

**THE DEPARTMENT OF ENERGY ORAL HISTORY  
PRESENTATION PROGRAM**

**OAK RIDGE, TENNESSEE**

**AN INTERVIEW WITH**

**DONALD B. TRAUGER**

**FOR THE**

**OAK RIDGE NATIONAL LABORATORY  
ORAL HISTORY PROJECT**

**INTERVIEWED BY**

**STEPHEN H. STOW**

**AND**

**MARILYN Z. MCLAUGHLIN (ASSISTANT)**

**OAK RIDGE, TENNESSEE**

**FEBRUARY 20, 2003**

**TRANSCRIPT BY  
BRIAN VARNER**

STOW: Today, we'll be talking to Don Trauger. Don joined the Manhattan Project at a very early stage and came to Oak Ridge in 1946, where he worked at K-25 and then later, most of his career here at ORNL. We've got a lot to cover today and some interesting stories as we talk with him.

Don, let's go back to Exeter, Nebraska -- to your early days. How'd you get started with an interest in physics and nuclear power and so on?

TRAUGER: My, that's going back a long way. Well, when I was in high school, I had an excellent physics teacher, and he probably was the best teacher that I had in high school, at least one of the very best. And, he somehow instilled in me the idea that I didn't have to stay on the farm forever -- that I perhaps could do something else. And, out of that, came the idea that I might study electrical engineering. And, he particularly emphasized some aspects of electricity in his course.

STOW: Yes.

TRAUGER: Incidentally, I've kept in touch with him ever since. He's still living.

STOW: My goodness.

TRAUGER: And, I sent him a copy of my book *Horse Power to Nuclear Power*.

STOW: Well, what about nuclear issues? Nuclear fission was discovered in late 1938, and it was announced in '39, and so on. Where did your interest start with regard to nuclear science?

TRAUGER: Well, my interest in energy started perhaps when we switched from horses to a tractor on the farm and had a source of energy that did not come from the farm.

STOW: Yes.

TRAUGER: So, that attracted my interest in energy. When I was in college and into my first advanced courses in physics at Nebraska Wesleyan University, I was very excited by the discovery of fission. Because I thought, "Well, we'll eventually run out of fossil fuels, and here's a new source of energy, and it should be a very great source of energy."

STOW: Quite some foresight there.

TRAUGER: I didn't have any comprehension of the problems of utilizing it, but that really excited my interest.

STOW: Well, you got a phone call from John Dunning from Columbia University that really started your career off. Tell us a little bit about what your thoughts were when you got that phone call and how your parents reacted to that.

TRAUGER: Well, after getting excited about nuclear energy, I read everything that was published on it through the rest of my college career.

STOW: Yes.

TRAUGER: And, I got interested in where the people were who had been publishing on nuclear energy. In fact, it was really exciting to read about the people in the newspapers who were also in my textbooks. So, when I got the call from John Dunning to come work on a very secret project that he couldn't tell me anything more about except that it was important to the war, I immediately thought, "That's probably a nuclear energy project." And, my professor, Dr. Jensen, said he thought it was probably radar, and I thought, "Well, I didn't work on radar but I really think this is what I want." And it turned out to be true.

STOW: Well, now, Dunning was a graduate of Nebraska Wesleyan also, right?

TRAUGER: Yes.

STOW: Is that one of the reasons you think he called you? Did you know him?

TRAUGER: Yes, and I came to know him, of course, very well. And, he called Dr. Jensen and asked him if he had any recent graduates who might be interested in this project. And, Jensen recommended me, and that's how it all got started.

STOW: And, you are not the only Nebraska Wesleyan graduate to end up ultimately at Oak Ridge National Lab, are you?

TRAUGER: Oh, no. There are others.

STOW: Who are some of the others?

TRAUGER: Well, Dale Magnuson was a very good friend in college -- and still is one. And, Clayton McAuliffe and his wife were here early, and Clayton's still living -- she's not. So, there were quite a few people. In fact, we had a Nebraskans' Club in Oak Ridge for awhile.

STOW: (laughs) It's a small world, because you went on to Columbia and got involved with the barrier project.

TRAUGER: Yes.

STOW: I want you to tell us a little bit about that. You worked with Bob Lagemann, who ended up being my physics professor at Vanderbilt. So, it's a small world. But, you write in your book about "Room 109" in Pupine Hall. I gather you learned an awful lot about science and safety by doing things in Room 109. Tell us a little bit about what you learned at that point.

