

DOE/ORO--914-App. C

DE91 008211

**Appendix C**

**ORAL STATEMENTS  
ABOUT THE  
RSI INCIDENT**

*MS*  
**MASTER**

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**DOE/ORO-914**

**INTERIM REPORT  
OF THE  
DOE TYPE B  
INVESTIGATION GROUP**

**Appendix C**

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RSI INCIDENT**

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**JULY 1990**

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## INTRODUCTION

This Appendix presents transcripts of oral testimony taken during this investigation and is included as an integral part of the factual data upon which the Findings of this report are based. The transcriptions in every case were made available to the individuals involved for correction of factual misstatements and to be cleaned of verbal idiosyncrasies that detract from the meaning of the text. Thus, repetitions of words and terms such as "uh" and "you know" are removed. Some individuals provided extensive comment, others rather little. All RSI employees, Les Price and Sylvia Wolfe, Peter Dayton, and Robert Lynch provided no response. The Chairman of this investigation group went through every tape and transcription to assure, to the best of his ability, that these transcriptions represent the testimony as provided, without the aforementioned verbal idiosyncrasies. Each transcription was then rechecked during the analysis of the data by at least one group member.

In the format of the testimony, the individual being interviewed is denoted by "A:." Where multiple individuals are being interviewed, they are specifically identified only when these identifications aid the clarity of the response. The questioners are identified only by "Q:." except when a conversation between questioners develops, and then names are attributed to the questioner's comments. In some very limited number of cases, the written comments of the individuals being interviewed differed rather drastically from what was actual stated during the interview. In these few cases, both the written corrected comments and the original verbal text are provided with suitable notes.

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**Tom Fisher--Part I**  
**RSI, Decatur, Georgia**

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### TOM FISHER (Part I)

It is June 27th, and it's about 1:30 after we have gotten the recorders fiddled again. We have Mr. Tom Fisher from RSI sitting here. Willis Davis, Mike Jugan, Judy Penry, Roger Jensen, and myself, Ron Hultgren, are sitting at the table. To reiterate the purpose of the activity is, we are here to determine why the cylinder in the RSI facility is leaking. We are here to determine the administrative controls that are involved with the leasing of radioactive sources of this nature. And what we would like to do is talk first of all about how the sources were placed into the RSI facility with the ultimate goal of determining, "Is it possible that the sources could have been damaged while they were put into the facility." And then, once we've talked about that, we can move on to discussion of what happened from about April 1988 through June here of 1988. In particular, the high readings that were taken in the cell itself. So Tom, let me turn it over to you. And please tell us about how the cylinders themselves arrived here at RSI and then how you loaded them into your facility.

- A: All right. Starting sometime at the end of January, we started receiving shipments from Hanford, Washington, about every seven to ten days. Three trucks with nine casks, a total of thirty-six capsules on each shipment. We would take the thirty-six capsules and store them in the bottom of pool in some aluminum tube racks that we had down in the bottom of the pool until the time we had finished up all seven loadings. We would have 252 capsules then we would, went into the identification of serial numbers and put them into proper racks. I don't know what else you all want. That's basically how we got the stuff in here. They came in like every seven to ten days. The last shipment came in, I think, about I don't have all my loading records here, about March 29th, 1988. And the first week of April, we shipped out our cobalt 60 to one of our other facilities. And at the same time we were shipping it out, we were starting to load our racks so we could get back in business again with using the WESF capsules.
- Q: When you picked a capsule out of the cask, what did you use? Did you use a special tool that you had or....?
- A: We had a special tool. I don't know where it was designed. Or we got the design from Hanford, Washington. I knew it was a, it slid down over the top of the capsule, and you cranked the right rod and it would put tension across the top of it. And then you would pick up and you would have to carry this big heavy thing over and lay it into the basket that was laid out at about a forty-five degree angle.
- Q: And so, this tool had a bearing area on the capsule itself? It didn't have any jaws that....?
- A: No jaws. It was just a solid thing that had a thing on the side that kind of came in and held it. It was almost like a cup. It went over it. And you just came in from the side...
- Q: And squeeze it over a big area.
- A: On a big area. It was clamped down on top, on top of the capsule.
- Q: Is that tool around here?
- A: Yeah, it's, it's one of them up on top of the cell up there. You can take a look at it. It's a tool we used both at Westerville, Ohio, and the same tools we used down here.
- Q: And you got the design of the tool from Westinghouse, Hanford?

- A: I can't, I don't really know where we got the design, but somehow that design was given to us for me to use.
- Q: Okay. Okay.
- Q: Was there any receiving inspection or whatever more than the serial numbers?
- A: Well, well, like we do with anything, any type capsule. If we noticed any, you know, if it was dented, mangled or something of that nature, like that. But we were mainly interested in, if there was no physical damage, and what was the proper serial numbers so we could check them off with each one of the shipments.
- Q: That would end up, the, the cask came in was unloaded underwater?
- A: Yeah. Okay. The cap, what we would end up doing, we would pull the roof plug, set it on the ground, and while we were running the water test and everything out of the cask, we prepared everything. And we would start lowering them into the side of the pool one at a time. Take out the four capsules. Take the cask back out and lower it. And it's back and forth nine times for each shipment until we got all thirty-six of them removed.
- Q: You said check the water on the cask?
- A: In the procedures we have right now, we have to run a water test. We have running water to make sure there's no leakage inside the cask. It's, we run in about two gallons of water. We have a vent plug at the top, check the kit, we check the steam coming off, check the water coming out. Get background on it, and this is a requirement we have into our procedures.
- Q: Would this see if the sources are draining?
- A: Just makes sure there's no contamination prior to we lower the cask into the, our pool.
- Q: (Hultgren) Okay. Any other questions about that, that part of the....?
- Q: (Jugan) No.
- Q: (Hultgren) Were there State people or anybody here watching you, or did you just basically do that all by yourself?
- A: The State would come out some during our summer cobalt-60 loadings. I don't think that they, they'd come out. They may have come out just briefly but not during, not for all seven loadings.
- Q: Okay.
- A: I don't have any records to show that they were or they weren't. But we keep, we got loading records that we have back there on the one, the time we, off the truck, while in the pool, off the pool, back to the truck. We kept very, very good time records on that right there. That are reviewed when the state and/or DOT hazardous waste people, you know, transportation people come in audit us.
- Q: Okay.
- Q: Once you've got the capsules down inside the water, how did you place them? What procedure do you use to get them into the rack itself?
- A: What do you mean a procedure? We, you just, we just...

Q: I mean the tools. What kind?

A: The same tool we unload them with.

Q: The same tool you used to unload it with?

A: Yes. It's a, it's a heavy tool. When you lay it up there, it's, you're picking that twenty-two pound capsule up with the heavy tool right there. And it would, you, after all day long lifting those things, you know you've done a day's work. It was the same tool. One time we did go to, we found, we found an easier method. As this, it was just what we call a snare, it's a rabbit snare. It had a round, you know, cable running through, you grab it and you could pick it up, holding it easier, light tube to hold it and just put it in there that way instead of using that big cumbersome tool. But we didn't find that till almost to the end.

Q: Well, getting them out of the cask that shipped it in here, you put the cask underwater, and then you pulled them out from the top of the cask? Okay. I got ya.

