

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
VOICES ORAL HISTORY ARCHIVES

IN PARTNERSHIP WITH
NOAA HERITAGE AND THE NATIONAL WEATHER SERVICE

AN INTERVIEW WITH DR. ELBERT “JOE” FRIDAY
FOR THE
NOAA 50th ORAL HISTORY PROJECT

INTERVIEW CONDUCTED BY
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Molly Graham: This is an oral history interview with Dr. Joe Friday for the NOAA 50th Oral History Project. The interview is taking place on Friday, October 16, 2020. The interviewer is Molly Graham. It's a remote interview with Dr. Friday in Edmond, Oklahoma, and I'm in Scarborough, Maine. I wanted to pick up with when you were offered the position at the National Weather Service. Remind me how it was presented to you and how you felt about the career change?

Joe Friday: Well, in one respect, it wasn't a career change because I had been in the field of operational meteorology basically all my life, all my adult life. On the other hand, it was a major change. When I got ready to retire from the Air Force, it was interesting from several perspectives. First of all, I was going to be leaving the protective features of that blue uniform that I had lived in for twenty years. I knew how the Air Force worked. I knew all the support systems and all of that. I really didn't understand that same sort of thing about civil service and exactly how the system worked there. So there was that little bit of concern about making that change, leaving, as I indicated, that protective environment in the military. But on the other hand, the opportunity to move into the National Weather Service, into a responsible position in the National Weather Service – when Dick Hallgren, who was director of the Weather Service at the time, approached me about the potential for applying for his deputy's position, he talked to me a little bit about what they were trying to do in the National Weather Service. Dick had a very, very strong commitment to trying to bring around a major modernization of the organization. The Weather Service, at the time, was a very devoted organization; people really understood their mission, and they did the best possible job they could do with it. But when you took a look at it, we had a very large number of understaffed and under equipped offices around the country. We were dealing with technology – the National Weather Service was dealing with technology that was decades old, as far as the weather radars were concerned. The weather radar that was the backbone of the system at the time was the WSR-57 [Weather Surveillance Radar - 1957]; '57 was the design year. We also had additional radars that were WSR-74s, and '74 was the design year. But both of those radar systems were getting old. The 57s were such that we couldn't even buy spare parts for them in the United States. They had vacuum tubes as opposed to solid-state devices. When we got ready to replenish the vacuum tube supply, we had to go to a factory in Russia to be able to do that because they were the only ones that could still have the capability of making that old technology vacuum tube. So it was kind of interesting that the United States weather radars that supported the backbone of the country had to be supported by a factory in Russia in order to keep them running until we could get a replacement radar. But Dick talked to me about his idea of modernizing the technology, but also modernizing the workforce itself. When I first joined the National Weather Service, we had, again, quality people, dedicated people. There were about three-thousand meteorological technicians and one-thousand professional meteorologists, and Dick really wanted to invert that number. He wanted to increase the number of professional meteorologists in the organization, still realizing we were going to need quite a few meteorological technicians as well. That's essentially what we did in the long term. We really inverted that number, substantially increasing the training level of the workforce. Dick talked to me about his goal, the fact that it was going to be a challenge, the fact that the number of offices across the country as I indicated that were understaffed and underequipped, and we knew we couldn't bring three-hundred offices – approximately the amount we had across the country – up to a larger number. That would be just impossible to do that. So what we were looking at, and he had described the general concept to me, was a smaller

total number of offices, but each one of them equipped with the latest technology and with a professionally-staffed cadre of people to take care of the mission there. So that was an exciting opportunity. I had spent all my time in the Air Force dealing with the good technologies associated with the intelligence community, working on the cutting-edge of technology there, and providing support to that. So the idea of being able to bring a modernization to the organization and work with that just was very, very attractive to me. After thinking about it for a while, I agreed that I would apply for that job as deputy director. I was fortunate enough to be selected. One of the first things that I really had to do was to take the modernization plan and complete that. The team that had been working on it had done a good job of laying a basic foundation. Working with that team, we completed the overall plan for modernization in a fairly short period of time. But because it did not involve substantial savings in total number of people and total cost, the administration was reluctant to approve it right off. As a matter of fact, that was a long-running battle with the administration, which we can discuss some of that a little later on. Their original thought was the fact that we might be able to cut the size of the Weather Service in half, and that would have been a very difficult thing to do. We had about five-thousand people in the National Weather Service for the United States. England, at the time, had about three-thousand people in the weather service for a very, very much smaller country. Japan had almost the same size as we had, for a very small territory. France, Germany, all of them were dealing with numbers that were on the order of three to five-thousand people for countries that were much smaller. Then you took a look, for example, at the Soviet Union; they had a weather service that had – I think it was, if I remember correctly, about fifty-five or sixty-thousand people in a country about the size of ours. China, a little larger than the United States, had a hundred-and-twenty-thousand people in their meteorological service. So for overall size and overall complexity of the weather – and our weather situation in the United States is much more complex than any of those countries. We have somewhere on the order of nine-hundred to one-thousand tornadoes a year. The closest country that comes to that is Australia, with maybe a dozen or two. We have tens of thousands of severe thunderstorms a year in the United States, lightning, and all that. China comes close to us with just a few thousand of those storms. So not only did we have a fairly large area, but we also had a very strong variety of weather and severe weather that required good support. So the idea of trying to reduce the National Weather Service by fifty percent didn't really make much sense to me. Even though, at one time, before we finally got the plan approved by the Office of Management and Budget [OMB], I was literally ordered to rewrite the plan to generate a service that would be less than twenty-five-hundred people. I told the folks at OMB that if they wish to direct me in writing to do that, I would do the best possible job I could do. That's not what they wanted to do. They wanted me to basically rewrite the plan with my name on it. I said, "I can't do that because, in my opinion, my professional opinion, we could not generate an adequate weather service for this country doing that." The meeting broke up very hurriedly after I refused to do it. I frankly expected that I was going to be removed from the job. The next morning, I received a call very early from one of the people that had been at the meeting. They said, "We want you to make these following minor changes to the plan, and we'll approve it." We ended up getting approval for the modernization and restructuring of the organization and were able to move forward with a very successful outcome. Excuse me for just a second.

