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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, Bill W. Cox *(Name of interviewee)* residing at 412 New York Ave. 37830 *(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 3/10/05 *(date)* at 104 Ian Lane #113 *(location)*.

In doing so, I understand that my interviews *(or oral memoirs)* will be made available to researchers and the public and may be quoted from, published, and broadcast in any medium that DOE shall deem appropriate.

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I, Bart Callan, *(Name of interviewer or agent for or duly appointed representative of DOE)*, accept the interview *(or oral memoir)* with Bill Bf. Cox *(Name of interviewee)* for inclusion into the DOE Oral History Program.

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Signature of Interviewer: [signature]
Date: 3/10/05

Bill Wilcox 2005 NETS, LLC

National Educational Technology Solutions LLC

K-25 Oral History Interview

Date: 3/10/05

Interviewee: Bill Wilcox

Interviewer: Bart Callan

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[1:00:09]

[crew talk]

Callan, B.: Let's go ahead and start out with the hard-hitting questions first here and that is go ahead and state your name for me. Spell your name out for me so we can have it preserved on camera.

Wilcox, B.: I'm Bill Wilcox, William J. Wilcox, Jr., but everybody calls me Bill. That's W-I-L-C-O-X.

Callan, B.: And how old are you and when where you born?

Wilcox, B.: I'm 82 years old and I was born in 1923 in Harrisburg, Pennsylvania. Stayed there just 8 months. Grew up in eastern Pennsylvania. Allentown, Pennsylvania.

Callan, B.: That actually was my next question, was where you were born and if you want to expand on that any more, please do so.

Wilcox, B.: I was born in Harrisburg, but I stayed there just short -- short time. My dad was lawyer and he got a job in Allentown, Pennsylvania and we moved there and I grew up there and went to college from there.

[1:02:18]

Callan, B.: Where were you living prior to coming to work at K-25?

Wilcox, B.: Well, I -- I came to work at Oak Ridge in 1943, at the beginning of the Manhattan Project. I was hired right out of college, Washington and Lee University in Lexington, Virginia, in May of 1943. The Manhattan Project was just getting started and the -- they were hiring people from -- everybody they could get with a technical education. And that class of '43, many of us ended up in the Manhattan Project work somewhere in the United States. I was a chemist; they were looking hard for chemists, chemical engineers as well as physicists. And I had interviews with a lot of different companies up in Detroit, Michigan, American Chemicals Society meeting where I went for a job. I wanted very much to get into war work and do what I could to help -- to help our country as all my classmates did. And I interviewed with about 10 or 12 different companies that, looking back on just a -- a little -- couple years after the war when it started coming clear that -- that -- how large the Manhattan Project was and how many contractors were working on it, I looked back at my notes from that American

Chemicals Society and found that if I'd accepted almost any one of the interviews, I would've ended up somewhere, either Chicago or Ames, Iowa, or Newark, New Jersey, or somewhere working on the Manhattan Project.

[1:04:14]

But I chose Eastman-Kodak because I liked that company and Eastman-Kodak was the contractor for the Y-12 plant here. And so that's where I got into the project. I came right out of college and went to work for Eastman-Kodak on the Y-12 process. Came down here then, worked a summer at Eastman-Kodak because nothing was here in terms of buildings that people could live in and work in. And then October of 1943, there was enough -- the chemistry buildings at Y-12 had been completed and all of us -- about 50 of us -- came down from Rochester, New York where we'd been working all summer. And that's how I started on the Manhattan Project.

[1:05:05]

Then after the war was over, the Y-12 plant had a major change because this brash new competitor called K-25 had just come on stream. A few months before the bombs were dropped, K-25 started operation. And by September of 1945 -- that's a month after the bombs were dropped -- in September, the K-25 plant, this -- this fantastic 40-acre plant using the gaseous diffusion process, the product level that came up out of the K-25 plant was now about 15% enriched uranium. It starts off you dig it out of the ground at 7/10 of 1% U^{235}, which you can't make a bomb out of. And even at 15%, you can't make a bomb out of it, but K-25 had got their enrichment level up to that point and Y-12 -- 2/3 of the Y-12 plant was shut down because K-25 was such -- so much more efficient, so much -- less than 10% of the cost of what it was costing at Y-12. So we started tremendous layoffs at Y-12 and K-25 kept increasing their Uranium-235 purity. And by a year later, the end of 1946, it was out doing that Y-12 was doing, so they shut down the rest of Y-12 plant.

[1:07:12]

They put -- I went to work -- I stayed there -- there were 20,000 people laid off in a matter of 2 years at Y-12. You talk about a layoff, 20,000 people. There were 2,000 of us left.

[1:07:25]

Callan, B.: What year was this? That the layoff occurred?

Wilcox, B.: I'm sorry.

Callan, B.: What year was this?

Wilcox, B.: 1946.

Callan, B.: 1946? Okay.

Wilcox, B.: This was the end of 1946 was the end of the Y-12 plant wartime edition. Now, they're still running today, but their mission is a different mission than it was during World War II. Y-12 had a number of people left and we started doing different things looking for a new mission. But I went to work as a research chemist on a newfangled idea for how to separate isotopes better than Y-12 plant or better than the K-25 plant. It took me about 2 years find out that that was not really the golden idea that I thought it was, and I transferred to K-25.

[1:08:23]

So I got to K-25 in January of 1949. Which was an awful long answer to your simple question about what I'd do before I went to K-25.

Callan, B.: [laughs]

[crew talk]

Wilcox, B.: Are we on tape yet?

[crew talk]

[1:08:44]

Callan, B.: You were probably one of the earliest people that I've interviewed at least that was out here in Oak Ridge, you said beginning in 1943.

Wilcox, B.: Yes.

Callan, B.: Do you want to talk a little bit about what your first recollections were, what the environment was like here when you came here in 1943? I don't even know if construction had begun at K-25 at that point. You could lead into what the construction environment was like at the K-25 facility as well.

[1:09:11]

Wilcox, B.: Oh, I'd love to. They -- bear in mind now that I was 20 years old and I had worked on an assembly line in a Mack truck company for one summer, and that was my total experience in industry, which was -- I was just on a labor gang. So this was -- this was just exciting and different, and I had really no idea of what it was going to be like. And we came to Knoxville and then went out in the country to -- to the Clinton Engineer Works and the first thing you saw was barbed wire fences and guard shacks and -- and guards with pistols looking at your badges, see if he'll let you in.

[1:10:07]

It was, in a sense, like a great big army camp and when you got inside, the impression you had or -- of these new buildings, wooden buildings just all over the place. Cleared ground, the trees were gone -- this was farmland, but they in -- in building the town, they left up as many trees as they could, but they chopped down loads of them.

[1:10:38]

I was impressed by the boardwalks that they had. They had 150 or 160 miles of boardwalks. Where they chopped down all these trees to clear, somebody -- some budding environmentalist -- said, "Shoot! Let's use these trees." And they put them through sawmills and made boardwalks out of them, keep people out of the mud. They didn't have time or effort to pave streets. They were cleared and then they were thinly graveled. And when you got a rain that gravel turned to seas of sticky, slimy mud. And we wore galoshes and rubbers in town and when we got out to the plant, these brand new shiny buildings, of course, they had mud all around 'em, too. But we had change houses that we went into, had lockers and big sinks to wash up in and so on. And you'd change your shoes before you go into the buildings.

[1:11:44]

So the buildings were -- oh, they were -- they looked gorgeous to me! They were all brand new. And one of -- first job I had for a couple of weeks was ordering stuff out of catalogs; Fisher Scientific Company catalog. It was just like Christmas. We'd just go through here and well, we need a couple of dozen Erlenmeyer flasks, and yeah, we need 2 P Tech, pH meters. And we need this kind of equipment and that kind of equipment. Oh, yeah, let's get that! And then all the reagents, chemical reagents; we had to stock everything.

[1:12:16]

So our job was one of taking a brand new building that just had lab benches and fume hoods and so on and -- one of the characteristics was the construction wasn't done in all of these buildings and then just turned over to the operating contractor. In the big process buildings, the construction workers were working finishing up one end of the building and the operating people came in the other end and started getting the equipment ready to start into operation.

[1:12:52]

Callan, B.: I heard --

Wilcox, B.: So it was -- .

Callan, B.: -- big sheet rock walls or something.

Wilcox, B.: No, no they're just working together. And those process buildings, 400 feet long. Y-12! They were huge. Of course, when I got to K-25, I thought, well, those Y-12 [laughs] buildings were pretty small.

But the -- it was a -- a feeling of great urgency that everybody had. The -- the common bond that everybody had was not we're here to make as much money as we can or to climb the corporate ladder as much as we can or get away from this or start something new or to improve my resume. The common bond of everybody that was there was what can we do to help our country win this terrible war? Because every morning, we woke up to headlines talking about our boys fighting in North Africa. We read about, in 1940, in 1944,

early in 1944, the -- we read about the Battle of Stalingrad. We read about the Battle of Kursk in east Europe, which is part of U.S.S.R. These places that we never heard of. And in that -- in the Battle of Stalingrad, for example, there was 1,600,000 soldiers killed total on both sides. It was just incredible! The stories that we read every morning, fighting in North Africa, fighting in Guadalcanal, fighting and violence in the South Pacific, names we never heard of. But now names that most of us that lived through it can never forget. It -- it was a -- it was a time that -- you -- you guys remember 9/11 and -- and it was just about a week or two after 9/11 when people woke up to the horror of that attack on the United States, and people went around saying things like what? -- "wonder what I can do to help" -- and this was 9/11 every week. Week after week after week after week for 6 long years that terrible World War II, terrible casualties! And -- so what was the common bond here at Oak Ridge was a feeling "Wh -- what can I do to help? I'm here to do whatever I can to help."

[1:16:11]

And it made you put up with all these shortages we had. Everything was rationed to keep from having a black market and people charging increased amounts of money for bread and sugar and butter and so on. But you can imagine when you get shortages, then somebody's willing to sell you something, but they want a premium price. So President Roosevelt froze all prices, froze wages, froze salaries. Put rationing on bread, butter, oil, sugar, letter -- leather shoes -- you couldn't buy more than 3 pairs of shoes a year. And tires and gasoline and so on, so on, so on. So you learned to put up with shortages. You just said, "Look at what our boys are doing overseas." People didn't go around bitching about it, they just -- they said, "I'm doing what I can to help."

[1:17:08]

The thing that struck us also and -- and -- those first days that we were here, is that -- and grew on us as we stayed. There was a feeling of security. We were behind this fence and there were, for example, for a single guy like me, 20 years old, I was very interested in the fact that there was a total of 13,000 single people here. Lots and lots and lots of girls. And we knew that every one of 'em had a job. Everybody here had a job and had to come in, get a pass to come in the gate. So they had a reason to be here.

Most of 'em had been security cleared. For clearances. So there was a feeling of trust and acceptance.

[1:18:06]

The -- the kind of feeling you have when you're in a small college environment where you know everybody, you know why they're here, and the relationships between boys and girls are a lot -- well, it was very easy. You sit and start talking to somebody. The byline here is, "Well, where are you from?" And they were here from all over the country. And, of course, wasn't very long before you -- oh, I know who that is -- and so on.