TRAUGER: Well, Room 109 housed the equipment for "quick and dirty" testing of barrier. You get a quick answer to guide the people who were designing new barrier for the uranium isotopes separation process. And, the room had about a half a dozen test rigs and the people running them. But you had to take very careful data for it to be useful, even though we were separating inert gases instead of uranium hexafluoride ...

STOW: Yes.

TRAUGER: ... but that was to get a quick answer. So, I learned a lot from that. And, Dr. Lagemann eventually assigned me to build some equipment. That was something I could do very well because I'd had that experience in college, to make a living. So, it went from there onto where I tested the first tubular barrier and had my own laboratory. It was really a luxury at that time, because the place was very crowded.

STOW: What were the safety conditions like in the lab at that time -- certainly not anywhere near the standards of today?

TRAUGER: No, safety was really emphasized, but one was pretty much on his own. There wasn't any safety monitoring, so there were some near-serious accidents.

STOW: Any that you were involved with?

TRAUGER: One, yes, when I was there. A cylinder of nitrogen gas at one side of the laboratory was disturbed by a member of the test lab staff, who was taking a break. He was horsing around a little bit and he knocked the cylinder over. So, he'd violated a regulation, because the cylinder was supposed to be chained and the valve was supposed to be closed. When it fell over, the nozzle broke off and the cylinder flopped around in the room. We all climbed on top of our equipment to get out of the way. But, the frightening part of it was that a hydrogen cylinder adjacent to it was in a similar condition. If he had knocked it over ...

STOW: That could have set the whole barrier project back ...

TRAUGER: ... he could have set it back.

STOW: At that time you were at Columbia working on the uranium hexafluoride enrichment process, did you know then of the magnitude of the Manhattan Project, and the fact that other activities were going on elsewhere?

TRAUGER: Well, I was told about the magnitude of the gaseous diffusion process ...

STOW: Yes.

TRAUGER: ... and the big plant that was to be built in Oak Ridge. And, I was impressed at how much work had been done toward the design of that plant, even at the early stage. So, that was very interesting. One really needed to have quite a bit of background knowledge to do a good job, even in a minor role such as I had. But, the rest of the project, the Manhattan District Project, was supposed to be compartmentalized, and we weren't supposed to know about it.

STOW: Very much so, yes.

TRAUGER: But, the grapevine works fairly well. So, when the bomb was finally dropped, and the declassification occurred, I had already learned about most of the project.

STOW: Did you know about X-10 at the time, and what was going on here?

TRAUGER: Yes, yes. I followed the building of the Graphite Reactor, remotely...

STOW: Through the grapevine ...

TRAUGER: ... through the grapevine.

STOW: Let's talk about your coming to Oak Ridge now. It was after the war. It was 1946 when you came to K-25 . . .

TRAUGER: Yes.

STOW: Were you married at the time? I mean, you'd met your wife Elaine in New York ...

TRAUGER: Yes.

STOW: And, what were your wife's impressions of Oak Ridge as a city and a place to live at that time?

TRAUGER: (laughs) Well, it was a bit of a shock coming from New York City, particularly on Sunday morning. We found that the Methodist Church -- of which we were members at our home churches -- was held in the theater. The previous Sunday we had worshiped at Riverside Church, a cathedral-like structure. So, coming from Riverside Church to the theater, with the popcorn machines already warming up for the afternoon movie, it was quite a shock.

STOW: What about living conditions here?

TRAUGER: Well, I liked the cimesto houses. We did buy a cimesto house. We were very fortunate to get that.

STOW: Yes.

TRAUGER: They're good little houses.

STOW: Did you anticipate at the time that you'd spend your career and the rest of your life in Oak Ridge, or at Dog Patch, or whatever it was called?

TRAUGER: That's the way we knew it in New York -- Dog Patch. But, we actually came here with a commitment to stay for about six months and to reestablish the laboratory that I had built in New York to further test and develop barrier here. And, barrier manufacturing was being moved here from Houdaille-Hershey in Illinois.

STOW: Right.

TRAUGER: So, I made a six-month commitment, but it took about six months for the bureaucracy to really let me do something. And so, by that time, we found we liked Oak Ridge.

STOW: Okay.

TRAUGER: ... and we really liked East Tennessee. And, we were happy here. So, I did reestablish that laboratory and then went on to work at K-25 in somewhat broader roles.

