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Oak Ridge Form 5: Oral History, Deed of Gift Release for Interviewee

DEED OF GIFT RELEASE FOR INTERVIEWEE
K-25 ORAL HISTORY PROJECT
U.S DEPARTMENT OF ENERGY'S ORAL HISTORY PROGRAM

I, DON TRAUBER *(Name of interviewee)* residing at 20 PALISADES PKWY, OAK RIDGE *(Address of interviewee)* do hereby permanently give, convey and assign to the United States Department of Energy (DOE) my interviews *(or oral memoirs)*, and the recordings, tapes *(audio and or video)*, and any transcripts of my interviews conducted on 3/11/05 *(date)* at 104 INN LANE, APT. 113 OAK RIDGE, TENN *(location)*.

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I, CONNIE CALLAN, *(Name of interviewer or agent for or duly appointed representative of DOE)*, accept the interview *(or oral memoir)* with DON TRAUBER *(Name of interviewee)* for inclusion into the DOE Oral History Program.

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Signature of Interviewee: Donald B. Trauber
Date: 3/11/05

Signature of Interviewer: Connie Callan
Date: 3/11/05

Donald Trauger

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National Educational Technology Solutions LLC

K-25 Oral History Interview

Date: 3/11/05

Interviewee: Donald Trauger

Interviewer: Connie Callan

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[1:00:07]

[Crew Talk]

Callan, C.: I'm Connie Callan. I'm the interviewer today with -- the date is March 11th. My first question is to state your name, spell your name, and just give a title or two or -- your title at K-25.

Trauger, D.: Donald -- Donald Trauger. That's T-R-A-U-G-E-R. Trauger. And my title at K-25? That's a long time ago. I think I was probably a research assistant or something like that. Well, I was -- I moved up eventually to be a Department Head at K-25.

Callan, C.: Okay. Now we're going to start with your place of origin, where you were born, and please expand on that, if you wish.

Trauger, D.: Well, I was born in a little place called Exeter, Nebraska. And in my book I've written about -- titled "Pioneers in Energy", but it's the story of energy. But it starts with the story of my grandmother who was a pioneer in the conventional pioneering manner with a covered wagon, a team of horses, coming the whole way from England to live there. And my story, that part of the book, is as my grandmother told it to me.

[1:02:47]

So, I grew up on a farm and I became interested in energy while I was on the farm. The occasion for it, as best I can recall, was when we switched from horsepower to tractor power. And the horses' energy came from the oats and hay that we grew on the farm and the tractor used gasoline, which came from some unknown source deep in the ground. So -- and at that time, of course, the automobile was exploding in numbers in the country. So, I very early had a feeling that we might run out of oil. I was only 50 years ahead of its time [laughs]. So --

Callan, C.: Describe where you were living right prior to coming to K-25.

Trauger, D.: Well, I was in New York City before coming to K-25, living in an apartment, 5F by designation. So it was near Columbia University.

[1:04:19]

Callan, C.: I think we're going to get into that story -- I'm anxious for that story, but I mean where you lived before you went --

Trauger, D.: Before I went to the Manhattan Project.

Callan, C.: Exactly.

Trauger, D.: That's your question. Okay, well, I graduated from Nebraska Wesleyan University and was working on the farm for the summer at my own place. But I had received a telephone call from John Dunning, who was a principal person in the Manhattan Project and gaseous diffusion at Columbia, inviting me to come work on a secret project that he couldn't tell me anything about it, but that I could perhaps take some courses at Columbia. So, I was very much interested in it because in college I had the most -- when I was in college the discovery of fission occurred and that excited me and it was very, very interesting and exciting for a young person, a sophomore in college, to be meeting a bunch of professors and people that were in your textbooks, in particular, who were also in the newspapers. So, that really forced my interest toward nuclear energy. And when I got this telephone call from Dr. Dunning, who was also a graduate of my college, incidentally, was -- I was very much excited about it and I immediately thought that it was nuclear energy. My professors at college said, no, that's just too big to take on during the war so it might be radar. I said, okay, I don't mind working on radar, but I think it's nuclear energy. And it was.

[1:06:30]

Callan, C.: [Laughs]. Well, you were correct. Did you tell -- I meant to ask you what your date of birth was and your age, if you haven't -- do you mind telling us that?

Trauger, D.: No. I'm 84 approaching 85 pretty fast here. So, I was -- my birthday is the 29th of June 1920.

Callan, C.: Good. Okay. I'm -- What kind of work did you do before you went to K-25?

[1:07:10]

Trauger, D.: Well, that was at Columbia University and the Manhattan Project. And my work was to test the barrier. The barrier material was the key element of the gaseous diffusion process. It's -- just to describe it a little bit, it was a thin metal sheet that had tiny, tiny holes in it that -- too small to see with the naked eye. Just too small to see with an optical microscope; you could see them with an electron microscope, which was a new instrument at that time. And it was -- my work, initial work was to test the barrier and to find out how well it would work. And it was to do a quick test on it that would allow the researchers to be guided properly in, in the development -- testing it with uranium hexafluoride takes a long time because it doesn't separate very much. So we were separating (indiscernible) gasses, but if you have a quick measure of how well the barrier performed, so that was my work in the first few months was just a routine operation, but it was pretty sensitive and very difficult to get accurate, really accurate measurements. The barrier was tiny pieces that were an inch. An inch square was a fairly large piece at that time.