We'd go to the rec halls at night. You could ask a girl to dance. And it was -- it was really a fun place to be for single people at night. I -- I think that people that came here as married people with children that were used to something different, shall we say, it was much more of a shock to them and come down to -- that -- those were the people that felt this was just sort of an army camp. But for the single people, it was -- it was -- we worked hard all day.

[1:19:18]

People worked 8, 10, 12 hours a day. Everybody worked Saturday. That was just a given. We all worked 6 days a week. And as a result, the stores were never -- you -- you couldn't go shopping a -- and -- of course, that was the same thing in Knoxville. Everybody worked Saturdays for the war effort. So the stores all stayed open Monday nights. So our big n -- holiday was Monday nights. And they ran buses into Knoxville. We all hopped on buses and went into Knoxville and -- and shopped and hopefully got a decent meal at the S&W Cafeteria. So that was our big night out. And sort of go back to a taste of civilization. That gives you just a little bit of a feel of what it was like.

[1:20:11]

It was -- it was a good place to be because it was safe and secure and we knew we were doing something that really would help the war effort, although the vast majority of 75,000 people in town had no idea of how their part of what they were doing fit into the overall project. Sometimes people ask, "How in the world did 75,000 people keep the secret of the atomic bomb?" Well, they

didn't -- [laughs] they didn't know anything about the atomic bomb. I'd say there were less than 100 people that really understood everything that was going on all around the country. The Manhattan Project was administered from here, but -- from Oak Ridge. And so those people who worked in what we call "the castle", which is where the federal building is now, they certainly knew the whole ramifications, but as far as the people that ran K-25 and the people that ran Y-12, they -- they knew what their mission was, but they sure didn't know what missions was all the rest of it.

[1:21:32]

That all came clear August the 6th. And the stories just popped out of the newspaper about all of the different parts of the project.

The ground was broken for K-25 in September of 1943, which is the month before I got here. But that was --

Callan, B.: (indiscernible)

[1:21:58]

Wilcox, B.: -- site preparation. Y-12 was just about finished and started operations in January of '44. I came in October, and so, October, November, December, and January, Y-12 started up then, but K-25 was a year behind and that's an interesting story. They -- but they were a year behind Y-12. It was built as a backup in case Y-12 didn't really work or had great problems or something developed and couldn't produce the 235. They -- General Groves wanted a backup plant.

Callan, B.: And they ended up working congruently or collaboratively where a certain amount of processing was done at K-25 and then a certain amount was done at Y-12 (indiscernible).

[1:22:58]

Wilcox, B.: Exactly right! Exactly right. They weren't really built for that purpose, but that's the way they -- that's the way they ended up working and that's exactly what happened. K-25 got started I (indiscernible) -- Y-12, as I said, got started in January of '44. And so they worked madly all through '44, increasing their trickle of enhanced -- enriched uranium that was sent out west to Los

Alamos where they made -- built the bombs. That increased all through '44. And then in '45, when K-25 came online, as you said, K-25 started shipping the -- their product, which was just partly enriched, but they sent it to Y-12. And that increased Y-12 output tremendously. And -- so they did work collaboratively. Yes, they did.

[1:24:03]

But when Groves really started the -- when he did the original planning, what he was doing is hedging his bet. Manhattan Project really had a blank check and the philosophy that Groves had -- 'cause he was General -- he was -- the army was told to do whatever it takes to be sure that the United States gets an atomic bomb before Germany does. Germany had a head start and Roosevelt, from a policy standpoint, was just petrified by the idea that Hitler could -- would get his hands on some kind of a monstrous, new, huge military weapon and use it against Great Britain, which, of course, would've been devastating on London, for example. And it would've brought the war to an end quickly. They had a head start, so -- and we were -- Einstein convinced him that the Germans were working on the bomb and so -- so Roosevelt's idea was, boy, if anybody can do this, we've gotta do it first.

[1:25:23]

And they gave General Groves the go-ahead because the army engineers were the real go-to people. I mean, the army engineers, boy, they'll build you a bridge or they'll tear this down or put this up. They were used to building army camps in (indiscernible) -- the infrastructure, you know, sewer systems, electrical plant, everything you need for a town. Those are the go-to guys, and boy, General Groves pushed -- with his unlimited budget, he -- the philosophy was if there's anything that might work, let's start it. If it doesn't work, stop it. But let's not let any stone unturned, and so K-25, you see, was a backup plant for Y-12 in case something happened.

[1:26:12]

Once they found out it would work in Y-12, they knew by then Y-12 was working, that's when they decided, gee, let's have 'em

work together until K-25 can take over the whole job. And that's what K-25 did.

[1:26:27]

Callan, B.: I think it's amazing, one, that so many people were pulled together just for the construction aspect of the thing. And then you have to also think about all these minds that were put together to actually figure out what we were doing and pull together all this engineering talent, all these scientists, all these people in such a short period of time to figure something out so quickly. And when you -- whoa! We probably got a few more minutes on this tape.

When you graduated, you didn't exactly know that you were going to come to this line of work, it doesn't sound like, but it almost seems to me and from other interviews that it was maybe almost like a recruiting environment going on to where a lot of people have a very similar story to your own where they just graduated college and the next thing they knew, they were working on this. What are your thoughts on that?

[1:27:27]

Wilcox, B.: Roo --

Callan, B.: (indiscernible)

Wilcox, B.: Roosevelt -- when the president gave General Groves the assignment of -- to get there first, if anybody can make it, we gotta do it first. Coupled with that assignment was the statement, "This has gotta be done in total secrecy. We do not want the Germans to know we're trying. We don't want the Japanese to know. We'd like not -- we'd like the Russians not to know, even though they are our allies." Great Britain was the only outside country that was aware of what we were doing as far as the atomic bomb is concerned. But the idea was let's be sure that we don't tip our hand and let people know what we're doing, or else that's going to encourage and urge them into a comparable program. And if -- if they don't know what we're doing and how we're doing and what leads we're following, that won't help 'em. So it was loose links -- loose lips sink ships.

[1:28:52]

We had huge billboards going out of town: "What you have seen here, what you did here, when you leave here, let it stay here." People were told only what they needed to know to do the job. And all these hundreds of -- of young people that came were told just the least amount. This was General Groves' policy what he called "compartmentalization". And what it meant was -- and it was a new idea that's been used ever since by different kinds of intelligence services -- Bart and Connie need to know just what it takes to interview people for this project. They do not need to know the oral history protocol that's being followed at Y-12. They don't need to know who has been interviewed over there. Or what kind of cameras they're using or so on and so on and so on. But, yes, we'll tell you everything you need to know here.

[1:30:09]

Callan, B.: Let me have you hold that thought real quick. He's gotta change tapes.

[End tape 1, begin tape 2]
[2:00:09]

[crew talk]

Wilcox, B.: Button -- button my buttons so my navel doesn't show. I don't have a belly button.

Callan, B.: You don't?

Wilcox, B.: Don't.

Callan, B.: Okay, we're back and we were talking about Groves and compartmentalization.

[2:00:41]

Wilcox, B.: Well, now the way compartmentalization, just to give you a personal story about how it worked, when I hired in to Eastman-Kodak, there was -- in May of 1943, Oak Ridge was swarming with people clearing land and building roads and fences and sewer systems and water plants and things like that. There was one building finished here. That was the Administration building. But there weren't any laboratory buildings at the plant, so they sent us

to Rochester, New York, the graduating class, chemists that Eastman-Kodak hired. But elsewhere, a lot of physicist graduates went out to the University of California. A lot of them went to Columbia University in New York City, so on, so on.

[2:01:35]

When I got to Rochester, they -- man that had interviewed me in Detroit where I went to get the job, the man that interviewed me had said, "Do you know something about Eastman-Kodak?" I said, "Yes. I've used your film, used your cameras, and I like 'em." He said, "Good." I said, "What kind of work is it you want me to do?" He said, "It's war work." I said, "Good. What -- what kind of war work?" He (indiscernible), "I can't tell you. It's a secret." I said, "Well, where will I be working?" He said, "Well, I can't tell you; it's a secret." And so on and so on. And every time I [laughs] asked for any details, he said, "I can assure you it's good --". I asked him how long the job would last. He said, "Until the war's over" and so on and so on. But I -- I took the job because I liked the company and I accepted what he said.

[2:02:40]

And when I got to Rochester, I was interviewed by a very formidable looking vice president. A three-piece suit and sitting beside the desk and he was a vice president of Eastman-Kodak and he interviewed [a] fellow that came from college with me; he and I together. And he said, "Gentlemen," said, "Welcome to Eastman-Kodak. We're pleased to have you as members of our staff. We're engaged in a very important project, war work. And it will involve you -- your chemists and we need to have you work on the chemistry end of the project. And you need to know you're working on uranium. But that is the last time you will hear that word until after the war. And if you say it yourselves, you're subject to immediate discharge and very likely a jail sentence." [laughs] I was sitting there just flattened. "Yes, sir, Dr. McNally. Yes, sir!" Says, "You will call it 'tube alloy'. And that is code name. And your hexavalent compounds will be called 'tubeneal (indiscernible)' or 'tubeneal oxide'. Your tetravalent compounds will be 'tubinous sulfate', 'tubinous tetrafluoride'." So on, so on. "You'll get used to it, but we're going to use code names. We don't want anybody to find out what's going on. And your boss will be Dr. Harlow Brigham, and here he is and I wish you very

well." Then we left. Now, that's the way the compartmentalization worked.

[2:04:49]

And then when we got with Brigham, he told us that what we're doing is trying to develop methods for separating uranium from solutions that had iron and copper and nickel and cobalt, molybdenum, and so on, so on, so on.

Well, when I got to Y-12, I found out that they were washing the calutron tanks with acid to get some of this enriched uranium off. And that's where all these -- what -- what -- essentially dissolving stainless steel, but we had to work out methods for purifying the uranium. There weren't any textbooks on uranium. And you couldn't go hire a college professor that was an expert in uranium. Uranium had been studied as a rare earth and there was -- we had the one little paperbound thing which had about one page on the chemistry of uranium. But we essentially developed an understanding of the chemistry of uranium that summer. We -- we young kids, at the end of the summer, knew more about uranium chemistry and how it works and how you test it and measure it and weigh it and purify it and so on than anybody else knew. So it was remarkable.

[2:05:48]

But as far as what was going on in that big brick building over there, I wasn't allowed to go over there. That's where the machines were. The separation. And I've never really got in there until after the war [to] see what the calutron tracks look like and so on.

I was busy 10, 12 hours a day in my chemistry building and it wasn't very long, about a year later, they had expanded so fast, they had to build us a new chemistry building and I moved down there.

[2:06:45]

But that's the way compartmentalization worked and I think it was very effective. We were encouraged not to talk after hours, so you went out with a bunch of guys and had a beer. He never did -- we respected this war effort, how important it was to keep it a secret. So even though I went out and had a few beers (indiscernible), you didn't ask Bart, "Well, what're you working on?" "Have you ever seen this? Do you have any idea what they're going to do with this stuff?" "No." And that's hard to present generations to understand because we're all so -- today, you know, we're all so feeling that everything should be open and -- and I have a right to know about anything [the] government's doing. And it's hard for -- hard for us to get across the fact that we would accept that, but it was because we were so intensely doing what we had right in front of us that you were satisfied. And you could talk to the people in your group, you say, about do you think there's a better way to do this? Or how can we solve this problem? This seems to be decomposing at much too high a rate. Do you think you could fix it by cooling it off? And things like that. So there's a lot of discussion, but it was in small, tight (indiscernible), and that's the reason that they -- they kept the secret. And that's the reason everybody was so absolutely amazed when they -- bombs were dropped and stories all came out.