STOW: And, of course, East Tennessee was close to North Carolina, which is where your wife's from, right?

TRAUGER: Yes. And, that was convenient.

STOW: Well, you started out working -- or maybe you didn't start out -- but you did work on lithium isotopes over at K-25. Tell us a little bit about that, because we don't normally associate lithium isotope work with K-25.

TRAUGER: Well, as the development of barrier and the operating parameters for the K-25 plant became pretty well established, we had to look for something else to do. And, that was my first work, somewhat before I came to the Oak Ridge National Laboratory. And, we did it at K-25. But, this was when lithium was separated -- lithium isotopes were needed for the hydrogen weapon ...

STOW: Yes.

TRAUGER: ... and they wanted lithium-6, so I built some equipment for using the high-temperature molecular distillation process to separate the lithium isotopes. It was in competition with a process at Y -12 that used mercury columns -- an ion-exchange process. Well, the ion-exchange process [called COLEX] was cheaper and easier because it didn't involve the high temperature that the lithium distillation required, so we eventually finished the work to be sure that the process would work well. But, it was never put into practice.

STOW: Now, did this work at K-25 that you were involved with -- did that involve the S-50 Plant in any way?

TRAUGER: No, no.

STOW: It was totally unrelated. Okay. So, you then came from K-25 to Oak Ridge National Laboratory. Tell us about when that occurred and what the driver was that brought you over to this organization.

TRAUGER: Well, there was one more step. When the Aircraft Nuclear Propulsion Project was under way, and the first reactor was built that led to the Molten Salt Reactor concept, the pump and the heat exchangers for that system had to be tested. And, we had experience with high temperature and with corrosive materials, so they asked us, "Could we build a test stand to test the pump and the heat exchanger for that first aircraft experiment?" And, we did. We had all the

resources of K-25 available, because the work there was going down, so the engineering people were available and the shops were available, and we built that in record time and showed that the experiment could go forward.

STOW: And, that was what year now, Don?

TRAUGER: That was in 1954, I think.

STOW: '54, okay. So, the ANP, or the Aircraft Nuclear Propulsion Project, is really what got you started at the Laboratory. Is it not?

TRAUGER: Yes, they said they would like for me to come to the Laboratory to work on that project. Now, it was one thing to work on a nuclear project, but it was foolish in my opinion at the time to fly an airplane with a nuclear powered plant, so I wasn't sure I wanted to work on that and be really identified with it.

STOW: Yes.

TRAUGER: But then I finally perceived that it could also be a means of producing energy for electric power generation.

STOW: Okay.

TRAUGER: And so, I decided it wouldn't be totally foolish to work on the aircraft nuclear plant, as long as it could be converted to a useful purpose.

STOW: Well, foolish or not, obviously we never got an airplane off the ground with a nuclear reactor ...

TRAUGER: No ...

STOW: So, I guess the ultimate objective of that project was never accomplished, but ORNL got an awful lot of beneficial results out of the project.

TRAUGER: That's right.

STOW: Can you expand on how we benefited from that and what things got started?

TRAUGER: Yes. There were many advances in materials [research at ORNL], in particular, high-temperature materials in control systems for nuclear systems, molten salts for reactors, and high-temperature liquid fuels, so ORNL was breaking new ground. And, the research really produced a tremendous amount of useful information. ORNL developed new procedures and technology for some entirely new and different applications. Incidentally, I do think that we could have built a power plant for a nuclear aircraft and flown it ...

STOW: Yes.

TRAUGER: ... but, [I don't know] why anyone would want to do that, particularly if you had to use the reactor during take off. It was just horrible to think of coming in and landing at a private airport with a nuclear reactor on board if it had an accident.

STOW: Well, I've read that maybe the Air Force wanted a nuclear-powered aircraft, because the Navy was getting nuclear-powered submarines. Any truth to that?

TRAUGER: Well, that might well be. I'm not sure how they arrived at the opinion. But, I did like to tell our colleagues, "All we have to do is get that nuclear airplane over enemy territory ...

STOW: Yes.

TRAUGER: ... they won't dare shoot it down."

STOW: (laughs) Well, that's true. There's some truth to that, I guess.

TRAUGER: (laughs) So, you could fly around there and be an observer for as long as you want.

STOW: True. Well, is it safe to say, then, that some of our divisions here at the Laboratory, like the Metallurgy Division, which became the Metals and Ceramics Division [and later the Materials Science and Technology Division], and the Instruments and Controls Division, which has been dissolved, got their grassroots start as a result of ANP?