[1:09:05]

But they envisioned that for a plant of K-25's size, to make weapons grade material we required many stages, many repetitions of the gas passing through barriers and a little bit of separation with each pass so that the plant would require a large area of barrier in many little pieces that somehow fit together at that time, but you could measure it in acres. And to go from these little pieces that were an inch square, about as large as they would make at the time -- I guess some were a little larger than that -- was a big task. So, some people thought it could be done and others thought it couldn't. I always thought probably it could, but that it was, it was a daunting undertaking.

Callan, C.: Do you need some water to --

Trauger, D.: Well, I -- let me try a little coffee.

Callan, C.: Drink a little warm coffee.

[1:10:21]

Trauger, D.: My voice isn't very strong and it doesn't always work very well.

Callan, C.: I hope we can get through all these questions before you lose your voice.

[laughter]

Trauger, D.: I probably won't lose it, but it, it doesn't come over very well.

[crew talk]

Callan, C.: Great.

Trauger, D.: That's good to know.

Callan, C.: Let's -- now that -- did you have any work experience before you came to this Columbia project and do you by any chance know how you were selected by Dr. Dunning? Do you have any information about that?

Trauger, D.: Uh, well Dr. Dunning called Dr. Jensen, who was a (indiscernible) professor and was my major professor at Nebraska Wesleyan. Dunning was there about 15 years before I was. But he asked Dr. Jensen if he had a recent graduate who might be able to fit into this big project that he was working on and Dunning recommended me and so I got the telephone call.

[1:11:32]

Callan, C.: Did you give us all the degrees and all the universities you attended before you went to Columbia University.

Trauger, D.: Just Nebraska Wesleyan.

Callan, C.: That's it.

Trauger, D.: A very small school and still a modest sized school, but it had then and still has, a very strong physics and pre-engineering program. It has many, many renowned graduates in many places.

Callan, C.: As far -- well, you went back to your origin as far as your family. Is there any more you want to say about that?

Trauger, D.: Not particularly.

Callan, C.: Okay.

Trauger, D.: Kind of a middle range of farmers, larger than some but smaller than many; very small today. But, incidentally, my brother still operates the farm.

[1:12:37]

Callan, C.: Well, now we're going to into some general questions right into working at K-25. I think we've covered the first question, which is why did you come to work at K-25, what attracted you to come, and how did you hear about it. Shall we go into the next, which is -- what are your first recollections when you arrived at K-25? Do you remember that first day or that first week?

Trauger, D.: Ah, yes. I remember that very clearly. The first -- I had visited K-25 before, before I moved here so it wasn't a surprise when arrival as a permanent employee, but it -- the immensity of it was really impressive and it's impressive even today. It's a great, huge plant. Since they had been working on it for three years, three and a half years before coming, it wasn't -- that wasn't a surprise, but it was like seeing the Eiffel Tower, for instance. It just -- you see it in pictures and you know about it supposedly, but it's very impressive. So, that was part of it.

[1:14:09]

But the frustrating part of it was that I'd come to K-25 in a rush, coming three days earlier than I had planned to and scheduled to come. Flew down because they were going to move very rapidly in establishing or reestablishing the laboratory we had in New York and had so much equipment that I had designed and built and had a team operating it, doing work with it. When we got here about the first word we got was that, well, the bureaucracy said to put it on hold for a while. So, we rushed to get here three days early and then we waited about six months before we got approval to proceed. But there was plenty to do, because in the rush of the wartime activity, we hadn't written up papers, or documented the -- to document the -- research that was done in a manner that would be acceptable for future records. And so we spent the six months doing that kind of thing, planning for a new laboratory and so it wasn't wasted. And it was nice not to working under the wartime pressures during that time. So we got acquainted with Oak Ridge and the surrounding area and the beauty of east Tennessee. So it was really a nice introduction, but frustrating not to do what you

intended to do when you came. But it all worked out pretty well, I think.

[1:16:15]

Callan, C.: Well, what year was -- give me an idea when you came to K-25. And one thing I didn't go into -- you talked about your work at Columbia University. I didn't know if you wanted to go a bit more into that and also the team of people that came out with you. Did you stay together through the whole period or did you lose track of each other?

Trauger, D.: The, at the end of the war many of the people that had worked with me and my retorted K-25 -- in New York, which was actually at the -- had been moved from Columbia University to the Nash Building, as it was named, parking lot -- parking garage that's converted into a laboratory in a few months. It was a really fine laboratory, incidentally. But, the team that I had there consisted of some civilians and some GIs who were assigned to the project that had engineering backgrounds or technical backgrounds. They might be picked out of the army and put to work on this highly classified, highly urgent project.

[1:17:42]

So, some of them came, but many of the GIs decided to get out of the army, so we had a combination here that eventually built up a new laboratory with a few of the old timers from the Manhattan Project and a few people that we hired and who transferred -- some from different parts of Oak Ridge because the wartime work was diminished in some places and new work was undertaken. So it was a good crew. We had -- we could have come in. Most were very well qualified people. So, it was -- that was a pleasure.

Callan, C.: Okay. And the year you came? What was the year you came to K-25 and what did the plant look like and the area around the plant when you came? What did it -- what were your impressions?

