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TAPE RECORDED INTERVIEW PROJECT

Interview of William H. Haggard
August 21, 2007

Interviewer: Sean Potter

Potter: OK, it is Tuesday, August 21st, 2007, 3:30 p.m. Eastern [Daylight] Time. This is Sean Potter conducting an interview with William H. "Bill" Haggard, here at 150 Shope Creek Road in Asheville, North Carolina. Bill, welcome.

Haggard: Thank you.

Potter: Let's get started with some basic background information. First of all, tell me about the date you were born, where you were born, and a little bit about your upbringing, early childhood.

Haggard: I was born on November 20, 1920, in Woodbridge, Connecticut, during a snowstorm. Birth was at home. My parents were Howard Wilcox Haggard and Josephine Foley Haggard. Dad was a professor at Yale. We lived about ten miles from downtown New Haven. I don't remember much about the first couple of years, but inklings of memory come back after that. We lived on a farm, raised apples and various other things. Dad was somewhat of a horticulturalist as a hobby, which he maintained through the rest of his life. I grew up with an older brother and a four-year younger sister. We were homeschooled until about the eighth grade, at which time I entered Hopkins Grammar School, the second oldest secondary school in the nation, second only to Boston Latin School, in the heights of New Haven, Connecticut, about eight miles from home, and stayed there until I graduated in 1938. My earliest recollection of real interest in something beyond immediate family and daily living was weather, and the most fascinating thing to me was watching it snow. It just held a tremendous fascination. I don't know when—well, probably at the age of seven or ten or something, I knew I wanted to be a weatherman, and that sort of controlled my life from that point on. I was a science major at Hopkins, was a physics major at Yale. I was admitted to MIT for graduate studies in meteorology. World War II came along very abruptly on December 7th, 1941 and shortly after that MIT informed me that they would no longer admit civilian students, that their entire training program was going to be military, and that being 21 years of age and in good health, undoubtedly facing the draft, I should if I wished to pursue meteorology as my career, promptly enter one or the other of the military services. I took the exams for both the Army Air Corps and the Navy and was accepted by both, chose the Navy, entered MIT in somewhat of a hurry in late February of 1942 in a class of about

104. I think there were just 98 or something, maybe a smaller number, of Air Force Cadets and a few hopefully Navy ensigns, though the Navy took its time getting around to giving us our commissions, to the extent that MIT reminded us in late March that while they hoped that the Navy was going to come through with the commissions, we would be responsible for our tuition if they didn't. The Navy did, and I spent nine months at MIT as a commissioned ensign in the Navy then was turned loose with virtually no knowledge of military protocol or who saluted who or what or why, was assigned to my first military assignment duty in Jacksonville, Florida, at the Naval Air Station.

Potter: That's good. And I'd actually like to go back and maybe talk a little bit more about some of the early years and maybe a little bit more about your family, and then we'll get more into some of the later events, including the time in the Navy and at MIT. But if I can, you mentioned that your father was a professor at Yale. What did he teach there?

Haggard: He taught applied physiology. It was a required course for business administration majors. It was the basics of human physiology. I think it was Applied Physiology 66 or something, and it promptly became known as "Sex 66" and it became a very popular course. All the industrial majors were required to take it and there was a lot of work going on. He and Dr. Henderson, head of the laboratory of applied physiology at Yale, and they had done work on noxious gases and diet and physical efficiency and did a lot of consulting for industries. The calculations for the amount of exhaust pollution that would be expected to be in the Hudson River tunnel, the first tunnel, the name of which escapes me at the moment. And my grandfather and my brother and my sister and I were guinea pigs under a plastic tent with a Model A Ford engine running, the level of carbon monoxide in our blood being measured continuously, which was abstracted or projected into the pollutants that would be expected in the Holland Tunnel. And when they got through, they turned in their numbers. The design engineers doubled their numbers. The further consulting engineers doubled those. And then after they'd been doubled three times became the standard for the ventilation system for the Hudson Tunnel.

Potter: So your father was a physiology professor at Yale during most of your upbringing into your high school years?

Haggard: True that. Actually Dad sort of took semi-retirement in '46 and full retirement in '51, so I was well on in my career before he left Yale.

Potter: What about your mother? Was she employed at all?

Haggard: No, she was a housewife.

Potter: And you mentioned you had a brother and a sister, two siblings?

Haggard: Yes, I had an older brother who was two years older than I. All three of us got rheumatic fever in about 1935 or '36, and my older brother Howard, Jr. died of it. My sister has a heart complication from it, and I was the lucky one who survived without any problems.

Potter: You mentioned your brother was older?

Haggard: He's two years older than I.

Potter: And your sister?

Haggard: Four years younger.

Potter: So you were the middle child.

Haggard: Yes.

Potter: What kind of education did your parents have? Obviously, your father has a higher education if he was a professor.

Haggard: He had an M.D. from Yale. He did not practice as a physician. He went into the Army Medical Corps, I guess, and he was involved with noxious gases during World War I. Then he joined Dr. Henderson at Yale in the laboratory and continued to do research and teaching for the rest of his career, except the last few years, the university tagged him for fund-raising.

Potter: And your mother? What sort of education did she have?

Haggard: She has a high-school education. I don't think she had any college.

Potter: Was there anybody that you can recall early on in your childhood or even you got into your high school years and your teenaged years, it doesn't necessarily have to be a family member, perhaps a teacher or somebody else who looking back now you feel like had a particularly strong influence on you, especially in science or in meteorology?

Haggard: No, there wasn't anyone who steered me into meteorology for an unknown reason other than my love of watching it snow, and my fascination with all aspects of weather. I just knew that I was going to be a weatherman. I didn't know whether I was going to work with the government or whether I was going to be on radio. We didn't have TV at that time. But I was just totally fascinated with weather and realized that if I was going to do it, I needed to study it and have an advanced degree in it, and so I took a science major at Hopkins and I took a physics major at Yale, and I applied to MIT early on as a career path. But there were a number of people who obviously influenced me. I had an English teacher, Mrs. Carver, who taught me grammar in summer school. I had various science teachers that I revered, though I'm not sure that they felt that I was to be revered as much for my inabilities as they were for their teaching. But you know, there were several people who I respected immensely, and realized how important it was that one learn as much as possible about their chosen field, if they were ever going to succeed in it. And this continued not only at Hopkins but at Yale. I had a physics professor, Dr. Gunn, who—I was enthralled at his knowledge. Interestingly enough, being a physics major and being in the scientific school, I didn't have

much room for liberal arts or humanities or anthropology or things of that type, but in my junior year I had a couple of opportunities for elective courses and I took one in anthropology and was just utterly amazed at the other half of the world, the part that I have not focused on because I was buried in my science studies.

Potter: You mentioned that you always knew that you—you always had interest in the weather and always knew that you wanted to be a weatherman or enter that field. You recall how early of an age you had, you know that?

Haggard: I'm sure I knew it by seven. Before that, I'm not sure, but I know I was fascinated with the weather. We were fortunate. We lived in the country. We were on a fifty-some acre farm, and I loved to look at the clouds in the sky and the rain and wonder why all of this came to be. I think I was about ten when I started subscribing to the daily weather maps. Of course, they were a week old by the time I got them in the mail, but I studied them and I tried to recollect what the weather was in those days. My dad helped me build a *Popular Mechanics* anemometer and wind vane for the house, and we cut out cups and calibrated them with a pull scale according to very detailed instructions in *Popular Mechanics* magazine, and had the circular displays in my bedroom with cut-out holes with lights behind them. I think there were at least sixteen directional lights and probably that many or more velocity lights, and as the—it was a bridal cup anemometer and as the clock spring wound up, the lights moved around, and when the hurricane of '38 came I rushed up to see what it was and it had gone around the full scale and started around the second time, and I'm not quite sure what it translated to, but the winds were something over 75 miles an hour, even though we were on the west side of the eye when it passed over New Haven and actually we entered the eye and I went outside. Then I heard this freight train coming down through the woods, and I rushed back up to see, watch it wind up again. We were really in the western part of the eye, so it wasn't a 180-degree shift in direction. But it was pretty phenomenal. A huge sycamore tree in front of the house broke off at about the fifty-foot level, and part of it came through the roof and into an upstairs room, but it was extremely thrilling.

Potter: You were about seventeen at that time?

Haggard: Yes.

Potter: Right, just before your 18th birthday with that hurricane. And when did you build the anemometer? How long before that?

Haggard: It must have been two or three years before that. I was probably fifteen.

Potter: Was it your idea, had you seen the plans?

Haggard: No actually, it was my dad who pointed it out to me in the magazine and said, "Would you like to build one of these?" And I said, gee, I would love to. I'm not sure that I can. And he said, "Well, I'll help you," and we worked, and he always had a hobby of woodworking, and there was a lot of woodwork involved in building those instruments and their bases that mounted on the ridge beam of the house and so forth. And the display cases

were made out of wood with space for little lamps. There were sixteen wires that came down for the direction, and there were sixteen wires that came down for the speeds, and we had a couple of big two-and-a-half inch by six inch A batteries or B batteries, I can't remember which they were at the time, that provided the power for it. So it worked when the power failed, and I had a recording thermometer and a recording barograph at that time and sort of kept a not-very-accurate weather diary.

Potter: And how long—that was around the time you were eighteen, so I assume that when you went off to college—do you know what eventually happened to that anemometer? Was it essentially a fixture in your parents' house?

Haggard: It became a fixture on the house, yes. It stayed there. I left home obviously in '42, except for brief visits, and it was always there when I went back during those brief visits. My parents sold the house in the early or mid fifties sometime, and I have no idea whether it's still on that old house or not.

Potter: The hurricane, the New England hurricane of 1938, was an incredible event and that must have only added to your interest and desire to enter the field of meteorology. Were there any other events that you can recall during your childhood that might have contributed to that?

Haggard: I think I was pretty well committed before the hurricane, but the hurricane was all the more fascinating to me because of my real interest in the weather. Of course, we didn't know from the forecasts that day that we were going to have a hurricane. As far as the Weather Bureau knew, the hurricane was somewhere down off of Hatteras and it had accelerated through a data-void area and struck southern New England, really with minimal warning. And it wasn't until I was driving a Model A Ford coupe from New Haven out to Woodbridge—and the wind was buffeting the car all over the road—and I said to myself, this has got to be a hurricane. I wonder if it's the one that they think is down off of Hatteras, you know, because we had listened to the radio and heard that—it was the one that they thought that was down over Hatteras, and then it had accelerated and it rushed up, basically up the Connecticut River Valley.

Potter: So you had mentioned that you had subscribed to the daily weather maps that were put out by the Weather Bureau. Having this interest in meteorology and in weather, were there any other things that you did, were there particular books that you read to try to learn about this before you entered your formal studies in the field?

Haggard: I'm sure there were, and at this moment I couldn't recall the names and the titles of any of them, and of course my four years—three and a half year—at Yale were so—I was so engrossed in preparing for the field of meteorology, and they didn't teach any meteorology courses at Yale, but being a physics major I was totally immersed beyond my capacity in mathematics and physics, and physics was great fun. Mathematics were a challenge—always have been, and probably always will be.

Potter: Did you choose to go to Yale because of your father?

Haggard: It was just understood that, you know, he was a Yale graduate and Hopkins was a prep school, basically, for Yale. I think the fact that dad could get a reduction in my tuition because he was a faculty member, the question of choosing some other college never came up in my lifetime. It was just assumed—and it turned out to be—that I was going to go to Yale.

Potter: Despite the fact that you wanted to be a meteorologist and Yale did not have a program in that.

Haggard: No, I did not know of any schools that had undergraduate programs in meteorology at the time. I knew that some of the major schools, I think there were five of them at the time: MIT, UCLA, maybe Chicago had already started by then—and they all went into it in a big way during the war—but I just knew that before I went to Yale that I was going to try to go to MIT, because I knew it was a good school in meteorology and that's what I wanted to learn.

Potter: So it was understood that you were going to go to Yale and you chose physics as a major to prepare you for your later graduate studies in meteorology?

