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FERNALD LIVING HISTORY PROJECT
Transcript

Name: Raymond Wolf

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Tape FLHP0043

18:01:00
Q:
Now you can just talk to me, you can ignore the camera like it's not even there.

A:
I can't look at the camera huh? Hi camera. How ya doing?

18:01:11
Q:
Great. Well our first question is really hard. If you could just give us your name and spell it just so we have it correct.

A:
My name is Raymond B. Wolf. R-A-Y-M-O-N-D. B as in boy. W-O-L-F.

18:01:28
Q:
Great. And we're going to start with a little bit of background questions here. First of all, were you born in the area or where were you born and where did you grow up?

A:
I was born in Cincinnati. And brought up in Walnut Hills. Went to Walnut Hills High School. And after a job with the government for over 4 years I came back and went to UC.

18:01:52
Q:
And what did you study at UC?

A:
Chemical engineering.

18:01:57
Q:
Great. And tell us, tell us a little bit about um, your college years and your family. Just a little background.

A:
Well I spent 4 years in the Coast Guard during World War II from '42 to '46. After that I started UC and met a girl there who, we married a couple years later and we just celebrated our 50th anniversary last year. So we got to know each other pretty well.

18:02:31

Q:
Congratulations.

A:
We have three children. Two boys and a girl and they're all physicians and they all live in this area. One lives in Cincinnati, one lives near Waynesville and one lives out in Butler County also. So, we had moved away and we were gone for 20 years and during that period of time they went through their med schools in different place and did their interning and residency and eventually all came back to this area. So when I retired they say well you got to come here to see us, we can't come to see you we're too busy. So 5 years ago we moved back to Cincinnati and moved into this place.

18:03:22
Q:
And where um, you say you were gone for 20 years? (Yes). What was your job for 20 years then?

A:
Uh, after I left Fernald I worked for subsidiary for Sherwin-Williams in Cincinnati and they transferred me to a place called Coffeeville, Kansas as a plant manager of a large inorganic plant. And I was there for 3 or 4 years and situation wasn't too healthy so I went with Phillip Petroleum and their international headquarters are in Bottlesville Oklahoma which is about 45 minutes from where I lived so I rode back and forth there for about 10 years and then took retirement.

18:04:09
A:
A week later I started a job in the town of Coffeeville and we were building another new construction I was involved with. A hazardous waste incinerator for the purpose of burning PCB wastes. Uh, we got that up and started. My job was to get the permits from the EPA and the state EPA which I did on time and so I finally retired from that and I started doing consulting work in the environmental field until we moved here.

18:04:44
Q:
Great. So you were always involved in the environmental type issues?

A:
I was when I first, after I, well I was at Fernald yeah. We were involved in that. So I was always somewhat involved in it until I got to where it was my only responsibility.

18:05:04
Q:
And uh, let's uh talk a little bit about your job at Fernald. First of all, when did you start your job at Fernald?

A:
In November of 1951. I started as a Process Engineer assigned to the refinery. There wasn't any refinery. There weren't any buildings except the farmhouses that were left after the government bought the cornfields. So we used the farmhouses as our offices but there really wasn't that much to do because all the building was on, was being drawn out in Philadelphia.

18:05:41
A:
And so as the drawings came in we would look at the drawings and try to figure out what was going on. And then all the engineers would sit in the farmhouses and fold up the drawings so we could put them in file cabinets. Meantime we were fighting the water and the mud because there were no paved roads. Uh, they would put gravel down for roads but a couple of days later it disappeared, it fell in the mud. And so we were all walking around with muddy boots. The farmhouses were muddy floors all over the place so it wasn't very, a very nice job for a while.

18:06:18
A:
It was interesting, we had to wait to get our Q clearance which is the ultimate clearance you can get from AEC. In the meantime they sent us to St. Louis to see the operating plant, Mallincrodt Chemical was operating, and get some idea what we would be doing. So we did travel between Fernald and Mallincrodt. Once in a while we did go to Philadelphia and work with the engineers there because eventually we had some ideas that we liked to give to them. So, it was an interesting construction period.

18:06:53
A:
We'd spend time out in the field watching them put up the steel girders and trying to figure out what this was going to be and what that was going to be. The first building was the Pilot Plant in the main office. And interesting thing, I don't know if you heard this or not, but when the main office was finished they didn't have any way to heat it because the Boiler Plant wasn't ready yet. And they were going to depend on steam heat.