[1:18:57]

Trauger, D.: Well, it looked much likes it looks today. In that respect, of course, they're starting to tear down parts of it and -- but the parts

than have changed thus far are not the original -- not the original building so much, although the administration building is gone. It's just a nice grass area. And some of the other buildings are gone, but -- and then many buildings have been constructed for other projects that have been carried on at K-25 other than the gaseous diffusion process. So, it has changed quite a bit, but the main features of K-25 still look just like they did. So when the secret city train travels through there with visitors, when it's allowed to run, they get to see it as it was.

Callan, C.: And what total years did you work at K-25 and did you transfer to Y-12 or X-10 or any of the other -- ORNL?

Trauger, D.: Well, I was at K-25 for, what, eight years I think, '46 to '54. But in the early 1950s, early '51, I started doing work for what's now the Oak Ridge National Laboratory. Well, I guess it was perhaps even then by that title. But, but I was doing the work at K-25.

[1:20:51]

The K-25 work was -- engineering in particular was diminishing and much of their service facilities were available. So I had the advantage and started doing some work for the laboratory, still employee of K-25 as kind of a contract arrangement. But I had access to excellent facilities, excellent services that were available and not difficult to induce to work with us. So, I started out with laboratory work for the Oak Ridge National Laboratory while in the last two or three years at K-25. And the research for the barrier and the testing of barrier was diminishing as the plant was completely filled with barrier material and was operating. The later work that we did in gaseous diffusion in the laboratory at K-25 was more directed toward improving the K-25 operating pro, pro -- the operating process, to find the best temperatures, the best pressures, the best operating conditions for the plant to get the maximum performance from the barriers which were separating material and the best, most efficient operation of the pumps and the gas circulators and all of the equipment. And uh -- so, and then there was always work to improve the barrier. The barrier was constantly being improved through work at the laboratory at K-25. So, it was interesting work, but it -- but that was diminishing and so it was nice to finally work for the Oak Ridge National Laboratory to fill in the gap.

[1:23:12]

Callan, C.: Now, if people would inquire what work was done at K-25, people in Oak Ridge, do you -- what were some of the things that you would tell people?

Trauger, D.: You tell them nothing.

Callan, C.: Not even come up with a story?

Trauger, D.: You tell them when you went to work. You could tell them about the cafeteria. So, but you just didn't talk about it. And particularly, of course, at Columbia University and the Nash Building during the war -- you didn't tell them where you worked and you didn't tell them anything. And, I met my wife there and she agreed to marry me having no idea where I worked or what I did. [laughs].

[1:24:14]

Callan, C.: [Laughs]. She accepted you on good faith.

Trauger, D.: On good faith. [laughter] For which I'm very grateful today.

Callan, C.: Well, talk about what that was like to have this secret work that you're not able to share with your family, with your friends -- was that a burden your whole life or did you not mind it?

Trauger, D.: Well, I didn't like working under the classification, under secret -- secrecy. I really didn't like it, but I respected it and that's --

[crew talk]

Callan, C.: Okay. Getting trunk noise. Okay. We're ready to start again.

Trauger, D.: Okay.

[1:25:07]

Callan, C.: We're talking about whether you liked working in the secret --

Trauger, D.: Well, I didn't like it in that respect. It's much better to be in a free society where you can talk and share information and get new information, but, under the circumstance, there was no choice because we were told and we thought from what we could gather

from news reports and things that the Germans were working on a project. We knew that before the war, before everything became secret -- that they were, perhaps, ahead of us in some respects. So, there was a great incentive to move this project as fast as possible and effective way as possible and not to relay any information that might be helpful in any way to the enemy in a very desperate, difficult World War II.

Callan, C.: What did you -- this is two questions, but I always put them together. What did you like most about working at K-25 and what did you like least?

[1:26:35]

Trauger, D.: Well, probably what I liked most was that even before that period when I started to work with the Oak Ridge National Laboratory, K-25 had excellent facilities and services and so you had a lot of advantages in doing your work because there was really a very fine support system. But -- lost my train of thought here. We, I guess that was it -- a very nice feature of working at K-25. But it was frustrating, again, because it was classified -- still classified -- so you couldn't write about it, you couldn't tell about it. I managed to have a couple of papers published once in peripheral developments that I did, but nothing about the process.

Callan, C.: And what are some of your most vivid recollections at K-25 when you were at work?

Trauger, D.: Well, I suppose it was, it was -- when we first came and were after the six month waiting period we began to build a laboratory facility. It was to design and layout and build a new laboratory and design it the way you thought would be best for the type of equipment we were developing and using. It was very -- that was very rewarding to have that opportunity. And then I suppose as we, as we began to work on new aspects of the design of the barrier and its use that some of that was very exciting because it was really something. These were developments that had the potential of making the facility more effective and efficient. So, it was a pretty exciting place to work.

[1:29:19]

On the other hand, I looked longingly at the Oak Ridge National Laboratory, which was just a few miles away, in which they had a far broader program and more, more technology available and more equipment than K-25 could ever justify for a narrow project work. The other laboratory had many interests because it had to build a reactor in order to produce some plutonium for research purposes and its goal was to separate the, the uranium from plutonium once the plutonium was made in the reactor, but they had to make the reactor in order to get plutonium that didn't exist in nature. So, you can see resources there that we could use at K-25 and I started a little mission to try to bring the two together and use the Oak Ridge National Laboratory for some of our work, but I suppose it was primarily the classification people that didn't want to do that. And maybe that wasn't a good idea. I don't know. But it was a little frustrating to see the laboratory there and not be able to use it very much. But it did -- and you couldn't use it very effectively because you couldn't tell them what you were doing or why you wanted to do it. [laughs]

Callan, C.: Getting back to the secrecy of everything.