[2:08:39]

Callan, B.: When you're talking about compartmentalization, to get back to the previous thought I'm having --

Wilcox, B.: Oh, yeah. Yeah!

Callan, B.: -- previous interviews and I'm just curious. Everybody --

Wilcox, B.: Yes, I can.

Callan, B.: -- (indiscernible) to work here from a different (indiscernible)?

[2:08:51]

Wilcox, B.: It was -- it was. That's a -- that's a. You put your finger on a very remarkable reason for the Manhattan Project succeeding. A -- a very -- there are a number of reasons -- I mentioned the unlimited budget -- that -- that sure as heck halp -- helped [laughs] a great deal. And I didn't mention the point, but secrecy helped a great deal in a surprising way because there was no need for worrying about briefing Congress. Or briefing the local mayor or briefing

the local city council. Or having focus groups of stakeholders and butt lick or something. Shoot fire! We didn't -- we wrote monthly progress reports, but they just went right up the -- a -- a very sharp line. We didn't do -- we didn't have to do budgets and we did not have to worry about PR. That -- that -- yeah, secrecy really helped, too.

[2:09:52]

But the reason that the project started so fast and got off such a raving start is because what General Groves did, he and Colonel Mickels (phonetic sp.), his top staff -- what they did was to separate the Manhattan Project (indiscernible) into separate chunks. For compartmentalization, yeah, but that's a minor part. A major reason was because each one of those was a tremendous undertaking. But instead of going in there, say, we talk about Y-12, K-25 as examples. Also has to do with Hanford and it also has to do with Los Alamos, the other key parts of the Manhattan Project. What he did was that he went and picked out what he thought were the two top, three top chemistry -- chemical engineering companies in the United States, and he tackled each one of them, twisted their arm as a -- as a patriotic duty of theirs for the World War II effort into operating this plant. And another for this plant and another one for this plant. And he picked the three best. He picked DuPont; he picked Union Carbide; he picked Eastman Chemical -- Eastman-Kodak. And these are chemical -- chemical engineering companies. Which are the key to these three plants.

[2:11:37]

And when he did that (indiscernible), let's talk about K-25. When he went to Union Carbide in January of 1943 -- late, you say? January the -- 1943, he went to the president of Eastman-Kodak, I mean, excuse me, well, he went to all of 'em in January. But -- no, that's not true. He went to Eastman -- he went to DuPont first back in December and told them he wanted them to run the Hanford plutonium reactor project. Big -- big -- out in Hanford, Washington. Then in January -- well, in December, Christmas Eve as a matter of fact, they got with the president, chairman of the board, and so on of Eastman-Kodak and talked them into running Y-12. And he talked to Carbide in January of '43, right there at the beginning.

[2:12:44]

But now, let's -- let's just look for a minute at what happened. He didn't tell them to come down here and hire a bunch of people. He did not come down here to -- to Y-12 -- or K-25 and -- and look for somebody who could hire people and set up personnel policies and so on and so on. He brought companies in that already had their own benefit plans, their own employment service. They had laboratories full of chemists. They had analytical service. They had maintenance people. They had the whole infrastructure up at Eastman-Kodak, and what they did was to pull a select sample of all those people, the whole organization, you see, some of their finance people, some of their benefit plans people. You with me? Wonderful concept! When they came down here, hell's bells!, they got an operating company. They can go out and hire other people, new kids like me, that's fine, but as far as having a top brass -- having their top administration, their key -- their key division heads and all that stuff, DuPont had that structure, just moved it right in to Hanford. Union Carbide had that structure and moved it right in to Oak Ridge, K-25. And Eastman-Kodak had it for Y-12.

[2:14:24]

Now, all of those, he lined up in December and January of '43, and he also lined up Stone and Webster, top architect engineer, to do the design of the city of Oak Ridge and -- and clear the land and to build Y-12. He used DuPont to build X-10 plant. He used Kellex Corporation to do the design of K-25, a subsidiary of M.W. Kellogg, another big architect engineer. But that's the reason there was such a sharp ramp up of -- in 6 months, they had a fully-staffed plant ready to go. Not here -- in case of Kodak, which I've talked a lot about, but they just signed him on as a contractor in December. And, shoot, by October, they had an outfit down here, housed and working, offices running, with 6,000 people on the job, in October. Fantastic! But the secret, you see, is that they hired a company and they gave a company the full job. And they didn't have a whole huge cadre of 5 engineers sitting on top of 'em, checking out every decision. They gave them the job. They said, "This is your job. War effort."

[2:16:01]

And they would have a -- a -- I mean, the number of people that administered this thing for the army engineers was relatively small

compared to -- Kodak ended up with 22,000 people at one point, peak, and Carbide, 11 or 12,000 at K-25. But the army just gave them the job, so different than it is today. What they're so concerned about -- it's a different subject. But does that help you?

Callan, B.: That does help me. So, technically, even you were working for Eastman-Kodak, so that was who you received your check from. You worked --.

Wilcox, B.: I was not a government employee.

[2:16:49]

Callan, B.: Okay.

Wilcox, B.: I worked for Eastman-Kodak.

Callan, B.: Okay.

Wilcox, B.: And a fine company it was. They had a profit-sharing plan that's far -- their personnel policies were just fantastic and they brought 'em all down here. For example, it was a non-union plant in Kingsport and in Rochester, our plant was non-union. So the whole culture at Y-12, you see, was Kodak culture. Similar, K-25, whole culture was Carbide culture.

Callan, B.: That's interesting.

Wilcox, B.: But -- but.

Callan, B.: I say I have not -- this is a piece we haven't gotten before.

Wilcox, B.: At Los Alamos, you see, the contractor was University of California. That's where those scientists were. It was a very small operation [laughs] compared to Oak Ridge. Oak Ridge spent $1.1 billion during the Manhattan Project. 59% of the total that was spent on the Manhattan Project was spent right here in Oak Ridge. At Hanford, which is a big production reactor site, 21% of the total; 21 cents out of a dollar.

[2:18:14]

Los Alamos is where you hear the stellar names: Oppenheimer and Bethe and Kistiakowsky and Fermi. That was the -- that was the

high scholastic, the physicists' domain. They were -- they were really the elite, so to speak. But in terms of what they -- what they cost, it was 4% of the Manhattan Project. But to watch documentaries, you don't hear those proportions at all. You don't hear about the big piece of the action which was right here. At 2 $500 million plants, (indiscernible) K-25. Fantastic story.

Callan, B.: Let's kind of flip-flop what we were talking about previously a little bit. And of course, we have this huge ramp up and successful construction and everything. But on the other side of the coin, getting this place set up and up and running, I assume a lot of people had to be displaced and displaced fairly quickly. What perspective, comments, or thoughts do you have about the people who were here in Oak Ridge prior to it becoming the secret city government facility here at K-25?

[2:19:39]

Wilcox, B.: The land area we were talking about was 59,000 acres. I think that's 92 square miles. A lotta land; pristine farmland in east Tennessee; beautiful farmland. The -- the site was picked for a number of reasons. In the summer of 1942, the site was picked. And one of the first criteria is that it be sparsely settled. And -- so they wouldn't have to move out towns or people, cities, and so on. But also they wanted a site that was easily furnished with good electricity. TVA, of course, was right here. They wanted a site that was served by railroads and this was served by 2 fine railroads. They wanted a site that was close a good labor supply, which was Knoxville; it's 12 or 13 miles away. They wanted a site that had good cooling water; Clinch River starts up from Norris Dam, flows around the bottom here; good; excellent cooling water. They also -- they loved the topography, the geology. The -- the -- the shape of the land here in east Tennessee is a -- is a rather unique one. It's long, parallel hills and valleys. And if you look on a topographical map of Oak Ridge, what you see -- well, of whole east Tennessee, you see these long, parallel ridges. It's like you took a tablecloth and just on a nice slick table. You end up with these long folds. They're about 1,000 feet high.

[2:21:52]

And one of them here is called Black Oak Ridge. On the topographical maps for 1898, it's always been there. But they like that because they can put the town in one valley and the plants in

another valley. And if something untoward happened at one of the plants, [laughs] it wouldn't wipe out the town or the other plant. Also, it was much easier to -- to provide security, keep people from just wandering into Y-12 from the town or K-25, so on. So these were -- these were many advantages.

[2:22:35]

Now, sparsely settled, in our case, meant there were 1,000 families. A total of about 3,000 people living on these 59,000 acres. And they, of course, all had to be moved out. And the army engineers are used to doing that. They have made army bases all over the country, you know, so they're used to the process, the procedure, and they went to court, Knoxville. This is now in the fall of '42. General Groves came down here a couple of days after he'd been put in charge, and he looked at the site. People had been coming down here since the summer looking it all over, riding around the roads. But he came down here and the very next day, he put out an order. Obtain that site, so the army engineers came in there and condemned the land. They condemned each farm. Interestingly enough, one of the things that they did as a part of their protocol was that they photographed every building from 2 different sides. Not just houses, but privies and barns and chicken coops and everything else. And one of our great historians around here, Don Raby, a couple of years ago, went to -- went on a search and he found those pictures and has put them on as a part of my (indiscernible) historical and geological society. Had put them on CDs and we now have a map and archive and it's in the public library. You go down there and look at the house that stood on this particular piece of ground here at K-25. Farm.

[2:24:33]

Of course, to the people that had to be moved out, this was a, you know, this was a total trauma. Families that lived here for years, so of course they're -- it -- it's a sad story for some of those people. Some of them ended up working here and of course, to hear their side of the story, they -- they -- they really suffered. There's just no question. And their -- through their legislators, they ended up getting a Congressional hearing down here on this terrible business of the government coming in here and taking their land. I think if you divide the total amount of money that they paid to all the farmers and by the total acreage, it's about $44 an acre that they paid for the land, which was nothing. It was what the land was

appraised for right then and there. But the problem is as soon as the people all around here, you know, find out that you got 1,000 families looking for new farms, prices just soared and so the $44, you know, was inadequate. So, but you can talk to people. There are a number of them still alive that were kids here and you can talk to them and see exactly how they felt and how their mom and dads felt. But those people were moved out entirely by about -- well, shortly after the end of the year, I guess. Most of 'em were moved out in February. I still have pictures -- I have pictures of the first plants that were started in February, groundbreaking February '43. And one of them show a farmhouse in the background and all that's left is just a chimney standing.

[2:26:44]

But I think most of that land was all cleared of people and farmhouses that were just frame and -- a number of them were kept as places for people to live, construction workers and so, over 1,000 buildings were kept for a while. But those that were in the way, of course, of putting in a plant, why, they (indiscernible).

[2:27:17]

Callan, B.: Okay, I'm going to have him go ahead and change tapes again right now.

[End tape 2, begin tape 3]
[3:00:08]

[crew talk]

Callan, B.: Asked me to finish something on the previous direction that we were on and we were talking about the locals here, the inhabitants prior to K-25 being built and how they had to be displaced. There was a story --

Wilcox, B.: What does he want to know?

Callan, B.: Well, there was a story that Connie had read in a book --

Wilcox, B.: Yeah?

Callan, B.: -- about K-25 --

Wilcox, B.: Yes, yes.