18:07:23
A:
So somebody very brilliantly brought in a steam engine, they tracked right up to the office building and hooked up the steam engine to the heating device. And so one winter we were heating with that steam engine, snorting outside the office all the time. It was different, it really was. Once they got the Boiler Plant going, they ›course took the engine out. There's going to be some noise here.

18:07:56
Q:
Wow, that's amazing. OK. Um, you were speaking of the mud and the mess at the very beginning during the early years. Uh, can you tell us a little bit about parking, what was parking like when you were first there?

A:
Parking was pretty horrible because not only were there no parking lots but we were competing with 3,000 construction workers to find parking. So you were lucky if you could park where you could get out otherwise you'd be in the mud till you need a tow out. It was very difficult so we formed as many car pools as we could. Of course it cut down on the number of cars but there were no parking lots. If there were, they were gravel and it would sink into the ground.
18:08:46
Q:

And you had a funny story about the guy that lost his boots in the mud.

A:
Yeah.

Q:
What happened there?

A:
It was so sloppy that it looked like it was hard where he was walking. Well, he stepped in a hole and he couldn't get his boot out so he just pulled his shoe, his foot out and hobbled back to the farmhouse. I guess he got it out later on but this did happen to other people too. It was pretty messy but it was interesting. Looking back on it, it was, it was very, you know there were the best of times and the worst of times. I think this was one of the best although it was kind of worst at the time.

18:09:28
Q:
And what was the surrounding community like when you first started working there?

A:
It was all farmland. Fernald was a feed mill and they may have had a store there I don't remember but the rest of it was all farm. There was nothing along the highway until you got into Ross and Ross had two saloons mainly. I don't know if they had anything else. I guess they ----- . But that was the closest place to go if you wanted to go out for lunch which nobody had time for while working at Fernald. ›Course there were good places to stop on the way to work and the way away from work.

18:10:09
A:
Our car pool would stop in some little, some little beer joint on the way in the morning to get donuts and coffee after we drove from Clermont County. There was a construction worker in there every morning drinking a shot and a beer at 7:00 in the morning and he was all ready to go to work after two or three of them.

18:10:33
Q:
Oh, my gosh. That's great. Um, had you ever heard anything about the way that they secured the land for Fernald?

A:
Only it was brought up in pieces of farmland from these, I think there were three farmhouses that I can remember, so there were at least three farmers that were asked to sell their land. Now they did do a big survey before they decided on Fernald. And they surveyed quite a few locations all over the country and based on something like 20 to 25 different criteria Fernald came out the best and that's why they picked it. It wasn't a chance decision. I saw the report and it was very well done.

18:11:29
Q:
And why did they pick that land?

A:
Well, it was good solid land. It was flat land. It was close to a large city which meant they could get a labor force and it was close to transportation. Of course a large city could supply all the material that they needed to run the plant so. Plus the fact that it wasn't in a built up area so if there were any attacks, chances are the city would be spared if somebody tried to go after the bomb plant. I think that's why it was picked.

18:12:07
Q:
And that was definitely a consideration when they were looking for a location was?

A:
Yeah, we were pretty worried back in the '50's about atomic bombs and there were a lot of bomb shelters that were built at private homes. Yeah, it was a big worry at the time.

18:12:28
Q:
Tell us a little more about that, the Cold War mind set. What exactly caused the Cold War mind set and what did people usually do about that? What were they thinking at the time?

A:
Well the publicity that we got, that the Soviet Union was out to get us, our government talked a lot about that. Of course when the government tells you things over and over again whether it's right or wrong, you tend to believe it when you have no other reason not to. So we were concerned that our city might be attacked. Or installations like Fernald and that's another reason why they picked more closer to the center of the country rather than have it on one of the coasts or the other coast. It was told to us that we better worry about it.

18:13:30
Q:
And how much did you know about the other Department of Energy sites? And the actual process that went from kind of east to west, the process of atomic weaponry I guess?