MG: Sure.

JF: That's San Pellegrino, by the way. It's not a beer.

MG: It's okay either way.

JF: [laughter] I don't know. Maybe a beer would be a little more soothing.

MG: [laughter] So this plan had to be submitted to Congress.

JF: Yes, it did. We had legislation that was passed by Congress, which authorized the modernization, but it demanded that we send a plan to Congress for the modernization within a period of time. I can't remember the exact details at the time. That plan would then have to be reviewed by Congress and approved for us to move forward, and that was that negotiation we were having with the OMB, Office of Management and Budget, to try to work out the details of that plan. We submitted it to Congress, and Congress received it fairly well, except for one small thing. Remember, we were going to be reducing a very large number of offices across the country to a hundred-and-twenty-five, I think, in our original proposal. Each one of those hundred-plus offices that we were going to be closing had at least one congressman and two senators associated with it. As a result of that, I got a chance to meet a very large number of our members of Congress, both in the Senate and the House. Those that were in districts where we were going to be reducing an office or closing it were extremely unhappy. Those where the office was going to be expanded were very happy. We tried to make all of the decisions – all the decisions, we tried to make them purely on scientific and technical grounds, as opposed to asking where the district line was, what congressman or what senator was associated with what office because we realized that could be politicized very fast. In order to approve the modernization and restructuring, Congress directed that we use a committee of the National Academy of Sciences, the Modernization Committee it was called, to review every decision that we made about closing an office, and that before we could close any office, we had to certify and we had to prove to that committee that there would be no degradation of services in the area supported by that particular office we were closing. Now, that turned out to be fairly easy to do because, with the new technology and the new capabilities we were putting in place, the services were much, much better than they had ever been before. So we were able to prove statistically and by direct example – not just arguments, but actually, by direct, verifiable example, we were able to show that we were indeed improving the services in those office areas that were being closed. That didn't solve the problem. I mean, there was still the political issue of the fact that, "Yes, we understand that, but you're removing jobs from my district," and those kinds of arguments. Those were real arguments. Fortunately, most of the offices we were closing had fewer than five people. Some of the time, we would end up consolidating offices and moving two offices together and making a large office out of that. Some of the times, they were in close enough proximity to each other that although it might be somewhat inconvenient for the employees to have to commute a longer distance, that we were still there basically in the same commuting area, and people's lives weren't that disrupted. Other times, people had to worry about transferring. I made a commitment to the employees of the National Weather Service when we had the plan approved that, if at all possible, we would give them a position wherever they wanted to go. What we did is we put together basically an assignment preference type of thing in which they would identify the areas that they wish to go, realizing their office was going to be closed. In most cases, we were able to satisfy their first or second, or sometimes third choice. I

also assured everybody in the organization that if they wish to continue in the organization, they would have a job. Now, I knew that the workforce was getting – in some respects, particularly in the technician field, the age of the workforce was such that we would have a very large number of retirements. I also realized then that we would have to go through and hire a great number of new meteorologists into the organization, and that activity would change that workforce balance that I mentioned before by making it much more professional than it had been in the past. We also put together a program that anyone who was currently a meteorological technician that wished to upgrade to a full professional meteorologist, we would send back to a special program that we set up at San Jose State University, which was very, very similar to the Air Force basic meteorology program that I went through in 1961, in which, in a one year period, they would be able to have the necessary coursework to upgrade and basically receive a degree in meteorology, so that they would qualify then as a professional meteorologist, as opposed to a meteorological technician. I can't remember the exact number; we had a couple of hundred people that went through that. We didn't have as many as I expected, but we did have a pretty good turnout, and those people that wanted to do that worked out very well. It worked out for them. They enjoyed the education, and that their pay went up as the grades changed. So it was a successful effort. All in all, the personnel actions that we had to take worked out about as well as can be expected with as much restructuring as we were doing – closing a large number of offices, helping people move – and we did all of the associated work that tries to help people move, give them pay basically for their trips to the new areas that they were going to for house hunting and things of that nature, that a lot of companies do for employees when they're making changes along those lines. So we tried to make it as easy as possible. It didn't make everyone happy, obviously. People that lived in the community for a very long period of time were going to have to move away from friends and established areas. In general, I think that the restructuring component worked out extremely well. The modernization itself worked out, as well, as was shown very quickly by the actual data. The accuracies of our severe storm forecasting, for example, rose significantly. The probability of issuing a weather warning for a severe storm went from very low – on the order of twenty or thirty up into the fifties and sixties. False alarms dropped – the lead time. When we first started collecting data back in 1989, the average lead time for a tornado warning was minus two minutes. What it said was, "What you just saw was a tornado." Now the warning helped people out downstream, but it didn't give much lead time for the touchdown of that tornado. Now, with the new technology, that lead time is on the order of twelve to fifteen minutes, and that's enough time to really start taking action and be safe as a result of it. The number of deaths from tornadoes have dropped significantly, too. The number of deaths from severe thunderstorms have dropped significantly as well. So, by any metric, the modernization worked very, very well. It resulted in a system that – I still am amazed when I look back to see what happened. Every time we put a new Doppler radar, WSR-88 – now, bear in mind that 88 means the year of design. They're getting pretty old now, and one of these days, we're going to have to start facing that, or they're going to have to start. I'm not there any longer. They're going to have to start facing that and worry about a replacement for that system as well. But every time we would put a WSR-88D or NEXRAD [Next Generation Weather Radar] radar into a location, we would start to see things that we never had seen before, to be able to identify those particular small-scale elements that caused the storm to intensify and to develop into a severe nature. We were able to start to significantly improve our capability of seeing what was happening in the atmosphere and to be able to forecast what was going on, and it wasn't just the technology, although that was very important. It was the fact that in preparation for all of this