Haggard: That was the only reason I chose physics. I didn't want to be a physicist, but I knew that to be a competent meteorologist I was going to have to go to a graduate school in meteorology, and I knew that physics and mathematics were the prerequisites for that, and it turned out that the physics majors at Yale took more math than the math majors did.

Potter: But never a meteorology course at Yale?

Haggard: No.

Potter: And did you do anything else outside of school? Did you have any contact perhaps with the local Weather Bureau office to try to get any sort of practical experience or training in meteorology during your undergraduate years, or prior to that?

Haggard: No, I think I had tunnel vision. I think I was just going to prepare myself to go to graduate school in meteorology and then become a weatherman.

Potter: So you graduated from Yale in 1942 with a B.S. in physics, and where did you go from there?

Haggard: I went early. I got an early graduation, and that was an interesting thing, because the Navy would accept me if I had my college degree and Yale would permit me to graduate early if I had my commission, and this became a small stand-off and I finally suggested to the Navy and Yale that they stand one on either side and exchange my diploma for my commission, which they did, and Yale was good to me, the Navy was great to me. Everything worked out well.

Potter: So you mentioned that you entered the Navy in 1942, right after World War II.

Haggard: It had begun in December and by March I had my commission.

Potter: In March, you had your commission, but then how long was it after you got your commission that you began your studies at MIT?

Haggard: Simultaneous. Actually, I had begun the studies before the commission came through, but the understanding was that I would be commissioned at the beginning and assigned to MIT, and I went to MIT but the Navy papers didn't come through for a month or so, so MIT advised a whole group of us that we would be responsible for our tuition if our papers didn't come through, but the papers did come through, and the whole small group—maybe there were a dozen Navy guys in amongst the roughly hundred Air Corps guys who were at MIT in that class. Subsequent classes got to be much bigger as the program expanded. But we were in a very accelerated, nine-month program, March to November.

Potter: And that's when you got—at the end of that you received what was called a certificate of professional meteorologist?

Haggard: Yes, the different schools didn't know what to do. Some of the schools gave Masters degrees at the end of the nine-month military training program. Some of them gave a second bachelor's degree and MIT sort of went in-between and gave us certificates.

Potter: And so it was just a nine-month program at MIT.

Haggard: Yeah, it was a nine-month, intense, accelerated program.

Potter: And that's when you really got your first taste of a formal education in meteorology.

Haggard: Yes.

Potter: And how would you describe—you said it was intense, but do you feel it was in terms of how comprehensive it was—did you learn a lot in that nine months?

Haggard: Yes. We worked 48 hours a day for nine months. (laughter) Mostly in-class, and with a tremendous amount of homework. And we had great teachers.

Potter: Were there any particular teachers there who stand out as having been particularly influential?

Haggard: Well, I remember Hurd Willet, who taught climatology.

Potter: I'm sorry, who was that?

Haggard: Hurd Willet. And Henry Houghton taught dynamics. And there were several others. There were several Air Corps people who had been in a previous class, who were instructors.

I don't recall any of their names, but they did most of the lab work. And I found the lab work fascinating. I actually learned to draw isobars and isotherms and isallobars and all the other things that we knew at that time, and then we had long daily synoptic lab sessions with a lot of map work, and then we had afternoon forecasts and then we had forecast discussion, and I remember one day in particular when I forecast a thunderstorm for that evening and the lab instructor ridiculed me. He said, "What made you think it was going to have a thunderstorm?" And I said, "Well, I went up on the roof and looked outside, and if I'd been back on the farm, we'd have sure been making hay." We did have a thunderstorm. (laughter) And I was elated.

Potter: (laughter) What did he say after that, the lab instructor?

Haggard: Oh, he just grimaced.

Potter: Were you doing any type of frontal analysis?

Haggard: Yes. Yes, we were…

Potter: It was fairly new at that time.

Haggard: It was quite new at that time, but we had the Norwegian air mass theories and they were being—they were in the textbooks already at that time. And we started right in with frontal analysis.

Potter: And how large was the group? How many students were there at MIT?

Haggard: Well, in our class there were, I think it was 112 or 114, mostly Air Corps and a dozen or so Navy. Subsequent classes got much larger very rapidly.

Potter: So you finished that program in November of '42, and then you started your actual assignments.

Haggard: I started standing watches at Jacksonville, Florida, the day I arrived.

Potter: How long were you in Jacksonville?

Haggard: I was in Jacksonville for a year that first time. I went back to Jacksonville later in '45. But I went right on to shift work. The aerologist in charge was from New York University and his maps were glorious but inaccurate and my maps were accurate and inglorious. But we worked well as a team. I think there were probably four duty officers in the aerology shack at the time, and it was a great experience. We had to sign clearances. Both the meteorologist and the operations officer had to sign flight clearances for all cross-country flights that were either flown by aircraft on the station—and Jacksonville was then under the command of the chief of Naval Air Operational Training Command. Pilots who went to Pensacola and learned how to fly came to Jacksonville and learned what the flying was all about and what their missions were going to be and things of that type. We had quite

a mix. We had training flights and we had operational flights, and we had patrol planes, amphibious as well as wheeled, land-based. And it was great fun. There were a number of other stations in Florida that were under the Naval Air Operational Training Command, and I was assigned additional duties and an admiral staff to go and make sure that the weather installations were up to snuff and that the observers knew what they were doing and so forth. We didn't have RAOBs (RAdiosonde OBservations) but we had APOBs (AirPlane OBservations), where instruments were mounted on bungee cords on the wing of aircraft and we flew them up to 15 or 16,000 feet and got soundings. I was chided by the Weather Bureau person at the Jacksonville Weather Bureau because I didn't always get my surface reference level right and my APOBs didn't always fit into the RAOB network. He came over to the air station and showed me how to do it right.

Potter: Do you recall the name of the aerologist-in-charge, you'd mentioned?

Haggard: I think it was Norman Skyler, was the fellow who was in charge. Gosh, I was an ensign and I think he was a full lieutenant. And you were there in Jacksonville for a year—until some point in 1943

Potter: And then where did you go from there?

Haggard: I was assigned to an escort carrier, and Kaiser Shipworks in Portland, Oregon, was manufacturing them at the rate of one a week. It took them almost a year to build them, but they started a new one every week and finished one every week. And they moved down to the mouth of the Columbia River at Astoria, Oregon, and I was assigned to CVE Escort Carrier 72 in the 55 to 105 class of what we called Kaiser Coffins, which were steam-driven, twin-screw, small. I think their flight deck was something like 500 feet long, and we had a single catapult. We had to get 31 knots of wind across the deck. The ship could only make 17 knots, so we needed a little wind or we had to use the catapult to get the aircraft off, and we had a rather early model fighter aircraft, and later got a fighter observation squad, and I was in Astoria for probably six weeks before the Tulagi VE 72 came down and was fitted out and we went to sea.

Potter: And where did you go?

Haggard: Well, we had a number of interesting trips. We started in Astoria and we went to San Francisco. We ferried aircraft parts out to Honolulu. We came back to San Diego. We took a fighter observation squadron of F-6Fs Hellcats on board. We went to the Panama Canal and came around to Norfolk. Then we were assigned to carrier landing training in the Chesapeake Bay for about three months. Then we did a couple of ferry trips from Quonset Point to Casablanca, with engines and aircraft parts and full-sized aircraft. Then we went into the Mediterranean and made a series of feints, to mislead the Germans and the Italians on where the landings in southern Europe were going to be. We would form up a carrier group with some battleships and sail out of Oran and then overnight disperse and then form up again maybe out of Alexandra, Egypt, and start for the—say, we were going to Greece or the Adriatic or something. We'd let the Germans take good pictures of us before we started shooting at them as they disappeared. We let some of the officers go ashore in Naples and

get drunk and talk about the false plans we had for the invasions and then all of the sudden we supported the landings in southern France in 1944, after D-Day.

END OF TAPE 1, SIDE 1

Potter: OK, this is an interview with William Haggard, conducted by Sean Potter on August 21st, 2007. This is side two of tape one and we're discussing your tour of duty during World War II. I'm sorry, what was the ship that you were on?

Haggard: The USS Tulagi, which was an escort carrier, CVE-72.

Potter: And what exactly was your role on that ship?

Haggard: Well, my primary duty was aerological officer. I had two enlisted men, a second class and a third class, who were both aerographer's mates. They were great guys. We got canned maps by radio. We had a code system where we took these sort of hieroglyphics that came off of the tape machine and we converted those to isobars and fronts and so forth on the maps. But I had a number of collateral duties. I was junior officer of the deck underway. I was officer of the deck in port. I was V-3, which is the air division educational officer, I was movie officer. I was assistant airplot officer. If I had nothing else to do, they found something for me to do. And interestingly enough, between December of 1943—and I was on board for 17 months—and I went from 215 pounds to 145 pounds, largely because I didn't have time enough to stop and eat.

Potter: Were you the only—how many aerological—I'm sorry, it was aerographers, were there on the ship?

Haggard: Well, I was the only aerological officer and I had two aerographer's mates. For a time, we had an admiral on board, so I suddenly became a member of his staff, but there were just three of us in the weather shack.

Potter: So it was obviously a 24/7 operation.

Haggard: Yes, as were the collateral duties.

Potter: And where did you—you were at sea for how long?

Haggard: A total of 17 months, part of it in the Atlantic and the Mediterranean and part of it in the Pacific and the China Sea. And goodness, I can't remember the date. It was, let's see—D-Day was in June of '44. So it was in August or September of '44 that we supported the landings in southern France and immediately after that—well, it couldn't have been immediately, because we encountered the North Atlantic hurricane of 1944 on our way back from the Mediterranean to Quonset Point and diverted. We went down south of Bermuda and came up the coast behind the storm, which looked so much in Tannehill's book, the weather map in October of '44 looked almost identical to Tannehill's map of the September '38 North Atlantic/southern New England hurricane. So we were in company with another

escort carrier, and the aerographer on that suggested full speed to get to Quonset before the storm got there, and I suggested to the admiral that it might be smarter to go around the storm and come up behind it. The admiral had the two of us break radio silence and talk to each other, and we agreed that maybe a circuit would have greater reason for being than to rush ahead of the storm to get back to the coast. So we went around and it was fascinating. We had two escort carriers and five destroyer escorts and two escort carriers, all small ships. And when we got behind the storm where the swells from the northeast winds and the swells from the west winds intersected we got these pyramidal seas and these great peaks of waves would come up and then the wave motions would go past and this tremendous quantity of water would plummet back into the ocean. And every now and then a ship would on it and it would plummet back into the ocean. And one night when this was going on when both the admiral and the captain got drenched in their cabins by water that swept back over the flight deck, they were the only wet people on the whole ship. They rushed up to the bridge in great excitement, but the ships all rode well and everybody made it and we arrived at Quonset Point and the weather was beautiful and calm. The storm was gone and the admiral was not really sure that he should've diverted, but I think was happy that we did.

Potter: How did you know about the storm? Were you receiving reports from other ships?

Haggard: Basically, we were doing it from the canned weather maps that we were getting by radio code. They came in coded form and they went to communications and they fed out these long, thin, quarter-inch wide strips with hieroglyphics, I call them. They were five-letter code words that made no sense at all until you matched them up with the code for the day. And then they would say "Isobar 1024," give you a latitude and a longitude and then a whole series of other latitudes and longitudes, and cold front from some latitude, longitude through a whole bunch of other latitudes and longitudes. If you simply sat down and you decoded these things and plotted them on the weather map, and you had your own observation. And we did a lot of—we had done some single station analysis and forecasting at MIT. I went back to school later after the war and we did a lot of that single-station type work, but not that much at the time. But we always tried to make our report where we were fit to the canned map that we had decoded. It didn't always fit really well, and we adjusted the decoded message a little bit.

Potter: And the coded messages that came in, you had to decode using a key that would change on a daily basis?

