostly used from a research capacity. The development of radar started with the military. That was the primary way that they had been used. A lot of the technology that's developed within NOAA – maybe not all of it, but especially radar and some other tools – started in the military. Then, once it's declassified enough, we, being in a science community, have then looked at applications of that radar then that can benefit the atmospheric science. So the key thing there that was being brought to the table is before these radars, we could see returns from storms that would tell us the size of particles in a bulk sense within storms, but not any wind motions within the storms. So having the doppler capacity then gave us information about wind that's perpendicular to the radar. So either coming or going from the radar. Every state had at least one of these, and some states have multiple. I think most states have multiple weather radars. So now forecasters and other users could actually see if there's rotation in a storm if it's oriented – that rotation like this, if it's perpendicular to the beam, you could actually see that there's circulation in the storm directly, versus having to look for something perhaps just like a hook that you would see in the reflectivity data. So now wind characteristics, not only associated with circulations but also with microbursts, were being studied a lot during that time, and perhaps even before that in terms of producing a lot of damage near the ground. There are certain radar signatures in the wind that are associated with those. It really provided observations from which you can deduce processes that are going on with storms that either show you that yes, something that we forecast or warn on is happening now, which, of course, is very good information, but then also seeing precursors – you have conceptual models

for storms that we've learned from field programs, and now you can actually see some of those concepts in action within the weather radar data.

MG: The newer technology that you and your team were helping to develop, you mentioned you shopped it around the country. Who were you introducing it to? Other forecast offices?

PH: Yes, so it was National Weather Service forecast offices. I remember we went down to – Dallas-Fort Worth was one of the offices. I think Peachtree City, [Georgia], was probably one. So it wasn't only in the heart of the country. We went to offices in the Southeast United States and the Midwest and interacted with them to get their feedback on the use of these new tools. That's really one of the big components of the National Severe Storms Laboratory and what the Cooperative Institute helped facilitate, is not only the research components of learning and understanding about severe storms but then developing tools from that knowledge, which then can be transferred and be of use to forecast offices, whether individual offices or centers, like the Storm Prediction Center, for example. I think that's something that was very attractive to me, to be a part of that process and see a linkage from science to society, if you will. Even though we weren't producing things directly for society, we were producing tools that could help forecasters better inform society. I think for me and other people who work at the laboratory and for CIMMS, that's a big draw, to be able to work in that space.

MG: Was this the work you were doing between 1995 and 1998 when you were on the transfer team?

PH: Yes, yes.

MG: What changed in '95?

PH: You mean compared to –?

MG: I looked at your resume, and it says you were a research scientist until 1995 for CIMMS, and then in 1995, you were part of the Severe Weather Warning and Technology Transfer Team.

PH: That was my first team. Actually, that was a part of it; I changed teams many times. That SWAT team, if you will, was the group that was doing the algorithm development and doing testing in the different offices with this display tool that was showing things like the tornado detection algorithm and attributes and meso and storms. Then, after that, I started working a little bit more with a group that was doing flash flood work, which was cool because there I also got to go out and go to different offices and train them on some of the technologies that were being produced there, but the big thing, which maybe you're going to ask me about [laughter] is during those three years, from '95 to '98, I did work in a similar area, but I was also realizing that perhaps working specifically in the area wasn't – although I was enjoying it, it wasn't fully satisfactory for me. During that time, I started talking a lot to more of the senior – well, to me, they seem like senior scientists, but now that I'm probably their age or a little older than they were at the time, they don't seem that senior anymore. But they were PhD scientists who were doing more basic research. I found myself spending a lot of time in their offices and talking with them and asking them to review my papers, and seeing what they were doing as very attractive.

So through my interactions with them and having some time away from school, I eventually came to the idea of – "I can go back to school now. Maybe I'm ready to earn that PhD and do that." So through my getting bored, if you will, and wanting to do something different, and their encouragement, it was around '98 or something like that, when I decided to go back to school. It was convenient to be able to do that because the University of Oklahoma [OU] is in Norman. So I could do that and continue working at the same time.

MG: Tell me about both of those things and how you negotiated your work and education. I'm also interested to hear more about what this PhD program was like.

PH: Yes. So what happened there, which was great – it took a lot of exploration, but one of my goals was for my research project to be associated with work so that the research itself wouldn't have to be separate from the work I was doing because, I'm like, "Well, that would not be very feasible to do that." I had initially looked at a snow project with Dave Schultz, and he had tried to get funding for me, but that didn't happen, unfortunately, although he got to participate. It looked so cool because they were doing fieldwork and hard data analysis. But what happened was that Ken Howard had some money, and he was in this flash flood group, the hydro group that I talked about being a part of. He had some funding from a power company in Arizona to look at patterns of storms as they relate to the Phoenix area and the mountains that are to the north of Phoenix. Their question was: Are there places where we can put power poles, really strong power poles, that perhaps are not impacted by storms as much as other locations. So he said, "I have funding to do this project. You can make it whatever you want it to be." I said, "Okay, sign me up." He had taken me out to lunch and told me about this. So I was like, "Great. I'll do this." Dave Schultz ended up being my advisor, so I still got to work with him because I really admired him, his scientific acumen, and things like that. So I got to work on that, and then I just did my schoolwork on the side. So I did that in the evening and after hours, and pretty much just took one class at a time. I started with the classes that I thought were most relevant to my job before I really got into the program. So I started with multivariate statistics because a lot of the work I was doing was statistical in nature. So I'm like, "Well, I can take this class and dip my toes in and see how that goes and see if I have the energy." I ended up doing really well in that class. I really enjoyed it. That's when I'm like, "Okay, I'm really going to jump into this program." I had my research component, put together a committee, and just worked at going through the coursework that I knew I needed to do to complete the program. Also, another thing that was really cool was that some of the researchers that are at NSSL that I looked up and encouraged me to go back to school; they taught some of the courses. They're affiliate professors. So Harold Brooks, for example, who I mentioned earlier, he still teaches a class on forecast verification. That was an area of really great interest to me. I got to take that course with him. Then Dave Stensrud, who was a scientist at NSSL for quite a long time, he was teaching the class on parameterizations for models, and how perhaps not so great they are because they're oftentimes derived from – this is so eye-opening. They're derived from science projects that are usually in one area, and they go and collect a lot of observations. Now, all of a sudden, you have this parameterization that describes things, which isn't necessarily generalizable. I got to learn a lot about parameterizations associated with models, especially close to the ground. There were these really nice ties between things that I knew were being taught by people I really respected, things I was really interested in, and I knew would tie back to my work. The other fun thing about going back to school during this time was that I realized that