new technology, we put together a program called COMET [Cooperative Program for Operational Meteorology, Education and Training], which was basically an operational training program for all of our meteorologists, particularly the lead forecasters, in which they would study the latest scientific information and developments in small-scale meteorology. That program was a resident program at Boulder at the National Center for Atmospheric Research [NCAR], in which we would send people there, and we would bring in the best – we would hire the best professors that we could in those fields, and send people to a several week course. I think it was four or six-weeks. I apologize for not knowing exactly those numbers. But anyway, it was that sort of course. It wasn't just a one-week course. It was a fairly extensive course, studying the latest technology and the latest information. That brought everybody up to speed, all offices up to speed. We put together in each one of the offices, a chief scientist, if you would, called the science and operations officer. They had the unfortunate initials of S-O-O, SOO. The Sioux City office had one that was always fun to have to [say]; it was the Sioux City SOO. It may not be old enough to remember that song, but there was one around by that name ["Sioux City Sue"]. We also had a very important position in each one of the offices called a warning coordination meteorologist. That was the person that would reach out to the local emergency managers and to the local people, to help them to understand what our capabilities were and for us to understand what their needs were, as far as how information was disseminated, what type of information they needed to support the local communities. Those two positions were key to the operations of our new warning forecast offices. We had a complement then of weather forecasters and weather technicians. Each one of the offices, of course, had its electronic technicians to take care of the equipment, and those positions were very important because we had not only new radar systems, we had new computer systems, and we had new observing systems, automated observing systems that would require their attention and their calibration and maintenance. So it was really a total overhaul of a system. But at the same time, we couldn't allow the system to stop operating. So in some respects, this whole modernization and restructuring was like trying to change out the components of a train without it ever slowing down on the track. So we had to continue to operate. We had to continue to provide the necessary warnings and forecast all during that time. We had to change all of that material out and make sure that things continued to flow. So it was a challenge. I remember when we first started in the detailed planning; we had something like ten thousand individual line items that we had to worry about keeping track of. As far as all of these things (phasing?) together. We had more charts and maps and everything else going on. Each one of the regions had their regional plans. Basically, each one of the states had a state specific plan. Each one of the offices had their office plan. We built new buildings because of the new equipment, and in many cases, new size requirements as far as a total capability was concerned. So we started with the new warning forecast office building. One of the first ones that we constructed was in Washington, DC. I used to joke [about] the NEXRAD activity; the NEXRAD research was done in Norman, Oklahoma, with the National Severe Storms Laboratory [NSSL] being a major player in that. I used to joke that the first operational radar was going to go into Norman, Oklahoma, because that's where all the research was done, but really because that's where my parents lived in Midwest City, Oklahoma. The second operational radar was going to go into Melbourne, Florida, to support the space shuttle, and that was true. The third was going to go into Washington, DC, because that was where I'd have it. But that really wasn't the reason that we did that. We wanted one in Washington, DC, not only because the National Capital Region [NCR] is a very important area for weather support, but it also would provide a display of the