TRAUGER: Yes. The Metals and Ceramics Division, I think, benefited greatly from that project. They were extremely helpful to me in putting together the pump and heat exchanger in the first experiment.

STOW: Sure.

TRAUGER: Because they knew techniques for welding materials that were different from the materials we had at K-25, we had to learn all that. And so, they learned a lot of technology useful for identifying materials compatible with liquid fuels, molten salts, and alkaline metals. There was really a very great value to that. The control system for that reactor was rather sophisticated, and later experiments we did for the ANP Project and experiments that I conducted in the Materials Test Reactor in Idaho ...

STOW: The MTR ...

TRAUGER: ... all used the controls technology developed by the Instrumentation and Controls Division, which worked very closely with us. Then, of course, chemical technology [researchers were] involved with all the new materials, and was also very important in building the total capability of the Laboratory to do engineering experiments at an early stage.

STOW: It's interesting to trace our present strengths back to those early days, isn't it?

TRAUGER: Yes, yes.



STOW: Well, the Aircraft Nuclear Propulsion Project died in the late 1950s or around 1960 ...

TRAUGER: 1957, I think.

STOW: Okay. And, you moved into other reactor technologies, such as the gas-cooled reactor. Can you expand on where you went after ANP?

TRAUGER: Well, my work with ANP was to test materials compatibility under irradiation.

STOW: Right ...

TRAUGER: ... and then we put radiation experiments in the Materials Test Reactor, which was the only reactor in the world large enough to accommodate these kind of experiments. We irradiated nuclear fuel. So, when the Experimental Gas-Cooled Reactor, or EGCR, was started in Oak Ridge by the Atomic Energy Commission, we tested the fuel for it.

STOW: All right.

TRAUGER: That was a natural outgrowth of my early experiments at the MTR. For testing the EGCR fuel, which is a different kind of fuel, we put capsule experiments – nuclear fuel in a solid ceramic -- in the Oak Ridge Research Reactor. We needed more capacity because the AEC wanted to move the Gas-Cooled Reactor along rapidly. I think Bob Charpie was particularly interested in that.

STOW: Yes.

TRAUGER: So we built new facilities in the Engineering Test Reactor in Idaho and eventually had the General Electric Company build a test loop for testing miniature fuel elements in its reactor at Vallecitos, California. Also, we put a fuel test loop cooled with helium in the Oak Ridge Research Reactor. So, we really had quite a large irradiation testing program.

STOW: You had your fingers into about every reactor here, didn't you?

TRAUGER: We eventually did.

STOW: How many reactors have there been here at Oak Ridge National Lab?

TRAUGER: Someone told me recently there were fourteen, but I don't think I can name all of them.

STOW: Starting with what, the Graphite Reactor, I guess.

TRAUGER: Yes. That's right.

STOW: And the most recent of the reactors would be what -- HFIR?

TRAUGER: HFIR, and recent means after 1955.

STOW: Mid '60s, yes?

TRAUGER: Fortunately, it's been rebuilt recently, and I think it will have a long life into the future.

STOW: What about the High-Temperature Gas Reactor Program? You got involved in that, right?

TRAUGER: Yes.

STOW: Tell us about that.

TRAUGER: Well, Oak Ridge National Laboratory had done some advanced work on developing fuel for that reactor. So we tested some of those fuel designs. We discovered in further tests at the Materials Test Reactor, using some of the equipment we built for the Aircraft Nuclear Propulsion Program, that the preferred design, because it seemed easiest to fabricate, wouldn't work. It would not contain the fission products properly and it would distort. So, that led us to look at what's called "coated particles." We learned how to coat tiny particles of fuel, about the size of the lead tip of a small, fine lead pencil.

STOW: I didn't realize they were that small.

TRAUGER: They're very small, and they are coated with graphite and silicon carbide to make them impervious. They're really tough little nuts  
You put them in a graphite matrix, where they can withstand very high temperatures.

STOW: Yes.

TRAUGER: You can operate the gas-cooled reactor at higher temperatures than light water reactors or other more conventional systems. Those [coated fuel particles] were of great interest to the GCR project. And, it happened at that time that the Germans also were considering a pebble-bed reactor.

STOW: All right.