the experience I'd gotten working and writing papers and reports and giving presentations, all of that made classes easier because I had these tools that I didn't have before, and I had a very directed vision of why I was in school and what I wanted to get out of it. Overall, even though it was difficult at times, it was a very rewarding experience.

MG: I wanted to ask about any difficulties. Were there challenges in work/life balance, juggling commitments, or anything else?

PH: Definitely. Although, when I moved to Oklahoma, I got involved in playing softball on a coed team. So I still was able to do that, although I took some summer courses, especially initially. So I'd be sitting at a picnic table at the park doing my homework, and then I'd go and play on the softball team because I always have loved playing softball since I was in third grade. So I was able to maintain some balance in that area. But as I got close to the end of finishing the degree, I had some really good circumstances happen. Dr. Jeff Kimpel was the director of NSSL at that time, and Dave Stensrud was talking with him about perhaps speeding up my ability to complete. Because when you're taking just one class at a time, it takes a while to finish those requirements. So he was able to identify resources that enabled me to go full-time to school for one semester. That enabled me to take three classes and really just focus on it and finish. I've been forever grateful really for that opportunity to just focus, get done. Their confidence and wanting to support me in doing that just made a really big difference for me.

MG: Good. Did your dissertation end up being about the research in Arizona or something else?

PH: It did. It did. I did a climatology. I put together a climatology of identifying different types of patterns of storm development that were associated with the mountains. For somedays, I classified patterns of storms that would move into Phoenix, which are really their most problematic from a power company point of view. Then also, days on which convection was focused on different areas of terrain. I was able to make that much broader and more interesting by then also bringing in synoptic climatology and looking at the wind patterns, the moisture intensities, and things like that that were then associated with that radar-based climatology. So I was able to bring together using GIS [Geographic Information System] to visualize these things, identify those patterns, and then also bring in environmental information so that you could actually learn more than what I was initially tasked with, which was fun about it because I could make it my own thing, which I think was really a big driver for earning my PhD, is I wanted to have more say in what I was doing and being able to use my own creativity to develop projects and the direction of projects. So I did end up meeting the requirements of the funding but also gaining a PhD and new tools out of that that perhaps I didn't have before.

MG: I thought you had a different position while you were pursuing your PhD, in the hydrometeorology group.

PH: Yes, yes. Ken Howard was the lead of that. This work was then funded through that group. I also got to work with people who were doing some basic modeling, if you will, taking radar data, satellite data, and things like that. J.J. Gourley, for example, was in that group, and he was developing tools for estimating precipitation. I was one of the people who volunteered to then take that new tool to the Weather Service offices, which I think I mentioned earlier. One of the

things I've always enjoyed and volunteered for is taking some of these new tools, whether I directly helped invent them/develop them or not, and take them to the forecast office, and do training on it, and do learning with the forecasters like I did with the other radar technology development that I did. That was another component. I'm sure I did other things while I was there, but I don't really remember exactly what those things were.

MG: Were you involved with the Red River Flood in North Dakota? Do you know when that was?

PH: I don't remember that being a focus, but I know there were some hurricanes that happened that were very much related to the hydro modeling because part of what we were developing was storm surge modeling and being able to connect that component. I don't remember exactly what hurricane it was, but there was one that happened in North Carolina that was very significant – water coming into the rivers, into that state, and there was a lot of devastation associated with that. So some of these tools that were being developed were meant to help the forecast offices identify those situations and the magnitude of what those events might look like. So the offices I was visiting – I think it was Raleigh and [Morehead] City, and other ones along that coastal area where those tools – their interactions with those offices to get those tools tested for them.

MG: What was it like when you finally finished your PhD?

PH: I was happy, [laughter] celebrating. Yes. That was a really big milestone for me to finish that. It was also a bit of a challenging time because the lab was going through some financial challenges at that time. I think the Valentine's Day massacre is what we call it. [laughter] Some funding that had been there had not come through. That was around the same time I was finishing my PhD. Because of that, I ended up being moved from the hydro group, actually to a dual-pol radar meteorology group. I think it was maybe six months before I finished my PhD. I had some overlap between finishing my PhD and being moved into that group. So I was very happy to be able to continue my work. There I was the only woman who was in the division.

MG: Was this the Radar Research and Development?