A: You go down there, and there's four of them. They're kind of, if you're looking at one of our tube racks, there's four of them. They're kind of sitting in. You just go until you, you feel it down. And then you crank it up, just pick it up.

Q: Okay.

A: It's almost like a posthole digger almost. If you put it in there and crank it down and pick it up. Then put it into our holders in the bottom of the pool.

Q: Okay. Then tell us about April. I guess that was, you had removed your cobalt sources?

A: We had removed our, we had removed our cobalt on April the 28th, thereabouts. And we took a routine pool sample. We take after all pool loadings. And we submitted it to Dr. Kahn down at Georgia Tech for cobalt and cesium content analysis. And the records on that show that the analysis taken it for cesium 137, we had 48 picocuries/liter. No other radionuclides were detected. And cobalt-60 was less than 2 picocuries/liter.

Q: These are per liter?

A: Per liter.

Q: Okay.

Q: Forty-eight picocuries per liter?

A: Yes.

Q: And cobalt was less than...

A: Less than 2 picocuries per liter.

Q: (Jugan) Okay.

Q: (Hultgren) Tom, what's the letter that you're reading from?

A: It's the analysis report that came back from Georgia, from Georgia Tech.

Q: Okay. And that's dated May 23th, 1988?

- A: That's when he did the analysis. That's the date we sent it in to him right there.
- Q: Okay. So you got the notification May 23th?
- A: Uh-huh.
- Q: Okay.
- A: That's the date we have the notification here.
- Q: What's the level of accuracy or the lowest detectable limit on this analysis? Do you have any idea?
- A: We're basically pushing the detection limits of their equipment here because of the other activities in here that have been done on previous, we're down to  $1 \times 10^{-9}$  microcuries/cc. That's pushing the limits of nothing there.
- Q: Yeah.
- A: That's what we've been finding. You can see here no cobalt-60 detected and no radiation detected, and this is November 25th sample. And it's been this way,  $1 \times 10^{-9}$ ,  $1 \times 10^{-7}$ , you know, ever since we've been running.
- Q: Okay. So with that reading you launched off using your cesium sources here. And how many times do you think you pulled them up out of the water, dropped them back into the water between then and, and the next sample which was taken in June, early June?
- A: I'd have to go, I don't have those source movement records. But it probably wouldn't, we were getting very good efficiencies during the month, during that time frame. I can, I can get those, the information for you later.
- Q: Tom, when you say efficiency, what does that mean?
- A: Well, I don't, we base our, you know, our efficiencies of how often we're, you know, we're running the system.
- Q: So when you say...
- A: (interrupts) I find the sources out of the water, and if we're shutting them down to pull samples, we're shutting them down because of mechanical problems or a jam or whatever. We base it on efficiency samples.
- Q: You're, by efficiency you're really mean your production efficiency?
- A: Production efficiency.
- Q: Your sterilization efficiency?
- A: I'm, whether we have the system running or not.
- Q: Fine. Okay. Because that can be misinterpreted as, efficiency of your sources or something.
- A: No. Well, it does get down to efficiency of, you know, if you're not, if the source is in the water, you're not making any money.
- Q: (chuckles) Tom, when, when did you start using the cesium sources? Was it in January?

A: April.

Q: It was until April?

A: April of '86. That's when we started product, actually producing with the sources.

Q: With cesium?

A: Straight cesium. Yes.

Q: Okay. So that was January of 1986 you were talking about when...

A: That's just when we started the loadings. It took...

Q: Yeah.

A: ...you know, about, almost two months, a little over two months to do all the loadings in there.

Q: Okay. And then, and then you haven't, was the forty-eight, picocuries per liter in April of '88. The...

A: (interrupts) April 28th of 1988.

Q: That was the, was that the first indication of any elevated cesium?

A: No, I mean that's forty-eight picocuries is not really an elevated....

Q: Was that the first indications of cesium, I guess?

A: No, it, they, in every...

Q: (interrupts) They've always been along those lines?

A: Yeah.

Q: Okay.

A: All the water analysis taken back through here, 1986, 1986, 1986...okay. You're talking gross alpha beta? No tritium? No alpha, beta, gamma? No cobalt-60 was detected after counting six-thousand seconds, four-thousand cc,  $1 \times 10^{-9}$  activity? And, there's all the mathematics that goes on, goes on with it. And this is all the way back to 6/4/86. And we sent in water samples off of every loading. They're in with the loading records.

Q: Okay. I guess my question is was the, is the forty-eight a typical reading that you would get back?

A: Yes.

Q: Okay.

A: Well, I don't know how to fill the conversion 'cause Dr. Kahn does the picocuries per liter and Dr. Bob Boyd is the Radiation Safety Officer down there that reported microcuries/cc. So however you work out the conversion factor on that. But it's out there like ten to the minus nine.

- Q: What was the other, microcuries?
- A: Microcuries/cc.
- Q: And what numbers was he getting?
- A: 2.25 times  $10^{-8}$  microcuries/cc.
- Q: That's  $10^{-8}$ . Okay.
- Q: So you, you didn't really, when you got this result back, you didn't, that was sort of a normal?
- A: That's a normal, I called and asked him, "Can you kind of help me out on converting these?" And we went back down through the thing and that comes out to be  $1.5 \times 10^{-8}$  microcuries/cc. So he said that's at the detection limits, you know, -8, -9. So that's a normal reading for us.
- (Peuse)
- Q: Okay. So on June the 6th, you took another sample of your pool?
- A: We pulled one after on June, on June the 6th, about 8:40, it was reported to me there was a problem inside the cell. That they had some elevated readings. So the safety system would not allow us to run. So I entered the cell and monitored the radiation levels of the pool with the Z-TEX 305 beam meter that we use at our pool. And we detected water radiation coming out of the pool greater than our .2 MR/hour background. This is for our cell. I pulled a grab sample, about a half-gallon pool sample and carried it out to the maze and measured it to be between 3.8 and 4 MR per hour. And by that time I had already, at that time I was calling Al Chin about 9:00 our time here, 8:00 his time in California, reporting that we had a leak of some nature inside our pool. Then at time, we shut down the area. We locked it out, and next we went to a restricted access for entering the cell. We're just either me, I was the primary person that just went in the cell and pulled any samples that needed to be taken on June 6th. But the safety system is what detected it.
- Q: Okay. And the safety system that actually detected it, it was the pool monitor?
- A: The cell monitor.
- Q: The cell monitor.
- A: We have two GM tubes, one's for the cell, one's for the maze. When the sources are out of the water, the maze kicks in and the cell is blacked out. When the sources are in the pool, it's reversed. The maze goes off and the cell monitor kicks in. And it's set at about .2 MR/hour. So it, whatever triggered it was above background.
- Q: And it was giving you some sort of audio alarm?
- A: It blocks out our safety system. If anything is above set point the safety system which is a complete loop. If you take one piece of the puzzle out it will not start up.
- Q: Okay. So you're, it's impossible to feed anything on your conveyor belts....
- A: It blocks the whole system out.
- Q: Everything just shuts down?
- A: Yes, sir.



Q: Okay. So, you called Al Chin about, about six o'clock in the morning his time?

A: Correct.