TRAUGER: It's a high-temperature, gas-cooled reactor in which the fuel shape, instead of being in the prismatic form of cylinders -- as in the U.S. design -- was in the form of spheres about the size of tennis balls.

STOW: Okay.

TRAUGER: And, the fuel [particles were] embedded in the spheres. So, the Germans paid a visit here. The U.S. government had established an exchange in nuclear technology with the Germans,

and they were telling us about their fuel designs. And, I showed them the photographs of the experiments we had conducted on [their fuel designs] ...

STOW: Yes.

TRAUGER: ... and what happened to that type of fuel. And, they immediately knew that they couldn't use it.

STOW: They couldn't do that, huh.

TRAUGER: So they had to go to the coated particle fuel. And, eventually we tested their coated particle fuel for them. So that [work resulted in] another expansion of ORNL's radiation engineering, which was a very large operation.

STOW: You mentioned the Germans, That brings to mind the international travel that you've done.

TRAUGER: Yes.

STOW: I mean, you've been to virtually all the European countries. You've been to Iran, to Japan, to China, and Lord knows where else as an advisor, conference speaker or participant, and so on. Is there any particular incident or event that occurred internationally that gave you great satisfaction?

TRAUGER: Well, it's hard to sort that out. There are quite a few possibilities. But, I think the most satisfying aspect of it was to get to know the people in the other countries.

STOW: Yes.

TRAUGER: And, to work with them so closely. I guess one of the things I was very proud of for quite a time was working with German and the English researchers. We would conduct experiments that were parallel in the same field of technology.

STOW: All right.

TRAUGER: They could rely on some of our data, and we could rely on theirs. We did not have to duplicate the total picture within one country.

STOW: Okay.

TRAUGER: That seemed to me to be a great advantage in the world [of reactor technology].

STOW: I guess the AEC was totally supportive of this approach, right?

TRAUGER: Yes. That went very well.

STOW: In 1970, you were asked by Alvin Weinberg to serve as Associate Laboratory Director. I guess that was the right title at the time, was it not?

TRAUGER: Yes.

STOW: He didn't give you much time to think about that, did he?

TRAUGER: Well, no. He was reorganizing the Laboratory.

STOW: Yes.

TRAUGER: It was a considerable reorganization. And, whereas he had had perhaps too many people at the associate director level, he wanted to bring it down to four people, and somehow, he asked me to be one of those people. It was quite a shock. I had previously been director of the High-Temperature Gas-Cooled Reactor Program. I rose from the program level to the associate director level. That was a considerable step, because I had not been a division director.

STOW: That's a big step up then.

TRAUGER: But I was terrified by the possibility, and I had to think about it. He said I couldn't have time to think about it very much, because he had to make the announcement. So, I said, "Okay -- I'll see what I can do." Well, I found I really enjoyed that position very much.

STOW: So, you got thrown into role overnight almost.

TRAUGER: Yes.

STOW: And you stayed in that role as Associate Laboratory Director for what, fourteen years or so?

TRAUGER: Fourteen years, yes. I didn't intend to stay anywhere more than ten years -- that was kind of a policy, but there never seemed to be a good point to stop, and things were going well, I thought, and I was enjoying it. So, it wasn't until I was so close to age sixty-five, the age when you really should resign as an associate director, that I thought I should do something else.

STOW: But, lots of things happened over those fourteen years. I mean, we had the Arab oil embargo ...

TRAUGER: Yes.

STOW: And Three Mile Island, and the breakup of the Atomic Energy Commission into ERDA and NRC and so on. There had to be some pretty trying experiences for you here.

TRAUGER: Well, there were. I had to [acquaint myself with a] lot of new players in Washington, as all these changes occurred, and I [was required to make] a lot of visits to Washington. I found that it was very desirable to get to Washington about once a month and to

go around and touch base with all of "our customers." That's the proper way to describe the people who were funding us -- to be sure that they didn't have some lingering problems that we could fix if I knew about them before they became major problems. I felt [that regular travel to Washington] was a very important aspect of my role, to keep the money flowing into the Laboratory so we could do the important work under way. Much of our work was in response to the oil embargo and the obvious need for new sources of energy.

STOW: Well, you had responsibility for a wide variety of divisions and programs. I remember that one of your divisions was the Chem Tech Division. I don't even remember what all they were. Can you kind of fill us in on that?

TRAUGER: Well, Floyd Culler had preceded me in most of the areas that I became responsible for. And, Floyd had sixteen people, as I recall, reporting to him.