Haggard: Yes, we had a whole month of what the codes were for each day for the coming month. And we picked them up in some port and then each day we'd start with the date for that day, and here were all of these crazy words in columns, and then we'd have the strip from communications and we'd match words to words, words to words, and scribble them down on a piece of scratch paper and then put the dots on the map and then we'd connect the dots and we'd have a weather map.

Potter: How long would that take you, the decoding?

Haggard: An hour and a half, maybe.

Potter: In addition to the time that it would take to…

Haggard: Oh, yeah, the map was many hours old by the time we got it. But we had a sequence of maps.

Potter: And the idea behind the coding was because it was during wartime, I assume. Was that the reason?

Haggard: They didn't want the German U-boats and everybody else to know what our U.S. weather analysis was. And there were major Navy broadcast stations at Norfolk and I don't know where else, maybe Quonset Point, that our communications people tuned into and then they would deliver this strip to us, and we would sit down with our page-sized sheet of weird words and match them up and create a map.

39:14 Potter: So it was in October of 1944 that you returned to Quonset Point after the hurricane and what did you do for the remainder of your time in the Navy?

Haggard: We very quickly went to the Panama Canal and went to the Pacific, to Honolulu and Enewetak and Kwajalein and Palau then we did a lot of anti-sub—we were basically an anti-submarine group after we left the southern France invasion—and we did a lot of anti-submarine patrol around Guam, Tinian, Rota. Then we went into the China Sea and supported the landings at Lingayen Gulf, which is the northwest side of the main Philippine island of Luzon. There were major landings there. This was after the Battle of Leyte Gulf where the Halsey's fleet was hammered by a typhoon. We had encountered the fringes of that typhoon, but we didn't know that Halsey's fleet was in Leyte Gulf and he didn't know that we had encountered the edges of the typhoon that was not on the canned maps that were coming from Honolulu at the time. So when we put the pieces together afterwards, we wished that there had been some communication. Maybe we could've helped save some lives and the hammering of the fleet, though who knows.

Potter: So you remained in the Navy until 1945?

Haggard: Yes, I got off the ship—I had orders to Scripps Institute of Oceanography to study amphibious meteorology, in support of the further landings in the Pacific, but those orders never got carried out because I got put on a cargo/troop transport to go back to San Francisco when the class at Scripps was over before my 42-day voyage from Ulithi in the western Pacific to San Francisco was completed, so I was reassigned to the Naval Air Station in Jacksonville and was acting in charge there until Commander Harding came in and relieved me of that duty, and again had collateral duties with the Chief of Naval Air Operational Training Command. And I stayed there until December of '45 at which time I was discharged from the Navy. I stayed in the Reserve but was discharged from active duty.

Potter: How long were you in the Reserves?

Haggard: I stayed in the Reserve for 22 years, was recalled to active duty later during the Korean Conflict, and did my two weeks training and joined a local group that met.

Potter: So you were discharged from active duty, initially December 1945. What did you do at that point?

Haggard: I tried to make up my mind whether I wanted to apply for a job in the Weather Bureau or whether I wanted to go back to school and get further meteorology, so I wrote to the assistant chief of the Weather Bureau, who happened to be Dr. Carl Rossby at the time, and he wrote me a three-page letter spelling out the pros and cons of either going back to school or immediately applying for a job, and he pointed out that if I immediately applied for a job, I might get it, but if I went back to school there might not be any jobs because all the Weather Bureau people who had gone into military service would be back and maybe all the jobs would be full. But I decided to go back to school and I applied for the University of Chicago as an applicant for a Masters degree and it turned out that Dr. Rossby left the Weather Bureau at that point and became the head of the department at Chicago, which was a tremendous experience.

Potter: And you didn't know at the time that you decided to go to Chicago that Rossby was going to be there?

Haggard: I didn't know at the time who Dr. Rossby was!

Potter: But you knew to write to him.

Haggard: Well, I wrote to him as assistant chief of the U.S. Weather Bureau.

Potter: You just had a name. You didn't know that he was...

Haggard: I learned afterwards what a great person he was, and he was an exciting person to be associated with.

Potter: So you went to—you started in the program, the graduate program in meteorology at the University of Chicago in what year?

Haggard: Early '46.

Potter: Early 1946.

Haggard: Because I got my Master's in probably August or September of '46, so it must have been January of '46 that I went to Chicago.

Potter: And you completed that in less than a year?

Haggard: Yeah, nine months.

Potter: Was that typical?

Haggard: I think so, with already graduate work equivalent to—some said equivalent to a Master's—but all agreed equivalent at least to a second Bachelor's degree.

Potter: What can you tell me about your experiences at the University of Chicago?

Haggard: It was exciting. I had a terrible time finding a place to live. I took the electric train from where we lived in South Dorchester to the Midway, walked west into the winter winds blowing down the Midway to the University of Chicago. And I'll tell you there is no greater wind chill than that early morning walk in February. Had a marvelous group of instructors, and a marvelous group of fellow students. Some of my fellow students were Werner Baum, Reid Bryson. Some of my instructors were John Bellamy, Dr. Biel in climatology from—I think from Rutgers, Herbert Reihl, who became my Master's advisor, Dr. Rossby, Victor Star. His wife, Joanne Star—later a couple of other names, now Simpson—was a fellow student, and it was—and of course, there were others like Seymour Hess and Charles Jordan. It was an exciting group to be there under Rossby during the—a renaissance of meteorology.

Potter: What was it like—Tell me a little bit about Dr. Rossby as an instructor at that time.

Haggard: Totally stimulating, and occasionally very frustrating. He would start an eloquent derivation of some formula, and halfway through he would look at it and say, "That's not right," and he would then tell us what he was shooting for, and say "you can fill it in." (laughter) But you know, he was talking about the jet stream and comparing it with the gulf stream in the ocean and so forth at the time, and had this vision of what was going on. We already knew about Rossby waves, and so forth and the general circulation, but he was just so exciting to be associated with.

Potter: So you said you didn't know who he was when you started there, but you learned very quickly of his prominence and who he was, and Rossby waves, of course as you mentioned, had already been discovered.

Haggard: But you know, you wear blinders and you go through life and you hear these names and you hear this name, and all of the sudden a bell rings. That's the same guy!

Potter: Was there any particular specialty that you had when you studied there in Chicago? Or was it just essentially an extension of the work—the meteorology work—that you did at MIT?

Haggard: It was a real mix. I got very interesting in climatology at the time, and Irwin Biel was a dynamic climatologist. I was very interested in tropical meteorology, having spent a good chunk of my time at sea in the tropics. And Herbert Reihl was a leading tropical meteorologist and he was my principal advisor. John Bellamy had just come out with the PASTAGRAM (Pressure Altitude Specific Temperature Anomaly diagram) and all of the new stuff that was going on in upper air analysis at the time. So it was exciting on multiple fronts.

Potter: And no pun intended, but speaking of fronts, Dr. Rossby was part of the Bergen school in Norway at that time that discovered fronts—so you mentioned that you were doing frontal analysis at MIT. What was it like to learn—I assume you did learn more from Dr. Rossby directly about air mass and frontal analysis.

Haggard: We were pretty well up-to-date in frontal analysis by that time, so the more exciting part of being indirectly associated with Dr. Rossby was all of the new dynamics that were going on, particularly the upper air work.

Potter: So you became interested in climatology. Was this the first real time you felt like that was something that you wanted to perhaps pursue later as a career?

Haggard: Not consciously at that time. I began to realize there was more to it than just analysis and forecasting, there was more to it than pure theory. There was an awful lot to the data that had been collected and what they had to say. And that sort of opened my eyes to climatology. Of course know, at about that time, Irving Krick had come along with his typing work, which was based on the Northern Hemisphere map series. And a lot of things began to tie together.

Potter: And so you finished up at the University of Chicago, you said in the fall of 1946?

Haggard: Yes.

Potter: But you also were an instructor at North Carolina State University at that time?

Haggard: Well, when I got through with Chicago, I wrote my letter to the Weather Bureau saying I'm ready. Do you have a job? And they said no. So the second half of Rossby's alternatives letter the year before came true. The new Weather Bureau people who had gone to war had come back, and they occupied all the vacancies, and so I cast around and had a couple of job offers. I had a job offer with TVA in Knoxville and I had a job offer, too, as an instructor in physics and meteorology at North Carolina State. It was North Carolina State College at that time, and became a university later. And I accepted that, and I taught in Raleigh from September to February, and then I got a 103-word telegram from Dr. Reichelderfer saying, "Will you accept if offered a position as P2, salary of $3,300 a year, in Washington, D.C., in the U.S. Weather Bureau?" And I immediately sent a telegram back and said yes. And North Carolina State was willing to release me from my one-year contract and I left in, I think, February of '47 for Washington, D.C.

Potter: And did you have any contact with— this was Dr. Francis Reichelderfer, who was Chief of the Weather Bureau at the time?

Haggard: That's right.

Potter: Had you had any contact with him prior to that?

Haggard: No.

Potter: Did you know who he was?

Haggard: Yes. (laughter) I also knew that he was a retired Navy commander and that he had been to the early air mass schooling in Scandinavia and that he was a great guy, and it all turned out to be true.

Potter: But you had had no experience or knowledge of him while you were in the Navy.

Haggard: No, I did not.

Potter: So you just received a letter from—this was...

Haggard: A telegram.

Potter: A telegram. And was this in response to the letter you had sent to the Weather Bureau earlier, before going to Raleigh?

Haggard: It must have been. They must have kept my application on file. We had it—when I applied, I didn't just write a letter and say, "Do you have a job?" I filled out a form. I don't know whether it was a standard Form 7, or 141 or what, but you know, it's an application for federal employment form that you fill out. You put your life history on it, and you say, "I want a job." And they say no. And apparently they keep it on file and six months later say, "Are you still interested?"

Potter: So he sent you the telegram and obviously you accepted and moved up to Washington, D.C., in February of 1947 and began a career with the U.S. Weather Bureau.

Haggard: Yes.

Potter: And what was your initial assignment?

Haggard: I had a dual assignment. I was assigned to Jerry Namias and the extended forecast division, and I spent half my time there, and I was assigned to under Sam Solot in the climatological and hydrological services division to work on a reimbursable contract from the Hawaiian sugar planters and the Hawaiian pineapple growers to discover if there was any methodology for predicting Hawaiian rainfall one month in advance. Of course, that tied in with my association with the extended forecast division, so I worked half a day on how to predict rain a month ahead in Hawaii, and then how to make five-day and occasionally thirty-day forecasts with Jerry Namias, who was another fascinating person to work for.

Potter: Why was that?

Haggard: Well, he was in the forefront of long-range forecasting. He was it! Of course, Krick thought he was it, but Jerry was doing it for the government and was doing a great job, and

had previously worked with Rossby, so he was really up on—one of my first jobs was to take the 700 and 500 millibar charts and compute constant absolute vorticity trajectories on them. This was the way you determined where the Rossby waves were going to be 24 and 48 hours in advance.

Potter: So what did you think of the extended forecasting? How accurate, was extended forecasting at that time?

Haggard: The five-day stuff was quite good. The thirty-day stuff was experimental. But there was an awful lot of modern—modern for then—meteorology that went into the five-day forecast, and we worked in a room that was probably forty feet by forty feet, with a twelve- or sixteen-foot ceiling, and we had maps plastered all over all four walls. We had several days of the 500 and 700 millibar charts, which were focused on primarily—the surface charts were sort of secondary to that, because the controlling things were going on in the upper atmosphere and were associated with the Rossby waves and so forth. And we just had all kind of—we had people who specialized—I was doing vorticity trajectories and the other people like Harry Hawkins were doing surface analyses, and somebody else like Jim Andrews was doing something else, and people were doing isallobaric analyses and then all of these got put together and Jerry would stand and look at them and tell us what he thought they all meant.

Potter: And this was at the Weather Bureau Central Office?

Haggard: Yeah, this was at 24th and M Street.

Potter: In Washington. And so you were there with the extended forecast division for roughly—for roughly two years?

Haggard: Yes.

Potter: Until 1949, and then you got transferred to National Airport?