Q: That must have been an exciting call to call your boss at that time.

A: Well, it was an unpleasant phone call. And I called him. And we started discussing, you know, then it, let's see 7:33, Al called Sylvia Wolfe at DOE and...

Q: (interrupts) That would be 10:30, Eastern Time?

A: Yes. He called Sylvia Wolfe and told her about it.

Q: Why would he call Sylvia? Do you have any idea?

A: 'Cause she was in the management of the lease of the capsules.

Q: Okay. Okay.

A: Then from there on it was State came and visited us that afternoon. I called the State shortly after I'd talked to Al. Tom Hill and his group came out. Then the week full of events started.

Q: Have you had experience in this sort of thing before? I mean, have you ever, you know, (chuckles) been involved in a mess like this before?

A: This is the first time. I've been to many loadings of isotopes, but I've never been through a spill or a leak. This is a first. Like this almost a first for the industry. It kind of caught us all off guard, but we went and shut down. Sent all the people out and had them monitored and blood, you know, all the bio-assays that needed to be run. We started setting those up as soon as possible.

Q: And we found, and you found that three people were contaminated? Is this, true?

A: Let's see....

Q: When were they found?

A: Okay. Let's see. (pause) We, the people on duty, we surveyed them with a Ludlum meter that day. And if they found anything on, they were asked to go scrub until they got to counts below background. There were three employees that we found it on their, (pause) hands and forearm of one employee, and just basically on the, on the palm of the hands of two of the other employees.

Q: And that's what they did? They went into the restrooms or wash area and they scrubbed off?

A: They cleaned up. Let's see. (long pause) Yeah, after we monitored them, we collected their film badges, wallet badges. Sent those off, sent them to the, Ciosmac Clinic to do some CVC work. And that's all we did at the, that time after we just shut down. We called some of our employees to come back in, bring any of the clothes that they'd worked with that was on the shift either that Sunday or Monday, and examined the clothes. Anything we found was bagged and put into the contaminated area where we'd already roped off. (paper shuffling) Then on June 9th, we did a urinalysis. And it was sent off. I sent to Teledyne Laboratories for all employees, and all samples that have come back have been below their, within normal limits. There is only one other thing we may be doing. We may be, we're still discussing with

ChemNuclear, we may have a whole body counts done to one final last thing to show that there's nothing there. And we're working that out with them right now.

- Q: Do you have any idea when the floor there and the rug and so on got contaminated in the (unintelligible)?
- A: (interrupts) A lot of that could have been us going inside the cell not knowing what had happened. We probably picked it up on our shoes 'cause you can look in my office in there and you can see where it is. And walking back and, back and forth 'cause we didn't know, you know, we were, we didn't have booties on or anything until probably the next couple of days. We went into a jump-off zone.
- Q: Is this normally a clean area?
- A: That's normally a clean area right there. Yes. Right.
- Q: Okay. And so since then you've been cooperating with the clean-up and trying to get things back and in shape again?
- A: Yes. I, we're, you know, we're on a, it's a very close effort between the DOE folks, the two state organizations, NRC, and RSI to work to this thing and till we come to get the place cleaned up and get back into operation again is the....'cause I know we work, we're trying to release a product right now with the help of everybody out there right now.
- Q: Torn, this is a question I'm going to ask everybody that comes along and, you know, that talks us, "What do you think caused this? What do you think caused this?"
- A: It's hard to speculate on there 'cause I've read all the, all the literature on these, these capsules and everything. Unless there's a hairline crack somewhere. There's, and with the possibly constant thermocycling, there is contamination that would have, might have been in the cesium. And the constant thermocycling could just have started aggravating the crack until it started leaching out. That would be about the only thing I can, 'cause after reviewing one of these things here, they're built like a tank.
- Q: (chuckles)
- A: I mean I saw the one you all have in your trailer over there, and that thing's humongous. I didn't know they were built nothing like that.
- Q: Did you have any contact with the Hanford people telling them, "Hey, we are doing this much raising up of the cylinders," or anything like that? The Hanford people or the Richland people never came here and looked? Never...
- A: We got our demonstration facilities in the Westerville, Ohio. And I think they took a capsule out of it about a year and a-half, two years ago. And carried it back for destructive testing. But nobody's ever questioned or called the Decatur operations here.
- Q: Okay. Have they took the capsule out under that term of the lease where they can come in and, and take one sample....?
- A: Take one capsule out. And I think they carried it down to Oak Ridge for evaluation at that time.
- Q: That's from the Ohio?
- A: Westerville Ohio. Yes.

Q: Did you ever get anything fed back to you as...

A: (interrupts) On that report?

Q: Yeah. I mean did they ever say, "Hey, everything's really great"?

A: I talked to Dr. Fairand whose the general manager up there (at Westerville), and to this date we have not received a report on that.

Q: Okay.

Q: Did you get any, when you got the capsules, did, get any additional instructions of how to handle them or anything else, procedures to be, emergency procedures to take if something should go wrong or....?

A: I'll look at my records but I, my first response to that question would be no, right now.

Q: Uh-huh. Were there any operating limits that you are aware of other than the State of Georgia placed on you using these capsules?

A: No. We're just limited to the number of curies we can have, you know, under, with our, under our license that we have with the State of Georgia.

Q: Okay. But no necessarily monitoring the, the temperature of the capsules?

A: Not for that. It was agreed upon that it, what I understand it, that all temperature monitoring would be done at our test facility which was designated as Westerville, Ohio, where they had thermocouples in there so they could measure the surface temperature when it's out of the water on the racks. And all that was set-up up there. And all that data, it was turned over to the Department of Energy after, I think, a year of operation.

Q: Is your Westerville, Ohio facility very similar to this one or exactly the same as this one as far as physical size of the pool and the room?

A: We have four source racks. They only have two source racks. The size of the cell would probably be, maybe, their's may be a little bit smaller 'cause our carriers which are, you know, carries our product in there, are a whole lot larger than their's.

Q: So if they found something out about your Westerville, Ohio facility, do you feel, would you feel comfortable that that data would also extrapolate to this facility?

A: I'd hope so.

Q: Okay. Is that a cesium only facility?

A: One hundred percent cesium, yes.

Q: Did you run that facility, and test that facility for some time before this one started?

A: Decatur was at the first designated to be the test facility, but we were still under licensing phase with the State of Georgia down here, so Ohio, we just did a turnaround and designate Ohio to be the test facility and the demonstration facility for Radiation Sterilizers.

Q: Okay. How long have, were you in this facility? How long have you been down here?