PH: Yes. Radar Research and Development Division. It was a big change in that they were focused on dual-polarization radar, and I hadn't focused on dual-pol radar, and that was the next big thing coming down the pipeline. That was very exciting, but I was also a fish out of water because I hadn't really worked with that group before. But it ended up, I would say, being the biggest opportunity of my career because as I got used to working in that group – and Dusan Zrnic led that group – and some of my best friends actually that I still have today were in that group. What was happening at that time besides testing of dual-polarization data, which I did some verification work related to hail classification and things like that – at the same time, there was some technology called phased-array radar that was taken from the Navy – again, the military track of technology and NSSL was exploring that technology for weather applications. At that time, it had just been installed. The radar engineers were working on getting that up and running and having a software interface from which you could actually run the radar and get quality data from the radar for this new idea. Actually, getting data from storms is different than how you work with the data if you're trying to track aircraft and things like that. One of the

things I realized during that time – because I was saying, "Do I want to stay here, or do I want to go be a professor somewhere?" I realized there was an opening because there were no meteorologists who were leading the work and working with the engineers. I was like, "Huh, maybe this is an opportunity for me to be able to do something in which I'm helping to lead and build my own expertise." Because, a lot of times, I got hooked onto projects that were at the tail end, and I hadn't had an opportunity to be at something at the very beginning of its development. So I went and talked to the head of the division, which was Doug Forsyth, and I told him that I was interested in doing that. He would always say, "Go forth and do great things." That's essentially what he said to me. He said, "Fine. You want to do this. Just go do it. Make it your own. Figure it out." So I decided that this would be a great opportunity for me, and that really developed a good ten years of my career, in which I was able to do those kinds of things that I wanted to do and interact. I really enjoy interacting with people in which I don't share the exact same discipline, and learning from them, and having them learn from me and build something together. That move enabled me the opportunity to do that and be part of something, like I said, from its infancy, and build something through time that was cutting-edge for the weather community.

MG: That was phased-array radar.

PH: Yes.

MG: Can you say what it is, its significance, and then your role on the team?

PH: Yes. Phased-array radar is different than the radars that we have on the network today in that it's electronically scanning. What do I mean by that? The radars that are out there now are mechanically-steered radar, so they rotate, and you have a beam that's like a pencil. As you move the radar around in a circle, it collects data in that way. Then you tilt it up, and it collects data around, which has done great service and continues to do so. Phased-array radar enables you to collect data electronically. What that means is that you can steer the beam wherever you want to, at whatever time you want to do so. So it provides a lot of adaptability in how you might scan a storm. In particular, each panel focuses on a ninety-degree sector, and you can collect data very rapidly because, for one thing, you're focused on less space – ninety-degrees instead of three-hundred-and sixty. So that part is like, "We can scan faster." But it also enables you to build scan strategies that focus on the most important weather signatures as they evolve. So part of my job was to figure out how to best scan storms and how these rapidly collected data might help to provide better information to a forecaster that's science-based that would then enable them to do things like get a tornado warning out earlier than you can do with the technology that exists today. But one of the things that is available, besides the WSR-88D Network, are Terminal Doppler Weather Radars [TDWR], which are located near airports. Those scan more frequently. . There are so many things that go into forecasts and warnings besides weather radar data; there's environmental data that also plays a very important role. But what we were examining with this radar was, can we improve the timeline from seeing signatures, be able to provide more warning compared to today. I think what's interesting about that from a history perspective is that the military started using this technology on its ships because it wasn't scanning the atmosphere quickly enough to be able to track things that are of concern to the military. So being able to take technology that was developed to track things

more quickly for military use, and then say, "Hey, we know that there are so many things that develop very quickly in storms that are not being resolved with the time sampling that we're doing with current technology and building applications to address that" – that connection, to me, was really interesting to apply the technology to a different role than it had been developed for.

MG: Where was this work taking place?

PH: This radar is located in Norman, Oklahoma. So they built the infrastructure and put it in a tower. It was put on a pedestal so that we could move it because if we could only look in one direction, then if storms are coming from a different direction, it isn't very useable. So we could move the radar to look in the direction from which storms were coming. Over time, we were actually able to automate that movement, so they could stay up with storms. So if we're looking at storms in a sector and they're moving, instead of having to move it manually, our software developers develop tools so that the radar could keep track of the storm. It's just a lot of interesting tools that were developed to make it more usable from an operational – looking towards operations and being able to do things in a more automated way.

MG: Was this part of the Hazardous Weather Testbed?

PH: Yes. One of the things that we did through my leadership – where all the experience I had prior to this helped me do is I had a team, and part of my role within that team was to then test the capabilities of this radar as a tool for forecasters, which was really our goal. After doing some basic research and saying, "Do these precursors fill in information that should be useful within the forecast process" and we saw, "Yes, we're seeing signatures that are directly related to concepts and the processes that forecasters know are happening, but they aren't necessarily seeing them." What we did was we brought that technology to them in the Testbed, and then developed experiments helped us directly measure the difference in terms of what the forecasters were seeing, and then also how that related to the quality of their decisions, their workload, and then also the outcome. If they were using this in operations, what would the lead time for making various warning decisions look like? So one of the ways we were able to do that was by having controlled experiments where some forecasters had the data that they would normally have, and they would work through events in simulated real-time. We had tools that enabled them to issue warnings and things like that that weren't live, so we could then compare what they would tell us was their decision process, and seeing what the skill of their warnings looked like, compared to then another forecaster group who was using the rapidly updating data for the same cases. Then we'd see what signatures were they seeing, what did their decision process look like, and what did the skill of their warnings in terms of lead time, probability of detection, and false alarm ratio look like, for example. Then we could compare those two. What we found was that there was a difference clearly, in terms of seeing what we had seen as researchers. They were identifying precursors that were important to their process earlier, which then enabled them in a bulk sense to be producing warnings in which they had more confidence because they were able to see trends in a more consistent way. Forecasters don't want to see it just once; they want to see: "One, two, three. Okay, I know I have a trend here. I have confidence." So if you're sampling more frequently, they're able to attain that information more quickly. So we did see differences in terms of the lead time. So it was interesting to see that actually play out, our

hypothesis for this being important we were able to see in this simulated environment. Another thing that we looked at, especially toward some of the last experiments we did with one of my graduate students – I involved my graduate students in this work as well – was to see how they would envision – the forecasters would envision seeing this transferred into operations. So we would get their ideas of conceptual models of how this would actually work in a real environment. So then we would report out on those things to people up the chain and write articles about it and things like that.