Haggard: Yes, I went to Harry Wexler who was the head of the scientific services division, the extended forecast division, and the Hawaiian research and pineapple people studied under him and I told him that I really felt that my career would be enhanced if I did some practical work in the Weather Bureau. And he said, "Do you want to be a forecaster?" And I said, "I think I should be." And he said, "Well, go talk to the people at the airport and see if they want you, and if they do, I'll release you." And I did, and they did, and he did, and I became first an aviation forecaster and briefer and then a marine and international forecaster. We did the flight cross-sections for Air Force One. We made the Navy forecasts, the forecasts for the north Atlantic for the Navy, after I did an awful lot of air-route six- and twelve-hour forecasts, some of which verified and some of which didn't.

Potter: This was in 1949 and 1950?

Haggard: Yeah, yes.

Potter: For Air Force One, and so this would've been...

Haggard: Harry Truman.

Potter: Harry Truman, was President at the time.

Haggard: Yes.

Potter: Did you ever have any direct contact with him or anybody at that level?

Haggard: No, only with his chief pilot.

Potter: His chief pilot.

Haggard: His chief pilot would come up for a personal briefing, and what we called interrogation, 'cause he knew an awful lot about weather, and he would look at the flight package that we'd given him and then he'd ask us, "Why did you put this here? Why did you put that there? Do you think that's really going to happen?" And this interchange with a knowledgeable, high-level Air Force pilot was educational.

Potter: So you were there for only about a year or so as a forecaster at National Airport. Is that correct?

Haggard: Yeah, I'm trying to remember the sequence of events. I was assigned to the training section to help Al Carlin train a group of fourteen Turkish meteorologists who had come to study meteorology in the U.S. They were supposed to go to the University of Chicago. They couldn't pass an English examination; the university said no, we won't take them. The State Department came to the Weather Bureau and said, "Can you train them?" So Al Carlin and I ran a training program in broken English and Turkish for about nine months at National Airport.

Potter: And after your assignment there at National Airport, what did you do?

Haggard: The Navy called me and said—it was Korean Conflict time. The Navy called me and said, "We'll give you a choice. If you'll volunteer, we'll assign you to a weather research project at Norfolk, Virginia. If you don't volunteer, we'll involuntarily recall you and you'll be on a carrier off of Korea. What do you want to do?"

Potter: What did you do?

Haggard: I went to Project AROWA in the Navy: Applied Research Operational Weather Analysis at Norfolk, Virginia for the next—'51 to '54—the next three years.

Potter: And what exactly did you do there?

Haggard: That was fascinating. We were supposed to meet the fleet needs for updated meteorological techniques, and we had about 15 projects that we worked on. One of them I worked with Paul Wolf, who went on to a great career in the Navy, particularly at Monterey. And we had a very highly classified project to determine the statistical variations in the height of the 500 millibar surface over the world for the baro-fusing of atomic weapons. And we used the services of the National Weather Records Center in Asheville to help us with that. We took the 40-year historical map series. We plotted the 500 millibar heights on a daily basis, and we tabulated them and then we let them computer-process them at Asheville. The National Weather Record Center had just moved to Asheville from New Orleans. And we did the statistical analyses and we created maps so that they would know how low and how high the various isobaric surfaces would be over areas of the world that they might want to drop atomic bombs on. The bombs at that time were baro-fused. They were set for a pre-determined barometric pressure and they went off and you hoped that was 2,000 feet above the ground at the time, but they needed to know what the limitations of that were. And I had a particular project that I was project officer on to devise a simple, 24-hour prediction of the movement of tropical cyclones—a system that could be done on a ship with limited capabilities by aerographer's mates. And we hired Herbert Riehl from the University of Chicago as a consultant on that. And he and Dick Sanborne and I worked for a couple of years on what became known as the "Riehl Haggard"—both final names rather than—and it later became the "very tired" prediction scheme, which was just before computer technology. We employed a moving grid with the storm center on a 500 millibar chart and we read values at various points on that and then we had nomograms that related that to the 24-hour latitudinal movement and the 24-hour longitudinal movement. And it was pretty good, but it was immediately outstripped after about three or four years by the computer models.

END OF TAPE 1, SIDE 2

Potter: All right, we're just returning from a short break during this interview with William H. Haggard, otherwise known as Bill Haggard, conducted by Sean Potter on August 21st, 2007. This is side one of tape two, and just before the break we were talking about your time in the Navy during the Korean Conflict between 1951 and 1954 when we were stationed at Norfolk, Virginia, and you were telling me about some of the climatological work that was done with upper air charts and looking at some computations that were being done down here in Asheville at the National Weather Records Center. And I'm not sure if you want to pick up from there, maybe tell me a little more about that, and anything else that you did while you were at Norfolk.

Haggard: OK, there were a lot of things that were going on. I think there were thirteen major projects that we worked on, and I mentioned two of them, the task on the statistical heights of the barometric surfaces using the 40-year historical map analyses, the objective 24-hour displacement of tropical storms using a moving grid. There was a project on the jet stream and a great deal of work was done on that, including some instrument and some commercial transcontinental flights, measuring the temperature differences along the wingspan of the aircraft and trying to relate that to the thermal field in various parts of their intersections at jetstream altitudes. There were a whole flock of projects, but I think I've mentioned the ones

that were most exciting to me. Working with Herb Reihl, who had been my thesis advisor at Chicago, who is now a consultant to us. We spent a lot of time with the then-current hurricane forecasters, including Gordon Dunn and Steve MacLeod and others in Miami and New Orleans, and a lot of empirical work. Her b and I, and Dick Sanborne, another Navy Lieutenant Commander, did an article for the journal on the empirical prediction technique, which really was a forerunner of the modern far more sophisticated computer models. But of course the computer models couldn't be done by the aerographer's mate on a ship at sea. But if he did have a good 500 millibar chart, he had a fair chance of making a crude estimate of the potential displacement of a tropical cyclone. It was an exciting time. Great people to work with. Bill Kotsch, who is unfortunately long gone, Ted Harding, who was then a commander in the Navy, Captain Fred Berry who was, you know, Berry textbook. It was a great three years of challenging, refreshing work with some hope that some of it would be beneficial to the immediate needs of the Navy at the time, and we think that it was a wonderful opportunity to be a part of the sort of updated retreading of our knowledge and the needs of the service at the time. And I didn't have to go on a carrier off of Korea at the time. Of course, the Project AROWA (Applied Research Operational Weather Analysis), which was Applied Research Operational Weather Analysis, became the Navy weather research facility and moved to Monterey shortly after I left it in '54.

Potter: And so when you—during in this time, 1951 to 1954—you sort of were back in active duty in the Navy, it was the Navy who called you back into active duty?

Haggard: Yes, well, as they put it, I volunteered.

Potter: You volunteered.

Haggard: Yeah.

Potter: And so you were there until 1954, and were you just discharged again a second time at that point?

Haggard: Yes, I was.

Potter: And then what did you do?

Haggard: I applied to come back to the Weather Bureau and was very fortunate to be interviewed by Helmut Lansdburg in the Office of Climatology in Suitland, Maryland. And he reemployed me in the Weather Bureau as the Chief of the Marine Climatology section.

Potter: OK.

Haggard: I had a number of great years with them. I was the Chief of the Marine Climatology Section and started an atlas of tropical cyclone movements for, I think it was 1890-something to whatever that current year was, with George Cry and White and it was eventually published. It's been substantially updated in recent years from that. I became the liaison

between the Office of Climatology and the National Weather Record Center for the preparation of the marine climactic atlases of the oceans. We started the publication, *Mariner's Weather Log*, which is still going. I think we started that in '54 or '55, and it's still ongoing. It was really sparked by the collision between the *Stockholm* and the *Andrea Dorea*, off of Nantucket Island in fog, and the need for a ready source of marine data for litigation. I don't know how many thousand copies of weather data were made for the lawyers that were involved in the litigation that took place after that marine disaster, but one of the things that we put in that was what we called gale tables, and we summarized on a quarterly basis the three months of gale reports—winds of gale force reports from ships at sea—as a quick reference for all maritime interest weather, and there'd be litigation or planning or whatever. And I guess it was there for about four years and I guess it was in '58 that I applied for and was granted a Weather Bureau scholarship to go to Florida State University for a retread program. The government had a program where people who had been in the service for a number of years without new, advanced academic training, they would select a certain number of them to go back to school. The amazing thing was and I soon discovered that there was more meteorology in the thirteen years—more meteorological research done—in the thirteen years between when I left Chicago and I went back to Florida State, than in all prior history. And I felt like, where have I been the last thirteen years? But the fascinating thing was that my new instructors and staff were old classmates at Chicago. Seymour Hess and Charles Jordan and Tom Gleason from MIT was a classmate, and Werner Baum—a whole flock of people that I had known in an earlier life were now my teachers and instructors and so far more advanced than any operational meteorologist during that intervening time could possibly be.

Potter: How had meteorology changed during those thirteen years? What were some of the most significant advances that took place?

Haggard: So much took place, and really as a result of the Rossby School: all of the new dynamics, all of the new prediction techniques, and of course computer processing. Modeling didn't exist in my previous schooling experiences, and all of a sudden everything was now being modeled, as it is today, in ever-more sophisticated ways. So I spent a year at Florida State. Then when I came back in, what, 1960, '59 or '60, out to the Weather Bureau I was assigned to the Office of Plans with Jack Thompson and we were the catalyst to put together the ten-year plans in observations and analysis, in forecasting and satellite meteorology, and all of the modern things that were going on in the Weather Bureau at the time. We didn't do any planning. We just pulled together the people and interviewed them and had found out what everybody's thinking was, and then had a small working group sit down and write a formal plan for the next decade in each specialized area of the Weather Bureau activities. The most exciting of those, I think, was working with Dave Johnson in what was known as NOMS, the National Operational Meteorological Satellite Plan. Dave was a real stimulus.

Potter: This was at the very, very beginning of the satellite era in meteorology, 1960-1961, with TIROS I.

Haggard: Well, this was '60 that we were doing this planning, so it was ten years after the first satellite had been launched. And the first one was launched when I was still working with Harry Wexler and Jerry Namias. And it preceded Sputnik, or was about the same time as Sputnik. It was a grapefruit-size thing. Then the TIROS series came along later.

Potter: The first operational weather satellite.

Haggard: Yes. Well, this was the National Operational Meteorological Satellite Plan. And to be in on the groundwork of trying to pull together—these were national plans. These were not just Weather Bureau plans. These were coordinated Air Force, Navy, Weather Bureau programs, and it was great to see things being done in an orderly and planned manner rather than—what I'd considered the previous work would've been pretty much hopscotch. Somebody had an idea and they did it, and that became the operational procedure, but nobody knew what was going to happen five years or ten years down the road. And this was an effort for each of the organizations to have a design and a purpose and a plan to achieve that purpose for the next decade. Not all of the plans turned out to be valid for a whole decade, but it at least was a blueprint of the way to go. And Jack Thompson was a wonderful person to work with. Jack and I worked directly with Dr. Reichelderfer, who was very vitally interested in all of these long-range plans and he fostered our work and he saw to it that we had access to the people that we needed to become the working groups to create these plans. So our job was to catalyze the planning process and to organize it and structure it and make sure they didn't go off on some horrible tangent that was unrelated to the other plans, so the whole family of plans was integrated in a fashion.

Potter: You mentioned some of those advancements in meteorology that you had become aware of when you were on the scholarship at Florida State. How easily did you find that the Weather Bureau at the time was utilizing that new knowledge or new techniques that were being developed?

Haggard: Quite a mixed bag. Some branch, section, division chiefs were with it, wanted to know what was going on, wanted to take advantage of new knowledge and new procedures, and some were pretty much stuck in their ways. So one of the purposes of the Office of Plans was to pull this all together and make it as cohesive as possible. And I couldn't have done that if I hadn't had the year's experience at Florida State. So the assignment to the Office of Plans immediately after my scholarship was a very fortuitous thing.