- A: We started in February 1985.
- Q: And so you've personally been here?
- A: I've been here since the first brick went up.
- Q: Okay. Maybe you could also tell us about what happens in a normal day's, Al told me that you have shift of twelve hours on, twelve hours off. How many people compose a shift? And what are their respective duties while they're, while you're operating it with, what we're come to learn as full efficiency?
- A: When we have normal operating hours, we have four two-man crews. And they work four on, three off, three on, four off type schedule, twelve hours a day with one supervisor and one material handler on each shift. And they run the system on the production schedule set up by the Production Manager. And run seven days a week, twenty-four hours a day.
- Q: So these two-man crews, they're loading....
- A: They're loading the boxes into our totes on a, and the, there's a dwell time set-up that they have to load it, you know, keep up, to keep the system up. If it's a ten minute cycle or whatever, they'll load it. And they'll load a tote per the dwell time with product, putting the appropriate paperwork and dosimeters for the production process.
- Q: And then obviously off-loading it at the end.
- A: Then the tote, once you off-load it, it comes back around to the load side of the, the operation and it goes right back to the cell again with new product.
- Q: And all of the operations of the conveyor's system are computer controlled. Is this true?
- A: They're micro-processor controlled out there that the operator has very little to do. If he has to go in to do anything, he can start/stop the system, reset the three-arm safety system, come back out and turn the key, and start it back up again. But he has very little control over any of the system in there. That's left up to our Engineering, you know, Director and he has that blocked so nobody else can get into the controls.
- Q: And what is the product that you normally, what are, what are the types of things, what are the types of things that you feed through this system?
- A: The, 99.9 percent of our business is single-use disposal medical devices ranging from surgical gloves, surgical towels, catheters, otology implants, anything of that nature there you'd find in, in a hospital that would be single use, that would be thrown away again. I suppose a lot of it, plastic latex type material.
- Q: The obvious question then is what's the other .5 percent of...
- A: (interrupts) We do, it's just, some R&D type work on product evaluation working with companies on doing, trying to come up with different types of plastics. Just R&D type work. And we're starting to get in now to a little bit of, of the food work.
- Q: Do people come to you with say, you know, two cases of some product and say "Hey, I need this sterilized, how long does it take, and run it through your system and give it back to me and I'll see how you did?"
- A: We do what we call product evaluations that we'll, we'll approach a customer or they'll approach us. Then we'll have them send samples in, and we'll radiate it at two or three

different dose levels so they can see the minimum and the maximum exposure where their product might be able to withstand radiation. If it can't, we can point them into some alternative vendors who might be able to give them raw materials that could, that'll be gamma compatible. And once they determine that it is, then we can get into them on some FDA requirements of determining dose and density levels and the proper controls for the service agreement that we enter into, then, as they ship product in, we'll process it doing it to the parameters that's been set up.

Q: Tell us a few of these other activities or if, do you feel that's in some way guarded as a company, which secret.

A: I do like...

Q: I mean are these people, I mean the non-medical use, people sending in food, you mentioned food for example.

A: (interrupts) We've had some, I can't remember the name of the university down in Baton Rouge, down there. We've done crawfish, (background chuckles) radiation shrimp, we've looked, gone into these bovine type serums for veterinary type use, the food products are starting to come on slowly in the Southeast down here. We've done work with some of the vendors that sell product raw materials to medical device manufacturers that they'll send in envelopes with different plastic chips. We'll radiate them and send them, so they can, their people can evaluate them for color changes and physical characteristics. That's probably be the other small percentage of our business right there. We've done some gem irradiation too.

Q: Sir?

A: Gem. Precious stones.

Q: Gem. Gem. Okay. (background laughter) We all come from different parts of the country.

A: Gem radiation. Topaz.

Q: Okay.

A: Color enhancement.

Q: And it enhances the color?

A: Yeah.

Q: I didn't know that.

A: You take topaz, raw topaz irradiated about 500 to 700 mega-rads, and it will enhance the colors.

Q: Hmm. I wonder how long it takes to fade.

A: I don't know, but, you know, there's been a lot of articles written on that.

Q: Is that right?

A: You buy them and take 'em out in the sun, and the color disappears. (background laughter)

Q: Okay. I have a question. You mentioned the cell was a clean room. What are the contamination control procedures or radiation contamination control zones if they are any?

- A: They was none set up prior to this 'cause, you know, dealing with sealed sources, it's not like a nuclear power plant where you have to, you know, you're dealing with, where you have to go through frisk zones and everything else. See there's nothing here besides entering the cell, we have cesium-137 check source at the safety panel, and you check that when you go in. And you have to arm our safety system from the inside and cut it on the way out. We got automatic counters in, automatic counters out that have to zero out. If they don't, you can't set the, you can't arm the safety system, but this is...
- Q: Yeah. This is more from a radiation point of view than a contamination control.
- A: There's nothing set up for contamination control. We set these contamination controls up as soon as we found out there was a problem. We started restricting it, moving some movable fences around so we could control the access to getting in there. Put it under lock and key that myself and one other individual has a master key that can get past the double doors out there to go inside the cell to either pull a sample or to, to make some observations.
- Q: Were you aware of much of the differences between these cesium sources and the cobalt ones that you had been using in the past?
- A: From processing?
- Q: No, from just, I guess, the characteristics of the sources and something about what they are.
- A: I knew what was being done. Well, I knew that the cesium chloride was in a water-soluble. That it's highly soluble in water. If there ever was a leak, that the cobalt-60, it's in pellets, and they wouldn't disperse quite as easily. That they would kind of lay around on the bottom of the pool or if they're light enough, I guess they might move around a little bit. But I've read the, some of the reports that Garth Tingey and some of them had written, and that report that came out in 1984 from Battelle on all the physical, chemical type characteristics. I got a couple of articles on that.
- Q: Uh-huh.
- A: I'd read all those at the time.
- Q: Okay. But in terms of the design of the facility and everything you viewed the, the probability of something happening to be so remote as to not set the thing up for contamination control?
- A: No.
- Q: Basically?
- A: There was nothing in the licensing for me that ANSI standards or NRC standards that are in for category 4 irradiators at this time.
- Q: Yeah. You said you had four units down in that pool that you fill up?
- A: Four source racks.
- Q: Four source racks? And you've got 252 units in there right now?
- A: A hundred and twenty-six in one rack and a hundred and twenty-six in the other rack. The other two racks are empty. Those are the ones that the cobalt was moved out of.

- Q: Okay. Let's see, two out of four racks in use. Correct? I noticed the lease that you have with the government. You've got, I believe a hundred and eighty-six units on one and two-hundred and forty-eight units on the other one.
- A: Uh-huh. It's, Westerville has got, I think, a hundred and eighty-six. We have two-hundred and fifty-two. But I think they gave us the other four or something on the lease agreement. They had four. That gave us two-hundred and fifty-two of 'em.
- Q: You got most of them out of one lease agreement and plus four?
- A: I think we got four from the other lease agreement that they didn't want to ship because you just don't want to ship one whole truck with four capsules. So they decided to tie it into the 248 shipment, is what I understand.
- Q: Okay. So you've been, all the, all the units that's on your lease. There are two different facilities. That's what you're saying?
- A: Two forty-eight from one lease and four from another lease is the way I understand it.
- Q: Okay. Did anybody ever come in and do any kind of safety reviews of your facility? I'm thinking like maybe private consultants any insurance companies or anyone outside of the government. Have you ever had anybody?
- A: Not from a radiation standpoint. You know, we get the normal insurance coming in for just product safety type liability. You know, out at the warehouse type stuff. But nothing from a safety review from a radiation standpoint.
- Q: So they just came in and do a normal safety check like, kind of like an OSHA type check on your facility?
- A: Correct. Yeah. They, we might take them back to the cell if they want to go and show them what it is and log them in and log them out. They'd go in there, spend five minutes and say, "It looks nice".
- Q: Okay. How about the state inspections or reviews? Did they...
- A: (interrupts) The state has been out, Tom Hill and his group, they come out, I think, the last time we were audited was last October of 1987. They're to, license, inspect us a minimum of once every twelve months.
- Q: You mentioned the water sample that you took when you take the units in and out of the pool that you normally do a water check. Do you do a water check any time in between?
- A: Yes. Whether we load or not load, our license requires us to do a water check every six months.
- Q: Every six months? Okay.
- A: We did, we decided that we would check after each loading to make sure that, you know, nothing came in off the cask or anything like that that would, could give us false indication inside the pool.
- Q: Do you have any guidelines or, I don't know the exact word I'm looking for under water chemistry. Do you monitor the PH?