Callan, B.: -- that had to do with a local farmer --

Wilcox, B.: Yes?

[3:00:54]

Callan, B.: -- that built chicken coops. And his chicken coop design was actually the design for the ventilation duct, caps, that are on top of the K-25 building. I didn't know if you had any familiarity with that story or you can lend any validity to it. [laughs]

Wilcox, B.: Quite the contrary. I -- those ventilation caps were designed by people in New Jersey, the Kellex Corporation. Weren't designed here at all. In Oak Ridge. So I would say that whatever resemblance there is is purely c -- coincidental.

Callan, B.: Probably an old wives' tale there.

Wilcox, B.: I -- I. That's -- why, it's worse than that.

Callan, B.: [laughs]

Wilcox, B.: That's a 3-beer story.

Callan, B.: [laughs] There you go!

Wilcox, B.: I just don't know the chicken coop story. Now, I can tell you a true story, though, about the guy that rented the chicken farm that supplied chickens to the army cafeteria because I heard it from his daughter just a week ago.

[3:02:16]

Callan, B.: Okay. Let's hear -- .

Wilcox, B.: But I don't know about any chicken coop. [laughs] But he raised chickens at a huge rate. And I'm sure he couldn't have raised them in a coop, so I don't know what. She told me that he --. What're we doing?

[crew talk]

Callan, B.: Start over.

[crew talk]

Wilcox, B.: I'm sorry. I was just going on. That's got nothing to do with your. Oh, Gary did ask to have some comment on that?

Callan, B.: On the chicken coops.

Wilcox, B.: Chicken coops?

Callan, B.: Well, it was just something that we -- .

Wilcox, B.: Have I given you enough of a comment?

[3:03:08]

Callan, B.: Yeah, I --.

Wilcox, B.: Or do you want me to tell you all again.

Callan, B.: Oh, no. [laughs] I think we had our question answered.

Wilcox, B.: All right. Thank you. Now, that's my personal view. I've heard a lot of these stories and, of course, they're getting better and better as the years go by, but I've never heard that one before, and I would say it's highly unlikely. Because that plant was designed in New Jersey by this bunch of fantastic, fantastic architect engineers at Kellex Corporation.

[3:03:47]

And the tough part of the design is how in the world you were going to make this plant work with all these diffusers in it and so on. We can talk about that a little bit later if you like. But it's just an absolutely remarkable, remarkable accomplishment. And the outside skin, shape of the ventilators is, you know, something I'm sure some guy whipped out in short order. But they might not -- they might very well look like chicken coops, but I think it's a coincidence.

[3:04:26]

Callan, B.: Okay. What about some of the other stories you heard recently about the chicken farm?

Wilcox, B.: Well, one of my other projects that I'm interested in these days at Oak Ridge is called Secret City Commemorative Walk. And we're building a historic walk down in the main Bissell -- main city park in Oak Ridge. And it's a walk around a loop, sort of figure eight shaped or something. And it's a couple hundred feet long. But it has 3 features. One is a set of tin plates. They'll all be 24 inches by 24 that tell what was done here by the founders of Oak Ridge in the wartime years and in the first post-war years. Not just '42 to '46, but -- not -- not just '42 to '45, the end of the war, but '46, '47, and '48 and '49. It was 1949 before they opened the gates. So all that time, the city was in a fence and you had to get permission to get in it. So we -- that's why we call this -- that's why we get the name Secret City Commemorative Walk. And it has 3 features. One is 10 monuments, 2 feet by 2 feet that tell what people did here. There'll be a plate for K-25, one for Y-12, one for the Manhattan Project people that ran this city, one for the city schools, one for the city army hospital, one for the Clinton Laboratories which is now known as Oak Ridge National Laboratory. The 10 plates tell people what we did here.

[3:06:17]

And then we're going to have a set of 8 historic markers that'll be like this, sort of like the kind you see on highways except these are going to be cast bronze. They're going to be real pretty. And this will tell the story of what it was like to live here each year, 1942, '43, '44, '45, '46, '47, '48, '49. It'll -- it'll tell what was going on here, but it'll put it in the context of the war, what was going on during that year in the war. One it was rationing and so on, so on. Then the last part of it is going to be a couple of walls 3 feet long, 6 feet high on which we'll be letting people buy plaques to put on their cast bronze plaques to commemorate a founder. And we're being very egalitarian about this. Founders aren't just Dr. George Felbeck that was the chief boss at K-25 and Dr. Martin Whitaker who was the chief boss at Clinton Labs. But this is anybody that came to work here during those secret city years. And the plaque will tell what plant you worked at. This was the meeting I was at before I came, so I just happened to have one of the plaques will me. It's a 4 x 6 cast bronze plaque. Has a person's name on it and

the year that they came and where they worked. This happens to be for Dr. Preston who was one of the first physicians at our army hospital.

[3:07:58]

But we're gonna have -- we've already sold about 450 of these. And -- so I think that the idea's that we want to tell the story about the founding of this city. Oak Ridge has no outdoor monument or memorial of any kind of people that built the city. They just -- in danger of forgetting them, so this is -- this is going to be, I think, a long overdue memorial to those people.

What was your question now? I've wandered off.

[3:08:39]

Callan, B.: I think we were talking about the chicken stuff, story.

Wilcox, B.: Well, that's -- that's.

[crew talk]

That's what the doctor, when he found out Mary was -- had a little lamb, the doctor fainted.

[crew talk]

Thank you!

Callan, B.: What I think we'll do is we'll get back into the story about the local (indiscernible)

Wilcox, B.: Well, the reason that I. You're not rolling yet.

Callan, B.: Here's what I think we'll do before (indiscernible).

Wilcox, B.: Yes, please.

Callan, B.: We'll do the chicken farming story.

Wilcox, B.: Yes.

[3:09:37]

Callan, B.: And then from there, I want to transition into Manhattan Project-specific recollections, what it was like during the Manhattan Project, were you aware --

Wilcox, B.: I sort've done that. I -- I really feel like I've done that.

Callan, B.: Can we get that all nailed down?

Wilcox, B.: Remember the early days at Y-12 and the kind -- the social structure and so on.

Callan, B.: Right, so we think we have that adequately covered?

Wilcox, B.: Yes.

[3:10:01]

Callan, B.: How you linked what was going on with the war effort?

Wilcox, B.: Yes.

Callan, B.: Okay. And what about -- ?

[3:10:08]

Wilcox, B.: I never got to the end of the war.

Callan, B.: What about your reaction --

Wilcox, B.: To the end of the war.

Callan, B.: -- to the end of the war? To August 6, 1945. What was it like that particular day? We could talk about that.

Wilcox, B.: That would be good.

Callan, B.: Okay, so let's --

Wilcox, B.: And then, let's go to K-25.

Callan, B.: -- (indiscernible). Right. And then we'll finish up the Manhattan Project and then we'll go back to K-25.

[3:10:17]

Wilcox, B.: That would be good.

Callan, B.: That would be --

Wilcox, B.: When I went over -- when I went over there in 1949.

Callan, B.: Right, so I thought we'd do Manhattan Project first.

Wilcox, B.: Cool.

[3:10:36]

Callan, B.: Right? Okay. So let's talk about the local chicken ranch.

Wilcox, B.: Well, the reason why I mentioned those plates is because this gal called -- I've been inundated with calls, asking questions about how many plates can I -- can I put my mom and dad on one plate? No. Is it too late to order plates? No. That's what this gal called last week for. And I said, "No, it's not too late to order a plate. Of course. And where were you?" She said, "Well, I was right here in Oak Ridge." And I said, "What plant you worked at?" "Well, I didn't work at a plant. I worked chicken farm." "A chicken farm?" I said, "I knew that the government had a chicken farm and a cattle farm." She said, "My daddy was the guy that ran the chicken farm and it was out on the golf course." And took us a while to figure out what golf course she was talking about, but she was talking about the golf course called the Centennial Golf Course, our newest one in town; out on the road to Edgemoor Gate. And she said, "My daddy got 75 cents an hour for running this chicken farm. And he'd get an order for, say, 600 chickens, and he and Mom would kill the chickens and run through a scalder. And then me and my brother were the chicken pluckers. And they paid us 50 cents an hour to pluck chickens." I said, "600 chickens is a lot of chickens." "You'd better believe it's a lot of chickens. And I was 15 years old at the time; my brother was 11. And they paid us 50 cents an hour for plucking chickens." And I -- I told her that was a -- that was a great story and I was going to give her name and telephone number to Bart and Connie and see if they didn't want to interview her because she was one of the original residents. And I think you might enjoy talking to her.

[3:12:40]

Callan, B.: I think it would be an excellent interview for this oral history, I really do. We've talked quite a bit already about the Manhattan Project.

[3:12:48]

Wilcox, B.: Yes.

Callan, B.: On that particular day, on August 6, 1945, what was your reaction to that news and what was the whole air of this place like on that day?

Wilcox, B.: It was -- it was remarkable. The -- the day finally came when Oak Ridgers woke up to the fact that this war work that they had been doing so hard, so long -- we knew it was important just because of all the posters and all the news that we got. People were telling us how important it was. But my goodness, to think that we did something that -- that had never been done anywhere in the world before, it wasn't just a new kind of weapon or a new kind of -- I think we all knew it was going to be some kind of a weapon or something, but we had no idea -- most of the people had no idea of what its impact would be. And of course, the news came right along with the fact that there had been 100,000 casualties in Hiroshima. That was part of it. But -- and in today's world, you see, that -- and ever since, that has been the focus for a great many people. The -- the terrible loss of life. But for those of us that were living then, in the context of the war, it was a -- yes, it was terrible. But those times, terrible things had been happening. And on the night of March 9th and 10th, just 3 months before, we had sent hundreds of B-29 bombers over the city of Tokyo with firebombs and had killed and -- and wounded -- with severe burns -- we used napalm -- and -- and just burned out the city of Tokyo, killed just about as many people -- injured 100,000.

[3:15:15]

So, you see, in terms of the terrible -- what -- what war isn't a terrible thing! But in terms of that and in terms of Sal -- Stalingrad and Kursk, at the Bataan Death March, and so on, when you put it in the context of the war, what you want to do is to end that war just as soon as you possibly can. And so the thing that Oak Ridgers did not celebrate was the bombing of Hiroshima. What they celebrated was, my goodness, we've done something that

really might help stop the war. And that was August the 6th, and the papers that came out August 6, had big pictures the K-25 plant, which I've never seen before. They had pictures of my Y-12 plant. But it told about Hanford, Washington, Los Alamos, and so on. All these stories had been prepared a couple of months in advance and security clearance gotten and so on.

[3:16:18]

So two weeks later, when Oak Ridgers woke up and looked at their Knoxville Journal newspaper, what they really celebrated was this. The headlines in the -- in the Knoxville paper on August the 14th, 1945. This is what Oak Ridgers celebrated. By golly, we had done something that brought peace to the world after 6 long years of a terrible war that had claimed 54 million deaths! 54 million people died in World War II. So it wasn't the atomic bomb that we're pleased with. What we celebrated is peace. And what we still celebrate is peace. And we were delighted; we were surprised; we were shocked, just like the rest of the whole United States. And most of the 75,000 people in Oak Ridge found out for the first time what we'd been doing. And we were just thrilled that the war was finally over. It was an end to the headlines and an end to the columns of gold-star mothers of -- every mother who had lost a son put a gold star in their window and you would see them all over town when you were driving in Knoxville, Atlanta, everywhere. So it was -- our contribution to the peace the Manhattan Project brought about that we were so happy about.