capabilities for Congress and the Administration to see the development that they had invested in. The space shuttle support was very important because weather was a critical operation on the Space Shuttle at that time, particularly rainfall rates. Of course, the development work that had been done at Norman was also very important to continue that activity along the line there. As we looked at that new technology, we started to put it all together, tying it all together. It was a whole new way of looking at the weather, looking at a smaller scale, being able to tell precisely what was going on. I recall I didn't think it was particularly humorous at the time, but looking back, I think it was kind of humorous. One day in November, it was a holiday period. It wasn't Thanksgiving – Veterans Day or something of that nature. We had forecast snow for Washington, DC, of about two or three inches. Actually, it was a pretty good forecast; there were about two or three inches of snow in that particular time period, except for a very narrow, probably about a mile-wide band of twelve inches of snow that went right directly over the US Capitol. The next week, I was called into the chairman of the House Committee on Appropriations office. I went over. I went in. He called me into his office. I sat down at the desk in front of him. He said, "Dr. Friday, we've got a real problem here with that forecast that you had. What happened?" I said, "Well, sir, we really messed up." He said, "What?" I said, "We really messed up. The overall forecast wasn't bad, but we had a thundersnow." We had one of those fairly rare, although not terribly rare anymore. "But we had one of those events where a thunderstorm literally was dropping snow at such a rate that we really got behind. Before we could really understand what was going on, it already started to drop that much snow. We were behind in the forecast and never did catch up." He said, "This is really amazing. This is the first time I can ever remember I had a Washington bureaucrat come in and tell me they had messed up. Now, I need to understand. You guys are working on a new radar system that we're funding." I said, "Yes, sir, the NEXRAD radar system, very important." He said, "Would that have helped?" I said, "Yes, sir, it would have. We would have caught this thing ahead of time. We would have been able to see what was happening before the actual snow started, and we would have been able to get the word out so that people wouldn't be caught totally unawares as they were." That turned out to be one of the best strategies I'd ever used was confessing the fact that we had gotten behind on that forecast. In doing that, and understanding how the new radar would have helped out, he became one of the biggest supporters that we had for making sure that radar program was funded and that we put it in. I learned a big lesson at that time about being very straightforward with our members of Congress and making sure they understood what was going on, and that was important, too, because Congress was interested in the Weather Service. They wanted it modernized. They wanted all that technology. But they wanted accountability for what was going on. They wanted to make sure that we were spending their money wisely. We worked with them on that modernization legislation. We worked with the National Academy of Sciences as they directed. The National Academy looked at how we were doing things, and sometimes they were critical with what we were doing, and you never liked to be criticized. But on the other hand, I realized in the long term, that probably was very important. In some respects, I consider that Academy committee almost like a clove of garlic around my neck to keep the vampires away. Because there were pressures during the entire thing to cut the budget, reduce the cost, and yet, we needed to have those base capabilities as far as the overall modernization was concerned. Since we had to prove that we were not degrading services before we closed any of those offices, that really was a protective committee. It protected the National Weather Service so that it couldn't be railroaded into making cuts that didn't make sense. It protected the taxpayer by making sure what we were doing was the right thing, and it protected

the public to make sure that there was no degradation of services throughout the modernization activities. They reviewed every one of our office moves, every one of our office closures, the number of times that we appeared before that committee. They had regular meetings every three months, I remember correctly, in which they would review everything that we'd been doing, making recommendations, and then they would have special studies occasionally. How well are you communicating with your employees? How well are you keeping them informed? – all of those factors that overall helped make a success of the overall modernization. I rambled on for a long time here. I'm going to let you ask a question now.

MG: Well, I have a couple of follow up questions and a million more questions after that. But I wanted to ask a couple of clarifying questions. Can you remind me what year you started at the National Weather Service, the year the MAR [Modernization and Associated Restructuring] was approved, and what year you became the director?

JF: I came to the National Weather Service as its deputy in October of 1981. I became a deputy director of the National Weather Service on October 1, 1981. I served in that capacity until Dick Hallgren, the director, retired, and that was in 1989. The modernization and restructuring plan was approved in late 1989. The legislation directing us to do that – there were a couple of different pieces of legislation, and if I recall correctly, the first legislation occurred in 1988. If I recall correctly, that actually set in motion the requirement to turn in the modernization plan. As I indicated, the radar design was completed in 1988. So we first started to see those come online a couple, three years later on. The last radar went in in 1996. Our computer systems were a little bit behind that. They came in, in the late 90s, going completely across the organization. So modernization took place over a period of several years. It wasn't something that was just instantaneously done. It took us, like I said, about five years, six years to put in all the radars. It took us about four years to put in all the surface observing systems. So the modernization itself was probably completed, or you could call it completed in 1997. It was a planning phase that started, as I indicated, in the 1980 timeframe. The plan was constantly being reworked and revised to make sure it responded to the latest science and technology. At the same time, then responded to the pressures of the Office of Management and Budget, the pressures of Congress, all of those factors working together. It was an interesting time period as well because we went through several administration changes during that time period. The fact that the director of the National Weather Service and the deputy director of the National Weather Service are career civil servants, I think, played a fairly important role. If those positions had been political appointees, you might have seen quite a bit of turbulence occur. A change in administration might have resulted in not only the administration wishing to cut the budget but being in charge of it and actually doing it. I can recall one time – and I won't even say at this time which administration it was, but I can one time, Dick Hallgren, as director, and I, as deputy director, were called into the office of the administrator of NOAA [National Oceanic and Atmospheric Administration] and given direct orders to cut the budget by twenty-five percent. Dick said, "I'm not going to do it." He said, "Well, if you don't do it, I will." Dick said, "Go right ahead," and turned around and walked out. That was a pretty high level of insubordination. But at the same time, a twenty-five percent cut in the Weather Service before any modernization took place would have been disastrous, totally disastrous. Dick made the right decision. If you wanted to fire him, fine, let him go ahead and fire him. But the fact is that it wouldn't be a Weather Service that we would want in the United States with those kinds of cuts. Then when the