A: Don't monitor the PH, we just monitor as long as we study, we keep them from ten micromhos down, for the water, for the water conductivity.

Q: Okay. So it was...

A: It was set on ANSI guidelines for the water.

Q: If it's out of spec, is there some additive that you put in like an electrolyte or something?

A: No. We've never, our's has never gone out of spec.

Q: Never gone out?

A: Never gone out of spec. If it starts getting too high, we just change resins.

Q: Okay.

A: And we send, like I say if you look in the water, every time we change resins, we have to send the resins off and have those analyzed. And once they're analyzed, I can throw them away. Maybe put four new tanks under the system, and our water is probably some of the purest around. It's, you know, .2, .4 micromhos which is...

Q: (interrupts) So you have an inservice demineralizer?

A: Yes. What it does, once you get the pool down to a level, to within spec, then run your demineralizers only when you're using make-up water.

Q: Oh, okay.

A: So you're demineralizing any of the city water coming in so you keep the pool level below the ten micromhos.

Q: Oh, okay. Is the 126 units that you mentioned, is that a full load in these two units as you got?

A: No.

Q: It's not a full load?

A: No.

Q: What would be the capacity of the...?

A: Oh, I haven't added it up, but we've got seven layers of racks in there like six across. And each basket holds six. So we're only using four. We're probably using about two-thirds to seventy percent of the, of our total capacity that we can put in a rack.

Q: So then two racks then are just partially filled?

A: Yes. Correct.

Q: Okay. Let's see I got this exactly straight on the timing. You start, you got the cesium capsules about two years ago.

A: Twenty-six months ago.



Q: Okay. And just this last April you were getting rid of the cobalt capsules.

A: We've had cobalt before and moved it out. We thought we were going to get some business here, and we moved it back out. We've had some cobalt that we had some big customer came in last fall. We moved in about six-hundred thousand curies. That business went back to another facility. So then we took this six-hundred thousand curies back out and sent it to Chicago.

Q: Okay. So the cesium in this inventory has stayed constant for a long time if you've been...

A: (interrupts) Two-hundred and fifty-two capsules have been here since, you know, April the 1st.

Q: Right.

A: And we've intermingled and taken in and out some cobalt sources.

Q: Cobalt? Oh, okay. That was the reason you said you checked the water after, ...

A: Yeah, we checked the water after the loadings.

Q: Okay. You said when you got the capsules that basically you didn't do...I mean, you looked at them in general and recorded their numbers, or you did that. The lease also requires that Hanford assure you that the welds are good by the results of an ultrasonic inspection that they do on those welds. Was that data ever made available to you, that you had the opportunity to either accept or reject a particular capsule?

A: No. No.

Q: So as far as you know, did anyone at RSI ever have access to those data to either accept or reject a capsule?

A: Unless Al Chin did. I did not. You know, we never had the chance to look at any production or QC records whether a weld pass had to go back and be re-QC'ed again or whatever. No, I've never seen or heard of any data like that. I'm sure it's available, but I, we've never reviewed it.

Q: Okay. The lease does include that provision that they...

A: (interrupts) Unless it was given to corporate, it was not forwarded to me here at Decatur.

Q: Do these, one of these sources are out of the water or even while they were being handled or are they jostled around to a minimum?

A: They're tight.

Q: Tight?

A: If you look at one of our sources, I don't know if I ...

Q: Tom, I have a picture of the rack anyway.

A: I wish I'd brought 'em. If you look at these racks right here there's a partition. There's three in this side of the basket, and it'd be three in this side of the basket over here. And they're, I mean they're just like this.

Q: Okay.

A: I mean they're, they're not touching. They're not going to be, they're can't go like this. I mean they're in there.

Q: Okay. Just the three touch each other too then?

A: Yes, they do.

Q: Do these things ever, does the racks themselves ever get hit by the product...?

A: No, 'cause if you look in there, I don't know if you saw it in there, I don't know if you saw it in there, the big safety railing we have around those things. Which is two by two tube of stainless steel.

Q: Okay.

A: You would have to go through that first before you would even get to the source racks, and the source racks are about six inches away from our product and our carriers. Where if you've ever, I don't know if you all have ever seen the other type commercial irradiators.

Q: Huh-uh.

A: On an AECL design the source plaque and the product pass within about an inch and a-half of the source plaque. Where we're about six to seven inches away from it with the large safety running around there so that a carrier, tote, or whatever can not jam into the source rack.

Q: Okay. We saw the tape, now that you mentioned it. Do the capsules that are in those racks, do you maintain an inventory control by capsule number?

A: Yeah, I don't have the record. I've given, I've turned it over to some girl last week that has, that shows my arrangement in there. And each one of them has a serial number in each basket.

Q: So you can, if anybody gave you a number, you can tell them exactly what location and which basket they would be found?

A: Correct.

Q: (Penry) When was the first time you had seen a DOE person down here?

A: DOE? I've seen, now is that Westinghouse or DOE?

Q: (Penry) Westinghouse.

A: When did they come down?

Q: (Jugan) Do you mean possibly starting in '86? Yeah. I mean as opposed to two weeks. As opposed to June 6th. Two weeks ago.

A: Two weeks ago.

Q: (Penry) Two weeks ago is the first time you've seen a DOE or DOE contractor?

A: Yes. Yeah.

- Q: It's important that that question be clarified in here. (mumbling)
- A: Yes. I think all the DOE kind of work had been gone through like at our Westerville facility that moved one capsule out about year and a-half or two years ago.
- Q: Any other questions? Okay. I, I think we're run through our question base, Tom. What we would like to do is to have the freedom to look at the collection procedures, the license book that you showed me briefly before lunch. Some other records we, just to make sure, you know, that such things exist and were here. I certainly appreciate the cooperation and the answers that you've given. We've got a long road ahead of us here to find us.
- A: Like I say, I'll be filling in for, for Chin and our engineering people will, on, that are not here now 'cause I probably know more about this system and what's taken place in the last twenty-six months more than anybody. So I'll be able to assist you on anything that you need here.
- Q: Thank you.

END OF TAPE

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**Claude Beecher**  
**RSI, Decatur, Georgia**

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## CLAUDE BEECHER

It is now about 2:30 in the afternoon on the 27th of June. We have invited Mr. Claude Beecher, an employee of RSI. And he was the supervisor in charge at the time the incident really was discovered. Tom Fisher is here with us also. And the rest of the panel. So Claude, please tell us in your own words what, what basically happened that morning when you came to work.