[3:18:25]

Callan, B.: That's understandable. It essentially did end the war. After the Manhattan Project was over and the first time that you saw K-25, you said it was in --

Wilcox, B.: 1949.

Callan, B.: -- what were your first impressions?

Wilcox, B.: I transferred over to -- to -- and 'fore my research was successfully completed and decided that my new project, separation process, wasn't going to work, the head of the laboratory at K-25 was looking for a technical assistant to him. It was a big laboratory, Research and Development Division at K-25. And he came over to

Y-12 and talked me into coming over there. And I thought that would be a interesting change and I went.

[3:19:21]

And for, I guess, it was 6 months before I actually got my first tour of the -- I was busy [laughs] helping him edit reports and evaluate technical projects and so on. But it was 3 or 4 months before I got a chance to be toured through the K-25 U building. And I was just absolutely floored at the size of it and the complexity of it. When you visit it, you really don't see any of the really superb scientific work. You can't see into the tanks that contain the barrier material. But part of the laboratory's responsibility that I was working on, Dan's technical assistant. They had a huge barrier development program and compressor development program and chemistry programs and so on, so on.

[3:20:30]

So I was still absolutely amazed that anybody could build a -- a barrier that would successfully separate isotopes. These things have to have millions in holes in them. They all gotta be just the right size. If the holes are -- if the holes are too small [laughs], the process won't work. If the holes are too big, the process won't work. The gas'll just go flowing through the holes without any separation at all. So they gotta be just the right size. And you got to have millions -- hundreds of millions of them. You gotta build acres of this barrier material.

[3:21:17]

Now, the thing that's different between about the marvelous science that was done at Los Alamos and Hanford and Oak Ridge, Y-12 plant is that the science of K-25 had been started to work on in 1940. And all the rest of these processes, they -- they started much later. But scientists in both Great Britain and the U.S. started working on trying to build a good barrier material in 1940, and they'd been working on it for 4 years, and had not been able to really produce anything that was really satisfactory. Now, when you stop to think about the fact that Groves had to make the decision -- General Groves, boss, had to make the decision to start building that huge K-25 plant, it's gonna cost $500 million, $6 billion today. Think of it. Think of -- think of -- think of

somebody today starting a $6 billion plant and not having the key component that you have to have to make it work. Like -- like building a $6 rocket to Mars, but you don't know what kind of fuel you're going to put in it. You're not sure you're going to lift it off and last that long. I mean, Groves taking a huge gamble. I think it was the biggest gamble that he took in the whole Manhattan Project.

[3:22:58]

But he was betting on the (indiscernible), betting on the scientists at Columbia University, that they would be able to make this and figure out some way. And they had some very capable people there and you're going to be talking to some of 'em. You've already talked to some people that worked at Columbia. But what an absolute fantastic accomplishment that was. At the last minute, they figured out how to make this barrier, put it in these 3,000 tanks in this building, hook the tanks together with nickel-lined piping. It -- it was -- as a technical man, I was just absolutely overcome with the fact that they could even make this thing work. But when you get out there and look at it and you see -- you stand up on that operating floor of one of those half-mile-long legs, you can hardly see to the other end. And you get on a bicycle, ride down there, and you're worn out by the time you get to the other [laughs].

[3:24:07]

But we didn't have a central control room, so people had to go on bicycles to look at the gauges and so on and assign people to stand there and look, maybe use telephones. And so I was just awed. And the heat was very impressive and the noise was very impressive, all these compressors whining away 'cause you have to have 3,000 -- 6,000 compressors for these 3,000 stages. Make a good -- a good noise. I -- I was just absolutely floored by the magnitude of it and the success of it. Went back -- went back to my laboratory and said, "Boy, if there's a way we can make that better -- barrier any better or the compressors any better, cut down the amount of power that is needed, I'm going to do it."

[3:25:01]

I -- and over the years, I took many people on tours. Congressional people coming down here, taking a look. All classified -- all

cleared, you know, or some of 'em were here. They were uniformly impressed just like I was, even though they weren't technically trained, some of 'em. But nobody could help but be impressed by the magnitude and sheer size. Remarkable plant. And -- and unlike Y-12, which operated just a couple of years, you see, K-25 went on and operated until 1964, that K-25 U. And then lots of the rest of the part of the plant kept on running until 1986.

[3:26:00]

Callan, B.: At the time that you came, which was in '49, the mission of K-25 was fully up and operational, more or less, and its mission was overall changing, and this was a time (indiscernible).

Wilcox, B.: It sure was! That was changing.

[3:26:14]

Callan, B.: (indiscernible) what I believe you call the expansion program.

Wilcox, B.: Yes, yes.

Callan, B.: This was about the time that you came on.

Wilcox, B.: Exactly!

Callan, B.: So do you want to explain a little bit about the expansion program - -

Wilcox, B.: Yes.

Callan, B.: -- how the initial K-25's mission evolved to that --

Wilcox, B.: Yes.

Callan, B.: -- and what the expansion program was?

[3:26:31]

Wilcox, B.: I can do that.

Let's start with the mission of the original plant, which as I've said, is -- was to back up Y-12 in case there was a failure, in case it

didn't work as well as it should, or in case something disastrous happened and they couldn't finish the job. Well, they could. And so K-25, when it started coming on stream in 1945 and then got fully on stream in '46, their mission was to take over from Y-12 and supply all the highly-enriched uranium that was needed for making more atomic bombs. And initially, it was just making more atomic bombs like we dropped on Hiroshima and Nagasaki. And the country knew that Russia now was going after a atomic capability, a nuclear capability.

[3:27:39]

In 1949, which is the year I went over, in August of 1949 -- I got there in January -- but in August of '49, all of a sudden, its mission changed. We weren't just building up maybe a dozen or two or six or eight -- I forget how many -- but handfuls of nuclear bombs, just in case. But in August, the Russians exploded their first atomic bomb. And that changed things. It turned out the bomb they exploded was a carbon copy of the bomb -- not a bomb, but the device -- these were not bombs -- the atomic device that was exploded at Trinity, Alamogordo, July 16, 1945, which was the first atomic explosion. And the reason I don't call it a bomb; it was a huge enormous device that sat in a tower up above the desert. 100 feet -- 100 feet tower. And it, of course, was fantastically successful. And then that was a -- a copy of that, but smaller, a little bit smaller was made into the bomb that was dropped onto Nagasaki. The second atomic bomb, a plutonium weapon, a so-called implosion device where you squeeze a shell, squeeze plutonium, a sub critical mass of plutonium, you squeeze it until it becomes critical, with these explosive lenses.

[3:29:41]

And the Russians were given our plans, engineering plans for that weapon by a British spy named Klaus Fuchs. Very shortly after we had that Trinity test. And he gave that to the Russians. The -- Stalin's lieutenant that was in charge of their Russian atomic program was the man that was in charge of the KGB, secret police, (indiscernible) Beria. And Russia had some very capable physicists, but Beria was just a politician, well, I shouldn't say just a politician. But was a power politician. Insisted that instead of improving that design, that they would just make an exact copy of the U.S. bomb.

[3:30:43]

Callan, B.: Okay. Let me hold you right there because he needs to switch tapes out.

[End tape 3, begin tape 4]
[4:00:11]

[crew talk]

Wilcox, B.: That's okay. Fine, look -- fine, look at the K-25 plant. Huh? Isn't that fine?

Callan, B.: I've seen that picture.

Wilcox, B.: This is the Administration building.

[crew talk]

Callan, B.: (indiscernible)

Wilcox, B.: Afraid I can't tell the layout.

I don't know whether the automobile insur -- medical insurance was $4 a month for a family and $2 a month for an individual. That includes doctor visits, all the tests in the hospital, all medications. I had some friends who (indiscernible) it costs too damn much, $2 a month.

[crew talk]

[4:01:23]

Wilcox, B.: All right. That's enough.

Callan, B.: You can probably -- .

Wilcox, B.: What happened?

So the die was cast, really, at Potsdam. It was a joint resolution of Roosevelt and Stalin and Churchill. But, you see, that just sorta -- that was the end. It gave 'em two days. And militarists over there -- the only thing that saved us is after the -- after the two bombs

had been dropped, the militarists still wanted to fight till the living end. Pass out wooden staves and everything to the housewives and they were going to fight to the last person. And Hirohito, we now know, was the guy that called the militarists in and just told 'em, "It is time to stop the war that we started."

Callan, B.: Did you want to get that plaque, too? Talk about the plaque?

[4:02:36]

Wilcox, B.: He has the bright plaque. This is another one.

Callan, B.: Okay, we were talking about --

Wilcox, B.: The implosion weapon.

Callan, B.: Right --

Wilcox, B.: Squeeze 'em.

Callan, B.: -- the Cold War --

Wilcox, B.: We're talking about the Russians' squeeze 'em.

Callan, B.: -- our technology.

Wilcox, B.: Right. They did. They got the -- they got the plans, essentially, for the whole thing from -- I don't mean engineering drawings but -- but engineering sketches so that you understood exactly how this worked. And even with our plans, it took the Russians 4 years to build that copy that it took Los Alamos labs 2 years -- 2 ½ years to build. Which I think is not an often-mentioned comparison of the quality of the work that was done by the U.S. scientists at the Manhattan Project.

[4:03:39]

But of course, with the Russians putting off the atomic explosion, it's clear now, and the Soviet Union, philosophically was moving far and far away from the U.S. Philosophically. We were beginning to recognize they were our primary enemy. And -- or primary person to be concerned about. And so, there in the fall of 1949 and the spring of 1950, the U.S. got into a very open and understood arms race with the Soviet Union. We wanted to build a

great many more atomic weapons. And -- so the first thing they needed to do was expand the production of Uranium-235 and plutonium, the two fuels for atomic weapons. We -- we started designing all kinds of different ones, not just a bomb, but missiles and so on over the next 10 years or so. The whole program, I call it "expansion", but what it was was a huge increase in -- for us -- gaseous diffusion capacity.

[4:05:15]

Now, the way you increase gaseous diffusion capacity -- plant capacity, is that you have this big plant that's enriching uranium. We like to draw it as sort of a diamond of this shape and you feed normal uranium in here. And then you -- you go up through stages of gaseous diffusion, and it's getting richer and richer in Uranium-235 until you get to the top. That's your product point. And then [laughs] every time you take U^{235} out of one batch of uranium hexafluoride, you're -- you're taking -- you're increasing the amount of 238. Two components make a simple. So you're taking the 235 out and it gets richer and richer. And since there's a lot less 235 in there than there is 238, it tapers up here sharply. So the volume flows get much decreased as you go up to the top. And at the bottom, then, you have 238 coming out. At the top, you have 235 coming out.

Well, the way you expand the capacity, you keep these parts of the plant, but you put a new section here so that it is enriching and the product of that enriching is now going into the middle of the K-25, into this big wide portion at the feed point. And that makes the whole thing over at the K-25 U a great deal more produc -- productive.