Potter: And was Dr. Reichelderfer as chief of the Weather Bureau—was he in favor of exploring new technology or new ideas in the Weather Bureau's work?

Haggard: He was a great administrator. He was a delightful person to work with. He was a kindly person. But he wanted the Weather Bureau to be as modern as possible, and of course he was supporting all of the work that Joe Smagorinski and the others were doing in the Fluid Dynamics Laboratory at Princeton, and he was trying to push the analysis people into becoming computer-literate and using numerical analysis in forecasting. George Cressman was active at that time, and it was a very exciting time to see archaic methods turning to modern methods.

Potter: So you were in the Office of Plans as assistant chief just for those two years, 1960 to '61?

Haggard: Yes.

Potter: And that was sort of the end of the part of your Weather Bureau career that was in Washington, D.C.

Haggard: Yes, I left Washington D.C. in April—I think it was April 1st—of '61. I had heard that there were going to be some changes at the National Weather Record Center, that Roy Fox was going to move on to some type of a new job, that Jerry Barger was going to become the director and that the deputy slot would be vacant. And I, with Jack Thompson's knowledge and consent, went to Helmut Landsburg, who had been my boss for several years in the Office of Climatology, and said, "If what I hear about the changes that are going to take place in Asheville are true, I sure would like to be a candidate for the deputy position at Asheville." And his comment was, "You would truncate your career to move to Asheville?" And I said, "Yes, sir!" (laughter) A little later, Jerry Barger came to Washington and he interviewed me. He said, "Do you want to be my deputy?" And I said, "I sure do, Jerry." And he said, "If you got that job, what would you do?" And I said, "Well, whatever you wanted me to do. If you wanted me to run the place, I'd do it. And if you wanted me to sweep the floor, I could go find a broom." And I guess those were the right answers, because I got the deputy job, and in '61—and I think it was in '63, that Jerry took a—Jerry Barger, who also was a great boss. I was very lucky throughout my whole career—I had great bosses, one after another. And Jerry moved to the World Meteorological Organization in Geneva, and they let me be acting for about three years. And then they decided, well, maybe he knows what he's doing and let me become the director, which I was the director of the National Weather Records Center, the National Climatic Center. Now today, it's the National Climatic Data Center, but it's all the same organization. We were already in the Arcade building, which is a delightful place to work in downtown Asheville, and I was privileged to be part of the modernization. You know, there were three Weather Records Processing Centers. There was one in San Francisco, one in Kansas City, and one in Chattanooga. And we integrated those offices into the Asheville office. Originally there were 11 WRPCs, Weather Records Processing Centers, but they had evolved into three and then we consolidated them in Asheville, all part of Helmut Lansdberg's long-range plan, but implemented by the National Climatic Data—what was the National Weather Record Center at that time. We modernized. We went from punch cards to magnetic tape. We went from electric accounting machines to computer processing. We went from all-paper records, films, to microfilm and then microfiche. We were active in trying to develop the film optical sensing device input to computers for punch cards, converted to a whole bunch of cards on a single frame of sixteen-millimeter film. There were just all kinds of exciting things going on. We had a great staff. I had the three guys who were heads of the Weather Records Processing Centers and knew what they were doing, all now part of my team at Asheville.

Potter: Who were they?

Haggard: Well, there was Herman Steffan and Gilbert Stegal and … I'm going to have a senior moment here for a moment. Ask me that question a few minutes later.

Potter: Let me ask you, during this time when you were director of the—were you actually director when it was still the National Weather Records Center, or had it already become the National Climactic Center?

Haggard: No, I became the director. I was acting from I think '63 to '65 and then I became the director. It was still NWRC. It wasn't until several years later that they made it National Climatic Center. Nothing changed except the title.

Potter: Were you under direct supervision of Helmut Lansdberg?

Haggard: He was my immediate boss until he moved on and we got a new director, Tommy Austin. And then Tommy Austin had an Air Force guy come in to be the deputy and I was suddenly one notch down below. You know, when I first went there, if I'd had to talk to the President, I'd have to go through four people. And when I left, if I'd had to talk to the President I would've had to go through at least twenty people, and I have no idea how many people Tom Karl—well he had direct access to Al Gore—but I don't know if he wanted to talk to George Bush today, how many people he'd have to go through to see him. But new layers of management kept creeping into the government program. But you know, we had a great big—the Secretaries of Commerce were interested in climate and interested in the fact that they had a facility in Asheville, and they would come and visit. The Air Force people would come and not just spend time with the Air Force people in Asheville. They'd spend time with the whole group. They'd talk to the Navy people. They'd talk to the civilian people, to the Commerce people. There was a lot of interchange and interplay, and it was an exciting time of great technological change, and great output change. Everything turned from paper to more modern techniques. And as you and I learned today on our tour of today's facility, it's all electronic and beautiful.

Potter: Do you get the impression even though it's been a good number of years since you've worked there, that you mentioned how the bureaucracy has increased and you mentioned how interested the Secretaries of Commerce were at the time, and the Air Force General and so forth, these top brass. Do you get the impression that that has changed since then?

Haggard: I think that the top brass, as you call it, both in the civilian and the military side, is vitally aware of the importance of climatology and is vitally aware of how this is so useful in all strategic plans. Maybe not so much in tactical, but you know, we saw today that the field people can use their laptop and create their own special-need climatological summaries on the spot from the very sophisticated databases that are possible today through the advance in technology. When I came to Asheville in '61, we had 422 employees. When I left in '75, we had 289. So we had downsided, but at the same time, we had increased our productivity manifold, purely by technological advanced. And those technological advances have just exponentially increased to today. When we went through, here's a room with nobody in it but machines buzzing frantically that are responding directly to Internet requests made my people in the field.

Potter: I'd like to go back a little bit and maybe talk about your experiences and interactions with Helmut Lansdburg, both when you—perhaps when you worked with him in Washington, is the Office of Climatology, the Weather Bureau Central Office, and then also when you were deputy director and the director of the National Climatic Center.

Haggard: Helmut Landsburg was probably the finest, most human boss that I've ever had, a really kindly person who knew how to get the best out of his people. He always had at least weekly staff meetings when I was in Washington, and almost the entire staff was invited to go around the table. He would interrogate them on what they were doing and what they thought this was going to lead to. He would drop a few helpful hints about things that they might think about that would make it better. And when I was at Asheville he would pretty much tell me what he was thinking and then leave it to us. And I would rely—I was always a believer in participative management. I was privileged in 1969 to be selected to go to what was called a federal executive institute in Charlottesville, Virginia when they took a—becoming senior field managers and brought them up to date on modern philosophy and a little out-of-this-world type of stuff that's sort of deorbited us and put us into a community thing, read books like Kafka and so forth and of course a lot of the California schools that we'd call "touchy-feely" were in vogue at that time. They very carefully reorbited us before they let us go. So one wife sued the government for having changed her husband's personality, at the school.

Potter: (inaudible)

Haggard: Well, you know, we had a lot of—there's no furniture in the room except a circle of chairs. And the boss is sitting there stroking his beard, waiting for somebody to say something. (laughter) And I applied some of that. I have Monday morning rap with the director sessions, and we'd invite 30 people into a room and all the chairs were in a circle and then the only person in the room that had a pen or a pad was the director's secretary. And the only thing she ever wrote down is when somebody said something and he said, "That's a great idea. Laura, make a note of that." And the rest of the time, we just went around the room and they popped questions and I would stroke—I didn't have a beard, but I'd stroke my chin and say, "Well, what do you think about that?"

Potter: This was when you were director of the National Climatic Center.

Haggard: Yeah. It was fun.

Potter: Tell me about more about your experience there. You talked about the advance in the technology going from punch cards to electronic and more modern archival systems. What are some of the other experiences that stand out during that time?

Haggard: Well, we had a lot of interchange with users. Everything was paper publications. We had the local climatological data, we had the state climatological data, and we had storm data, and we had just all kinds of summaries going on. These have been carefully designed by meteorologists who thought they had their finger on the pulse of the user needs. We had

user surveys—how do our publications suit you, what would you suggest, what would you suggest be changed, and so forth. We would occasionally have seminars where we would invite major users to come in and tell us what we were doing wrong, as well as what we were doing right. And we had working groups to try to update and upgrade everything that we were doing and make our products more useful to the end user, and that's still going on today on a very accelerated pace, because the user now in a few minutes can get answers to questions that used to take a month to get answers to. Of course, a lot of things are the same. The litigants still want original copies of observational forms with blue ribbons and gold seals on them, to be introduced in court, and things of that type. But the publications were constantly updated. We went through some iterations. We stopped publishing hourly data and started publishing three-hourly data, and then later went back to publishing hourly data. But the whole purpose was to provide a service to those in the nation who needed climatological data for some purpose, whether it be designing an airport, laying out the runways, whether it was the structural strength of the Trade Center buildings in case a hurricane went up the Hudson River, the location of the Golden Arch to the west, which was reoriented because it has sort of an airfoil shape and in its original position it was subjected to the maximum stresses, from the strongest potential wind field. So they reoriented it a little bit so that—and they did that based on climatic summaries that were either from published data or specially made in response to a request. A lot of what we did was in responses to requests.

Potter: That would be the arch in St. Louis? The Gateway Arch?

Haggard: Yes, yes.

Potter: And was this the first time that you really had a sense of how important climate data was to litigation, during your time at the...

Haggard: Yes. We had—I think our largest single customer base was litigants. There were lots of requests from lawyers directly to the center for data that they could introduce in court to help them with their side of the litigation, and the courts basically required that the data either be presented by somebody who could verify that they were authentic data, or that the data had a blue ribbon and a gold seal on it, which was the automatically admissible.

END OF TAPE 2, SIDE 1

Potter: OK, we're continuing on with the interview with Bill Haggard, conducted by Sean Potter. Today is August 21st, 2007, and this is side 2 of tape 2, and we were talking about your experiences as a director of the National Climatic Center, which is now the National Climatic Data Center here in Asheville, and you mentioned that your biggest client base, if you will, was attorneys who required data, specifically certified data and other records for litigation.

Haggard: I guess they were the biggest client base in terms of the number of people making requests. There were other clients who used huge quantities of data but only got counted as a single client. But I became aware of the significance of weather data in litigation, and how

much litigation there was. It was (inaudible) had a weather factor. It wasn't totally weather dependent, but had a weather factor in relationship toward it. And it was everything from a slip and fall on a wet or icy road or walkway or something, to an airplane crash, to a ship sinking, to a roof collapse, to highway accident on a wet highway, and very often the question of what was the lighting at the time, when it was in the dusk period between 30 minutes before sunset and 30 minutes after sunset and visibility gets rougher on the highway.

Potter: What were some of the—were there any interesting cases or requests for data that you recall while you were at NCC.

Haggard: Well, of course I knew about this huge quantity of data in the ship collision and I realized that sometimes hundreds of lawyers were involved in major litigation representing all of the interested parties. And then I realized that some of them were just two lawyers on opposite sides of—some poor person slipped entering or leaving a grocery store on a wet floor that should've been maybe squeegeed or maybe the rain had happed so suddenly that they didn't have time to squeegee it, and all of these things that you never think about unless you get a question. So yeah, I became increasingly aware, and probably five years before I retired, I thought, you know, I don't want to do this until I'm... at that time, there was a mandatory retirement at 70, and I looked at a lot of senior government officials, in effect being carried out on their on their chairs on their 70's birthday, with the corners of their mouths turned down and a defeated look on their face. And I said, "That's not what I want to do." So I decided, and I let my bosses know when I was 50, that I'm going to retire at 55. At that time, if you had 30 years of service and were 55, you didn't have to take a deduction in your retirement annuities for having retired too soon. So I announced five years ahead that I was going to do that, and then I was going to go into meteorological consulting and litigation, and it was largely because of the exposure to the quantity of data that were being used for that purpose. And often, being misused for that purpose. The lawyers would get data and they would present the data and then they would argue from their legal perspective what that meant, and I didn't think that sometimes their arguments from that legal perspective of what that meant were as valid as those of the knowledgeable meteorologists out there. But I thought I was a knowledgeable meteorologist and I thought it would be fun to go and explain what those data meant and how they applied to the circumstance at hand. So it was my intention and it was announced well in advance and when the time came, I retired within a month after my 55th birthday, with 32 years of federal service and hung out my shingle.