STOW: All right.

TRAUGER: That seemed like too many, so I narrowed it down to a much more manageable number. So, I had six divisions and ten programs.

STOW: (laughs) And, you call that manageable?

TRAUGER: Well, I didn't think it was, so I got it down to about a total of six or so. I had Metals and Ceramics for a while and Chem Tech and Engineering Technology, then called the Reactor Division, and Instrumentation and Controls. Most of the consolidation I did early was in the programs. I brought it down to about four programs by bringing different fragments together in what I felt was a logical way. And then, eventually, we moved the Engineering Division into a broader engineering [effort to serve] all three plants here in Oak Ridge.

STOW: All right. I remember that.

TRAUGER: The Reactor Chemistry Division was focused on the Molten Salt Reactor. Because that work had declined, I thought we didn't really need a separate division for it.

STOW: Okay.

TRAUGER: So, we moved those people into other divisions. It was a fairly major reorganization during the next few years. But it was very exciting to be working then with broader aspects of the energy field ...

STOW: Especially at that time.

TRAUGER: ... the environmental aspects, the safety aspects, and the control systems still being developed, not only for nuclear plants but for other systems, as well.

STOW: As you look back on those fourteen years, what do you think was the greatest challenge that you faced? Other than reorganizing ...

TRAUGER: I think the most important aspect of the role was, in my judgment, to maintain a proper relationship with our customers.

STOW: All right.

TRAUGER: And to know as much about, not only our own laboratory but also the other laboratories, because Argonne National Laboratory had many programs that were parallel to ours.

STOW: Similar, yes.

TRAUGER: It seemed to me that we shouldn't be in competition with the Argonne National Laboratory unnecessarily.

STOW: All right.

TRAUGER: I established some close friendships with the people at Argonne. We began to work together in a very informal, unofficial way. I think that was a useful addition to the Laboratory's programs at the time -- a little bit with Los Alamos and quite a bit with the industrial companies that were involved in, not only in nuclear but also in other fields as well.

STOW: I want to ask you about the Emergency Core Cooling System hearings that the AEC conducted in 1972.

TRAUGER: Yes.

STOW: I think you and other ORNL staff got involved in that. Can you tell us a little bit about your involvement and your perceptions of how that went?

TRAUGER: Yes. Well, the hearings resulted from a group called the Union of Concerned Scientists in New England, who had challenged the safety programs of the whole nuclear industry. It led to the Atomic Energy Commission setting up this hearing, based on the type of hearings that were used in establishing new nuclear reactors. It was conducted in that format. It was an adversarial public hearing where attorneys from the Department of Energy and from the nuclear companies were pitted against attorneys from the Union of Concerned Scientists.

STOW: Okay.

TRAUGER: But, it got pretty bitter. I was responsible for keeping our team together -- the four researchers they subpoenaed, so to speak, were from the Laboratory, particularly Phil Rittenhouse. [The other three were William Cottrell, David Hobson, and George Lawson.] Phil, in particular, was subjected to long and intense cross-examination on his testimony and it went on for as long as three days, which is really a very difficult thing.

STOW: All right. Yes.

TRAUGER: I was on the stand only once, and that was just to tell about the scope of our program on nuclear safety.

STOW: Well, the AEC did not like what it heard from ORNL staff, is that true?

TRAUGER: Well, we were neither as reassuring as the industry wanted us to be, nor were we as critical as the Union of Concerned Scientists wanted us to be ...

STOW: All right.

TRAUGER: ... and the AEC was somewhere in between. So, it was hard to satisfy anyone in those hearings. And, the lesson from those hearings in my way of thinking was that, if it had been approached as an engineering project to be sure that the nuclear reactors that we were building at the time are safe, and if the Union of Concerned Scientists brought their concerns and the industry brought their concerns and we did research to improve reactor safety, it would have been much more effective. It could have been much more effective I think with proper leadership than the adversarial system, which is powerful. I have a great respect for the adversarial system as a way to find out who was the killer, as in a murder case ...

STOW: Yes.

TRAUGER: ... because there is something specific to be found. But here you wanted to be sure that everything was done well -- and many things were done well -- and there was not a specific objective. So, it was the wrong approach, but it did produce a lot of new organizations, such as the Institute of Nuclear Power Operations established by the utility companies to look at their own safety aspects. And also nuclear operators were organized to share their experiences. So, a lot of good things came out of it and, even the Electric Power Research Institute expanded to do research in the field.