[4:07:08]

And so what we started doing was building new plants at the bottom. We started with K-29, a big new gaseous diffusion plant. And that's what they were building when I went over there; 1950, went on stream, I guess. Not clear on those dates and I don't have 'em right with me. But almost as soon as we'd gotten that big plant built, somebody came along and said, "Oh, you should double capacity again." And so we built K-31. And then we built K-33. And then people said, "My goodness, that's a -- Oak Ridge is getting to be too much of a target for missiles or sabotage. So let's -- we gotta expand it again, but let's do it somewhere else."

And so the K-25 engineers went to work -- they're the world's experts -- and they designed a plant for Paducah, Kentucky. And it's a big gaseous diffusion plant. And it's all big, square, boxes kinds of things. I'm being simple -- overly simplistic. But it's a big plant, enriches uranium up to a couple of per cent. And that is all shipped to K-25 and it goes in here.

[4:08:35]

About that time, 1955, we'd finished up a new plant in Portsmouth, Ohio. Another separate location. But the three plants all worked together. And these -- Paducah fed material to both K-25 and to Portsmouth. And that's all laid out in the operation reports that the DOE -- AEC, Washington put out every year. That's -- that's not -- you can -- anybody that really wants to understand that better than my facile explanation can -- can see it there.

[4:09:16]

But this was a huge expansion program. The laboratory people that I worked with at K-25 figured out ways to tremendously improve the efficiency of the barrier material which is the key to the thing. And compressors, and valves, and so on. So that these new plants in the expansion program were much more efficient. We essentially quadrupled the capacity, the U.S. enrichment capacity, over what it was during World War II; about 4 times. But the plants were so much more efficient that we actually got an extra plant free; just because the increase in efficiency. And that quadrupled the capacity. So that expansion program which really ended in '55, '56 was the way we operated then until 1964. But up until that point, 1956, the K-25 U -- you know, the nice U-shaped building -- that was the sole producer of all of the U^{235} that went into our nuclear stockpile. And -- so K-25 was tremendously important in providing the basis for our country's winning the Cold War.

[4:10:55]

In '56, Portsmouth came on. They also have a nice top that can produce product which was a very sensible decision so that we just didn't have one plant, K-25 U, you know; we had 2 plants. And so then, from then on, the U.S. had 2 producers.

Callan, B.: Just hearing the stories about the expansion project and the different facilities, I mean, the different locations -- I haven't asked this question before of anybody, but it seems to me that there was a tremendous amount of shipping and traffic occurring between all these facilities. Did they happen by rail or was there a lot of things coming in and going out every day at one of these places?

[4:11:51]

Wilcox, B.: The product from Paducah had to go to both Oak Ridge. Some of it went to Paducah and Oak Ridge. Some of it went to Oak Ridge. Some of it went to Paducah. And its low-percentage U^{235}, it's -- it's -- say, like 2, 3, 4, 5%. It's low-enriched uranium. You can't make a bomb out of it, but you can make a nuclear reactor out of it. So it's very valuable. And it's uranium hexafluoride, which is a gas if you heat it up to -- if you heat it a lot hotter than you can put your hand in. Don't remember the exact temperature. But it's hot. And that turns into a gas. But at room temperature, it's nice white crystals, looks like rock candy. If you remember rock candy on a stick. And if you freeze it down carefully and -- and make it a liquid first and then freeze it slowly, it turns into -- looks like ice, frozen ice, clear ice.

[4:13:19]

But that -- that means what you do is you put it in a cylinder that will take maybe 2 tons or 5 tons or 10 tons. I mean, a lot -- big cylinders, and you heat the gas up over here and you run it in that cylinder and then you cool it down and fill it up and it's frozen. We call it frozen because it's now in crystalline form. And put it in a protective container. Put -- put the cylinder in another big box with foam or something to cushion it, you know, put it on a railcar. Ship it down on -- on rail to Portsmouth or to Oak Ridge.

[4:14:11]

It was not too long -- well, it was after a number of years, some entrepreneur in -- in Paducah decided that shoot, he'd like to have a contractor doing it on trucks. And he could do it cheaper than you could do it on a rail. So he went to work and we ended up shipping a lot of those cylinders by truck. It was just railroad to start with, but trucks for many years. There was a lot of stuff going back and forth. But safely. We had a number of -- a handful of accidents where the things would roll off or got into some kind of wreck, but

we never had any big release, you know, like ammonia tanks on trucks or hydrochloric acid or something. It -- we did a lot of research on these packages that you put 'em in, you know, drop tests and crash tests, fire tests, and things like that. So even though it was shipped over a fair distance, we never had any -- I tell you, it was a successful operation.

[4:15:31]

Callan, B.: In 1964, the K-25 facility was put on standby. What does that exactly mean? And what did you do when the facility was put on standby?

Wilcox, B.: Well, short answers nothing. The -- I think the region -- it was put on standby is really because of a decision in Washington by the federal government that we had accumulated a large enough stockpile of highly-enriched uranium to make the weapons that we need. And the realization was coming that the marginal value of another nuclear weapon is -- is pretty small. If -- if you've got 10,000 or 20,000, why do you want 2,000 more or 1,000 more or something like that? What you need is a nuclear weapons stockpile that you think is -- is big enough and maybe what you're doing is judging it by how much the Russians -- how much you think the Russians have or somebody else. And I don't know how that -- those arguments went. I was never even close to 'em.

[4:16:54]

But what I'm saying is that somebody decided that we not only have enough for the weapons we need to build, but we have a cushion here in case we need some more. And so let's not operate the top of that plant any longer. Now, you know what I mean by top when I was talking about was the K-25 U. They kept on running K-29, 31, 33, and so on. Paducah. And so on. And the top up at Portsmouth kept running a little while longer because it was built long after K-25 and so it was more efficient plant. And so that's the reason that the top of the plant was -- was shut down.

[4:17:42]

The decision initially was to put it into standby. And what that means is that you keep people -- you keep it dry, you make it sure that wet air is not going to leak in there. You pump it out very carefully, get as much out as you possibly can, and then you flush

it out with, say, nitrogen, you put in dry nitrogen and let it circulate around and then you pump that out, maybe do it again, you know. So you get all the uranium hexafluoride out of there you possibly can. And then you fill it up with dry nitrogen, say, or dry air and you keep the -- all the systems in operating condition, keep it in standby so that it would be very easy to start it up again.

[4:18:35]

But that costs money and after doing that for a number of years, I think it was 1967, say 3 years later, '68, somewhere in that period, the policy makers in Washington decided, "Hey, this is costing us quite a few bucks to keep that thing in standby and really, it doesn't look like we're going to need it ever, so let's shut it down." So that was a -- that was a major decision, you see, and -- and at that point, you -- you -- we essentially put it in shape so you could just walk away from it, didn't have anybody keeping track of it. And that's the way it has been ever since. It's the difference between standby, putting it in standby so that you can start it up any time you want and shutting it down. It wasn't really shut down until later in the '60s.

[4:19:44]

Callan, B.: You've kind of answered this one before, but what are your thoughts now about how the activities accomplished at K-25 revolutionized the world? For a broad perspective type question.

Wilcox, B.: Well, I would -- I would say -- I would answer it in two parts. I'd say that the first phase, you see, which lasted until -- from '46 to '56, roughly, was a period when it was the sole supplier of U^{235} to the nuclear weapons program, so that our first stockpile weapons that we built during that crucial first 10 years of the arms race with Russia, that all came out of K-25. Not Y-12 and not Portsmouth because it wasn't built yet. And I think that that foundation of the availability of U^{235} which assured the nuclear weapons stockpile we needed for the first 10 years, was -- had a tremendous impact, which would be dramatized by what it would've happened if we didn't have it. 'Cause the Soviet Union would've capitalized on any advantage that they had and if they thought we had nothing except, say the first 3 or 4 weapons that had been put out by Los Alamos -- and their spy system, unfortunately, was quite good -- and if they'd known that we just didn't have any weapons at all, I think Stalin would've capitalized on that. It would've been a

tremendous black bill (indiscernible), even if he didn't use 'em, even if he didn't send one over here and blow something up. But just the threat of doing it would've been catastrophic. So I think we -- in a sense, K-25 in their first 10 years, the 10 years when we were the sole supplier and made possible that nuclear weapons stockpile, that had a dramatic effect on stabilizing the arms race with Russia. It kept us right in there head-to-head with them. We may have been ahead of them; I'm not sure what the facts were, but. That certainly had a tremendous impact.

[4:22:44]

Now, the second way that I think we really at K-25 impacted the world was in the period of 1960 to the end of the 1970s, the 2 decades in which we were in a different business. And this business was of nuclear power reactors for civilians. And we were putting out low-enriched uranium, 3%, 4%, 5%, and our friends and colleagues over at Oak Ridge National Laboratory were inventing power reactors that could be used to generate electricity for civilians. The U.S. took to them like a duck to water for a while, but the rest of the country really took to 'em. And friendly foreign countries started building these civilian power reactors in the late '60s and then through the '70s. There was a tremendous growth in civilian nuclear power. And we provided the fuel for that, K-25. Later on, some of it from Portsmouth, but K-25 led the way with the enrichment, low-enrichment program.

[4:24:23]

And one of our main customers was Japan. You know, our wartime enemy. But they were importing all of their coal and were just thrilled -- and oil for their power reactors -- for their power plants, excuse me. And boy, they saw this as their salvation. And France went nuclear just at the same time. Now, France, at the same time they started building their power reactors to supply their country with -- with cheap electricity, they -- they said, "Hell's bells, let's us build a gaseous diffusion plant of our own." And they did. And I went over there and saw it. And it's at Pierrelatte down in southern France, and it's a beauty. And it looks a little bit like K-25, but not much. They use a different kind of barrier instead of having their diffusers inside the plant looking like this, they look like this; they stand 'em up. So they really did design a gaseous diffusion plant and it works great. And of course, we lost that market.

[4:25:43]

And then other countries -- this is in the late '70s, now -- other countries decided to get into the nuclear business and nuke -- enrichment business. But through the '60s and '70s, we really had a monopoly, U.S. And we lost it late '70s and '80s and it's been getting tougher and tougher ever since. And we're under heavy pressure now, in the U.S., to stop the gaseous diffusion plant at Portsmouth. This is after all those years. And to build a new -- new plant based on gas centrifuge technology. And it'll be in Portsmouth. And that's gonna happen about 2010.

[4:26:34]

And the irony that I like to point out is that when General Groves looked at the 3 top leading processes for isotope enrichment in 1942, he chose the electromagnetic process, which is Y-12, he chose the gaseous diffusion process, which is K-25, and he axed the gas centrifuge process as being much too difficult and much too mechanically-hard to do. And so that got killed. And at K-25, we resurrected that gas centrifuge program in 1960, about the time these power reactors are coming along. And I was very closely connected with that program in the laboratories at K-25. And it was very successful. And we -- we actually turned -- we actually developed it commercially -- economical missions and then that program was stopped in 1985. But it's starting again and now that gas centrifuge is the -- is the preferred method. That's what we think maybe Iran is doing, maybe North Korea. We're not sure.

[4:28:02]

Callan, B.: It was actually a technology that was being researched at the same time as these other two were being researched.

Wilcox, B.: But there was a huge breakthrough in gas centrifuge technology, so what we have today is a far cry from what we had in World War II. It's much, much better. It's just -- it's just interesting the way the technologies have changed through the years.

Callan, B.: Okay, he's going to change tapes real quick 'cause we're right here at the -- .