A:
The longer I was here the more I learned about it. I didn't know anything about it when I first started. Of course everything was secret at the time we started and all of our papers had to be put into a locked file cabinet with a circular lock on it, not just a key lock, but a bank type vault. If you left anything on your desk that could be confidential or secret, you heard about it the next day cause the security went through all the offices and made sure that nothing was left out and most of the materials that we were making had code names. They tried not to use the official name, the official chemical name.

18:14:30
Q:
What were some of those code names? That's kind of interesting.
A:
Well, K-65 was one and I don't know where that came from, that was given to us by some people up in New York state. We had orange salt which is uranium trioxide. Brown salt which is uranium dioxide.

We had green salt which is uranium tetrafluoride. We had derbies which is impure metallic uranium. We had what did you call them? (Ingots). Ingots were purified uranium metal. We had billets that came out of the Rolling Mill and then we had slugs which were the final product.

18:15:18
A:
Now we knew that they were going to another location and after a while we learned more and more about it. I visited Oak Ridge a few times because we sent material there. I was at Paducah and we sent material there. And I was out at Hanford a few times for various reasons so I got to know pretty well the chain. We sent material to Savannah River, Savannah Georgia. So as time went on and the security diminished also so it got more and more easy to talk about it.

18:15:59
Q:
And in the beginning you had to get a Q clearance, can you tell us what you had to go through to get a Q clearance?

A:
Well you had to of course tell them all about your life, what you'd ever done and then that was submitted to the FBI. And if they had any questions, they would question you. I never had any FBI people question me. It took from 3 to 6 months to get the final clearance. So you get what we call the QE which allows you to see some stuff but not the good stuff. And so for a while we had the QEs and then we got the final Q clearance.

18:16:37
Q:
Wow. And how did they know that you weren't sharing information with the people on the outside?

A:
The security department tried to hold training sessions with us and tell us what we could and couldn't tell people on the outside. Uh, that's as far as I know, I don't know if they talked to people on the outside or not. But we were asked not to divulge our trade secrets.

18:17:07
Q:
Could you or did you um, discuss your job with family and friends at all?

A:
No. No, we didn't. We were told not to and so we'd just tell them that we were working at an atomic energy plant. They'd say what do you do, I'd say work in a chemical plant, that's all, the chemical section. And that was it. People would say OK. I mean, during World War II they had these war plans all over the place and nobody knew what was going on. Nobody asked questions. I mean it was none of the people's business.

18:17:45
A:
And it sort of kept going after the war was over and people, in those days were used to it. Now they question everything that happens anywhere behind the fence. No, it was just a different, different life in those days. Most of us were used to a depression where things were always pretty tough and you were lucky to get by the day or the month and so we had a little different outlook than people have nowadays.

18:18:19
Q:
Wow, that's great. Um, tell us a little bit about your jobs. Did you stay in the same job or did you move around? Did your responsibilities change during your tenure at Fernald?

A:
I started out as a process engineer in the refinery working mainly in the digestion area and the K-65 filtration and the refinery sump and the general sump. There were about 5 or 6 engineers assigned to the refinery and each one in a different section. It was our job to technically take care of that area and make sure it would operate.

18:19:06
A:
We reported to a plant superintendent whose name was Walt Strapman and uh, he was promoted after about 4 years uh, to a combination of plant supervising so then I became the superintendent for the refinery which at that time it was Plant 2. The next move was to be promoted to Plant 2 and 3 and then a year or two later I was promoted to include Plant 4 and Plant 7 so when I left I was superintendent of that whole area.

18:19:50
Q:
Great. And um, you were assigned to start up the refinery when you were a process engineer. What did that entail exactly?

A:
You putting in all new equipment. Everything is new so you gotta know what the piping is, what the wiring is, what the equipment is supposed to do and you try to train the operators on how to use that equipment to do their job. You run into troubles, there were always problems on start-ups, problems you never expect. So one of the biggest jobs of a process engineer is solving these immediate problems. You know what you have to do. You know what the equipment is supposed to do but you run into some strange problems that were not expected and uh it becomes kind of messy to clean things up.

18:20:49
A:
Uh, we had a conveyor called the Hapman, H-A-P-M-A-N, which was a pipe about 4 inches, 4-6 inches in diameter and inside that pipe was a chain and the chain went all the way around this pipe, continuous chain and on that chain were discs, metal discs, it also had rubber discs so that if material was put in the bottom of this pipe, these discs would take it up to an opening and drop it in somewhere up above and then come back empty and get more material. It sounds great doesn't it? It didn't work.