Potter: And that was—and you retired from federal service in1975?

Haggard: Yes.

Potter: And when did you—was it immediately, right after you retired that you went into your private practice?

Haggard: In February of '76. There was the six-week interval between retirement and hanging out my shingle and saying if you need assistance in interpretation of weather in your case in litigation, I'm available. (laughter)

Potter: So it was the end of 1975 when you officially retired?

Haggard: Yes.

Potter: Left the government and then in February of '76 you hung out your shingle, and is that when you began the Climatological Consulting Corporation?

Haggard: Yes.

Potter: And tell me about those early days, as a consulting meteorologist. You were using—was the term forensic meteorology used at that time for what you did?

Haggard: Yes, I think so, though I don't say I am a forensic meteorologist. I had in realizing the importance of it applied for an obtained my Certificate of Consulting Meteorologist from the American Meteorological Society. I'm not quite sure whether it was then or a year or so later that I joined the National Council of Industrial Meteorologists. I wanted to make sure that I provided the lawyers the best possible service and the highest possible credentials, and the certifications that said all of this is true. What I didn't know about was business. After 32 years of federal service, or in 32 years of federal service, I had never heard the terms "undercapitalization" or "negative cash flow." I spent the first six years learning those terms. It took six years to bottom out and start back at the zero level and grow from there, but it was a great ride.

Potter: Tell me about some of the various cases that you had worked on as a forensic meteorologist.

Haggard: Well, the first one, and the one when I learned a little bit about the use of an expert in litigation was an unfortunate aircraft accident in Anchorage, Alaska. I had written letters to attorneys using the directory of attorneys published by Martindale and Hubbell. My daughter-in-law for 25 cents a name and address selected potential clients from the directory of attorneys and I wrote them letters, a form letter but personalized, saying that if you ever need the help, the assistance of a meteorologist in the case where weather may have been a factor, consider utilizing the services of the Climatological Consulting Corporation. We have these capabilities to offer you, solid certified data, competent trained person with a knowledge of meteorology, no knowledge of law but you don't need that. That's up to the lawyer. And after I sent the first 600 letters to Alabama and Alaska, because they were the first two states alphabetically, and a lawyer in Anchorage, Alaska got one of those 600 letters and he called me and he said, "I need some help. Got in an aircraft accident and it's related to weather, and I've got a bunch of people up here who are going to testify about the weather, and they have no idea what they're talking about. I want to put an expert on the stand. Are you interested?" And I was, and it was an aircraft accident in which Congressman Begich from Alaska who was running for re-election, and Congressman Boggs who was from Louisiana who was the Speaker of the House were going to Alaska to help Begich get re-elected and was going from legal meeting to legal meeting and public meeting to public meeting and saying why Begich would make a great Congressman to be re-elected, and they had a meeting in Anchorage in the evening and they had a luncheon meeting in Juneau the

next day was the six a.m. flight from Anchorage to Juneau, and the Anchorage meeting ran late. It was going to run late, so they didn't want to have to get up that early just to fly to Juneau, and a friend of Congressman Begich said, "I'll fly you down in my plane." And they accepted his offer, and the plane disappeared during the flight and they were lost. The Boggs family and the Begich's family accepted the insurance which the pilot carried. The pilot and everybody on board was killed. Congressman Begich's administrative assistant was also on board, and a plaintiff's attorney in Anchorage said to his widow, "Don't accept the insurance. You've got a great suit against this pilot, who is dead, but against his estate. I can get you a lot of money." Which of course, we would keep his commission, which was probably 30 percent or so. So they brought a suit, Brown v. Jonz. Brown was the administrative assistant, and Don Jonz, J-O-N-Z, a parody of Jones, was the pilot. And they were going to deplete his estate, which would deprive his son of an education and everything else. So Charlie Hagans, an attorney in Anchorage, called me blindly. He'd read my letter and I flew up to Anchorage and waited for an opportunity to testify at the trial. The real question was whether it was a legal flight, which means you have to stay clear of clouds and have good visibility. And the plaintiffs had a number of local pilots who said the weather was lousy, the guy should've never taken off, it was an illegal flight, it was 100% pilot error, he's guilty. And Charles Hagans wanted to put an expert, a guy with a briefcase who lives move than 50 miles away, and I met those qualifications at least. (laughter) And it was in fact, I was able to demonstrate from the records, it was in fact weather that was appropriate, for a visual flight, and that hinged on the legality of the pilot's liability. And we prevailed. The jury awarded $62,000 but the family had turned down $150,000, so the savings to the family was the difference between $62,000 and $150,000. They thought it was worthwhile to have Hagans defend the pilot. The jury was sort of mixed, you know. They didn't really believe that the pilot was totally guilty, but they didn't really believe that he was totally innocent either, and it was what they called a compromise verdict, but it was a great education for me, and Charles Hagans was a very patient man. One of the things you're supposed to do when you answer a question is tell the judge, which means turn to the judge and say something, and the jury, which means turn and face the jury and answer the question fully. Don't look at the attorney. That's very, very difficult to do. The attorney asks you a question. You're going to look at him to answer the question. So Hagans told me fifteen or twenty times, "When I ask you a question and I say 'tell the judge and the jury,' I want you to look first at the judge and then talk to the jury." He finally ended up standing right beside the jury box and pointing at the jury whenever he asked me a question. (laughter) But that was a great initiation into the courtroom, which frankly I had never been in and I was utterly naïve about those parts of the proceeding. But the beauty of it was that he was satisfied with what I did. He recommended me to other people. I got other cases, including a huge case in which I worked for the government over the legality of building a cross-wind runway at the Anchorage International Airport, which required three years of complex work and testifying in federal court in Anchorage on behalf of the government, which wanted to build a cross-wind runway, and that led to letters to other FAA attorneys saying "if you ever need a meteorologist, use this guy," and so you know, this is built on success of a very naïve initial case, and from then on it became fun, although as I say, it took six years to overcome the negative cash flow aspect of it, and have enough business that I could support an office and a staff. But it grew. I ultimately ended up with eight associates, a local staff of six, and a wonderful relationship with marvelous lawyers.

Potter: How different was the work from the work you had done at the National Climatic Center? You weren't testifying there, but you were certainly involved with the data. Did that really prepare you for this sort of new career as a forensic meteorologist?

Haggard: It prepared me for the meteorological part of it, but not the legal part of it, and learning—and the worst thing an expert in weather should ever try to be is a lawyer. The worst thing that an expert in building structures should ever be is a lawyer. Leave the lawyering up to the lawyers and leave the experting up to the field that you might actually qualify to be an expert in. But, lawyers want you to do the right thing in the courtroom. First of all, first instruction is tell the truth. And then of course, you're sworn to tell the truth, the whole truth, and nothing but the truth. The truth is no problem. Nothing but the truth is no problem. The whole truth is a problem, because your job is not to get up and make a speech, but to answer the questions that are put to you, first by the lawyer that you're working with. You're not working for the lawyer. You're working with a lawyer, and you must never, never, never forget the first maxim. The worst thing you can do is to stretch the least little bit to help your attorney. Word will spread like wildfire and you'll end up working for nobody but plaintiffs. Once a lawyer uses you and feels that you can cut the mustard, he will tell other lawyers, and we use this guy down in North Carolina and he's OK. Or we use this guy in upper New York State and he's OK, or whatever. So the successful forensic meteorologist or meteorologists who learn to tell the truth and learn that their job is to educate the judge and the jury about the meteorology related to the event and to perhaps interpret its impact on the event. Don't ever pretend that you're a pilot and what this means to a pilot. They have a pilot expert for that. You say what the weather was, then they put on a pilot expert and he says what that means to a pilot, and so forth. But once I got past the how can I ever afford to keep this company alive until I can make a profit, and how am I ever going to know enough to really be a good and credible witness? I'm convinced that juries know who's telling the truth. They may not remember everything you've said, but they remember who they believe and which side they're working for. So you've got to talk to the jury as interested pupils, but don't lecture them, don't pontificate, don't show them how great and knowledgeable you are, but tell it to them in such straightforward way that they understand it, and don't rely on their memory of words. The name of the game is show and tell. And so eighty percent of what a jury retains is all visual, and twenty percent of what they retained they heard. So you show and tell. And I became known as the guy with the pictures. We demonstrated every technical point in the simplest possible way and lectured to them as if they were high school juniors or seniors. On your own level, not "I'm up here on the throne and you guys are down here and I'm going to tell you what happened," but hope that your lawyer can ask you questions that are pitched at your being able to respond to them in a way that they believe you're telling them something that they're like to know.

Potter: As far as you knew, was it fairly new at that time to use visual aids in the courtroom in explaining the weather data rather than just explaining the weather data or having certified copies of the data in the end?

Haggard: I was absolutely amazed that the courtrooms were not equipped for visual aids in any way, shape or form. Initially, our visuals were on thirty by forty inch Bristol boards, put on

an easel. I really thought that we ought to have projectors. I really thought we ought to be able to project things on the screen. Today, everything, you do computer graphics and put them on a machine called an Elmo, and it puts that on a 54 inch television screen three feet in front of the jury box. But I lived through that whole evolution of no way to show anything significant in the courtroom to modern day high-tech computer graphic demonstrable evidence. But demonstrable evidence is the key to success in educating a jury on technical matters.

Potter: What was the competition for you like in those early years? Were you aware of many other people who were doing what you were doing—essentially working as private consulting meteorologist for litigation?

Haggard: There were a number of people. There was A. H. Glenn and Associates in New Orleans. There was Loren Crow in Denver. There were people on the West Coast and southern California. There was Walt Zeltman in New York. There were probably 15 or 20 people who were making a living out of assisting the court in its search for the truth, demonstrating the significance of the weather to whatever the event in litigation was. Actually, there are a couple hundred in the back of the Bulletin; advertisements in other places now who are active in forensic meteorology. But I certainly wasn't the pioneer, but I was in the early rapid development of forensic meteorology in litigation.

Potter: Were you aware of any point in time when—it might have been before you started, before you left the government—when this type of work stopped being done by government Weather Bureau employees and pretty much was done entirely by the private sector?

Haggard: Before I retired, there was a regulation, if not a law, that government meteorologists, meteorologists on the government payroll, could not testify in litigation other than on behalf of the government. So there weren't any government meteorologists who were making an outside living doing this. The only government meteorologist who was testifying was doing so in litigation, where the government was involved.

Potter: Before that, that regulation or law, were you aware of government meteorologists who would do that, go into court?

Haggard: Oh, way back, they did regularly, yes. There were several meteorologists in charge who spent a fair amount of time in litigation, but that was a long time ago. That was long before I got into the field.

Potter: But you never did that as a government...

Haggard: No.

Potter: So, you had some of these early cases and you got some referrals and you eventually, the first six years, you said Climatological Consulting Corporation were able to turn a profit and...

Haggard: Not within the first six years, but after the first.

Potter: Right, after the first six years, you were finally able to break even and then start turning a profit. Did you ever get discouraged in the early years and think that...

Haggard: I was ready to throw in the towel. I told my wife that this is what I've wanted to do for years and this is what I love doing. But I don't think I'm going to make it. We've hocked the farm and we've borrowed from our relatives, we've mortgaged the house. The outgo simply continues to exceed the income. Maybe I'd just better quit and not go any deeper in debt. And she said the big one's going to come. If this is what you wanted to do, do it. And she was right.

Potter: And what was the big one that came along, the first big one?