MG: Was this around the same time you started teaching? In 2008?

PH: 2008 I may have taught. I know I was advising students by then. I think I taught a class, like an intro meteorology class at OU. I'm not sure if it was in 2008. It may have been a little earlier than that, and I really enjoyed it at that time. But what I found out about myself, which probably wouldn't surprise you at this point because I take things seriously when I do them, and I always want to do my best job, but I enjoyed teaching so much, and I wanted to really bring a great experience to the students in terms of thinking and not just memorizing things, is that I put a lot of time and energy into teaching the class. What I realized was, "Well, if I'm going to be a researcher at NSSL, I cannot dedicate this much time and energy [to teaching]." Although I loved it – I absolutely had a great time doing that course, and my ratings were good. So then, after that, they were like, "Come teach, come teach," I'm like, "No, but I have focus on my research." So what I realized during that time, and especially up to 2008, was that I could take that love for teaching that I've had since I was very young, and use that to interact and help students develop on more of an individual basis, versus in a classroom setting. In 2008, is when I really started advising graduate students. I also had a number of students that I worked with in summer programs. I was in a summer program. Then I mentored students through these summer programs that are in Norman, Oklahoma. So I found that experience of helping them to find projects, take ownership for projects, teaching them how to use various tools, and grow as early-career scientists, that was my outlet for the teacher in me, and I still continue to work in that capacity.

MG: You're on staff at the University of Oklahoma, but no longer teaching there.

PH: Correct. One of the great things and one of the reasons why I stayed with CIMMS, and I eventually became a federal scientist is that you could be adjunct faculty. So as an adjunct, you didn't have to teach. You could advise students, and that was enough. Plus, you could be on committees to help select new students. I served on a committee for identifying students to get scholarships, things like that. So there were opportunities for service within the school, in which you could play without necessarily having to teach. So that is the route that I took. I've enjoyed that immensely. Once I became a fed, then it was like you become an affiliate-type professor – assistant, associate, or whatever. So the name changes, but your role stays the same.

MG: What changed when you became a federal employee?

PH: I became a fed in, I think it was, March of 2009. That really grew out of my early success in leading the phased-array radar program on the meteorological side of things. I think what was attractive about that is that I knew that if I was a federal scientist, that I would have more

continuity in my funding. Whereas, with CIMSS, I had experienced this thing back when I was finishing my PhD where funding can change very quickly in the soft-funded type of positions. This helped to provide a little bit more stability, but also provided an opportunity in leadership because within the National Severe Storms Laboratory – I wasn't a team lead by then, but I knew – there were opportunities to be team leads, to be a division chief like Doug Forsyth was when I joined the Weather Radar Research Division. I knew that I've always enjoyed working with people. I worked with the students. I knew that if I went that route, there would be opportunities directly for me to build leadership skills and to help lead groups. That was very important to me at that time. I saw that as a career path for myself. I knew being a fed that I would have that experience. You also get to represent the lab directly. Through my experience working with NOAA in my different internships and my experiences, I got to know the lab better and saw what that work environment was like. It was very much a family environment, especially. I could see that as I got more experienced and I had a little bit more individuality in what I could contribute. I wanted to be a part of that, and be able to contribute more directly also to NOAA's mission, which I had always been interested in and was contributing to, but as a fed, I could do it much more directly than I could as part of the CI [cooperative institute].

MG: Has it always felt that way, like a family?

PH: Yes, very much so. It's been federal scientists who have really helped me through my career and mentored me, even though they're all male scientists who have mentored me in my career, but it was those who were involved at NSSL at different levels who helped me evolve through my career and encouraged me to have different experiences. When I went to them, they supported me to grow. So definitely.

MG: Did you continue the phased-array work as a full-time federal employee?

PH: Yes.

MG: Can you say more about that and how that work developed?

PH: Yes. So around the time that I became a fed, I also applied for an award that I think was important to my career. That was PECASE Award, which I'm having a hard time here on remembering what it stands for – Presidential Early Career Award for Scientists and Engineers.

MG: Yes.