18:21:31
It, it became messy because what happens when it gets plugged up? How do you clean it out? That's just a problem. You have to take it apart somewhere and all that material goes on the floor and you have to clean that material up, fix up whatever caused it and start all over again. It's all them pipes that you can't see what's going on. Well, it was abandoned after about a year. It was a good idea but it didn't work for our type of material.

18:22:01
A:
But that's the type of thing you run into. You try to solve the problem. If solving the problem means different equipment, you get different equipment. We ended up with a conveyor that hauled the drum up to the top of the building and dumped it into a tank and the drum came down empty, that worked fine.

18:22:24
Q:
Was that the same type of conveyor that was under Plant 1?

A:
Uh, I believe so, yeah.

18:22:30
Q:
Cause that were silos, were silos ever used?

A:
Oh yeah, oh yeah, they were always used. Definitely. They would put a batch in the silo when they got it out of the railroad car or the truck and then pump, and then take that into the sampling plant and diminish the lime until they got the sample to send to the lab which would represent an entire railroad car full of steel drums. Yeah, it was used a lot.

18:23:05
Q:
Cause there was some contention from other folks of since the conveyor under Plant 1 didn't work, what they ever used to ore silos?

A:
Yeah, they solved it, they got a different method. No, they had lots of troubles there too. (Wow) Yeah we used the silos quite a bit. That's before the pigeons. (Right)

18:23:33
Q:
And tell us about putting um material in the K-65 Silos, what was, just tell us about that.

A:
Well the material called K-65 was a residue that was produced during the Manhatten Project in the plants in the Niagara Falls area and its residue had been pretty much stripped of uranium although there may have been a little bit left but it did contain radium from African mines. They actually were

diamond mines and this material was left after they took the diamonds out, or the gold and, but it contained uranium so the government bought it, I think it was from the Congo. After the uranium was removed they'd put the stuff in drums and stored it at a Army base outside of Niagara Falls.

18:24:32
A:
This was in the '40's, the war was over they just left them and after about 5 years they noticed that the drums were rusting, they were out in the open. The material was starting to fall on the ground and it was no question it was radioactive cause it contained radium so since the two big silos that we call them silos now, used to call them tanks, held a million gallons each. These were empty, the AEC said well let's put that residue, that K-65 residue in there for a while because it belongs to the Congo government, it's not ours, we have to negotiate with them.

18:25:11
A:
So we sent an engineer up there and he said well we can't transfer these drums because they're leaking so he was told to put the material in new drums. Well, in those days we didn't have these large drums that we have now, 70 gallons, they were just 55 gallons so he would move the stuff into clean drums, patch up the old ones and send them down to Fernald and then I would take over. There was a building built down at the K-65 area that contained a tank and a conveyor, or an elevator.

18:25:52
A:
And we would take each drum and raised it up and dump it into the Silo, I mean into the tank, add water, slurry it up and pump it into the K-65 tanks. And that's how we got rid of all the material that was up in the Niagara Falls area so the majority of the material in #1 came from off site. Later on we did make our own K-65 in the refinery and that went into the #2 tank.

18:26:22
Q:
And that came from Plant 3?

A:
Well it actually came from the extraction. This is the bottom of the extraction. They call it raffinate. I don't want to go into all that.

Q:
Hot raffinate.

A:
Yeah hot raffinate, cold raffinate.

18:26:42
Q:
I've been in the hot raffinate building. Yeah, that's a, well that's interesting. Um, let's see, I'm real interested in K-65. Is there, I know that mostly came from New York.

A:
After the solid settled uh we would decan off the water and put it back into the tank to slurry it up some more, these solids from the drums so we try to conserve water and not throw any away. And there was a valve for every foot above this tank, the tank was about 25 feet high on the side. There's 25 valves and as the water got up to a valve they would open it up and run it back into this tank. So we did have a water tank as well as a slurry tank. And we had shielding.

18:27:37
A:
We had a steel shield that the operator would have to stand behind when he took the lid off the drum. The conveyor was motorized so a lift truck would put a drum on the conveyor motorize it up to get to the shield, he would take the lid off and then the drum would be by motorized conveyor put in a drum lifter which would lift it up and dump it into the tank.