Haggard: Probably a fellow by the name of Bill Zurzollo in Philadelphia. He had a major airplane accident case, and he employed me for more than a few hours at a time. It wasn't until 1980, which was—what, I got started—well, it was four years down the road when the ship hit the Tampa Bay Bridge and the skyway fell, and the State of Florida hired a major Tampa firm and one of the senior partners, Ben Hill, came to Asheville and interviewed Henry Harrison and Sam McCown and me who were the three principals in Climatological Consulting Corporation at the time, and we worked a couple of years and testified in about six major cases, against the ship, against the pilot, against the shipping company, against all the people that were involved, and defending the state for its alleged errors in locating the bridge. Then some aviation work began coming my way and despite the fact that I really wanted to be testifying in maritime cases because of my long Navy experience and my involvement with marine meteorology in the government for so many years, I didn't get a lot of marine cases. I ultimately did, but aviation blossomed first, and I think this was largely because of my association with Charlie Hagans in the Alaska Boggs/Begich crash, and the fact that he recommended—Charlie said to me, "Bill, you need to meet all the lawyers who are involved in aviation. They all go to the Southern Methodist University air law symposium in Dallas every year. If you want to go there, I'll introduce you around and you'll get a lot of aviation business." So I registered and went and Charlie didn't. And so I introduced myself to a number of lawyers in a rather low-key manner. They let me put my brochure on the registration table. I didn't stand at the door and hand it to people with a folded sheet of paper that they threw in the wastebasket on the way down the hall. And a few cases came. One case came in Greensboro that was a suit against the City of Greensboro and the FAA for—it was Eastern Airlines. That plane crashed on takeoff in a snowstorm. It was permitted to take off on a runway that was totally blocked with snow and it should have never been permitted to take off on that runway. The judge finally said, you know, there's enough blame to go all the way around here, and I find everybody guilty and everybody innocent and throw this case out. But he did so after he heard all of the testimony including the meteorological testimony. That lawyer used me a number of times, and his firm used me a number of times, and they recommended me to a number of other people. And you know that success is if you serve somebody well, and they like what you do, they'll tell somebody about it. The great thing about going to subsequent—and I went for 15 years to the SMU air law symposium, and lawyers that I had worked for would say to a friend of theirs, and put

their arm around my shoulder and say to a friend of theirs, "I want to introduce you to this guy. He's a good meteorologist. If you ever need one, try him." And business boomed. It blossomed. I had to hire more staff. I had to bring more associates to the table. One of the things that really helped Climatological Consulting Corporation was my associates. I had Wally Bohan, probably the world's authority on satellite meteorological interpretation at that time, Jean Lee in Norman, Oklahoma, a true expert on radar meteorology. Ted Fujita at the University of Chicago offered to affiliate with me, not to testify but to assist me behind the scenes in the Delta 191 crash at Dallas, Fort Worth. Ted did masterful work that I would have never thought of, but showed me the way to come up with the analyses that were pertinent to the litigation, and Ted simply said, you know, I like to come down out of my ivory tower and work in the real world, but I do not want to be involved in a courtroom. I will work with you, and he became a consultant, and we must have done 15 or 20 cases together where his insight showed me the way to provide the meteorological answers that were pertinent.

Potter: But he contacted you initially and offered...

Haggard: Actually, he and I were both employed by the same lawyers for the insurance companies, and we were put together as a team and he enjoyed the teamwork, so he volunteered that he would work with me on cases that he was interested in.

Potter: The first one was the Delta 191 crash, that you collaborated with Fujita on?

Haggard: No, I think the first one was the Pan American crash in New Orleans, which preceded the Dallas crash by several years.

Potter: I have here... OK, so the first one was the Pan American crash, the first...

Haggard: I think that's the first time I worked with Ted, yes.

Potter: But the Delta 191 in Dallas...

Haggard: That was the big one.

Potter: That was a big one. Tell me about that.

Haggard: (inaudible)

Potter: (inaudible)

Haggard: The insurance company that had insured Delta and Lockheed and some of the engine manufacturers had a major stake in the loss of Delta 191. And they employed very high-powered attorneys and they employed Ted Fujita who wrote the book, the DFW microburst, which was all about the crash of Delta 191. And the work that Ted did was fundamental to the detailed analysis of what was going on meteorologically that day and how it impacted on the performance of the various aircraft that were in trail coming in to—there were 62 aircraft

in trail coming into the DFW airport at that time, and the weather was steadily deteriorating. And Delta 191 happened to be the unfortunate one that got caught in a roll vortex on the side that tilted the plane against its control forces and caused it to drop 200 feet, and actually strike the ground quite some distance from the airport before it regained flight but not enough to clear the highway north of the airport. And it was Ted's infinitely-detailed fieldwork that produced the insightfulness that let us know what was going on meteorologically. I just can't say what ability he had to see the obvious once you had it pointed out to you, but it took him to point it out for others to see it.

END OF TAPE 2, SIDE 2

Potter: All right, continuing on. This is tape three, side one with the interview with Bill Haggard, conducted by Sean Potter on August 21st, 2007, and we're talking about your experiences working with the late Ted Fujita during the case involving the crash of Delta flight 191, Dallas Fort Worth, which was instrumental at least from Ted's standpoint in discovering microbursts. Is that correct?

Haggard: No, Ted had discovered the microbursts some time before. It started with an Eastern flight at Idlewild which because J. F. Kennedy airport and its controversy over the existence or non-existence of microburst and his early work well preceded both the New Orleans Pan Am flight, the 727 that took off under a microburst, and then later the Delta flight, which was many years later. So Ted was deep into microbursts before, and he immediately saw that this was a microburst situation. But the detailed analysis of all the flight data recorders on the preceding and following aircraft, all of the ground data, all of the radar data and everything together, which led to his book *The DFW Microburst*. He was several years into microbursts before that happened.

Potter: You know if he ever worked on other cases, files in which microbursts resulted in airplanes?

Haggard: I don't know that he worked as an associate or consultant to any forensic meteorologist, but he published a number of reports and in the Pan Am case in New Orleans, which is a few years before the Dallas crash of the Delta 191, he had done extremely detailed work and he had written reports which the NTSB utilized, and they're finding a probable cause of the accident. But there wasn't any testimony in the Pan Am New Orleans case. The plane that flew into the microburst, the government agreed that it was fifty percent their fault and fifty percent the airline's fault, so there was no litigation. They each paid half of all the damage suits, and in the Delta 191 case the government had a new policy of we're going to defend every case. We're never going to admit liability.

Potter: And so you testified during the Delta 191 trial.

Haggard: Yes, I did.

Potter: Tell me a little bit about that. What was that like?

Haggard: Well, it was a fourteen-month trial. The judge got married and had a heart attack, not necessarily in that order during the trial. At the end of the trial, the attorneys on both sides produced pictures of the witnesses and brief summaries of what they said to remind the court what had happened in the last year or so, in the courtroom. The government had some very powerful lawyers. Kathlyn Fadley was the principal courtroom attorney. The question was, the question that the government focused on, was did these pilots fly into a thunderstorm, because you're not supposed to fly into a thunderstorm. And of course, the cockpit voice recorder had a comment "lightning out of that one," by the flying co-pilot. The captain says, "What?" He was a little hard of hearing. And the co-pilot says, "Lightning out of that one." There's a long pause in which you can imagine that the pilot is staring out to the windshield, and he says, "Where?" And the pilot says, "That one. There ahead of us." That became the crux of the government's case that proves willfully flew into a thunderstorm, which is a no-no. And when the case was over, Kathlyn's cohorts, compatriots bought her a four-inch diamond studded lightning bolt pin, which she wore proudly on her lapel for years afterwards.

Potter: Who was this?

Haggard: Kathlyn Fadley. She was first an FAA—interestingly enough, she was the FAA attorney in the case that I first worked with in the Eastern v. Greensboro and the FAA, and then later with the principal government attorney in the Delta 191 case. And she didn't like my testimony in either case, but my testimony was as straightforward and factual as I could make it. There was no question, and I told the lawyers that I was working with when I first heard the cockpit voice recorder transcript that that's going to be your biggest problem, that the crew saw lightning out of a cloud ahead of them and proceeded, which was basically what won the case for the government.

Potter: So the government prevailed in that case.

Haggard: Yes. Delta ended up paying all the damage suits.

Potter: So tell me about some of the other—I know we could probably spend hours talking about all the various cases you've worked on, but maybe we can just talk about one or two more of the more memorable or interesting or unique cases.

Haggard: We've mentioned the skyway collapse after the phosphate carrier hit an upright, well removed on that channel, because they lost track of where they were during a vicious rain squall. They lost personal visibility and they lost radar visibility because of the intensity. I mean, it may have felt like we had an hour or so ago here this afternoon. Very brief, very intense. And we mentioned the Boggs and Begich case, and we mentioned the Alaska runway case, which was a fascinating task which the government ultimately won and I was pleased to be able to work on their behalf factually. Some interesting maritime cases. The APL China, the American Pacific Lines container ship, APL China, was carrying 6,000 containers from China to the U.S. to meet a train in time for the Christmas market a bunch of years ago. And they ran into a storm. A major wave hit the side of the ship and entered through the louvers 52 feet above the water line of the generator room and shorted out the

generators which caused a loss of all of the computers that controlled the diesel engine that were pushing this huge ship at 24 knots across the Pacific. They wallowed for several hours with 60, 65 knot winds and humongous seas. 388 of the containers fell overboard and about 400 of them became unlashed and tilted on the ship. It was something like $80 million of damages that resulted from that, and of course this went into litigation. All the people whose merchandise was destroyed or lost sued the ship and the ship owners for the loss, and a major, major, major maritime case, and I was privileged to work with a major firm in New York, was deposed and during discovery the lawyers for each side can interrogate the witnesses for the other side and find out what they're going to say in the courtroom, and that's a deposition. Then that deposition is part of the record, and if you say something different in the courtroom than what you said in your deposition, you're impeached and your testimony can be thrown out, so you have to remember that there is only one truth, and that's what you tell each time. That never went to trial. That was ultimately settled because they were good attorneys on both sides and were good experts on both sides. We disagreed a little bit on some of the details, but the attorneys assessed what the true liabilities were and came to an agreement, but that was a year and a half of intense work to get all of the data, the satellite data and the climatological data. Should the skipper have known that if there was going to be a storm it was likely to be in this area of cycle genesis in the western Pacific at that season of the year? With the aid of the Navy, Marine Climatic Atlas, yes. Should the skipper have known when he first started encountering it that he was being overtaken, even though he was making 24 knots that he was being overtaken by a major storm that was marching at 30 knots and that he was going to be submitted to very severe weather and taken some more evasive action than he did? Yes. And a whole cascade of questions to that guy, to which the answers were yes, as far as I was concerned, from a meteorological point of view. Had a bunch of—lots of airplane accident cases, both private aircraft and major carrier aircraft, all of which were very challenging. Now, to the lightning strike case, where people alleged that they were so severely injured by lightning, when the National Lightning Data Network didn't show a single cloud-to-ground strike within six miles of the location where the guy said he was struck by lightning. Roof collapses from major snow. One of them was that, you know the PTL Church that Jim Bakker ran was sold to another group, and there was a major, major snowstorm and about 22 inches of snow in Rockhill, South Carolina, and the roof was a long sloping roof with three dormers near the southwest end of it, and the northeast wind blew with vigorous winds, with 22 inches of snow on the roof and the dormers formed barriers that drifts just formed behind, and the roof collapsed between the first and second dormer, which is where the biggest drift would've been. And the question was, what was the weight of snow between those dormers? Well, all I could do was use the density of snow, and that was measured by a co-op observing station very close to a university station, very close to the locale. And I came up with a potential depth of snow of greater than three feet, and the density of the snow, and converted that to pounds per square inch on the roof and those pounds per square inch, I was never told what the roof design was supposed to be. I was simply asked what was the weight of the snow, and I came up with my best answer on the weight of snow, and it was considerably in excess of the design requirement for the room. So you know, there's all kinds of variations of this. We had a major, I think it was a 75-vehicle pileup on Interstate 75. 75 vehicles on Interstate 75, Calhoun, Tennessee. Right next to them, Bowater Paper Mill. Well, obviously, during a sudden onset of abrupt, very dense fog, like driving into a marshmallow, like somebody

throwing a towel over the windshield, reduction of disability. Of course, the paper mill was blamed for making the fog. Paper mills have a lot of money, paper mills put out a lot of water vapor, and paper mill's got to be liable if there's a highway accident near them. And case, did an awful lot of work on that case, and again, it settled without going to trial after everybody listened to everybody and realized what a jury probably would come up with, so both sides agreed to overcome the cost of the trial and made a reasonable and acceptable settlement, but the settlement was in part based on their knowledge of the facts after they assembled all of their experts and everybody was deposed and the lawyers sat down and huddled and decided, like I said, 80 percent of the cases, ultimately settled without going into the court room. The Peterson case, you wrote that up in—the Peterson East case. That was the Peterson West case, you know. That was the Peterson who killed and unborn child in California. And our Peterson case, which...