A: Well, I was actually at work from twelve midnight. (laughter) And we had just finished shifting Long-Life Dairy out, outside, the warehouse, when upon return into the control room, the system went down. So I was a bit surprised, you know, the system just went down just like that. But, it is customary that if something goes wrong with the system, it will go down like that. I went to the computer to find why it went down. And there was an alarm displayed. It showed us that the starter was manually activated. So I went outside, and I made a physical inspection in the vicinity, get back in the control room. And I cleared the alarm. Just after clearing that alarm, there was a next alarm that came upon the computer stating that radiation monitor was above set point. I went out, and I also acknowledged that alarm and cleared it. Went to the control panel in the control room and set off all the other breakers controlling the source racks. I then pulled the door. I had a meter with me, exposure rate meter. And then after pulling the door I was accompanied by my co-worker, Rick, and we went inside the cell. I went in the cell, in the maze first actually looking in, looking at my meter which was displayed. While in the region, it was fluctuating in between .1 millirad and .1. All right. I was about to make a physical inspection of the cell, right. And to restart the system, set the safety system, restart the system. Just about after placing the key in the maze, in the control panel in the maze, and upon entering the cell, I noticed my meter went from a .1 and just flucted to a .9.

Q: To what?

A: To a .9...

Q: Okay.

A: ...millirad. I shouted to my co-worker who was behind me at a point that something is wrong, and he should get out. And I turned around, and I get out as fast as I could at a point. When I got out, I went over to Mr. Bob Ramsey, who was in control or who was about in control of the plant at the time. And I explained it to him, and he took the matter from there.

Q: What time was that?

A: Well, when it actually happened it was about 8:30.

A: (Fisher) 8:39?

A: (Beecher) 8:39, 8:30.

Q: Did you go into the cell twice were you saying?

A: No.

Q: The first time that you cleared the alarm, you cleared it from outside?

A: From outside.

A: (Fisher) Okay. Robert Ray is here. You want him in here? Wait out there for a second while....

Q: You've never seen anything like this before?

A: No. (laughter)

Q: Never want to see anything like this again? (background laughter)

A: Well, now I was a bit surprised, you know, because we always go inside the cell and it does normally read like, it would be like either a .2, you know, it fluctuated to either .0, .1, or .2. And I was a bit surprised to see it go into a .9. I, you know, I just sensed that something was wrong. So I said, "Let's get out of here," you know.

Q: What limit would you have continued going on in there? I mean if you looked at you meter and say, say it had read .5?

A: If I looked at my meter and it was reading a .3, .4, I'd have gotten out. (background laughter)

Q: Anything unusual basically it would have...

A: Right.

Q: ...been enough to tell you...

A: Something was wrong.

Q: Okay. Had you had any problems? I mean with the conveyor system or were you really feeding stuff through there very efficiently up to that time when everything going very nicely at that time?

A: Up unto that time, everything was going along great because we'd not gone previously before for the night. And the system was running good. All right. As I say, I was a bit surprised, you know, when it went down like that because we were trying to run like a couple (unintelligible) before shutting down. So....

Q: What's happened since to you? You, they discovered radiation, some sort of contamination on your palm. Is this, is this correct?

A: Yeah. Yeah. What we did, we went through a, we did a blood test before I went on vacation. And I was clean in a sense, and they found some amount of radiation in my palm, which was washed away with soap and water. We got it off.

Q: How do you think you got that on you, on your palm?

A: Well, we had unloaded, a tote of product that night I think, Long-Life Dairy, and that was coming off the system.

Q: Uh-huh.

A: So that's possible where it, it had came from. It had come off Long-Life Dairy because...

A: (Fisher) In some of the surveys, we were running right there, we're planning, on some of the product boxes so, you know, telling 'em like this. The box, it was found on the shirt, clothing, like on your stomach and on the palms of the hands. We just surveyed a thousand boxes of

Barnes Heines. We found four boxes out of a thousand that had a very small minute cesium chloride. It must have been in a water form cause it's in the cardboard.

Q: Umm.

A: (Fisher) It's not on the surface. It's not removable. It's in the cardboard.

Q: Is it typically pretty humid in the pool like most cells? Is it, do you get water condensation normally in there?

A: (Fisher) You probably would from this, you know, from the burn-off of the water coming off of the cesium chloride, but we have a fifteen ton water chiller on the pool trying to keep the pool water down, you know, like less than seventy-five degrees Fahrenheit. But as long as that and, then you know, with the ventilation that we have in there its moving the heat and the humidity out about as fast as its developing

Q: Anything else you might want, can think of, Claude, anything that you might think of that could have caused the problem or things that could have been done better? Or in the future can be done better?

A: Well, I've been working on this, this company for about seven, eight months now, but a lot of attention is paid to safety, you know, right. It's difficult for anyone to be, to access the system, I mean, you may probably be nuts trying to beat the safety system. Right. It's pretty safe, you know, if you are, if you are paying attention to what you are doing, it's pretty safe.

Q: Does the idea of a two man crew, I mean, that, that's enough, you're able to keep the product flowing through and also pay attention to those safety aspects that, you mentioned?

A: Yeah, because I mean being in charge of a shift, you are in charge of the fellow that is working with you or your co-worker. And you would not necessarily want to take on unnecessary steps to either getting your co-worker injured or yourself. And you are in charge of that shift, so you got to be in the forefront really, you know. I would not send my co-worker in front with the meter knowing that either, unless I would be looking over his shoulder or something like that, you know. It would be wise for you to be here at all times, you know, especially if he's just training or something like. You wouldn't want to leave him alone.

Q: You...

A: If I, if I had to leave him alone for any period of time I would turn the plant off.

Q: Your shift starts, or that particular shift starts at twelve midnight and ends at twelve noon?

A: Twelve midday. Right.

Q: So you and your co-worker basically have been at work about eight...

A: (interrupts) Eight hours.

Q: (Jensen)...eight hours at that time.

Q: (Jugan) Is that a fairly strenuous job?

A: Well, it's not strenuous in that sense. I mean my shift is normally, a three man crew. But just that one, one member of my crew did not come in that night.

A: (Fisher) This, while we, back earlier when we had all the cobalt in there, we had geared back up on some of the crew shifts where they had three man crews. And as we moved the cobalt out they were absorbed, well they stayed three man crews. And they were finding other positions for the, that extra third person as we scaled back down to the lower isotope and the lower number of people needed on the shift.

Q: (Hultgren) Any other questions?

Q: (Jensen) No I can't think of anything.

**END OF TAPE**



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**Robert Ray**  
**RSI, Decatur, Georgia**

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## ROBERT RAY

(Hultgren) Okay. It is about 2:45. Again June 27th. We have with us Mr. Robert Ray, who works for RSI. Robert works with Mr. Beecher, who was here just a minute ago. Also here is Tom Fisher and the rest of the board. So, Robert, I think it would be best if you'd just tell us in your own words, you know, what you know about all this. How, how did it, how, what happened?

A: About what? The leak?

Q: Yeah.

A: I have no idea, you know, what happened. (background laughter)

A: (Fisher) Now Robert gets off shift...

A: Yeah, I got off.

A: (Fisher)...Saturday night at midnight.

A: I got off at noon time...