18:28:01
A:
But this material was like mud it didn't like to dump, so we had a gadget on top of the tank, well some people call it a thumper, and we'd try to beat the tank up so we can get the material out. If wasn't a nice operation but we did manage to empty out all the drums.

18:28:22
Q:
Now what kind of protective gear were you wearing at the time?

A:
Me?

Q:
Or anybody that was on that operation.

A:
People on the operation were wearing their regular white suits and white caps, gloves and hightop shoes. The foreman had different type of uniforms like you see now in most industry, industries, and the engineers and supervisors just wore a smock over their street clothes and company shoes.

18:28:58
Q:
How about respirators?

A:
No. No we didn't wear respirators. We didn't have any other, the other protective was that shield, that steel shield about 2 inch thick.

18:29:15
Q:
OK. We gotta take a break here to change….

19:01:04
Q:
OK. Um, tell us about your last job which is supervisor of the refinery and the green salt plant. What exactly did you have to do for that?

A:
Well, the main thing was the production. Make sure we made the production that we were required to make and to keep the cost down. The big thing was the on time factor. Try to run the plant as long as you could without taking a shutdown. And we were pretty successful. Of course, I had other people in supervision working in this plant and I had foreman so I was just overall in charge of the bigger things and didn't have to worry about some of the small things like plugged up lines.

19:01:55
A:
We did have some hazardous chemicals that we were working with. In the refinery we used nitric acid. Very concentrated nitric acid to dissolve uranium when it came in and uh it went through the refinery as uranyl nitrate and became uh, in the last part of the refinery, became a salt, but we drove off all the nitrates as a gas and so we had a nitric acid plant over in Plant 3 which would recover these gases. Oxides and nitrogen and concentrate them so we could use them again in the refinery. That was a hazardous material.

19:02:45
A:
Uh, the green salt plant used in hydrous fluoric acid and hydrous ammonia and had a tank farm outside the green salt plant to handle these things which came in in tank cars. So they are hazardous materials we had to guard against. We had quite a health program to make sure that you didn't get hurt. You can see as we learned more and more how to handle it we had fewer and fewer injuries.

19:03:16
A:
But there was some pretty bad ones at first. Hydrofluoric acid is a very nasty thing. It gets on your skin and it just creeps down into the bone. In those days the only medical answer was to put on ice or to put ice on wherever it touched your skin. It's awfully hard to hold your hand in icewater for an hour or two hours so it was some nasty stuff.

19:03:45
Q:
What kind of safety precautions were there that sort of came from the beginning until you left in 1966? What was the difference between the safety in the '50's and the safety into the '60's?

A:
Well, as the safety department learned more about what we were doing, they emphasized more the bad things. Uh, I don't think there were any difference in the safety equipment we still wore the same uniforms and the same clothing. But when they were handling acid of course they used acid protecting suits and rubber gloves and either face masks or goggles so anytime they were handling anything that was hazardous that's what we put on, chemical hazardous clothing.

19:04:39
Q:
Great. So that was sort of, that came?

A:
Well that comes from a chemical plant. In any chemical plant your handling acids or caustics you wear protective equipment. This is before OSHA came into, you just knew you had to wear them. Ain=t no question about it, otherwise you get burnt, very simple.

19:05:02
Q:
What types of injuries happened early on?

A:
I think couple types, all types of industrial injuries. Chemical burns, falls, uh sliding on the wet floor, fall off a bicycle. I mean it's pretty standard industrial injuries. I don't know any that I can't remember any that were the worst or most popular ones. They're pretty standard in the chemical industry.

19:05:42
Q:
You mentioned bicycles. Is that how they got around the plant?

A:
Well, they assigned bicycles to people that needed to move around the plant. Like engineers and some of the supervisors. And it was difficult to hang on to your bicycle because people who didn't get a bicycle wanted to use them too. So if you had a bicycle remain outside your office it usually would be gone in about 10 minutes. And you could find it if you looked all over the site. You could eventually find it, somebody took it, went to where they wanted to go and just left it. I ended up putting my bicycle in my office.

19:06:20
A:
So I knew when I needed it I could have it because I did go all over the plant. We had quite a big maintenance plant. I don't know if that building's still there but they had specialties you know, a electrical plant, a machine plant, a pump plant then in this large building but each one was a separate room. So whenever we were interested in how something was getting fixed, I'd go over there and look at it. It was a big maintenance department, big storeroom.