[laughter]

Callan, C.: I think we're ready to change tapes --

[End of Tape 1 - Begin Tape 2]

[2:00:05]

Trauger, D.: Let me move my legs a little bit. That's part of getting old, but I also fell --

Callan, C.: You did?

[2:00:17]

Trauger, D.: -- in November and broke my right leg. So I've been through the hospital and rehab and all that and so it's still a little bit stiff.

Callan, C.: Yeah, my mom had a double knee replacement, which was quite a -- ready to roll? Have we been rolling?? Oops. Working conditions. Let's talk about -- and you talk about this, but I think

you really mentioned the communication between fellow workers in a secret facility. Can you talk about how you communicated?

Trauger, D.: Well, within the laboratory, of course, it was no problem. You could talk with people within the Nash building and the Columbia buildings that were devoted to the project. But the barrier was being manufactured at Houdaille Hershey in Illinois and my laboratory was a testing laboratory is really only a quick test to evaluate the barrier. So we would get samples coming from Houdaille Hershey in Illinois and we needed to talk with the people about it. And so we devised some code language to convey information. It probably was very simplistic and easily translated, but [laughs] to a good spy, but [laughs], but there were no classified lines, telephone lines or equipment -- no way to transmit information that needed to be done quickly because the plant was, was either developing or in operation. And so that's the way we did some of it. But within the individual facility you can speak fairly freer -- fairly freely, although some aspects were even restricted even there.

[2:03:05]

Callan, C.: I think -- what were the physical working conditions like at the plant? Was it comfortable or uncomfortable to work there?

Trauger, D.: Well, the laboratory in which we worked, my laboratory, (indiscernible) I suppose, was as we designed it so it was reasonably comfortable. There were no amenities, no -- there were nothing luxurious about it. It was pretty Spartan. But the whole facility was somewhat Spartan in that respect. The cafeteria was like, oh, institutional. The food, we complained about it, but it really wasn't all that bad. It was probably acceptable. Better than some and not as good as others. But, the folks that ran it were friendly and they're doing their job. So maybe it was a good place to work, but it didn't have any luxury of any kind.

[2:04:37]

Callan, C.: What were your coworkers like? Did everyone pull their own weight?

Trauger, D.: Yes. Pretty much so. I had to dismiss a few people because they weren't pulling their weight, but -- and that was very painful and

very difficult, but for the most part they were -- there were people were really very good and so it was, it was a pleasure.

Callan, C.: Talk about some of the rules in general. I know we talked about security, but rules that had to be followed at the plant. Can you recall some of those rules that were really essential?

Trauger, D.: Well, there were slogans. What you see here, let it stay here and things like that. It was -- the secrecy was emphasized and safety was emphasized very, very extensively. I think, considering what people were doing during the war, some of it was certainly handling hazardous materials and doing things that were hazardous. It was really done in quite a safe way. So --

[2:06:22]

Callan, C.: You've gotten right into the next area, which is talking about safety and how often the plant and how it emphasized safety. Do you think you answered that pretty much?

Trauger, D.: Probably so. I think that some of the safety programs that we had then I suppose would look crude today, but they seemed to work well and I think those, to me, those that provided incentive to the individual that's beyond the great benefit of not getting hurt is maybe effective. One of the things that we had up there after the war at the laboratory, but at the Oak Ridge National Laboratory, but was you'd have a safety campaign of -- and if you did not have any lost time accidents everyone got a little gift. So, it wasn't anything very valuable, but not -- it could be a tool or a kitchen appliance or something small but very nice. And I liked that program because no one wanted to break the chain of safety because the longer you had no accidents, the bigger the gift and the better the gift. So, it didn't -- you didn't want to have an accident so that you deprived all your friends and coworkers of their gift. And, that's kind of a silly way maybe to take care of yourself, but I thought it was pretty effective.

[2:08:35]

The most important thing in safety, I think, is to always have in mind that I'm gonna do it in a safe way. To go back to the very first day at Columbia University; I worked for Dr. Slack, who is a Division Director in the barrier development and barrier testing. He said to me, "Now, we don't have time to train you or

indoctrinate you, but you're expected to -- you must know what you're doing and everything you need to know about it and do it in a hurry, but do it safely. The responsibility is yours to do it the proper way. You're on your own." And I liked that too.

[2:09:43]

Callan, C.: Well, you've really expounded on that more than I've heard, about the gift. I had never heard that one. I think that's a really good approach. Let's -- now we're going back again in time a bit to the Manhattan Project and the years '43 to '45. And you're saying you were at Columbia University during that period. So, during that -- during the war, did you have -- you talked some about the enriched uranium 235 and if you knew what it was going to be used for and I'm kind of grouping all this together because you might answer it together, but on August 6th, 1945, the dropping of the atomic bomb, where you were and your recollections of that day and how you think people will view that day in history. It's a long question, but it all kind of fits together.