STOW: Well now, those hearings got an awful lot of press and publicity, if you will ...

TRAUGER: Yes.

STOW: ... and within a year or two, the Atomic Energy Commission was dissolved and became the NRC and ...

TRAUGER: ERDA.

STOW: ... ERDA. Do you think those hearings led in any way to the dissolution of the Atomic Energy Commission?

TRAUGER: They might have, but I think probably it had pretty well run its course and there was much pressure, not only from the small group of Union of Concerned Scientists, but from many areas where people looked at the total impact of energy systems on our society, neighbors, and the whole system. And also, the oil embargo had brought the need for more energy to people's

attention, so many energy systems were of interest. So, it led to a much broader program under ERDA, which then became the Department of Energy, which has carried on much of that work, but not as much as I personally think would be desirable.

STOW: I'd be remiss if I didn't ask you about your dog-sitting experiences, though. That's got to be a highlight of your career there.

TRAUGER: Yes. Well, of course, Dixie Lee Ray [former chair of the Atomic Energy Commission and governor of Washington state] was one of the Nuclear Regulatory Commission members.

STOW: Yes.

TRAUGER: And, she was a very interesting and delightful person, really. She was not intimidated by anyone. She always kept her dogs with her whenever she could -- they were in her office even. At one meeting, in which the NRC was discussing their safety programs and she was to be on the platform, one of the dogs started wandering around a little bit, so someone had to take care of the dogs. So, I volunteered and got the dogs back. I like dogs.

STOW: What kind of dogs were these? Do you recall?

TRAUGER: Well, I don't know what breed they were, but one was big and the other one was smaller. Anyway, that was an interesting experience. It broadened my skills a little bit.

STOW: We want to make sure that that's part of the historical record. In 1984 you moved into a new position as a Technical Assistant to the Laboratory Director of ORNL. Briefly tell us what some of your duties and responsibilities were then.

TRAUGER: Well, I asked Dr. Postma what he wanted me to do and he said, "Well, you know the Laboratory, so find something that needs to be done." So I had a lot of freedom in that, but I guess the thing I found that I wanted to do was to make a broad study of what would be possible and desirable approaches to improve nuclear energy overall.

STOW: Yes.

TRAUGER: So I started a study of that and brought in from the Laboratory different people. We started with just some Laboratory "seed money."

STOW: Yes.

TRAUGER: Money that the Laboratory -- that Postma -- could make available. But, eventually the study was funded by the Department of Energy and it grew into a rather large program. We produced four volumes of documents that were directed toward a sustainable energy system in the nuclear field. And it attracted attention pretty widely, particularly overseas. I'm not real sure that anyone in the Department of Energy ever read it, except to criticize it when it was being finished and benefit from its message. So, that was a fun project and it led to a couple of



invitations to Europe to talk about it and exchange ideas with the Europeans, which I enjoyed very much. But, unfortunately, [sustainability] has not materialized in this country in new nuclear energy systems. There were many other things to do under Dr. Trivelpiece, the director of the Laboratory. He wanted to start a supporting organization, like the Friends of Oak Ridge National Laboratory, which came out of that. I did some of the early exploratory studies there and brought a small team together to decide how to do it and contacted other laboratories that had similar organizations.

STOW: Well, that organization survives today, and it's very vibrant.

TRAUGER: And, it's turned out very well.

STOW: Yes, very much so.

TRAUGER: I'm not really a founder of the organization as it is today, but I did do the initial work that led to that.

STOW: Okay.

TRAUGER: As, you look back over your entire career, stretching all the way back to the phone call that you got in Exeter from John Dunning, what would you consider to be your greatest personal accomplishment, or professional accomplishment?

TRAUGER: I'm not a great scientist, so I can't look back and say that I discovered a new element or something like that.

STOW: Those guys are few and far between.

TRAUGER: But, I think what I did do, and something that I would never have thought possible as a boy on the Nebraska farm, was to really enjoy working with people. As an associate director, my emphasis was to create an environment in which scientists and engineers could work most effectively, to support them, to keep resources coming to them, and to be sure that all the work was done safely, properly, and effectively.

STOW: Well, you know, that flavor comes through in your book now that you mention it. Your book [ *Horsepower to Nuclear Power* ] seems to reflect a very sincere, personal involvement and commitment on your part to working with people and enjoying other people and their company and their presence and so on. So, I guess I'm not surprised in your answer there. You say that you're not a great scientist, but you've rubbed elbows with an awful large number of great scientists and engineers, starting back with perhaps Dunning.