Potter: You weren't involved with the one...

Haggard: No, no. (laughter) In Durham, North Carolina where Mr. Peterson sat out by the pool for several hours in shorts and a T-shirt when the temperature when from 55 to 51, and then allegedly went into the house and found his wife dead at the foot of the stairs where she must have fallen after taking some pills and drinking, and where the prosecutor was pretty sure she had been bludgeoned to death, and one of the little question in the case was, was it credible for Mr. Peterson to have sat beside the pool just as he was for that length of time, with the temperatures that were prevalent at the time, and how do you know what the temperatures were that were prevalent at that time. And I was privileged to testify in that case, and while I don't think the verdict hinged on that, I think it was a little piece of the jigsaw puzzle, that the jury put together in finding him guilty.

Potter: You testified on behalf of the prosecution.

Haggard: Yes, the district attorney.

Potter: The district attorney, and what percent, or how many cases in which you testified or in which you worked were you working for a plaintiff's lawyer or a prosecuting attorney versus a defense lawyer?

Haggard: Very, very nearly 50-50. I ran the statistic from time to time, and it usually came out something like 46-54 or 52-48, and this was simply because I responded to whoever called me first. I did not choose to be a defense witness or a plaintiff's witness.

Potter: So you never developed sort of a reputation as being more aligned with one side versus another. You mean more somebody who'd work with a plaintiff's lawyer or a defense lawyer...

Haggard: Well, you're automatically assumed to be a hired gun no matter who you're working for, but you have to overcome that and simply assist the court in its search for the truth, by doing an objective study and presenting the material in a straightforward and honest manner.

Potter: I'm assuming that no matter which side you're working for, the opposing side will do their best job to try to discredit you, and it must be quite a challenge at times to try to overcome that.

Haggard: You simply have to sit and listen to the question and answer the question in a straightforward manner and look the jury straight in the eye when you do so.

Potter: Did you find any difference, or do you find any difference in working for a plaintiff versus a defense lawyer?

Haggard: A defense lawyer is really more anxious for you to tell the truth and a plaintiff's lawyer wants you to tell his version of the truth.

Potter: And how does that affect your ability to do your work objectively?

Haggard: My answer to that is I cannot say that.

Potter: You mentioned the Peterson, Michael Peterson murder trial. Was that the only murder trial that you've worked, or are there others?

Haggard: There were a couple of others that I did some preliminary work. There was one in the Peterson case. My little ditty was "it was cool by the pool," and then in another case I said, "the corpse was wet." They found a corpse in the trunk of a car, and the corpse was wet. And the question was where had it rained, because it hadn't rained where they found the car, but it was wet in the trunk so he must have been moved from someplace where it had rained. And my job was after the coroner determined the approximate probably time of death from the condition of the corpse, considering the ambient conditions that it was subjected to after death and so forth, which is a whole forensic pathological field in its own right, I found out where it had rained at the probably time of death, and they went back there and all those places and tried to figure out if any of that was the potential scene of the crime.

Potter: Any other cases that really stand out?

Haggard: Hundreds of them. (laughter) You don't want to hear all hundreds of them.

Potter: You sold your company you founded, Climatological Consulting Corporation. You should that a number of years ago.

Haggard: Yes, I think it was in '99.

Potter: 1999.

Haggard: It was a gradual transition. It was paid for over a period of years and there were—well, it changed over a period of years, but I think 1999 was my final year with it.

Potter: But you've still been—for the last several years, you've still been active and you've still been working as a forensic meteorologist and testifying in trials. Do you continue to do so?

Haggard: I remained a climatological consultant for a while. The new owners do all of the administrative work, the billing itself and so forth, and I submit my time and expense records to them. A number of clients that I've worked for years have called and said, "We want old Bill," and the new owners have said, "OK." And on a gradual decline in activity, I'm phased out. I have one case left to testify in probably, in October of this year, and my answer from the last year and a half has been I'm not taking any new cases.

Potter: (inaudible) this case finishes off that you're currently working on and testifying in October on, that's it?

Haggard: No more forensics.

Potter: Taking the shingle down.

Haggard: Well, the shingle's down.

Potter: Well, the shingle's down, but no more forensics. What will you do?

Haggard: Well, I'm selling the property that we've lived on all these years. I'm hoping to move into a retirement home. I'm 86 and not getting any younger. I'm fortunately in pretty good health except for a fairly severe balance problem. I'm dabbling with a book which might be something like weather in the courtroom or something of that type. I don't have an agent at the moment, though I've corresponded with a couple of them. I may have a co-author, Paul Roelle, Lieutenant Colonel in the Air Force, and he may write half of the book on the battlefield, so we may have something like "Weather in the Courtroom and On the Battlefield," which I think would be interesting, and it would—I've given you some of the content of it in the last couple of hours.

Potter: The table of contents. (laughter) Maybe you can tell me about—I'm just kind of interested to hear in some of the time that we have left about some of the things that you've done outside of your working hours, throughout your career. What is the other side of Bill Haggard besides that of meteorologist?

Haggard: Well, I've been married twice. I had two sons by my first marriage. I had 38 wonderful years with my second wife, who unfortunately died of cancer. We had a family life, we had travels. I'm afflicted with a disorder called Seasonally Affective Disorder. Lack of sunlight depresses me, so we learned it's warm and sunny in February in the town of Sanibel, Florida, so we would go there for four weeks in the wintertime. Initially, with a fax machine and a credit card and sometimes I spent two days in Sanibel and the rest of the time in courtrooms one place or another, usually also attending the Southern Methodist University air law symposium. So I flew and Martina was content to let me do that. We have a farm in the country with a lot of acreage and I love riding around on a big riding mower and cutting

about four acres of grass. I'm a rockhound. I have a number of other nature interests. Martina was a great horticulturalist and she taught me a great deal about botany. We used to joke when we went on field trips. She looked down and I looked up, and I would tell her all about the clouds and what they meant and she would point out the beautiful wildflowers and the minerals that we were supposed to be there looking for and rockhounding. I've been active in the community. When I was still working at the Climatic Center, I did things like serving on boards with the Red Cross and the County Library. The Science and Educational Center, the Colburn Gem and Mineral Museum. I was the campaign chairman for the United Way one year. I just enjoy being involved in what's going on wherever I'm living.

Potter: Getting back to just one thing, getting back to the progression of career that I wanted you to touch upon, you mentioned and I know right after you left government service you became a CCM, Certified Consulting Meteorologist with the American Meteorological Society. Do you think you could tell me briefly how important you think that was in the work that you did as a forensic consultant?

Haggard: I think every forensic meteorologist should prove to his clients and share with the court that this man has met certain not only academic but real-life standards, and the American Meteorological Society set up an examination program. It takes a year or more to get a certified consulting meteorologist. You have to pass a written examination, you have to pass an oral examination, you have to be recommended by three already-existing CCMs, and then you have to defend yourself in an oral examination before you are awarded that certificate, and it is a certificate to the world that you've met their standards to represent yourself as a consulting meteorologist. You are certified, board-certified by that, in the same manner that doctors are board-certified. I think it's an important thing. I think anybody who does work for the public should prove their credentials, not just that they have a Master's degree or a Ph.D. or some specialty, but that they meet the high standards of their professional society.

Potter: And you mentioned some of the things in the community boards and (inaudible) organizations you're involved with. Maybe you can tell me briefly again from a professional standpoint about some of the boards or committees or commissions that you have served on.

Haggard: Well, when I was with the government, I was privileged to work on a bunch of commissions, so—the World Meteorological Association has a whole family of commissions. They have a commission for maritime meteorology. They have a commission for climatology. They have a number of regional associations like North and Central America and I was privileged to work for the U.S. government as a representative on the Commission For Climatology, the Commission for Maritime Meteorology, as a member of the Organization of Regional Association Four (inaudible), which was North and Central America. (cough) Excuse me. I worked for the International Oceanographic Commission on Maritime Meteorological Matters and represented the U.S. government in international meetings with representative of other governments who were parties to the World Meteorological Organization. These were great experiences. And you know, I had an opportunity to collaborate with other U.S. people like Robert White and Helmut Landsburg, a whole flock of very, very talented, far more talented than I, but great people to work with.

Potter: You've been involved professionally in the field of meteorology now for 65 years. How has the field changed in that period of time?

Haggard: I guess you can sum it up by saying you used to move a cold front two pencil stubs and a thumb width. Now you don't even do it. The computer does it for you. (laughter)

Potter: Do you think that's better?

Haggard: Sure, it's better. Sure it's better. Our knowledge has expanded exponentially, and what a wonderful opportunity it was to live during the change from an art to a science.

Potter: But would you feel that there's still—that forecasting, at least, is still somewhat of a blend of art and science? Is there still a...

Haggard: Yeah, but it's more science now than it ever was, and it was more art than science. Science had come along, and the air mass frontal theory had been developed before I started and for years people were good forecasters because they had a feel for how the weather was going to be. There isn't much feeling left in it anymore. It's fairly methodical, very scientific. But I have no doubt there's going to be just as much change in the next two-thirds of the century as there was in the last two-thirds.

Potter: What do you think the future of meteorology holds?

Haggard: Unbelievable quantities of infinitely detailed data and very high-powered computer processing and then a final touch of the human hand to make it fit the locale.

Potter: Well, what have we left out? We've covered a lot of ground here, but is there... I just want to give you an opportunity. If there's anything of interest that we didn't discuss that you want to mention, from your professional or personal life, any interesting experiences or anecdotes, just anything else that you'd like to add, for the record.

Haggard: Do we have two weeks? (laughter)

Potter: Unfortunately not. (laughter) Any more (inaudible)?

Haggard: I think you've done a great job of stimulating my failing memory banks, and I've enjoyed immensely recounting these tidbits.

Potter: Do you mind if I ask you another quick thing?

Haggard: Fine.

Potter: There are a couple things that I've come to know about your experience and I'd like to maybe just kind of hear it in your own words. In May of 1937, you were a high school

student in New Haven, Connecticut and I think you were witness to an interesting and historical event.

Haggard: The final flight of the Hindenburg. I was in study hall on the third floor of the Hopkins Grammar School, which is on a hill north of New Haven, Connecticut, and the Hindenburg was on its flight to Lakehurst from Europe and it flew maybe 800 or 1,000 feet above sea level, down over the middle of Long Island Sound and then that evening burned and crashed at Lakehurst. It was the only time I had ever seen a zeppelin in flight. All of a sudden, in the study hall, we're fascinated. We all ran to the window and watched it go by and talked about what a wonderful thing it might be, and then that evening, we'd heard on the radio of the tragedy.

Potter: (inaudible)

Haggard: Oh, yes, absolutely.

Potter: How close was it when you came by?

Haggard: Oh, it was probably eight or ten miles away.

Potter: Did you know... did you have any advance knowledge that it was coming?

Haggard: No.

Potter: It just appeared?

Haggard: It just appeared and somebody said, "Look at that!" And we all rushed to the window. Look at that. (laughter) That's a good place to stop.

Potter: All right, we'll end it there. Thanks a lot, Bill. I appreciate your time.

Haggard: It was fun.

Potter: Thank you very much.

Haggard: Okay.

END OF INTERVIEW