individual actually started to make those cuts on paper, he began to realize it wouldn't work. So instead of a twenty-five percent cut, we ended up with about a five-million-dollar cut, a little trimming around the edges. Most of that got restored by Congress in the budget process. Congress has always been very supportive of the National Weather Service because it's one of the few organizations that everybody understands what they do. Everybody understands how important it is. I recall when we first went over when I first came in as deputy to the National Weather Service. Shortly after that, I was called over to a meeting in the Office of Management and Budget. When we were trying to get organized as far as the radar program – even though we had money to develop it, we still didn't have money to really start to manufacture or anything of that nature. We didn't have much money to develop it. It was being done almost on a shoestring basis. But I was called over to the Office of Management and Budget. At that time, it was in the old Executive Office Building, which is now the Eisenhower [Executive Office] Building. This is the castle right next to the White House. Not only was I there – I was in the Department of Defense at the time, I was still in the Pentagon – but also, we had somebody from the Department of Commerce, who was their budget officer, not National Weather Service but their budget officer. We had somebody from the FAA [Federal Aviation Administration], who was responsible for their weather systems. So we had the National Weather Service represented, we had the Department of Defense represented, and we had the FAA represented with a meeting. The OMB examiner said, “We're looking over the weather programs in this country. There's only two things that this nation does that affects every man, woman, and child in the country. One is the postal service, and the other is the weather service. It's about time we got one of them right.” He proceeded to basically direct us, all the players in the weather business, to work together to generate a radar that would satisfy all of our needs. That was when NEXRAD was basically formed as a tri-service, tri-agency development effort. That was also when we were directed to work together, as best as we could, on the automated observing systems and on the computer systems that can be necessary. So we started to take advantage of the fact that we all needed something along those lines, and there was no sense in developing three separate individual activities when we can develop one that can satisfy all the needs. In doing so, we probably ended up with a better NEXRAD because we had certain needs; DOD had certain needs that may not be quite the same, and FAA had some needs that might be a little different still. When we looked at all three of them, you probably ended up with a radar that satisfied everybody better than you would have individually if you were simply doing it by yourself. It was funny; when I went back to the Pentagon, and I told my colleagues in the Navy and the Air Force – they had the weather programs in the Pentagon – that we were going to be working with FAA and National Weather Service to develop the next generation radar, they had an absolute fit. They wanted to develop their own. Fortunately, Bill Perry, who was the undersecretary of defense for research engineering at the time, when I briefed him on what we were doing, he said, “That makes more sense than I've heard coming out of OMB in a long time. So we're going to do it that way.” So we did. We went together and worked together and developed a program that satisfied everybody's needs, probably at a lower cost than we would have done with three different individual systems. Anyway, that was that's a little bit of background on that development activity.

MG: During these years, were all your efforts towards the MAR? It must have been difficult to focus on much else.

JF: Well, we had to focus on other things, because as I said, this train – we were changing out all the parts on the train, but the train still had to go forward. So as things changed, as international activities changed, new data systems came online not only with the United States but others; we had to be able to integrate those into our overall system. There was a revolution across the world at the time on how weather data were handled. For example. In the capacity of director of the National Weather Service, I was also the US representative to the World Meteorological Organization [WMO], which was headquartered in Geneva, Switzerland. One of the big questions we were having during that time period was the fact that the United States' overall weather system was somewhat different than many of the other nations. We had developed in this nation a private weather sector and the public weather sector. The National Weather Service was a public weather activity. The National Weather Service made a decision back with the beginning of television that we would get out of the private weather business. We were initially asked to basically be the weather forecasters that would appear on television, it turned out, NBC because our office was in the same building, in 30 Rockefeller Plaza at the time. *The Today Show*, when it first came on the air, they basically wanted the National Weather Service to come up and brief the weather. Now we have Al Roker doing that. But they wanted the National Weather Service to do that. The head of the Weather Bureau at the time, after much consideration, said, "No, we don't want to get in that business. There's plenty of opportunities for other people to do that." The development of private weather companies in the United States started right after World War II. The buildup of World War II was such that we have over twelve-thousand meteorologists that were suddenly trained over that period of time in business, and most of them like the weather business; it turned out to be a lot of fun. But, as the war spun down, there was not a need for anywhere nearly that number of people. So several of them decided that, "I like this business so much. I think I can make some money doing private weather forecasting." That was the beginning of quite a few of the private weather companies, one of the first ones was in St. Louis, Weather Corporation of America, as a result of that. I'm not going to go into the names of individuals at this time, but another gentleman decided that he not only enjoyed weather, but he enjoyed England, and so he wanted to stay in England after World War Two. He was going to develop his own weather company there. So he went to the British Met Office [Meteorological Office] and said, "I need to get your weather data." They said, "Well, we don't just give it away. We sell it." In the National Weather Service in the United States, we give it away, just for the cost of delivery. They have to worry about paying for the connections, but we give it away. So he said, "Well, how much would that be?" And they gave him the price. He said, "That's pretty high, but let me go back and think about it." So he went back and did some sharp calculations. He came back a couple of days later, and he said, "Okay, I'll take that." That shocked them. They said, "Oh, we made a mistake. Instead of the price we quoted, it was supposed to be ten times that." He couldn't make ends meet at that. So he ended up coming back to the United States and starting a very profitable weather activity here in the United States. I know, particularly as the National Weather Service was generating more and more high-quality data, satellite data coming from NOAA, the radar data coming from National Weather Service, all the new observing systems coming along, and we were providing those data to the private sector virtually free of charge. The taxpayer had paid for that, so there was no reason to start charging money for that. The private sector had mission areas that were very important, helping the economy. The National Weather Service is important for the protection of life and property. Private weather companies here provide weather support to private industry, specialized activity. Overseas then, we saw several countries that felt that we