Trauger, D.: Well, I suppose people view it today much as many of us did on that day and the rest of 1945. We have, we have created a weapon that ended the war. And that was a great thing. Ending the war was very important, but we also have created a new weapon that's of great potential and a very fearsome thing. And it was a terrible thing to do and it was a dilemma all the way through the project. Period.

[2:11:39]

Constantly hoped against hope that somehow they couldn't explode, it wouldn't work. You knew that wasn't true, but you still kind of hoped somehow all the science was not right somehow. Because if it couldn't explode and you could still use it for producing electric power, that was wonderful. So, so you had very mixed feelings about it. Here we created something that might be extremely valuable and if you look at the project as a whole and what it accomplished in bringing about the nuclear era, perhaps the greatest value that came from it was kind of a side benefit, but that was from the reactor side of it and producing radioactive materials for medicines and diagnostic and treatment. That's the biggest part of the industry today. It's far greater than the nuclear power production. And, and it's -- I said to visitors that I sometimes conduct through the areas of the bus tour that goes in the summer,

that I think that there's no extended family in the country that hasn't benefitted in someway from radioactive medicine. And no one's challenged that statement. There's probably hundreds of people that --

[2:13:42]

Callan, C.: My dad had a radioactive -- Let me -- I don't know if this is a good time to ask the question of how the technology that was researched and developed there has lived into other areas and benefitted the world since you brought that up. Can you talk of other incidents of the technology and the research that was done at K-25?

Trauger, D.: Well, my first contact with the Oak Ridge National Laboratory came when they were -- they realized that they needed to put some filters in the air filter that cooled the graphite reactor. And they needed to clean the air coming into the -- into the reactor so it wouldn't become -- carry radio -- dust that would become radioactive. And also to filter it as it went out so they'd use the stack to dilute it and any radioactive material that might be produced in the reactor and go into the coolant system. And someone there knew about the barrier development and here's a very fine filter that would filter out anything other than an atom. So they asked me to come over and talk with him about using it for their purposes. Well, it ain't that porous and it'd take too much power to force the air through it so you couldn't do that. But we studied all porous materials -- all types of porous materials just to get a background for developing the barrier. And so we knew about filters. These were filters that were developed for another different -- a different wartime project, but we knew about it and said, here's what you need. And we -- so we -- that was my first official contact with the Oak Ridge National Laboratory was to help them with filters for the graphite reactor.

[2:16:21]

Callan, C.: Okay. After the Manhattan period and let's now go into the expansion program. That's '45 to '48, which is really when you came. Talk about how -- well, you know the mission changed and some of the activities that happened during the expansion program. I think you've talked to some of those. Is there any more you want to talk about -- the way the plant kind of changed into new activities? Because that's when you came so that would be the beginning.

[2:16:57]

Trauger, D.: Yeah. Well, by that, by that period, of course, we were aware of the amount of electric power that it took to operate that facility. And so any small improvement in the barrier or in the whole operation for that matter, but particularly the barrier, if it made it more efficient, would save large amounts of energy. And so it actually improved -- some fraction of one percent improvement in the barrier could produce thousands or billions of dollars in saving electric power. So, there was an incentive to improve all aspects of that operation because it was such an energy intensive operation.

Callan, C.: We have a bug in here that's interrupted every interview. [laughter] This whole week. It's just like -- I've been thinking about it. Oh well. Okay.

[2:18:19]

Cold War era specific recollections, and this is '48 to '64. We're talking about the work changing during that period, '48 to '64. Any interesting stories during that period? And whether -- this is really getting back to what we were talking about. Thoughts about how these -- the activities that were accomplished at K-25 revolutionized the world.

Trauger, D.: Well, the product certainly did. [laughs]. The uranium weapon. But, K-25 -- the development for K-25, this came earlier than the period you're talking about, but the application came -- began in that period I suppose. The uranium hexafluoride is a very corrosive material and very difficult to contain, and so you put together some equipment, different pieces of piping or whatever, and you want to be able to take it apart, you need seals and gaskets that will close it. The fluoride compounds could do that. And so that was -- Teflon was developed from that, which people use in cooking pans now. So, that was a major product that came out of the project.

[2:20:18]

Also, the -- since the -- to make things very clean and you needed sometimes very low temperatures to collect all of the gases, gaseous materials, liquid nitrogen was used extensively and I don't know that it was particularly developed on the project, but we

certainly learned to use Styrofoam such as they use in this coffee cup. I remember when I first saw Styrofoam in a little block, maybe two, three inches cubed, was very expensive. It was like, I don't remember how many dollars, but in today's dollars it'd be 25, 50 dollars. [laughs]. Now, unfortunately we tend to throw them away. They're very durable and they don't disintegrate. So they -- both good and bad, but the good is nice and the bad shouldn't happen. [laughs]. It's not the fault of the Styrofoam. [laughs].