TRAUGER: Yes.

STOW: Can you indicate or identify anyone that you really hold in high esteem, perhaps who has had a significant impact on your career?

TRAUGER: Well, I think two people from your alma mater -- Vanderbilt University ... who were in the Manhattan Project. Francis Slack, who was later the head of the Physics Department, and Bob Lagemann...

STOW: Interesting ...

TRAUGER: ... I worked closely with them and they imparted to me some of their skills in thinking things through and reanalyzing a problem ...

STOW: Okay.

TRAUGER: ... and formulating a task so that it was workable. And, Dr. Eugene Booth of Columbia University. Later in my work, when I'd expanded to have a group of technicians and engineers working on barrier testing ...

STOW: Yes.

TRAUGER: ... and our work was very supportive of the Barrier Plant, so we were kind of the control system for that. So, it was kind of a key role at that time, and Dr. Booth was very much interested in being sure that we were really doing the job right. And, he'd come down every Saturday afternoon, after everyone else had gone home, and we would talk and look at the equipment, and he would look at things in detail and look at our data. He was very, very helpful.

STOW: Good.

TRAUGER: You couldn't have a better teacher than Gene Booth.

STOW: What do you think ORNL's going to look like five years from now, ten years from now?

TRAUGER: My, so much has changed since I retired.

STOW: Yes.

TRAUGER: It's kind of hard to focus it -- but with the new facilities, and I think, bringing the Laboratory together here at the X-10 site ...

STOW: Physically together, yes.

TRAUGER: ORNL has been spread out with research groups at X-10, Y-12, and K-25. Just bringing all these people with their great talents in different fields together in a working team has potential because the whole is much greater than the parts. I can see that there are many, many areas where it can go, and particularly with the SNS. I firmly believe that the most important advances that are made in technology come through better materials. The SNS is directed toward improving materials.

STOW: True.

TRAUGER: All, kinds of materials -- biological, ceramics, metals ...

STOW: That's right.

TRAUGER: The whole bit. New materials offer great possibilities for improving the whole technology of our country. Having this tremendous new computer capability at ORNL enables people to do things that we had to do the hard way. I had to put experiments in the Materials Test Reactor to test the compatibility of a fuel and its containers.

STOW: Yes.

TRAUGER: But, if you know enough about the materials and about the container, from basic experiments at the SNS and HFIR, then with a computer you can design most of the equipment you need without doing all that experimental work.

STOW: Yes, the same way we run car crash tests now with computers rather than messing up a car.

TRAUGER: That's a good example.

STOW: I'm looking back at the 50th Anniversary [issue of the *ORNL Review*, 1993] that was published ten years ago, and here at the end, it states that senior staff advisor Don Trauger reflected on the lessons of a half century. Here is a quote: "The laboratory and science at large expand their strategic planning to longer time spans. Perhaps, Trauger suggested, the national laboratories can effectively consider the time spans that are really desirable. Even a hundred years is not as distant as we might have thought." Do you think we can look a hundred years into the future?

TRAUGER: Well, I try to do so in the last chapter of my book [*Horse Power to Nuclear Power*].

STOW: Yes.

TRAUGER: It is focused on energy, which is what I know. So, that's what I had to write about. But, I do think that we can maintain our present standard of living through the next hundred years as oil and natural gas are depleted, by a proper combination of other energy systems. So, I would like to see a major role for national laboratories, and Oak Ridge can be a leader in this as they have been in many studies of energy, to pursue these new energy systems. And, they're not all new, but can be refined to make them available to people on a longer-term basis.

STOW: Do you think we'll get to the point of enjoying fusion energy?

TRAUGER: Fusion is very intriguing, because it does not produce as much radioactive material. But, [even though] there's been a concerted effort on fusion in many countries, and across our country since the 1950s, it is not yet at a point where I've seen any design of a fusion plant that I think would work. In 1945, at the end of the war, you could envision fission systems that looked workable.

STOW: Sure.

TRAUGER: We haven't quite reached that with fusion systems. So, if you think that it took about fifty years for fission to produce six percent of the world's energy, twenty percent of the electricity used in our country, it's a tall order to get that much energy from fusion within a hundred years.

STOW: Thank you. Well done

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