were allowing our weather companies to compete unfairly with them because they were getting their data free, and they were charging for data. We had quite an interesting time in the World Meteorological Organization over about a four or five-year period, on trying to come up with some sort of international agreement in which we would agree – and what finally happened was we all agreed to share certain absolutely essential data for the overall computer models and things of that nature. But that very specialized data sets in specific countries could or could not be shared depending on what the country wanted to do. That sharing of data is still a fundamental principle in the United States, and it has resulted in probably the best weather support system in the world. In the United States, with all the private weather activities going on, it's easier to get weather information here than it is anywhere else in the world. The quality of presentations, for example, on television, for the general public, is spectacular here because each one of those private weather companies is trying to sell their product. Therefore, the competition for doing a better job of selling that product, a better job of displays, a better job of specializing, is driving improvements all along. It also serves to keep the National Weather Service on their toes as well, to make sure that we are also doing the best possible job that we can of providing fundamental weather service, the weather warnings. We have had problems. At one time, there was a push, for example, to restrict the National Weather Service activities to only providing weather warnings and no forecast. Well, you can't make a weather warning without first making a forecast. In the long term, it all settled out. I think the relationship between the private and public weather sectors in this country is probably in as good a shape now as it's been in a very long time. The private weather companies understand they need the National Weather Service to be strong, having the observing systems that support activities. The National Weather Service realizes that one of the outlets for all of the work that we do is through the private weather sector. They take our products. They improve on some of them and specialize it for the individual industry so that the models that we run, the information that we provide ends up being more widely distributed than we could ourselves distribute it with our staff. The private weather side of the house now is at least – well, I'm not sure what the latest numbers are or the last time I saw any real data on it. A few years ago, it was bigger than the National Weather Service when you take a look at everything combined. The American Meteorological Society, which is our professional society in the United States, its membership is composed of about one-third public sector, one-third private sector, one-third academics. So you get some idea of the numbers along those lines. There is more and more business that the private sector is doing as weather forecasts improve, then there is more economic benefit to come from using weather in your operational decisions. The public service, National Weather Service, couldn't possibly provide specialized forecasts for everyone pouring concrete in a metropolitan area, for example. But each one of those concrete pouring companies can hire a private meteorological firm to provide the tailored input they need. For example, and I forget exactly what the number is, but you can pour concrete down to about twenty-nine degrees; you can't pour it much colder than that. So that twenty-nine degrees is very, very important, and you need to know whether it's going to be that temperature or higher before you fill the truck with concrete because when you fill a truck with several yards of concrete, you've got to get rid of it. You can't leave it in the truck, or that truck becomes useless. It becomes a very large solid block of concrete. So it's very important that quality weather service is provided to industries like that. Every industry now has critical weather-sensitive factors associated with it. As weather forecasting improves, the ability to accurately forecast those critical factors becomes more and

more important. So there is plenty of opportunity right now in the private sector to develop more business, particularly as weather accuracy improves.

MG: I wanted to ask if there were any historical precedents for the MAR. Had there been any periods of time in the Weather Bureau or Weather Service's history where this kind of large-scale technology improvement and restructuring had taken place?

JF: Yes. [inaudible] The initial installation on the first radar network. Yes, there has. The installation of the WSR-57 radar network back in 1960 was one of the first cases of major technological infusion into the National Weather Service or Weather Bureau at the time. We had a different understanding at the time on exactly what we needed to do as far as the radar network was concerned. So we tried to put that radar network in a very orderly precise fashion across the country, so it formed a nice grid across the country. We realized by the time we were putting in the NEXRAD radars, the WSR-88Ds, that we didn't have to have quite that precise a grid. But as a result of that installation of those 88Ds, we had some strange anomalies. For example, we had an office in Dodge City, Kansas. It's been there a long time, not all the way back to Mr. Dillon, but it's been there a long time. When we put it in the radar network, it didn't line up with one of those ideas of where the next radar should be located. So we put a radar over at Garden City, which is about forty miles away. When we got ready to restructure under the MAR, we didn't need an office both at Dodge City and Garden City. So we made a decision to put the office in Dodge City. Technically speaking, that provided a little better coverage; we had a better support system there. Again, we tried to make sure that we were technically bound on exactly what happened. Because we were going to close a five-person office at Garden City, the city fathers in Garden City did not like that. They got ahold of their Congressman, who is now a senator from Kansas. I received a phone call, [saying] the congressman wishes to bring in the city fathers of Garden City to talk to me about closing your office. That happens. They come into the office with several boxes, Xerox boxes, full of petitions signed by most of the citizens of Garden City, asking that their office not be closed. I listened very carefully. I tried to explain exactly what we've done, but I tell them that we will take this under advisement. They leave. The next day, I called up the congressman, and I said, "Here's what we've done, and I just need to understand if there's any factors that I'm missing." He said, "Joe, I want you to make the decision based purely on the technical and the scientific activities. But you have to understand I'm representing my constituencies. Both of those towns are in my district, but Garden City had a concern, and they wanted it to be heard, and you did a very good job of listening to them and hearing what they had to say and laying out all the factors. So you make your decision based on whatever you really need to do. Tell me what that decision is, and I will convey it to the city fathers." Fortunately, that happened in a lot of places; the members of Congress – working very directly with them, laying out, not trying to hide any factors or anything of that nature. It worked out very nicely. There were some that just continued. I remember Huntsville, Alabama, being one of those, and the congressman from the Huntsville area, who I turned out to be quite friendly with after a while. I remember a headline that appeared in the Huntsville press, referring to me as the worst kind of Washington bureaucrat because I didn't automatically agree with the congressman to continue that office in Huntsville. But those situations, and some of them I can't even go into because I couldn't repeat the language that was used by some of the congressmen in the discussions, were fascinating at times.