Callan, C.: Well those are two good examples of positive things that --

[2:22:05]

Trauger, D.: I think the other thing that was probably in the technical and industrial fields was probably the art of making systems gas tight, air tight because in the gaseous diffusion plant, these parts of the plant were operated below atmospheric pressure and you could not allow any air to leak into it and you couldn't allow any uranium hexafluoride to leak out either because it was corrosive and it was hazardous. So the art of making things absolutely leak tight was refined and developed and the helium leak detector was developed as a -- by Alfred Nier at the University of Minnesota to -- as a very sensitive device to detect any leakage in a system that was either under vacuum or under pressure. And, so that was -- the technical fields and in many chemical processes to get proper equipment tested and validated, the helium leak detector was a major development. Not one that you find in Wal-Mart, but --

Callan, C.: Okay. We're going to go into job specific questions and what -- I think you've gone over a lot of this, but if you want to expand on what types of jobs you were associated with at K-25 and the kinds of job activities. And then your most challenging assignment as an individual and as a member of a group and your most significant accomplishment as an individual and a group.

[2:24:17]

Trauger, D.: Well, I suppose, to go back to the Nash Building and the Manhattan Project and our interaction with the plant that was being built in Illinois, Houdaille Hershey, to manufacture the barrier. Our little laboratory was the, I think I'm safe to say, the principle group that was evaluating the effectiveness of the material that had

been chosen to put in the plant to manufacture there. And as we got more and more manufactured product, we found that it wasn't performing properly and it wasn't going to be suitable for putting that material into K-25. And as we watched the samples come in and our test results and slowly just came to the conclusion that they wasn't going to work. And there was a major problem because here's a plant been built to manufacture this product and they were gonna manufacture something that you couldn't put in K-25 and make K-25 work. So, they tore all the equipment out of that plant and built new equipment for a new type of barrier. Now, that tells you --

[crew talk]

Callan, C.: You can go on. He just was signaling me that you have four more minutes on this tape.

Trauger, D.: Oh, okay.

Callan, C.: Okay?

Trauger, D.: Okay. Well, that was really a very exciting time and a very deep responsibility, as you recognized. But they -- and the K-25 plant was under construction and was coming along quite well and if they finished it and didn't have barrier put in it, this was a tragedy. So, so our little testing group played a major role in and it took the management some time to make that decision because it was, it was a big decision and a very difficult one. So, I'm really proud of that and I asked one of my colleagues I happened to see not too long ago if he thought was -- whether it was a correct statement and we were taking too much credit and he said, "No, I don't think so." So, once in a while you're involved in something that's important and you -- a little hard to know when it's important enough to change a major -- a major facility. So, that's a story that I like to tell.

[2:28:02]

Callan, C.: I'm gonna have to say that I'd be -- that's amazing. And I can see why you can be very proud of that. [laughs]. We all thank you for your contributions.

[laughter]

I think we probably out to change tape because he's got two more minutes and the next question might go over two --

[End of Tape 2 - Begin Tape 3]

[3:00:01]

Callan, C.: -- what you all worked on.

Trauger, D.: It was vitally important.

Callan, C.: Yeah. [laughs]

[3:00:18]

Trauger, D.: It either worked or the project was a failure. And when you build a facility as large as K-25 and have no way to use it, that would be a major embarrassment.

[laughter]

Callan, C.: That would really be -- okay, we're going to -- I forgot what I was going to ask -- can you compare the technology of today and the technology back then and how it might compare?

Trauger, D.: Well, you have to compare it with what exists before. If you compare the technology that was used in the Manhattan Project compared with, with the industrial practices of the time and some of the things that were already mentioned such as the leak detector and the new products for corrosion resistance and the leak tightness in the building and big, huge systems, then that was -- that technology, it was a big step forward. But compared to today's technology, it's primitive. It really -- things are just so far beyond it that old fogies like me are just totally out of date. [laughs].

[3:02:03]

Callan, C.: I guess -- you talked so much about secrecy and I really like some of your answers and now I'm starting to think about the responsibility of not having an accident -- we were talking about health. That would have really set the project back so much, is that right? Isn't that kind of what the responsibility was --

Trauger, D.: Yes. Yes, it could have. It could have. And in fact, one, one accident happened in the barrier testing facility where I first worked at Columbia. We were working in the basement of Columbia University and we were separated helium and carbon dioxide as a quick separation with the barrier to find a quick way to determine whether it was a good barrier or not and we had other gases that we needed for different aspects of that either in building the equipment or for various purposes, and we had -- one day one of the people that was working in that group was kind of horsing around and -- you need a little relief from time to time or from just running these routine test facilities, but he was carrying it a little too -- much too far.

[3:03:41]

And he knocked over a cylinder of helium gas that was under high pressure, very high pressure -- I've forgotten what the pressure it, but its several thousand pounds per square inch. And contrary to -- well, it also had a regulator valve to bring the pressure down to pressure you could use. It was a high pressure in the cylinder just to store that much gas and then you used a regulator pressure, regulator to bring that down to where you could use it. But when the cylinder fell over, it broke the pressure gauge off of it and the gas was streaming out of a nozzle that was at right angles to the axis of the cylinder. And so it would spin around and it would flip over and it was a big, heavy, iron cylinder, steel cylinder that was maybe four feet high and several inches in diameter just flailing around in the room. And we climbed on top of the equipment to keep out of its way and no one was hurt and there was no damage done because it was helium, which is an inert gas. But it released inside the laboratory and the -- all cylinders were to be chained tightly against a firm wall or support. This was not.