A: (Fisher) Noon.

A: ...and shut down about what?

A: (Fisher) Noon on Saturday, and Claude takes over twelve hours later after him.

Q: Oh, I see. So it was in operation?

A: Claude's shift. My shift had already went off.

A: (Fisher) He, his shift had already been gone two days, by the time this event had happened.

Q: Oh, okay. Okay. So there was nothing, nothing unusual that was happening during your shift? Your shift was going on just like it had been for years and years?

A: Yeah. As a matter of fact, it run smooth since we been down to this slow ten minute cycle. That thing runs perfect, just one hundred percent. I hadn't been in that cell, I don't guess, a week, ten days, two weeks.

Q: There were no alarms? There were no...

A: (interrupts) Not on my shift.

Q: ...funny readings or just, you're just concerned with loading it on and taking it off?

A: Right. Sure was.

Q: Okay. What would happen to make you go in the cell?

A: Oh, well, like double release, two carriers, sometimes the stops won't close fast enough or for some reason they open up too early and they run together or won't get out of the way.

Q: The products then?

A: Yeah, the two carriers then been moving at the same time, and they may want to run together. When they do that, the alarm will go off, and they shut it down. Then we have to go in there and push the carriers around and straighten them out and get them back in sync.

Q: Cells drop down into the water?

A: Yes, starts to go into the water.

Q: And then...

A: (interrupts) But then all of our safety, if they don't, it will get hung up, and we couldn't get in the cell in the first place.

Q: If it wouldn't drop back down into the water, you couldn't get into the cell?

A: No, ma'am. (background laughter) Doors won't open.

Q: Do you have to do something to make 'em drop? Do you have to go to the control room to drop them into the water?

A: It would do it automatically when it's got problems in the cell. The computer will automatically put it down in the water. Then you got to go in there and get your key. You got a key.

A: (Fisher) What happens is, what, Robert is telling you about in there, if two, if two, you get a double release in there and it's traffic control in there. If two carriers come around and they happen to clip one another...

Q: Uh-huh.

A: ...the safety system acknowledges that as a overhead erratic. And it lowers the sources into the pool, then makes you have to go in, clear the, clear the jam back out, rearm the safety system, come back out again, and start the system back up again. That's what he's saying about the double releases in there.

Q: Uh-huh.

Q: Okay. So, let's say, you know, in the last couple months on your particular shift has the only time the system been shut down, has it been because those two things hit, or have there been other situations that made the system shut down?

A: Oh, there's various reasons. Sometimes...

Q: Like...

A: ...like we was loading cans and a real heavy product...

Q: Uh-huh.

A: ...to the totes. And sometimes when you transfer from carrier to the elevator, the elevator don't line up exactly right and it gets hung up. You got to go in there and push it back onto the carrier and line the elevator back up. But this one turned over in the elevator. And which I, we got a certain time to get the trouble fixed and start the system back or it automatically when a cycle time runs out, it will shut everything down. In that case we have to empty the tote and set it back up. I knowed we couldn't get down so I just hit the off button. Well,

when you do that you don't have to go in the cell and set your safety system and all that. You just hit the on button again.

Q: So does the system on the average shut down once a shift or....?

A: Well, now that since we've been running ten minute cycle, I hadn't been down hardly, maybe out of the week, two weeks, maybe once, four times at the most. 'Cause that ten minute cycle....

Q: Is a ten minute cycle longer or shorter or?

A: Shorter.

Q: Shorter. And so things goes better when it's shorter?

A: Oh, yeah.

Q: Oh. I didn't know.

A: And you'd take the time...

Q: (interrupts) You'd think that if it was a lot slower then.... (background laughter)

A: I was talking about was it five and a-half, six minutes. And ten minutes is another four and a-half, five minutes longer. You've got time to....

Q: Oh, okay, I see.

A: (Fisher) What he's saying that there is an elevator area which not only helps (unintelligible) the machinery right there. There's three shelves on an elevator. When a product comes back out it transfers in the elevator and if they don't line up right, they will, they may jam. And as long as you can clear the jam within the timed sequence of the dwell time, the system won't shut down. But if you go to ten minutes and one second...

Q: (interrupts) Oh, you're out...

A: (Fisher) ...the system times out. So the sources come down. It means you have to go ahead and clear your problem here. But it makes you go all the way inside the cell to rearm the safety system and come all the way back out again.

A: (Ray) I've done got smart about that though. I knowed down there if I don't get down in time I go shut it down anyway. And that way I don't have to go in the cell.

A: See that...

Q: So it won't go down?

A: (Fisher) It will lower the sources down, but as long as you did it on your own...

Q: (interrupts) All the...

A: (Fisher)...time, that means you don't have to walk all the way in there to rearm the safety system. You can just go to the control panel, acknowledge your alarm outside, which is a non-safety alarm, and re-key it back up again.

Q: Oh, okay.

Q: What makes the difference in the cycle time? Is it the product? Your particular product that you're processing? Or is it the number of sources that you have up? Or....?

A: (Fisher) Dose and density.

Q: Okay.

A: (Fisher) Dose requirements of the customer and the density of the product contributes into determining the dwell factor.

Q: Okay.

Q: Do you on any one particular shift, do you have the same product, or do you change?

A: (Fisher) It's continuous. You run one product butted up right next to the next product.

Q: Okay.

Q: And you may have a different...

A: Density.

Q: ...dwell time?

A: No. Same dwell time.

Q: Same dwell time.

A: Same dwell time with different density.

Q: Okay.

A: So on a, say a heavy density product that you're wanting two and a-half megarads, it may go through the system six times.

Q: Oh.

Q: Oh, okay.

A: (Fisher) A lighter density product may be trailing it. And may just go through three times.

Q: (Penry) How do you get them off? Say this one is still going on, and you have to get these.

A: (Fisher) Well, in the low configuration log you know when to. You're on recirculation of one product, and when the next one comes off, come off recirculation, so it automatically starts unloading.

Q: Oh.

Q: The computer is set?

A: (Fisher) Yeah, it's all set on our microprocessor right there when you go into recirculation, when you don't go into recirculation.

- A: (Ray) Well we got, at the time, at the proper time, take it off of recircling. If you don't the computer won't automatically, well, there is a thing about setting it up automatically, coming off recircling. But nine times out of ten we got to know exactly when to go in there and take it off of recircling.
- A: (Fisher) Each one of the carriers are, are numbered. And so you know when it finishes one, two, three, the next time it comes back out again, you got to take the carrier off of recirc on carrier number nineteen. If not, nineteen goes back through again, and you got to go bring that product back and, you know, put it into reverse and bring it back out again.
- A: (Ray) Yeah. After you do that once or twice, you can remember it. (background laughter)
- Q: How long have you been with RSI and doing this kind of work?
- A: I'm the senior operator. I've been here all of the two years and a couple of months.
- Q: Uh-huh.
- Q: You were here when they poured the first, first brick or....?
- A: No, sir. I come shortly after that. (background laughter)
- Q: Okay.
- A: (Ray) How long the plant been there now? Five years?
- A: (Fisher) Let's see three years in February of '88. So we've been here about three years and four months now.
- A: (Ray) Yeah, I come in shortly after.
- Q: Were you involved? Was there any contamination that you received out of this?
- A: They found it on me nowhere, on my car, at the house.
- A: (Fisher) Robert was clean.
- Q: But people did come out and check?
- A: Yes, sir.
- Q: Do all the checking and everything like that?
- A: As a matter of fact, I was kidding my wife. I was gone. They called two or three times. You need to call work. So I called. We was on, I was on vacation. And so I called work. And they wanted to come out to the house. And I had got the movie *Silkwood* (background laughter).
- Q: (laughter) Oh, gosh.
- A: (Ray) And my wife, we had watched that about three or four days before that. And I told her they'd come out to the house to check for contamination. I said, "They find any, they'll put you in the shower and scrub you down." (background laughter) She wasn't going to let them do that.
- Q: So you, okay, your shift got off two days before? Is that....?