19:07:00
Q:
Wow that's great. And uh, when you first started there was the cafeteria open? I know that seems like a, but it's a basic human need to be able to eat, was the cafeteria up and running? How did you guys do lunch and stuff like that?

A:
We brown bagged. Once you found a parking place, you didn't leave it to go out to lunch. So we would brown bag it and eat in the farm houses until the cafeteria was put together. Of course it was

one of the first buildings being built, the office which, and the cafeteria which included the exchange room and the Pilot Plant. They were #1.

19:07:41
Q:
Tell us a little bit about the cafeteria? What was it like?

A:
It was like a big old fashioned cafeteria. They had two, two serving lines and a lot of tables and you get in line, then go through the serving line, pay for it and sit down with your friends usually. And just like anywhere else you had certain friends that you ate lunch with all the time. Now it was open at first around the clock because we had a lot, when we first got into operation, a lot of people were working around the clock so it did stay open for I guess you call it dinner 3:00 o'clock in the morning and things like that. It was a full service cafeteria.

19:08:27
Q:
How was the food?

A:
It was like any other cafeteria. It was good for a while but then you got used to it and you didn't think it was any good. It was the same stuff. You just get tired of eating the same place all the time. And everybody had their favorites of course. We'd sit there and talk and usually sit at the same table and the same spot. Get out of my spot.

19:08:59
Q:
And uh, how much did you know about the process, say midway through your career at Fernald?

A:
I knew pretty much about it. I was familiar with the parts that I supervised and I pretty well learned some of the parts in the mechanical part of it. The foundry and the machinery.

19:09:28
Q:
Can you give us a basic rundown of how the process works?

A:
Yeah, you got time?

Q:
Sure.

A:

Well as we discussed the ores were brought into the sampling plant and put in the Silos. Uh, we drew a sample, put it in the other Silos and then transferred over to the refinery in drums. I think they did add a conveyor to bring it over but it didn't work. So they sent the drums over and we dumped the drums in what we called digesting tanks. I think we had 12 of them, we had 6 on the what they call the cold side and 6 on the, 5 or 6 on the hot side.

19:10:12
A:
Hot being, did it contain radium. If the ore contained radium it was hot, if it didn't contain radium it was cold. This thing, uh, we put it in a tank and treated it with nitric acid and this would form as I said nitrate of uranium, uranyl nitrate. We then pumped this whole mess into the extraction area. The extraction area consists of three circular pipes that were I don't know maybe 25-35 inches in diameter and about 5 stories high. And there was one on the hot side and one on the cold side, so we had two lines.

19:10:57
A:
We'd dump this mess into the top of this extraction column. The column consists of plates perforated plates about every 4 inches apart all the way down. So we dumped this stuff in the top and we'd pump a solvent in the bottom. In order to mix the two, they were called pulse columns which meant that the entire column content was pulsed, it was pushed up and it brought back down again, pushed up, brought back down

19:11:35
A:
This helped mix the solvent which was lighter than water going up and help the water which was heavier coming down and meantime any solids would be coming down too. So we were extracting uranyl nitrate from the rest of the mess because the solvent we used liked this material and they were able to, it was able to pull it out of the mess. What was left was called raffinate and if it was on the hot side it was pumped to the hot raffinate building.

19:12:06
A:
If it was cold side, it would be pumped to the spray dryers. Now the spray dryers would dry the material and send it down to Silo 3 where it was stored as a dry powder. The raffinate, hot raffinate would go to a filter and any rocks or dirt would be filtered out and this is K-65, solid material. And this was taken to, pumped down to one of the tanks at K-65. So now we got this nice clean uranyl nitrate but it's in a solvent so the first thing we do is wash it in the second column with a little bit of water and so you wash away the impurities.

19:12:50
A:
Then you pump it to the third column which is again a pulse column and flood it with water. Well, the uranyl nitrate likes the water better than the solvent so we transferred it over to water. So now we got uranyl nitrate pure in water. And this then goes to the denitration part as they call it. We want to get rid of the nitrates on that uranyl nitrate and make an oxide out of it. So we boil it down into evaporaters into a pretty sticky mess. Then we put it into heated kettles. They're heated with steam. Steam jacketed.