[3:05:26]

It was a violation. The regulator should not have been left on. It should've have been valved out. So there were two violations on that and -- but, the frightening thing -- the terrifying thing was that standing beside the helium cylinder that was knocked over was a cylinder of hydrogen. And the cylinder of hydrogen would have produced a fantastic fire -- we would probably have lost everyone in the room. And, depending on how the hydrogen became ignited, whether there was enough hydrogen in the room before it ignited to cause an explosion, it could have destroyed a major part of the

building. And this was a vital part of the Manhattan Project. So here was a near accident that was -- that could have had a very severe impact on the project.

Callan, C.: Well that was a -- I'm glad you recalled that story.

Trauger, D.: I won't forget.

[3:06:39]

[laughter]

Callan, C.: Is everything okay? Is that bug getting in there? Got a new bug. I thought I got the -- I thought it was one bug, but I guess they're just --

Trauger, D.: It's a whole family, I think.

Callan, C.: A whole family?

Trauger, D.: They usually come in families.

Callan, C.: [Laughs]

[crew talk]

Okay. Do you remember any conflicts between management, the workers, the unions while you were there? Ay stories about that?

Trauger, D.: Uh, well there's always a certain amount of conflict, but I think, in general, it was a pretty good situation and the K-25 union people were pretty easy to work with. I had -- my work at that time involved a lot of contact with them. I was often out in the machine shop helping them, showing them what's important about this particular unusual device or, or -- in more detail than what they needed. And I'd always tell them as much as I could about what it was about. What it was for. Just to create their interest. And I found that there was a very good feeling there.

[3:07:55]

On the other hand, about 1947, there was a -- there -- it was time for an increase in wages and management was holding off on it. And it was kind of known that -- what the situation was. And, and

that brought about a strike. And when the workers struck, the management had to operate this big plant. They had people all through the plant who were diddling little valves and little controls to make it work smoothly. But it's a very automatic process. And the management couldn't get around to diddle with all this and it kept running and it ran very well. They didn't need all the people. And so, most of them didn't have jobs when the strike was over. [laughs] That's kind of a major development that can form unexpectedly. And, it's partly, perhaps mostly due to the management just being a little slow in responding, perhaps.

[3:09:29]

Callan, C.: Let me straighten your tie. It's gone a bit off to one side here. [laughs]. I think it just happened. Okay. Let's talk about women and women in the workforce and what sorts of roles women played at K-25 and how they were treated.

Trauger, D.: We had several women working at K-25 in the laboratory that I refer to, that I was responsible. They were very good. They worked effectively. One of them eventually went to the Oak Ridge National Laboratory and had a little rather let's say satisfying and productive career there as well as at K-25. So -- but the women were more technical people because there weren't so many technically trained women at that time. They didn't go into the sciences as much as people -- as the women are today. So, it was rather unusual to have a woman. I had one woman at Columbia University or at the Nash Building who was an engineer and she was operating this big test equipment we had and she was just a delight. And she was small and sometimes we built the equipment too big for her, but she found a way to climb up and take care of it and care for it properly. And it was -- then she left -- her husband was free from the army at the end of the -- the VE day -- and went to Panama so she went to Panama with him and I lost a really good employee.

[3:11:46]

But -- so, there were many that belonged in the direct system in the plant itself. There were many women who were operators and they were some of the people that were diddling with the little valves and controls that I mentioned earlier. But in those roles where they didn't need to have gone through a technical training they were great.

Callan, C.: Okay. Now let's talk about minorities and Afro-Americans or other minorities and how they were treated.

Trauger, D.: In Oak Ridge, very badly. They mostly were, were confined to labor type jobs, janitorial -- this kind of -- it's a dark period in our history here. And their housing was deplorable. It was simplistic. It was totally unacceptable from my point of view, even at the time. And there was just a shock when I discovered the housing that they had.

[3:13:31]

Now, there were Caucasians who were also living like that and it was temporarily -- temporary for them because some of them were GIs, but the GIs were, that's kind of what they expected anyway because they weren't expecting to have nice accommodations. But, but it was inexcusable, I think, for the federal government to provide very inadequate housing for minority peoples. And it's a shame. And that was a shock to come here, too, from New York where, where there wasn't the same type of isolation between blacks and whites but there weren't black people working in the Nash Building either other than just janitors. So it's a dark period in our history.

Callan, C.: Okay. Now talk about spouses and your family and what you did -- your outside activities, your life at Oak Ridge with your family, you know? What was it like to live in the secret city and what were some of the activities you did off hours?

[3:15:08]

Trauger, D.: Well, at first -- when we first got some transportation we enjoyed just driving around the countryside, it's so beautiful and so different from, from the flat country in Nebraska where I had grown up and so different from -- pretty much from the people out in North Carolina where my wife had lived on a farm. So, we were exploring the mountains and the lakes and enjoying this countryside very much. And then we also, as did all the people who worked on the project, I think, developed little groups that provided their own entertainment. And Oak Ridge has, I think, the oldest playhouse in the state, at least a continuously operating playhouse. And very early had a civic orchestra and many, many things like that developed - clubs and different activities. And our

family participated in some of that and it was -- it was innovative. And looking back on it a few years ago, those of us who worked on the Manhattan Project in New York City entertained ourselves. It wasn't going to the plays or to the nightclubs and things that were in abundance in New York. Those things were too expensive for us in the first place. In the second place we didn't have time.