[End tape 4, begin tape 5]
[5:00:05]

Wilcox, B.: We had many women very -- very capable of working in analytical laboratories doing chemical analyses. But that's standard stuff.

Callan, B.: And I've actually gotten quite a few comments on that.

Wilcox, B.: Leave me alone.

Callan, B.: We can do this.

[5:00:30]

Wilcox, B.: Leave me alone on that one.

Callan, B.: Okay. So --

Wilcox, B.: I don't know any women.

Callan, B.: -- let's go ahead and talk a little bit about the evolution of your career through K-25, and you started out as a lab technician, correct? Or lab..? I'm sorry.

Wilcox, B.: Technical assistant.

Callan, B.: Technical assistant.

Wilcox, B.: To the laboratory director.

Callan, B.: Okay.

Wilcox, B.: Pretty good job. What? Are you rolling?

[5:01:04]

Callan, B.: Yep. We're rolling. [laughs] Okay.

Wilcox, B.: Should I mention Paul Vanstrum

Callan, B.: That's one of the gentlemen we interviewed, correct? Yeah, let's work him in. I actually have some questions about you. Did you say he was --

[5:01:28]

Wilcox, B.: Boss for a while, but not at the beginning.

Callan, B.: I actually have questions like what was your boss like? And, so, we can mention him in there.

Wilcox, B.: I'm sorry for stopping you. Excuse me.

Callan, B.: I'm sorry.

Wilcox, B.: I'm sorry I stopped you. I was apologizing, screwing things up here.

Callan, B.: Oh, no, you don't need to at all.

Wilcox, B.: Sorry. You got a tough job; I'm not helping you much.

Callan, B.: You're helping us tremendously. I just know that you like to kind of outline out the story in your head before you go on your roll, so we're just kind of helping you structure it out.

[5:02:17]

You ready? Okay. Let's go ahead.

[crew talk]

Wilcox, B.: You asked me -- you asked me about my progression of jobs and I started off at Y-12. I -- I think I mentioned to you, in the Manhattan Project as a junior chemist with (indiscernible) Eastman. And couple of years, I was a chemist, and I went from a production chemistry operation into a -- something that suited me a lot better which was running a small process control laboratory where we did -- solved problems that were coming up in production. And I had a couple army guys and a navy guy for a while, and a team of really committed chemists, and what we would do was to work out problems that came up from day-to-day in the production operation in the same building. This thing didn't separate right; this thing -- the precipitate was too gummy and I couldn't filter it and so on, so on, so on.

[5:03:43]

After the war was over and I got my Manhattan Project silver pen for working on the Manhattan Project like your buddy, Elston, I -- I moved into -- and Y-12 was shut down, the calutron (indiscernible) operation, I moved into analytical chemistry and set up a quality control group, which was just coming into vogue, statistical quality control for analytical chemistry and -- and really enjoyed that.

[5:04:16]

A couple of years and then I went into this research business; I got this bee in my bonnet about being able to separate isotopes a new way, maybe a better way, using the differences in their Torchen spectrum (phonetic sp.). And I -- I spent a couple of years on it, working all by myself, making different kinds of uranium light bulbs and irradiating different kinds of solutions and having a lot of fun. But it was 20 years before its time. And what we really needed was a laser, and we didn't have a laser. And the process does work, but you couldn't do it the way I was doing it 'cause I didn't have -- too, too crude instruments.

[5:05:04]

And then I went to K-25. The laboratory director came over to Y-12 and asked if I wouldn't be interested in being his technical assistant, help him decide which projects were good and which projects weren't. There was a couple of hundred people in his organization and it was a real challenge, and it was something I had never done before. I had managed this little laboratory, but it was a 5-person shop. And the analytical chemistry job was a matter of 2 or 3-people shop. But this was helping him run this big organization.

[5:05:45]

And it wasn't very long before I met his administrative assistant who was Paul Vanstrum. And Paul Vanstrum, who you have talked to, and I had offices right across the hall from each other. He was doing all the hiring of the people and wage and salary and the benefits, but he was a very competent technical person. And -- but he had worked out in the plant and so he had hands-on experience out in that fantastic cascade. So Paul and I hit it off very well and we spent a lot of time doing, I think, some very effective planning, not just in project management, what -- what of

all -- the 300 projects that were going on, which ones were really good -- likely to pay off the most. We developed systems for evaluating projects as well as people. Came up with a new performance appraisal forms. Which, when I look at today, shoot, I think they're pretty damn good.

[5:06:48]

It's -- we had a nice association. Then Paul, after a couple of years of that, there was an opening in the Barrier Development Department, which was one of the key departments there, and he moved down to 1401, that big, huge building along the side of that main street and Paul went down there as an assistant and then very shortly became the department head and did a really great job. But then I moved in and took both those jobs, administrative and technical assistant.

[5:07:28]

And then the head of the Physics Department got a Fulbright to go to Germany for a year, and they put me in charge as Acting Director of the Physics Department. By then, I decided that I was really not cut out to be a PhD research chemist. I was -- I think I was -- as a kid, I think I was cut out to be a PhD research chemist, but I wasn't sewed together right. And so I decided to go into management. And got a degree working at night, Master's degree from UT in Industrial Management, and I got hooked on that. Well, the guy came back from Germany, he took off for ORNL and I took over that department. And after 12 years running the Physics Department, which was a wonderful education -- we did electron microscopy on barrier that had never been done before, just -- just -- and very helpful to the people who were doing the research work. So I -- I really got hooked on that. And after 12 years, I took over the gaseous diffusion -- gas centrifuge programs and just after one year of that, I got the chance to follow Vann, who had been the technical director for not just K-25, but for Y-12. Same company ran both plants at that time. And so I took Vann's job. He moved up to senior vice-president. So, that's why I was working for Vann. That's when I got to -- and -- and I did that for most of my career. Technical Director of all the research and development groups and all of the technical service groups, like at Y-12, the certification people and the health physics people and the libraries and the analytical laboratories, as well as the research and

development laboratories. Peaked at about 2,100 people. It was a challenging, great job.

[5:10:60]

Callan, B.: So, for you personally, what was it about management that you liked a lot more than being?

Wilcox, B.: Planning. Strategic planning. Thinking a long way in the future and is what we're doing today really gonna pay off? Does it really make sense? Is this something we really need to do? How can we get this particular organization or department or division or study group or somebody -- how can we harness them so that they pull together toward this long-range view of what we're trying to accomplish? That, I've always thought, was a great challenge. And helping people develop; moving people around. I hate to see people stuck in the same job for couple of years or something, you know. And in my organization, it was big enough, you see, we can move people around.

[5:11:01]

Somewhere in there came affirmative action and I was able to mentor a number of women, just fantastically competent. But to pick them out, identify them, and then help them by getting them in jobs that would really develop them. And I -- I'd take a gal from the Y-12 organization, might've been kind of hard to move her up over here, but I'd pick her up and take her over here and put her in the gas centrifuge program. And -- and bigger job. And it was just thrilling to see some of these people really develop. [laughs] Some of them don't, but, boy the ones that do make you feel like a -- gosh, that's -- that was a nice thing to do.

[5:11:56]

And all through these years I worked with Vann, we'd keep looking for people and helping 'em develop in that way. So, looking back on it, that -- that was where the real satisfaction came from.

[5:12:16]

I ended up with a trip to go see Pierrelatte in France, gaseous diffusion plant, and we took a short vacation afterwards with a couple of families. And I ended up having a heart attack over there in Switzerland, up looking at the Matterhorn mountain. [laughs] And they pulled me through, great, great bunch of Swiss doctors.

But when I came back, I decided that that was -- line management was too big a stress, so I got into my old job as Technical Assistant, this time to the president of the -- Union Carbide nuclear company that was running K-25, Y-12, and/or (indiscernible) and Paducah. And he was one of the guys I came down from Rochester with, 1943, Roger Hibbs. And so that was great, and then Roger retired and then I worked for the next president, who came from Martin-Marietta, and then he moved on, and then I worked for Clyde Hopkins, and then I retired after 43 years. But those last few years were just another wonderful experience. It was something very different. But I did executive development; I did strategic planning; set up innumerable tours; and visits from people; and wrote innumerable reports, progress and so on for the home offices.

[5:14:01]

It was -- it was a great thrill then I, after I retired, I was a management consultant just by myself. Doing primarily strategic planning for a bunch of different people, including DOE, Washington, hospitals around here, the school system *pro bono*, you know, a lot of that. And then I decided I had enough of that after 6 years. That was 1992.

And ever since then, I've been doing volunteer work and it's just -- I got into Oak Ridge history, talking about the total role of Oak Ridge and -- and the Manhattan Project, and I find people are just terribly -- well, not terribly -- people are very interested, I find, but they are very ignorant of it. It's been so long that the Manhattan Project, the kids in school don't know anything about it except it's when you dropped that terrible -- "Oh, you -- you helped build that terrible thing." And that's about it, so I've really enjoyed trying to help people understand the real story, as Gabriel -- as Paul Harvey says. The rest of the story. But that's been my career and I feel very privileged to have lived and be able to be a part of it (indiscernible).

[5:15:35]

Callan, B.: It sounds like a very rich career, I'd say, and you have a lot to be proud of, and I can tell you've contributed a lot during the course of your career.

Wilcox, B.: It's been a real privilege.

Callan, B.: [laughs] This is where we get to the drumroll and the broad perspective ending type thing.

Wilcox, B.: How can it get any broader?

Callan, B.: [laughs] Just this wrap-up. I think that you've really covered it during the course of this interview, and I think you've pretty much said it before, but describe what future generations should remember. What should be remembered about K-25 and what was done here? What should be acknowledged?

[5:16:22]

Wilcox, B.: You're asking what future generations should remember about what was done here.

Callan, B.: (indiscernible) [laughs]

Wilcox, B.: That's a -- that's a superb question. And that really has motivated me to work so hard on this Secret City Commemorative Walk. Just trying to find some kind of way to get the future generations.... Lots of cities can tell the story about Robert E. Lee and they take visitors to the center of town, there's Robert E. Lee. And here's about the battle that our town had something.

[5:17:05]

There's no place in Oak Ridge where you can go get any kind of -- see any kind of monument that even begins to tell the story. You can go to the museum, yes. They have an Oak Ridge room, and you can go to our public library, but Joe and Sally from Peoria, Illinois, ought to have a monument here in town, something to remember, something to tell them a little bit. That's -- one of the things that has driven me to work so hard on this, because that I think this is a start on telling that story. I -- I think that what they need to remember is that the Manhattan Project was a fantastically complicated scientific achievement which was done under wartime circumstances, which means shortages of just about everything

because the country was fighting for its life, and for the first couple of years of the war, the Japanese were really beating us in the Pacific.

[5:18:17]

In one of the years of the war, the early year, 1942, the German submarines controlled the Atlantic and we were just being -- we had ship after ship just sort of torpedoed and sunk. So the U.S. was really fighting for its life.

And here comes this Manhattan Project, and of course, you look back on it now and you say, "Well, it worked." But there was a huge doubt, should we say, the whole time of the project. "Is this thing going to work?" "Yes, we can get this -- maybe we can separate isotopes." But there were physicists in 1939 that said that they don't know that they'll ever be able to separate the isotopes. You know, those things are chemically identical. You can't separate them like you separate iron from iron ore or mercury from mercury ore and so on. You -- you can't. They're -- they behave exactly the same in the chemical reaction. And -- and -- so you have to separate them on the basis of the trivial difference in weight.