MG: I'm having a hard time formulating this question, but I'm wondering if you felt responsible for a plan that Dick Hallgren had put in place but that you were stuck implementing and taking some of the criticism for?

JF: I didn't feel that way at all. I thought Dick had the vision. He started actions in place. I had the privilege of coming into the organization before that plan was completed and working on completing the plan and helping do that final plan. I had nursed it through all of the debates in the Office of Management and Budget. I had worked with Congress in helping develop the legislation, directing our modernization. I worked with Congress to make sure that all the safeguards were in place, both for the public and for the National Weather Service. I had agreed with Congress as they were putting the legislation together that there should be no degradation of service. I had agreed with them that the National Academy of Sciences committee would be a good idea, even though it was probably going to be a pain in the neck for me to do, but I felt that it was the appropriate thing to do. Then when Dick left, the plan still had not been approved. So the following few months involved the final discussions with the Office of Management and Budget. Congress was pushing like mad to get the plan up there. I think, technically, we violated the law by not sending it up within the ninety days that we were supposed to after the legislation had been approved. I think it was closer to about two-hundred-and-seventy days by the time that we finally got it up there. So Congress pushing to get it approved, OMB was pushing to get the budget down to reduce the size of the government and all of that. So when Dick left, I didn't feel that he had just walked out. He made a decision. He actually stayed longer than he had originally intended. He told me, for example, when I was selected for the job that he would probably be there another four years; he was there another eight. I didn't object to that either. One thing that I did notice, looking back on it, when I was working on the planning activities when Dick was director, I always had Dick to bounce ideas off of. On any of the activities that we were involved in, I could sit down with him, and we would discuss it and so forth. After he left, and I was now director, there was nobody up in NOAA that understood all of the details of the weather business. In some respects, all the NOAA senior management wanted to do was for me to keep them out of trouble. So there really wasn't anybody that I could go up with and say, "Things are issues that I need some help on." Now, I did have people in the National Academy I could deal with, and I had other people that had been there, Dick Hallgren and others. I had some very good office directors that had been with the organization for a long time that were devoted to the modernization and all. But when we first started that whole modernization with the new technology and everything, there was a lot of resistance internally in the National Weather Service for that because it was a change. It was going to be a major change. The Doppler radar was new technology, and they were uncertain of it. In order to help with that, by the way, we trained every forecaster. We sent every forecaster to Norman, Oklahoma, where that radar was developed, and they went through a four-week training program. We took over a large hotel and basically kept it occupied for several years as we were sending people through that training organization. So we spent a great deal of money very profitably on all of the training activities we do in Boulder, Norman, and other places – San Jose State and the like. That was one thing that I felt that we could not scrimp on, that we had to make sure that people were ready to start using the data, that they knew what to do and how to do it. But there was concern with all this new technology, just as when we first started putting in computer systems before we had people that left, we had a lot of people that after this time, they just didn't want to face the new stuff coming on. But those that stayed did a masterful job. I was

really impressed with the dedication. When they saw what the capabilities were, the support turned around. I can remember one meeting that we had. We had every manager in the National Weather Service meet in Boulder, Colorado, to go through a one-week period, going through the details for our modernization plan and the details of the technology. We had prototype technology up there so they could see what was going on. They'd heard rumors before, but most of them hadn't seen it. When we started that week, I would say that we probably had about twenty percent of those managers that were enthusiastic about it. We probably had about fifty percent of those managers that didn't think it was going to work. When we finished that week, I think we had eighty percent, at least, of those managers that were enthusiastic about it and wanted to get on with it as fast as possible because they saw the benefit. I still remember the first talk that we had was an expert on change management, talking about paradigm shifts. Most of us didn't know what the word paradigm meant at the time, but by the time we finished, that was our buzzword for the day. It was, "This is a paradigm shift, guys," and they understood that. That meeting was the first time that we had had all the managers of the National Weather Service together since somewhere in the late 1800s. We had a picture made of all of us together, taken from a balcony overlooking a whole crowd of us in a courtyard – a hundred and some odd people there. Then we publish that in a little booklet with a picture of the previous meeting of all the directors or all the managers of the Weather Service that had been taken a hundred years before with all of the high collars and everything else on. A lot of interesting things in the comparison of those two pictures. First of all, there were no women in that first picture. We had a fairly large number of women in the second picture. And, of course, the dress had changed considerably. In the first picture, there were quite a few people wearing clerical collars because the initial organization in the Weather Bureau was formed with a lot of weather offices that had been formed at Catholic missions. The Jesuits were very active in the early days of the Weather Bureau, and there were actually mission activities associated with the local Catholic churches. So you don't see many clerical collars now in our current workforce, but you did at that time. So it was a fascinating comparison of pictures.

MG: I had asked about precedents earlier because I read a sort of secondhand quote from Dick Hallgren, where he said, "This is the tenth Modernization and Restructuring Act."