[3:17:12]

And so on Sunday nights we often had just a group get together and play things like charades and we thought, well it's kind of interesting to be here in the middle of New York and entertaining yourself as you might out in dog patch, as we called Oak Ridge at the time, after the (indiscernible) comedy -- comic strip. But we found that people in Los Alamos were doing the same thing and they were here in Oak Ridge. So, there was a camaraderie we developed in the project that carried over into social aspects. There was a good, wholesome but quite entertaining. And it was talented people so they could make it interesting.

Callan, C.: Well, we are getting to the final questions. And I've got a different way of doing these. Since you're a writer you know what I'm after. But I want, as succinct as possible now, to -- let's say this is your final closure of your book about K-25, okay? And you're coming to this final summary and it's like one paragraph and you're going to summarize the whole thing, describe what future generations should remember about K-25 in as succinct manner as possible.

[3:19:10]

Trauger, D.: Well, K-25 you might say was an idea based on very limited technical data on the separation of isotopes by gaseous diffusion through a barrier. People had tried it before, but only in tiny pieces of laboratory equipment just to perhaps find -- obtain a little bit of different isotopic material for research purposes. There was nothing more than that to go on. And starting with that and to envisioning a plant that would have acres of that kind of material in it to operate continuously and for long periods of time and produce the separation of isotopes for nuclear power or for weapons was -- is a pretty remarkable thing. It's kind of hard to, to properly appreciate the vision that people like John Dunning had or as Fermi had and Gene Booth and others that -- so, I think that's a very exciting aspect of the whole project. And it worked very well.

[3:21:15]

And there were so many skeptics that K-25 was really built with more temporary structures than Y-12, for example, which was another separating process, but the Y-12 process, electromagnetic separation, turned out to be labor intensive and, as I mentioned earlier, they -- the K-25 plant would pretty much run itself. And so there was just no comparison in the cost of the two even though people felt more certain of the electromagnetic separation and, indeed, it did most of the separation for the first weapon. But K-25, the gaseous diffusion process turned out to be a good process. Now it's terribly energy intensive and so it's doubtful that anyone will build a -- new gaseous diffusion plants, new K-25s because the centrifuge, for instance, is a less expensive way to enrich uranium.

Callan, C.: This is an interesting question. It's massive, but -- if you imagine that you're going to write a book or story or a documentary about K-25, could you give me some of the key topics, thinking about an outline or a progression of topics? And I know that's a massive question, but everyone's kind of had a different approach and it's been real interesting and helpful. What are some of the key topics that need to be addressed if we were talking about K-25?

[3:23:14]

Trauger, D.: Well, it's hard to separate a -- what has happened as an accomplishment, starting as I just described -- with very little experience of separating isotopes by gaseous diffusion to building a plant that is of monstrous proportions and to produce a fearsome weapon from this. But, I suppose that if you think about some of the new technology that we mentioned earlier -- the nanotechnology for instance, they produce things equally striking and surprising in a very different way, but coming from a tiny bit of work and experience to some major development that, at least, perhaps we can't perceive -- or at least I can't perceive what they will be. But, I have a feeling that they're probably certain to happen. People are so ingenious and so dedicated.

[3:24:56]

But in terms of, of our own country, it's frustrating to me that, that we are not training as many people as we should be and we're not encouraging people to go into these various aspects of technology. And it's a really strong base of technology and the, and the

experience in operating the equipment that goes with it that has led us to be a formidable society in the world. And I see us losing ground steadily. We're not putting as much money into the universities as we could or should. We're not starting the early years of childhood development as we know how to do. And we tend, too much in my judgment, to, to try to, to perpetuate what we've had in the past -- drill for more oil. Well, you can't drill for more oil in this country. There isn't any place to drill for it. And we -- I worked on a project for radioactive waste disposal and we were studying the great area of the midwest that has deep bedded salt and was a nice disposal place, but, so we discovered that there were thousands of holes drilled in the state of Kansas looking for oil and gas. And that's happened all over the country and you know we're not going to find a Mideast oil supply. It just isn't gonna happen.

[3:27:12]

And if you, for instance, develop the -- this is getting a little bit political and probably shouldn't. But if we develop the ANWAR, which would be maybe something like Prudhoe Bay and it produced at its fullest capacity right now, it would change our importation of oil from maybe 56% to 55%. The oil we use, well, you're not gonna win that way. You've got to win by technology and by discipline of people; strong, well-educated, effective people.

Callan, C.: Well, we have just two more minutes on this tape. Is there anything else that -- we're finished with all the questions. Anything else you want to say?

Trauger, D.: Well, I don't know. It's been a pleasure working with you.

Callan, C.: Well, I've really found this incredibly interesting. Is there any other people you think we definitely need to interview? I could show you some of the people we have interviewed, but suggestions of people that we definitely need to find?

[3:28:30]

Trauger, D.: Hmm, well --

Callan, C.: You can think about it later too because you --

Trauger, D.: Many of the best people are not living now, unfortunately. I know some people who could tell good stories but don't want to. Just because they don't like to sit in front of a camera and have people throw questions at them.

Callan, C.: Well, tell them it's not painful.

[laughter]

Trauger, D.: But, it's -- yeah. I find it okay.

Callan, C.: Well good. I think everyone's had such a different perspective on this story and the more stories we get, the more likely we're going to get a clear picture of what happened.

[3:29:25]

Trauger, D.: Sure.

Callan, C.: Well, I think we're done.

[End of Interview]