PH: There we go. Yes. So my boss, Doug Forsyth, and Dave Stensrud actually were both involved with getting me to apply. They're like, "The work you've been doing is really good, and here's an opportunity to write a proposal about your work and how it's important to NOAA." It was really interesting going through that process of putting that proposal and other pieces of information together because it was the first time that I had to brag about myself. [laughter] That wasn't something I was used to doing. So they helped me learn how to write something like that. At the time, it was surreal to apply and be chosen to win that award. One of my colleagues won the same year, so Mike Coniglio and I both won that the same year, having different experiences at the laboratory. But what I learned through that – I think I gained

confidence in what I was doing and the importance of the work I was doing. It also provided a lot of opportunity for me to present and share my research to a lot of different groups, including – there was a special dinner that I went to in D.C., and I shared my science with senior people in a restaurant. It was an Italian restaurant, and I'm there giving a presentation on my work and meeting all these interesting people. I think Dr. [Richard] Spinrad was in NOAA at that time. So it opened these doors for me to meet people I hadn't met before and to put my communication skills to work. When I was first giving talks, I was a little bit shy, which is funny because when I was a kid, I used to be in plays, and I wasn't shy at all. Somewhere along the line, I became shy about speaking in front of people. What I learned through this – one of the things we had to do – we had this big breakfast for PECASE, and it was in this really fancy hotel. We had breakfast there. There were all these higher-ups in NOAA there and our families. One of the things we had to do was give a five-minute talk on our research that would be understandable by families who were there. I just loved doing that. It took creativity and teaching ideas and things like that. I was able to stay within my five minutes, which not everybody did. [laughter] I received some compliments from that, from people who are higher up – "Wow, look at what you did. Everyone understood. Your audience was listening to you." So I think it helped to – besides feeling like, "Wow, this is pretty awesome," it was a launching point for me in terms of having confidence in what I could bring to the table as a scientist and seeing that those things are important. Sometimes around me in the groups I was in, I would see scientists who liked to stay in their cubicles and work extremely independently. I liked to work more as part of a team, and interact with people in different areas and communicate. This experience showed me that those skills that I had were actually very relevant to the science and that I could have a place in that – I think more so than the: "Hey, Pam's a PECASE winner." It did give me some visibility from that, which was really great, but I think the primary thing is – for me, it instilled confidence and also the idea – ever since then, I think this was interacting with Dr. Kimpel. He said, "Pam, aren't you excited about this?" "Yes, I'm excited," but I wasn't as excited as he would hope I would be about winning the award, which might sound funny. But what I learned from that is that you have to play to win. I've always taken that with me, that even if yourself – perhaps I'm humble about what I do. I don't know. But if you don't put yourself out there, you can't get it. You can't advance. I'd done that with my start in working with the phased-array radar, and probably didn't really realize that that's what I was doing at the time. But that just helped. The rest of my career, that's been a pattern for me and something that I've built on is always looking and making opportunities happen, not only for me, but for other people, and not being afraid to go for those things. That's what I tell people now. If you don't play, you can't win. That's something that I've taken with me since that time.

MG: What's another example of you putting yourself out there for an opportunity?

PH: So, well, another example – not too long after the PECASE award, my director wanted me to go for the [Professor Dr. Vilho] Vaisala Award, and it was an international research award for a publication. I felt differently about applying for that. I'm like, "Hey, I'm not going to get this award unless I play. I'm going to go. I'm going to put my paper out there. I'm going to fill everything out. If I win, that's great. If I don't, at least I tried." I did end up winning that award and got to give a presentation in Helsinki, Finland, of all places as part of the WMO [World Meteorological Organization] conference. That was related to some of the early work I did on phased-array radar. But that was another short-term example, where then, I was like, "Yes, I'll

apply for that. Let's go." Later in my career – if we can jump ahead a little bit. After I'd worked in phased-array radar for quite a while, I was starting to feel like I needed some change in what I was doing. I was ready to grow some more. I always talked about getting to the bored period. I've done that a couple of times in my career, where I know what I'm doing so well enough that it's almost second nature to me, and I'm not feeling the challenge. That's something that really drives me. So I was looking – this was in 2015 to '16 timeframe. I was looking for opportunities to grow. I had applied for one position. I think it was with FACETs [Forecasting a Continuum of Environmental Threats], and I didn't end up getting it. Someone else got the position. So I was like, "Okay, that position is now gone, and there aren't any opportunities that are going to come up soon." A lot of the leadership jobs, they don't turn over very often, and they were all men at these positions. I think sometimes – I'm not saying this is directly what happened in this case, but sometimes males who are in charge have a long string of men that they know, and they don't know as many females. So they tend to evolve them up the line, and they know them, so they may more be likely in certain cases to earn a position. So I was like, "How do I find an opportunity where they're going to be looking for me and what I bring to the table?" So I ended up talking to people at the Forecast Research and Development Division, which was led by Jack Kain. Earlier in my career, I would see him in the hallway, and he'd say, "Pam, we could really use your skillset." I'd be like, "Oh, I'm really into what I'm doing. Thanks." I didn't really take it seriously. But they were developing this thing called Warn-on-Forecast. I thought, "You know, I could help bring War-on-Forecast to the Testbed," because they hadn't really done that yet. So I started talking with him and letting him know I was interested, perhaps, in working with that group. It turned out that, at that time, the person who was doing program management, who was Lou Wicker, wasn't really into program management. He wanted to do the science. I wanted to do program management. So through many, many meetings back and forth with them, and, of course, talking with my own boss, who at that time was Mike Jain, they said, "Okay, you can move from this division, go over to the other division, start doing this role." They hadn't actually advertised that position. So they said, "Eventually, we'll advertise that, and you can go for it." So I took the risk of moving from radar, in which I'd had all this experience, to the forecast realm and learning a lot, and working with a different group of people. So that was just another thing where I identified my own opportunity where I thought there was a gap, and I could play a role and wasn't shy about exploring what that could look like. I've evolved quite a bit in a very short period of years because I started doing that in the summer of 2016, I think. Since it's now 2020 – so, since then, I became the program manager. Then my boss, who was Jack Kain, who was leading the division, he decided to take a position at EMC [Environmental Modeling Center] in College Park, so that he could do a lot of the operational modeling for NOAA. That's where all the models are run that are used by various weather communities. He left, and so that provided an opportunity for me to have the role of division chief in an acting capacity, which was my end goal. I wasn't thinking it would be that soon, but it provided the opportunity. So then, eventually, when that job came out, I applied for it, and I'm now a division chief. I'm still doing the program management and trying to hire someone behind me. In the federal government, it takes a lot of time to evolve these positions. But between '16 and now '20, I went from being the head of a research team doing radar meteorology to now leading a program and a unit that's focused more so on forecasting.