19:13:31
A:
And we just keep heating it and heating it and this material very slowly goes over to a solid which is a bright orange solid. That's why they call it orange salt or juice, that's another word for it. The nitrates are in the vapor and they are pumped over to the Plant 3 where they are recovered and reused in the digestion area. First they need to absorb them and then they concentrate it in water. So we have these nitrates pretty much in an interior flow. Any material that's fallen on the ground or is not usable is put together and sent to a scrap plant which takes scrap from all the various plants.

19:14:23
A:
Recovers uranium, sends it back to the digestion area and it's redigested. So we had a pretty much of a closed loop there for any uranium material. The orange salt were put in portable hoppers. They were on wheels and they were pulled over to the green salt plant and elevated to the top of the green salt plant with an elevator and dumped into the first reactor where they were heated and subject to hydrogen. The hydrogen was made from ammonia. We started with the inhydrous ammonia and put it through catalytic crackers and we cracked it into hydrogen and nitrogen.

19:15:16
A:
Well the nitrogen doesn't do anything, it's pretty neutral. So we pumped this whole business up to the reactors. The oxygen then would, I mean the hydrogen then would pull some of the oxygen off the UO_3 to make UO_2, turn it brown. And then this brown salt would be dropped into the green salt reactors where we'd add inhydrous hydrofluoric acid and convert to UO_2 to UF_4, uranium tetrafluoride and this is the green salt which would be packaged in hoppers and then sent over to Plant 5. You want to continue?

19:15:59
A:
You want to set this down for a second?

19:16:08
Q:
OK. Alright, so now we're at green salt, what happens now?

A:
The green salt would be put back in these hoppers and taken over to the what's called Plant 5, there the green salt would be mixed with metallic magnesium. Mixed up and put into a furnace and heated until it became a liquid and then it was put into a mold and cooled. And this converted the uranium tetrafluoride to a uranium metal and made magnesium, magnesium fluoride, which is slag. So they would separate the magnesium fluoride which is a white powder from this silver metal which looked like a derby, they called them derbies.

19:17:10
A:
They got off all which they could by using chipping hammers and everything else and then they would take these derbies and put two or three of them in another furnace and heat them up until they were

molten and then cast them into ingots. And as they settled the impurities would sit on the top so after the material cooled, they'd take them out of the mold and saw off the tops which contained all the impurities.

19:17:42
A:
So now we had pure uranium metal in very large pieces. Uranium is heavier than lead so these pieces were quite heavy. The ingots were imported to Plant 6 and put into a salt bath and heated pretty much before going to a Rolling Mill. And uh, they were rolled back and forth each time cranking down on the rollers until they had a fairly long billet. And then the billet would go into a continuous Rolling Mill which had a bunch of stations that would continue to squeeze it until it was skinny and long. And it was cut into rods which would be maybe about 6-8 feet long.

19:18:33
A:
And these would be taken to the machining department. Our customers were very persnickety about what we sent them. Not only did they want pure material but the wanted it in the right form. They wanted the diameter proper, they wanted the right kind of surface, they wanted the length proper so we had quite a few machine tools to do all this. They wanted, some of them wanted holes drilled in the middle. And so we had drills, lots of machine tools.

19:19:06
A:
And it was a regular machine shop. Any material that was machined off, like when you see a shaving, it was pure uranium metal. Well, unfortunately that burst into flames if you had it in contact with waste air which we had a lot of it around here. So we had to keep that under an oil. We used water soluble oil to flood it all the time. Put it into drums to fill it with oil and this ended up in the scrap plant and they redissolved using hydrochloric acid and then sent over to the digestion area to dissolve it in nitric acid.

19:19:46
A:
And so that was our product and we had an inspection department that looked at each one of these slugs that came out and to make sure that they met all the conditions or they would send them back either Savannah River or Hanford. Usually with, they were very particular about the size they got. So that's pretty much the plant. We had to have a magnesium storage building because true magnesium metal burns very easy so you have to watch that. And you can't use water as a sprinkler because you'll help it burn so you run into those peculiarities.

19:20:26
Q:
And what was the final product used for ultimately?