JF: Well, I think he's probably right if you look at all the time that we had reorganized the Weather Bureau. Having only been in the Weather Service itself since 1981, I don't have the same history that Dick did. He had been with it much earlier. But as technology changed, organizations changed accordingly. The Weather Bureau started at first, and the offices were located where the military forts had been. Congress basically directed, I think it was in 1809 or something like that – Congress directed the head of the Army to take observations in Fort Saint Louis, to find out why the troops didn't like to be there. This was one of the first directions for taking an organized weather observation. Well, I lived in St. Louis for a while at Scott Air Force Base across the river from St. Louis. I know why they didn't like to be there; it was hot as the dickens in the summertime, hot and sticky. But the technology then was determined by the location of the forts. When the teletype came along, it allowed a structure; you had to be along the lines where the teletype organizations were. When we first started supporting, for example, aircraft operations to a great extent and severe weather information, we located one of our major centers in Kansas City, because that's where the FAA's predecessor, the CAA [Civil Aeronautics Authority], had a collection where all of their teletype circuits came together, so they could be

sharing information. So we were located there so we could have that rapid access to information ourselves. The major organization before the MAR put together a kind of a spoke and wheel type of organization across the country – most states would have a forecast office that was responsible for the entire state, and then they would have multiple offices around the state that would be taking weather observations and the like that would be supporting that office. The MAR was based on the fact that there would be a uniformity of service across the organization and that each office would have its forecast and warning responsibilities like I said, uniform across the country, no degradation of services by closing any of the offices. So there had been several reorganizations, again, based on the technologies associated and what was the driving factor and organizational structures. I don't think there had been any organizational realignment as significant as this one because it was not only in number and location, but it was also in capabilities and in professional levels and the like. But, Dick was probably correct when he said that there had been ten reorganizations. I don't know if there have been ten modernizations, but certainly the restructurings.

MG: I also read that Dick really made sure that people understood it was modernization and restructuring. Why was emphasizing the restructuring important?

JF: The modernization component was very important because of our capabilities. The restructuring was very important because of the uniformity of services across the organization and the necessity for everybody to understand that the restructuring was a part, that it would involve moving, it would involve closing offices and the like. That whole restructuring was to provide the capability of providing uniform quality service across the entire nation.

MG: I also read that the origins of the MAR can be traced much earlier to a 1974 tornado outbreak, which was a turning point for the agency in terms of issuing warnings and updating technology. Was there a connection?

JF: I'm not one hundred percent certain of the connection with the 1974 tornado outbreak. The tornado outbreak itself did prompt the installation of more radars, in addition to the original fifty-seven, so that we could cover more of the areas, and that would be one of the types of modernizations that occurred. That was when we put in WSR-74s in several places across the country to try to fill in some gaps that we had in the original WSR-57 radar coverage. But in 1981 – I think it was '81 – the National Academy of Sciences completed a study called "Technological Opportunities for the Coming Decade," which outlined basically the type of structure that we have now. They talked about the small-scale forecasting structure. They talked about the necessity of bringing in improved observations, radar observations, making use of the satellite observation. They talked about better automation for pulling all of these data together, integrating them into the forecast process. So, that National Academy of [Sciences] report was one of the fundamental guiding documents to the type of thing that we should be doing to take advantage of the advances in technology. It was kind of interesting, in that respect, because I had a chance to participate in some of those National Academy studies when I was still in the Pentagon. So I saw a little bit of that activity along that line – "Technological Opportunities for the Coming Decade."

MG: Yes. I was curious if there was a clear turning point in the agency's history that said, "Okay, we really need to spend the next ten years and four billion dollars on making serious changes."

JF: Well, I think that was Dick Hallgren's vision, and I think that he recognized—he participated in the Academy study. He certainly understood the shortcomings in the Weather Service. You have to attribute the whole impetus to getting that modernization started to Dick and his leadership during that particular time period. I was very grateful when he asked me to consider applying for his deputy's position because I had worked with him when I was in the Pentagon. I had worked with him on several of the interagency committees that we would have and various discussions. So I had worked with him in various areas and was delighted to have the opportunity to come to work with him full-time.

MG: Who was your then deputy when you took over as the director?

JF: I had several over the years. When we were doing the modernization, we actually had two deputies. The first deputy I had was Lou Boezi, and he became then the deputy for modernization if you would. Then we also had a deputy for operations, who would be responsible for keeping the train running while the deputy for modernization was responsible for changing out all the component parts. So that dual deputy situation kept the state in place for a fair length of time. Bob Landis was the deputy for operations. I missed something. We also had Ron MacPherson as the overall deputy for a while before we put in that dual deputy system. So we evolved during that time period to try to accommodate various activities. Ron agreed to be the deputy for a while, but he also wanted to become the head of the National Meteorological Center. I'm sorry, Molly. I'm starting to have more of a problem than I thought I was having.

MG: That is okay. We wouldn't finish today anyway. So let's take a break for today.

JF: Okay.

MG: I am sorry for taking up so much of your time.

JF: That's fine. I'm enjoying this in a lot of respects.

MG: I really am, too. We will have to stay in touch even once we're done doing the interviews. So I will email you with some dates and look forward to our next call.

JF: Okay, very good.

MG: Thank you so much, Dr. Friday. Have a great weekend.

JF: Okay, you too.

MG: Bye-bye.

JF: Take care.

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Reviewed by Molly Graham 10/17/2020

Reviewed by Joe Friday 12/3/2020

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