MG: Can you say more about the Warn-on-Forecasting?

PH: The Warn-on-Forecast. So what is that? That idea was really – around 2007 is probably when the idea really started being floated around. The idea there was those forecast models, especially convective-allowing models, could be developed that would produce representative structures of individual thunderstorms, which, at that time, was not something that models could do very well. It was like a pie-in-the-sky idea. They didn't know – they thought, "Well, maybe the science is right now where we could develop things and be able to do that." So that was really the concept of forecasting for individual storms over short timeframes, like zero to three hours for example. Can we provide rapidly updating forecasts of storms that could become severe and the characteristics of those storms such that perhaps they could provide information that would be useful for forecasters, even perhaps in a warning environment. Again, with this idea of extending lead time. So that was really the impetus for that, which was lead by Dave Stensrud at the very beginning. They brought in people who, in particular, do data assimilation. That's where the interesting tie to radar comes in because it turns out that the assimilation of weather radar data is very important to being able to spin-up storms very quickly within a model and do these short term forecasts with storms that actually have rotation in them, and have the right types of structures, such that they look like what it would look like on radar. When you take the model, you run it, and you produce things like radar reflectivity and precipitation rates and fields like updraft helicity, which tells you about the intensity of updraft and rotation within storms. There were a number of years of research that went into – by this group of people who were bringing in satellite data, bringing in radar data. How do we do that to the best of our ability to produce forecasts that look right, have quality to them, and then might be useful to forecasters?

MG: I also wanted to ask you about adapting to the division chief role. You were the first female division chief for the NSSL.

PH: It was really cool, I have to say. It was a long-term goal of mine. I had these ideas of what I wanted to do as a division chief and things that I wanted to do within that group. I think I'm someone who's always been reflective about leadership around me and learning about what people are doing well, and things that I think I could improve upon. So getting in that position, it actually felt like a natural fit for me. The transition wasn't really that hard into doing the types of activities that one does as a supervisor and working with all the different people in the unit and helping to talk through the science – what should our priorities be? I found out that even though my expertise wasn't directly in models, that my scientific knowledge was very applicable to helping people in the group evolve some of their ideas, which, to me, was really cool. I'm like, "Oh, my science background matters. I can still bring that to the table while also bringing my personal skills, and working with people, and helping people grow, and things like that.

MG: That's great. Is there anything I'm missing up to this point in your career?

PH: Well, I think one thing that I'm open to talking about is when I had cancer. That was a huge learning experience for me, and involved NOAA in some ways. That was around 2014 when I was diagnosed with Hodgkin's lymphoma. At that time – it was actually Halloween when I started treatment. What I found through that experience was that people were very supportive of me and needing to take time off was okay. It was an opportunity where I learned to delegate more because I was always very independent. It taught me to delegate, especially to

my students. Students have been a huge part – I haven't talked about them a whole lot, but at that time, I had a PhD student, Katie Wilson, who's one of several that I've interacted with. But she was just starting on her PhD the same semester that I found out I was sick. I'd had her as a master's student, and she was from England. She was very interested in working on things that related to people. So having her work in the Testbed with me was a great fit for her. I also had another student, Charles Kuster at the time. Going back to that, what I learned – they both earned master's degrees at the same time. Having two students that are working on similar problems but different angles was so cool. Because if you can have students who are working together as a team and you can bring them to meetings together to push ideas off of each other – so awesome. So that was really cool. But Katie was then moving on, and he was finishing up his degree, actually, while I had cancer. But it enabled me to step back a little bit and help them grow by giving them things to do in the workplace that were usually my job. It was cool to have the confidence in them to help them. I would help them go through their presentations. Katie actually gave a presentation that I would normally have given about our team during the NSSL review, which was during that period. So she got to get exposure and things like that that she normally wouldn't have gotten. I got to experience the joy of delegating and helping somebody grow. I'm trying not to cry here.

MG: If you need to take a break or get a tissue, I understand.

PH: Yes, I'm fine. But it was that experience of learning that I could focus on just what I could do at that time, which was mostly reviewing other people's papers, helping them continue in their research, which was very closely tied to what I was doing, and then having people at the lab – every time I had chemo, someone brought me a basket from the lab. There was a woman who had my same cancer several years before. She put out emails, and people would bring things to put in this basket. People volunteered to bring them to my house and eventually there was a meal train. I said, "Okay, I need a meal train." By December, I was like, "Yeah, I need people to help me make food." People signed up for that and were very gracious. But what I learned through that period, I think, was I'd always felt very independent. There's nothing wrong with being independent, but I also learned the joy of letting others care for you, and that other people needed to have things that they could do to help you through these things. I've always taken that with me. Where there's a tie back to NOAA with this is that all of my colleagues and my boss, who was Mike Jain at that time, were just very understanding. Like I said, they helped me in various ways. I remember I would come in and work about fifty percent time, and people stayed away from me if they were sick, which was also very nice. But, one time, I ran into Dr. Steve Fine, who isn't with NOAA anymore. I think he's with the EPA [Environmental Protection Agency] now. But he was visiting. I had met with him before. He knew who I was. Somehow, he knew that I was sick, that I wasn't involved with things as much. I ran into him in the hallway, and he looked me straight in the eye, and he said, "Are you being treated well in your laboratory? Are you getting the understanding that you need?" I said, "Yes." But to have someone up the chain directly interact with me in that way was just amazing to me. There are some people in my career who have also written me direct letters thanking me for presentations I've given or other things like that. It taught me the importance of doing things like that, and what it feels like to be on the receiving end, in that you aren't alone when you're going through difficult things like that. All that support that I got through that time – it was shortly after that, when I got through that, when I started thinking about changing my career direction. I think that