[5:19:24]

And if I took two basketballs that are identical and -- and you asked me, "Hey, Bill, what -- what -- show me the kind of difference in weight that you've got between 235 and 238," what I would do is to this basketball over here, I would just tape a nickel, a 5 cent piece. And that's what we're talking about. And now you're asking me to make -- separate 100 pounds of this stuff? From this? And, hell, if that isn't hard enough, this stuff here that weighs just a little bit more, is scarce -- scarce as hen's teeth. If you dig 1,000 pounds of uranium out of the ground, you get 7 pounds of this stuff and it's all mixed up with 993 pounds of Uranium-238. Whew!

[5:20:32]

I'd like future generations to have some concept of what these scientists went through to accomplish that. And you had one set of physicists saying, "Well, University of California's saying, 'Tell you what we'll do. We'll just take these and we'll run through a

stiff magnetic field, real strong magnetic field, real strong.'" If you don't have a magnetic field, you accelerate some of these uranium atoms and you get 'em all going as fast as you can out of this through a slit in a vacuum, but then you put a magnetic field on and it makes 'em curve, so that the heavy ones curve on a bigger radius. Think like (indiscernible), like the whip on your ride in the park, right. It's got heavy people, it's going to go around to the outside. This thing is 8 feet tall; it costs a fortune to build it; we can't use copper to wind these electromagnets; so they go to the U.S. Treasury Department and say, "Hey, we want some silver to run around iron cores to make magnets. Oh, by the way, we're going to make 1,000 of these magnets." They say, "Well, how much silver do you need?" "Well, somewhere around, oh, probably couple of hundred tons." "Tons?" People at the Treasury Department say, "Hell, we talk about silver in terms of troy ounces. We don't talk about it in terms of tons." Say, "Well, it's all going to be behind the fence and nobody can get to it, and we'll keep track of it, and we'll give it back to you after the war." And they said, "Yes."

[5:22:29]

The bureaucracy in a wartime. Just can't imagine that happening today. And they took these silver ingots out of the West Point depository and they turned 'em into wires and straps and they made these magnets, and they built these damn machines, and that worked.

[5:22:49]

And -- but all the time up at Columbia, these other guys are thinking about these teensy tinsy pores and putting this stuff, uranium, pumping it through this thing. And of course, it gets just a trivial separation every time they put it through. Theoretically, it's a maximum of 4/10 of a per cent. And what that means is that you have to do this thousands of times. And so this K-25 plant just gets bigger and bigger and bigger and bigger.

[5:23:27]

It takes me a long time, but those are just a couple of the examples. But what I'd like future generations to understand is that this was a fantastic project. It was equivalent to building a new Panama Canal each year for three years. It was done under wartime

circumstances. It was done by not just brilliant scientists at Los Alamos, but it was done by brilliant scientists at California, at Columbia, at Chicago, and Oak Ridge. And more than anything else, it was a fantastic engineering accomplishment. To think that these people could make a plant like K-25. I -- that's what I hope future generations would understand.

[5:24:25]

And -- and then to cap it off, I want them to understand that war is absolutely terrible and that that 6-year war that killed 55, 54 million people. We were all anxious to do whatever we could to stop the killing. And we had here in Oak Ridge, a major part of it. The Manhattan Project was a major part, and its accomplishments did bring peace to the world after all those years, and I'd like them to think about that rather than the four square miles that were burned out at Hiroshima.

[5:25:17]

At Tokyo, I told you about that attack 3 months before. 16 square miles were burned out. It's awful. But if you start talking about that, I want to talk about the Bataan Death March where the Japanese forced our troops, dying and starving. If they fell down by the wayside.... The Rape of Nanking by the Japanese, hundreds of thousands of Japanese just slaughtered -- you get into that kind of talk and you say you just lose the perspective, context, of the Manhattan Project. So I don't want to talk about that; I want to talk about what I told you about -- and about our bringing peace to the world.

[5:26:17]

Callan, B.: Boy, I think you've gotten through to at least one person from our generation.

[5:26:21]

Wilcox, B.: Good!

Callan, B.: That's me. I'm starting to get quite an appreciation for what was done here.

Wilcox, B.: Good.

Callan, B.: Those are really all the questions that I have. Is there anything else that you feel we need to cover, to contribute to this interview?

Wilcox, B.: I want to give you the names of three people you need to add to your list.

Callan, B.: Okay. We'll go out front and we'll definitely do that.

Wilcox, B.: I don't -- I don't know. What do you want to know?

[5:26:40]

Callan, B.: Why was it called K-25?

Wilcox, B.: What?

Callan, B.: That's another old wives tale we're getting conflicting stories on. Why is it called K-25? How'd it get its name?

[5:26:52]

Wilcox, B.: K-25 is very different in the way it got its name from the other plants. S-50, Y-12, X-10. Because K-25 does have a reason. And the K stands for Kellex, which is the architect engineer. People can say that it stands for Kellogg and that would be perfectly all right, too. Kellogg was a parent corporation. Kellex was the individual corporation that designed K-25. And the account that I think is most credible is that K stands for Kellex. The 25 is an unfortunate choice, but it stood for Uranium-235. And they just left the 3 out and called it 25, thinking that they were protecting that rather critical -- rather critical point.

[5:28:00]

But General Groves -- and the way I got this conviction that I have that that's it is because I read about it in some stuff General Groves' Colonel Mickels wrote. An -- and, you see, the Kellex Corporation has all these people up there in New Jersey doing this design, drafting, and so on. And they're building air plants and they're building power plants, and they're building this, and so they need something to designate the project and they started calling it K-25.

[5:28:31]

Before anybody really from security -- army security caught on to the fact that they had this 25 all over the sheets and that wasn't a really very good screen -- a very good cover. But by the time they caught up with that fact, it's too late to change it, because if you change it, we're -- we're not going to call it K-25 anymore, we're going to call it Q-16 --

Callan, B.: Calling attention to it.

[5:29:03]

Wilcox, B.: -- hell, what you're doing is just advertising. And so they left it that way. Now, the same thing happened at K-20 -- 10 -- Y-12. The production buildings, when they pick numbers, they ask somebody to just pick random numbers and -- and make 'em 4 digits and the production buildings are 9201-1, 9201-2, 9201-3, 9201-4, 9201-5. And when the security people caught onto that, from the Stone and Webster guys, they thought that was a good number. Hell, 92 is the atomic number of uranium. Wow!

[5:29:50]

But it was the same deal. The people that picked it out didn't pick it out for that reason, but it was too late to change it. Call attention to it.

Callan, B.: So it had nothing to do with the grid lines on the Rand-McNally map. [laughs]

Wilcox, B.: There is no -- I have spent -- I have spent quite a few hours trying to draw a map, and you can't do it. Y-12 and X-10 and K-25 just don't go together on any kind of a map you can draw. And people have looked hard for a map, and even as early as 1950, which is just 5 years later, people were saying there wasn't any kind of a map like that. They're just code names -- code numbers, except for K-25. I think that's the story there.

[5:30:41]

The first Y-12 building to be finished was 9731. It was named 9731. And I couldn't make any sense out of that. It was a pilot plant building that was built with a couple of calutrons in it to train the supervisors when the production buildings were finished. And it was done in March of 1943. Very, very early. And I ran into -- when I was writing my book, I ran into -- had -- had an old timer with him and I asked him --

[End tape 5, begin tape 6]
[6:00:00]

Callan, B.: Why do you ask?

Wilcox, B.: He's the guy that told me the story.

Callan, B.: Oh, okay.

Okay, we're talking about --

[6:00:19]

Wilcox, B.: In March -- in March 1943, the very first production buil -- operational building at Y-12 was finished. And of course, by then, the security people had been looking at choices of names and so on and so on. And I asked my friend, Paul Wilkinson, who worked in 9731, I said, "Well, how in the world did that get that name?" That was the first building; why wasn't it building number 1? Or [laughs] -- or 9001 or something. He says, "Well, hell, it was very easy." The concrete pad that the building sits on is 731 feet above sea level. So they named it 9731 [laughs]. So this is -- this is the kind of ingenious way later on that we selected code names and so on. We -- we use code names for all the chemicals and so on. It was -- compartmentalization -- it was really -- it was really good.

[6:01:33]

Security was -- was a major issue with all of us. We just didn't talk to our -- even to our buddies after work. And when you left town, you saw these big billboards about not talkin'.

[6:01:55]

But when you went in on these buses, cattle cars to Knoxville Monday nights to do your shopping, people would spot you because of the mud either on your shoes or on your pants cuffs, it was pretty easy. And -- and boy, you -- Knoxvillians were kind of hostile about all these damn Yankees coming into their town. They didn't make any distinction between people that came from Chicago and California and New York. They were all damn Yankees. And strangers. And they knew -- 'cause people were working out here -- they're new town.

[6:02:33]

So they had -- it wouldn't be long on Monday night before somebody might stop you on the street and say, "Hey, that sure is a big plant you got out there! What you doing?" Well, of course, we can't really tell him. "It's -- it's a secret operation, but it's war work, important war work." "Well, it looks like you could tell me something about what you're doing." An -- and after doing that for a while, people got sick and tired of 'em, that same line, so we started making up stories. "Well, if you promise not to tell anybody, what we're doing out there is making a great big city for officers in the army and the navy to come live in after the war." "Oh, is that right?" "Yeah. That's what it's for. Big town for people to come retire in." Or you'd say, "Well, what we're doing is making the fourth term election buttons for Franklin Roosevelt. And we're making luggage for globetrotting Eleanor Roosevelt to go around the country." Or you'd say, "Well, you promise you won't tell anybody, but what we're making is thousands of barrels of a thick green oil. And we got just shipping docks full of these 55-gallon drums of this gre -- thick green oil. Gonna take it out and pour it on top of the Atlantic Ocean. And when the German U-boats stick their periscopes up through this, they're gonna think they're still under the water so the submarines keep going up and up and up and when they get up out of the water high enough, we shoot 'em down with our airplanes."

Callan, B.: [laughs]

[6:04:21]

Wilcox, B.: Or -- or one that I like is -- is, "What we're doing is making a bunch of full-size front ends of horses to ship to Washington to go with the excess of horses' rears that they got up there."

[6:04:44]

Callan, B.: The only one of those I'd heard before was the -- was the horses one. But those other ones -- .

Wilcox, B.: And another guy says, "I'll tell you what I'm making out there. $1.17 cents an hour."

Callan, B.: [laughs]

Wilcox, B.: Well, I -- one of my favorites is -- guy at Y-12, he said, "I'll just be honest with y'all. I don't know what they's making out there. But I'll tell you this much. The government can sure as hell go somewhere and buy it a lot cheaper." [laughter]

Callan, B.: Oh, those are all good! [laughs]

Wilcox, B.: It was fun. It was fun.

Callan, B.: Gosh, that's really all I have. Is there any other final thoughts or comments?

Wilcox, B.: You better shut me up. I'm -- I'm -- I'm done enough.

[6:05:44]

I wanna give you those things.

Callan, B.: It's been wonderful interview! Just been tremendous. I can't thank you enough for coming down and interviewing with us this (indiscernible).

Wilcox, B.: Well, you're welcome.

Callan, B.: I did have one -- stop the camera for me -- 'cause I do have one question -- .

[End of interview]