A:

It was put into atomic piles to make plutonium. As far as the metal is concerned. If you raise it up to a point where it becomes radioactive it converts to plutonium. From U-235 over to plutonium 239 but the green salt was also a product of Fernald because that was sent to the, what they call the uh, Paducah in Oak Ridge where the material was converted to uranium hexafluoride, UF_6, which is a gas. And then they'd blow this gas through filters, very secret filters and what they're trying to do is concentrate the U-235 which is radioactive and get rid of U-238 which is not.

19:21:30
A:
And so they had hundreds and hundreds of these filters and big blowers that blew the gases through. They call them the Cascades because they cascade from one to another. Eventually you got pretty enriched uranium (Wow) which was also used to make atomic bombs. We're wet.

19:21:54
Q:
We're getting a little rain. What do you think?

A:
So we had two products mainly. (Wow, that's interesting) We also had Plant 7 which would take back (thunder - laughter - comment, OK we'd better stop rolling)

Break

19:22:30
Q:
Um, generally how do you feel about having worked at Fernald?

A:
I think it was a great experience. I enjoyed working there. I didn't have any problems. I learned a lot of chemical engineering practically that I didn't learn in the classroom. They had many, many unit operations there that taught me quite a bit for my future career. No it was a great learning experience and I met a lot of great people so I have no, no bad thoughts about Fernald.

19:23:12
Q:
Great. And um, let's see uh, uh, how careful was the AEC about uranium releases into the atmosphere, into the environment?

A:
AEC was very concerned about it and they did everything they could to make sure that we minimize it as much as possible. Any avenue of escape was monitored. The stacks from the dust collectors, uh had optical readers on them so if there was any dust going out of them, it would shut down the equipment and sound the alarm. All the water that left the site went through a general sump where it was checked for oh, 6 or 8 different chemicals before it was released to the Great Miami River. Uh, we would sample the river before and after our discharge to see what we were contributing to it.

19:24:15
A:

Of course, this was all done with the, on the outskirts of the AEC. Uh, they were very, very careful. They had an office there, they had a one whole wing of the office building on the second floor. So they had quite a few people there and they monitored very, very carefully. And the man in charge was a chemical engineer and his deputy was so they knew what was going on. They weren't bureaucrats. That's all I'm saying.

19:24:52
Q:
Oh man. How about the standards of compliance then as opposed to the standard of compliance now?

A:
Well, I think that the, the maximum concentrations that we had to watch were a lot higher than the ones that people there have to watch now. All we could measure, the least we could measure were parts per million, now you can measure parts per trillion, parts per quadrillion, billion and so we were conforming to our standards, our maximums. We had very little trouble. Course now it looks pretty bad that we were contributing but I don't agree that it's that bad compared with the standards that were set by AEC.

19:25:46
Q:
Great, great. (Thunder) Are you OK? Yeah, I'm OK. I am. Um, now I know you've taken a couple of bus tours and things at Fernald now, how do you feel about the work that's going on at Fernald now, the cleanup process?

A:
Well, it looks like they're doing a pretty good job. As I said, I'm not too sure that what they're doing is absolutely necessary but under present standards it's required. So the last tour I took I really didn't recognize too much out there cause some of the old buildings are gone, some of the new buildings are up. And so it's a little difficult to see where we were. I would have liked to walk around more and gone in some of the buildings. But it looks like they're doing a good job.

19:26:45
Q:
Good. Is there anything you'd like to add, anything we didn't touch upon that you want to talk about?

A:
I think I pretty much told you my thoughts on film. I appreciate the chance to do this and pass this on to other generations because to me it was a real learning experience and I never regretted working at Fernald. I did enjoy it and I enjoyed the people. We had a quite a good crew out there and had some very good friends so it's been a good experience.

19:27:25
Q:
I do have one other thought. Uh, once the buildings are torn down out there, there's been a lot of discussion about future land use, what would you like to see done with the land?

A:
Golf course. Turn it into a golf course. Can't hurt anything, it'll get well taken care of. It would be mowed and fertilized and people will enjoy it. And I don't think it's going to hurt the aquifer underneath. Something like that or a park. Uh, it may be another farm. You may be able to raise crops on it, I know people don't want to do it but I think it's possible to do it too but because of the public resentment I think just keep it into a recreational area.

19:28:14
Q:
Great. OK. I think we should shut her down.