that experience somehow helped trigger that because I saw things differently and could see some things more clearly than I did before. I was supported and slowly growing out of that and seeing that I could continue to contribute – being able to take those personal things that I learned during that period and then apply them in the workplace. Also, being able to support other people when they're going through difficult things – I know the importance of being there and providing that empathy and support, whether they're students or a colleague or someone you see in the grocery store. So I wanted to talk about that just because it goes back to NOAA being a family, and where I work having such a great culture and environment of support, and how people can come out of those things and contribute in greater ways than perhaps you could have before.

MG: Can I ask about the diagnosis? How did you learn you were sick?

PH: Oh, gosh. That was quite the journey. Initially, it was in June or July, before I was diagnosed in late September – it was probably early October when I was diagnosed – I started feeling itchy. I was just itchy all over. I ended up being sent to a dermatologist. The dermatologist gave me some creams and took an x-ray. She's like, "Well, you may have cancer." So I took an x-ray, which, I think in retrospect, wouldn't have really shown it.

MG: Did she say it just like that – "Oh, you may have cancer?"

PH: Yes, pretty much. I thought, "Well, no way. I've always been healthy. I work out. I'm not overweight. I never smoked – all these things. She took an x-ray. "Oh, you're fine." So I was using the lotion; it didn't do any good. The itching was almost unbearable. I had to just think about other things so that I didn't scratch my body. Lotion didn't help at all. Then I got this red spot on my neck, and it was swollen. I'm like, "What is that?" So I went to my doctor. She thought initially maybe I had been bitten by something or it was an allergic reaction because I have allergies. So she gave me a steroid. Nothing changed. Then she sent me to an ear, nose, and throat doctor. He thought it was something – I don't remember exactly what it was – very technical term. He was actually going to go in and do surgery in this area. When he opened it up, he saw that my cell structure was kind of ugly, and he didn't do the surgery that he was planning on and took a biopsy. Then just closed it up. The biopsy came out negative. There was nothing in the biopsy, but then the area that he opened wouldn't heal. It wouldn't heal, wouldn't heal, wouldn't heal. We had to clean it out a lot, and I was wearing scarfs because I didn't want people to see it. So I have a great scarf collection. I've become the scarf girl. [laughter] Whereas before, I didn't really wear scarves very much. Then, eventually, I think that surgery was maybe early September. So when things didn't heal, eventually, he just sent me to the hospital, and he said, "I'm going to have some specialists look at you because the biopsy had come back negative." So they thought maybe it's some rare disease. So I worked with all these specialists, lots of bloodwork, and nothing showed up for things that they were looking for. And I was really tired. That was another thing during that time. I had lost a lot of weight, and I was super skinny. I didn't know what was going on. I've always had a high metabolism, but that was crazy. What was interesting during that time is that I also talked with a heart specialist because I think I'd been diagnosed with a – what was it? You know when you have to take blood thinners? I had swelling. I don't remember what it was called, but I needed to take blood thinners. So they brought in this heart specialist. He was a great doctor to talk with. He said, "I think you have cancer," because we'd been talking about taking another biopsy. I said, "If I was

your daughter, what would you do?" He said, "Well, I would have another biopsy and have this checked out because I think that's probably what's going on here." So they did the second biopsy. It was after that that I did get the eventual diagnosis of that. I think one of the things I learned from that, which was funny, was to always just ask doctors a lot of questions because, at first, I was like, "Well, they know what's going on and what's happening." One of the things that I learned – because when I had my treatment, one of the drugs I was very sensitive [to]. It messed with my lungs, and I had breathing problems from one of them. I went to see this one specialist because I'd been diagnosed with pneumonia, and it wasn't really pneumonia because I went to my allergist, my asthma specialist – "I don't think this is pneumonia. I think it's from one of your drugs." So I went to see this pulmonary guy, and he was talking all this technical stuff. I thought, "As a scientist, I can talk to laymen people and give my science in laymen's terms. So surely, this doctor can do the same thing." So I said, "Can you tell me this in laymen's terms what you're telling me here?" He's like, "Oh, that's really hard. I'm not used to having to do that." [laughter] But he did. What he told me which no other doctor had directly said – because they have these fancy names for these drugs that they give you. He said, "Well, what they were giving you was a form of mustard gas, which is used in war previously." So no wonder it was messing with my lungs, especially when you have asthma. So I was like, "Oh, well, okay. That explains that." He said, "If you are ever sick again, don't ever let them give you that drug." He said, "That should be on the total 'no' list for you." It was interesting just to take my experience of things that I was expected to do, or I had come to do as a scientist, and then have those same expectations for my doctors. Just to hear how they would respond initially would give me a giggle. When they say, "Oh, I'm not used to having to do that," I'm like, "Well, here's your opportunity." [laughter]

MG: When did you receive the good news that you were cancer-free?

PH: I finished in April of 2015. The concoction that they gave me three months in – every so often they would do tests to see if it was killing the cancer cells. Even the first time they tested, there was a reduction in that. The cancer that I have tends to have a fairly high rate of success. The regimen they put me on worked, which was really good. It's like kill the cancer before you kill the patient is what you come to realize through that process. I was very pleased that that had worked for me and that I would be able to regain my strength and continue to do things that would contribute to society because when you go through something like that – at least one of the things that I thought about the most was: have I made a difference in any way? You really think about: well, if I die – it just comes to you because you're like, "Well, that's a possibility," even when you have a really strong history with a certain treatment regimen. Have I made a difference? So it made me think about those things, and where I felt like I made the most difference was with the students that I'd worked with. One of the things I've always tried to do is if I had an experience where I felt maybe the advisor didn't give me all the tools that I needed along the way, and then I ended up having to learn them on my own. I always tried to give students what I didn't get and what I would hope that I would have gotten, and to watch them grow. I think that having worked with several students, in particular those two that I talked about – to actually see that in practice, to me, that was making a difference in a way that mattered because I knew that that would perpetuate through their career. That was a major thing. So being able to continue in order to make a difference in some way was the biggest thing of getting through that. And being a NOAA scientist, especially where I'm located, provides that

opportunity. Like I said before, bringing science to society through that research to operations, and doing things that can help save lives and property and make a difference in the careers of scientists, or at least that's what one of my goals is. Besides learning that through my own experience, one of the things I learned from Jeff Kimpel because I would talk with him about wanting to be in management – he's like, "Are you sure? Because scientists get to do certain things, and you don't get to do them in management." What he would tell me is, "It's all about the people. Being in leadership positions, it isn't so much about managing, but it's about leadership. Leadership is about helping people. That's how you can measure yourself is by the success of others who are in your group." I had learned that even before I got in management positions through working with students and having him as a mentor. So that has always stuck with me and resonated with me. As I continue to progress in my career, that's what really drives me besides wanting to really have great science done that is cutting-edge and is advancing our knowledge base, as well as advancing tools that transition to operations and so on, is also helping people evolve in their careers. I think that ties back to even my childhood. Although I didn't know it at the time, when I look back, I can see this connection from what my interests were as a little girl to my own career evolution and the things that I'm doing now.

MG: Yes. I also wanted to ask about your life outside of NOAA and your husband, Carl.

PH: Yes. Fun, fun. So Carl and I actually were married around the time I finished my PhD. He and I like to do a lot of things together. We have a lot of common interests, like hiking. We both love exploring nature and being immersed in that. So we have a lot of fun time hiking in Rocky Mountain National Park, for example. We've been to England and Ireland and explored those areas. We love going to National Parks and doing that. We also love having a dog. We've had two dogs together now. The one we have now is Rolli. We call him a Jackuahua because he's half Jack Russell, half Chihuahua. We got him from Second Chance. So we've gotten dogs that have been found and fixed up. He brings a lot of joy to us because we don't have children. The dog is our kid. We have fun playing with him and taking him for walks, and things like that. Another thing that we enjoy doing together is watching classic movies. My husband has always been a fan of the old movies. He's brought that to me. So I know a lot about older films and who all the stars were. We have a fun time watching those movies together. Also, watching a lot of British – we like to watch British television and *Masterpiece Theatre*, and things like that. So that's also another thing that we really like sharing together. And I enjoy reading. I've liked to read since I was very young. I'm now in a book club and really enjoy hanging out with other women and having that girl time. We take turns meeting at each other's homes and cooking and talking about books. I used to like to read a lot of historical fiction, and I still enjoy that. But being in the book club, I've expanded my repertoire, if you will, to thrillers. I also like thrillers. I like espionage books and mysteries, but now also biographies and books where I'm learning about how things have changed over time. For example, recently, we read *21 Lessons for the 21st Century*, which talks about the rapid pace of technology that's happening today and how are people adjusting or not adjusting to that. What does that mean for our future? So I really enjoy reading books on a number of different topics and getting to talk about that. So that's one of my hobbies that I get to do on a regular occurrence as well as continuing to go to the gym. I've always been very physical and played sports. I actually taught Zumba at work for a while, so I became a Zumba instructor and I was teaching that. People at work would come. I'm not teaching anymore because I don't have the

time and effort and energy, but I enjoy going to fitness classes and taking the Zumba and the Zumba Strong and dancing. My husband and I also really enjoy dancing a lot. So when we go to weddings, we're always on the floor. I took ballroom dancing when I was a PhD student; that was one of my outlets for stress. I taught him some of that stuff. He naturally has a good rhythm anyway. So dancing together is something that we really enjoy. But he's my best friend, and we enjoy exploring life together. He's been there through all my difficult times to help me out and be supportive. It's been a great addition to my life and the life journey that I've been through since I met him, and we were married.

MG: Is there anything I've forgotten to ask you about?

PH: I think we've covered things pretty well. A lot of the highlights, both of me as a person and in terms of my career. So I appreciate the opportunity to do this. I appreciate the opportunity to share my story so that other people will hear it, and perhaps it will resonate with others in some way, shape, or form.

MG: I'm sure it will. You've been such an interesting person to talk to. I really appreciate all the time and stories you have shared with me. Thank you so much. I'll be back here later this week, so if there's something else that pops into your head, we can get together again.

PH: Okay. All right.

MG: Thank you so much.

PH: Yes, thank you.

----------END OF INTERVIEW----------
Reviewed by Molly Graham 2/25/2020
Reviewed by Pamela Heinselman 4/19/2020
Reviewed by Molly Graham 4/20/2020