A: (Fisher) Saturday noon on the 4th.

A: (Ray) And I was off twelve hours before, let's see, Chris come in, no, Mike Sheppard relieved me. And he came in at noon time. He gets off at midnight.

A: (Fisher) And Claude came in.

A: Right. At midnight.

A: (Fisher) Sunday night. Saturday night at midnight is when Claude came on.

Q: His midnight. Somewhere between the 5th and the 6th, Claude came on.

A: (Fisher) Yeah.

Q: Whenever midnight's considered.

A: (Fisher) Yeah, that's, that is considered the 5th.

Q: Okay.

A: (Fisher) So he came in on Sunday the 5th and he found the incident on the morning of the 6th.

Q: Okay.

Q: Okay. I thank you. I appreciate your help.

Q: Yes.

Q: And good luck to you. I hope to get you back to work again. (background laughter) Hope we come up with something good real soon.

**END OF TAPE**

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**Tom Fisher--Part II**  
**RSI, Decatur, Georgia**

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**TOM FISHER (Part II)**

- Q: The person that worked with Robert, how?
- A: Nothing. Nothing on him.
- Q: Okay. So, did you have three employees, if my understanding is correct, that...
- A: (interrupts) Robert only had two on his shift.
- Q: I meant three employees that had some...
- A: Yeah.
- Q: ...contamination. Okay. And so the two on...
- A: Claude's.
- Q: ...Claude's shift and there was one other person who, (pauses) who was at...
- A: Chris Henson.
- Q: (Penry) Okay. What capacity was that person?
- A: He was a shift supervisor that comes on Sunday at noon.
- Q: (Jensen) So he was the shift right...
- Q: (Penry) Right before....
- Q: (Jensen) ...immediately proceeding Claude's shift?
- A: Correct. He had it on his, his hands, forearm and his shirt. And he carried it in (unintelligible).
- Q: But his associate did not have anything?
- A: Ricardo, Ricardo, Rick Atkinson. (mumbling) (paper shuffling)
- Q: Chris Sheppard. I don't know why I wrote Mike Sheppard.
- A: He had, Rick Atkinson had it on his left palm and his shirt.
- Q: That's the Rick that Claude talked about?
- A: Yeah. That's the person that works for Claude right there. That's his material handler.
- Q: Okay. So the material handler on the prior shift, there was no detection?
- A: On Robert's shift?
- Q: On Chris' shift. Was Chris right before Claude?
- A: Chris was the only one on his shift that had it.

Q: Oh. But, but then somebody else was there and did not have it? There wasn't just a one person shift in another words?

A: No. No, the other person did not have any. Or we didn't 'cause we got everybody down here non-detectable and on their hands and everything.

Q: What was, what was Rick's name again?

Q: Ricardo.

A: It was Ricardo Atkinson.

Q: Okay. In the question we asked Claude about what would have triggered you doing something a little different. Okay. Have those folks ever been instructed, you know, if it's above the .2, which is, I don't know what you would call it...

A: Then when they go inside the cell with anything above background they're...

Q: (interrupts) Is something...

A: ...they're to clear, it's in our procedures...

Q: Okay.

A: ...that once they have any type of a trip like that that's from a safety nature, they can go in, and as long as they find nothing when they go inside the system, they can come back out and start back up again. If they find something of abnormal readings above background, that's when they have to call the RSO. And lock the...

Q: RSO?

A: Radiation Safety Officer.

Q: Who is that?

A: That's me.

Q: Oh.

Q: Who, who was Bob Ramsey?

A: He's the general manager from our Fort Worth facility who was here in interim before Ernest got here. He was helping out during the month of May.

Q: Okay.

A: Bob is the head of the operations at our Fort Worth plant. And he was in here on temporary leave.

Q: Okay. Is there always an RSO here?

A: Not on site, but is on call.

Q: Oh. Okay.

Q: What kind of an operator training program do you have? Is it an on-the-job training?

A: It's on-the-job with, we have tests and everything else, ninety days program. They're signed off after they pass a test and show, I think, a minimum eighty percent on the test. And they have all the, the state requirements: reading our emergency procedures and what to do in situations like what Claude got into right there.

Q: Is that a license requirement...

A: Yes, it is.

Q: ...as specified in the license?

A: Is specified in the license of what we do.

Q: Is there, actually is the recertification every so often or....?

A: We have an, what you call, an annual recertification, but a lot of our employees that, you know, like Robert's only been here two years, Mike Sheppard's been here two years. Some of the others have been here less than one year. So they haven't even had a chance to see recertification. So yes, we do have provision of sign off form where we review a radiation safety film, review the Georgia requirements, review our emergency procedures on an annual basis. Plus we have, you know, monthly and quarterly safety meetings.

Q: Of the whole staff?

A: Of the radiation staff, yes. With the Production Manager to go over machinery problems 'cause the, you know, you start thinking about safety in that system, that it, the safety system is there which will detect anything. But the machinery is probably the most dangerous thing around there.

Q: Oh. (mumbling)

A: Chris Henson.

Q: (laughter) I'm sorry. Who's Mike Sheppard?

Q: Is there a Mike Sheppard?

A: Yes, there is a Mike Sheppard.

Q: Okay. (background laughter)

Q: Chris Henson was the supervisor immediately preceding Claude?

A: Claude. That's correct.

Q: Mike Sheppard had his car contaminated?

A: Yes.

Q: But not the person wasn't?

A: (paper shuffling) Mike Sheppard, none on him just his car seat.

Q: Okay.

- Q: And he was, and he was the loader for Henson?
- A: No. Mike Sheppard is a supervisor. He came on right after, after Robert on noon on Saturday. He got off Saturday night at midnight. Then Claude came on after him.
- Q: Yes, considering the facility has only been here three years you all, that's not long enough time to have any trends in terms of turnover of personnel?
- A: A lot of people don't like to working the types of shifts we have. And they'll come in and work, then they may go find some easier work. There's some people who just can't adjust to a midnight to noon shift. That's what we've seen.
- Q: Oh.
- A: And all five of our plants work this type of operation. Even when I was in South Carolina, this is a typical type operation from a seven day a week to a twenty-four hour maximum utilization of manpower.
- Q: The twelve to twelve turns out to be better than a eight to eight or....?
- A: Yes. 'Cause you go to those you have to have five to six crews to go into that type of operation.
- Q: Well, no, I meant three twelves, going from eight to eight, eight in the morning to eight at night.
- A: This way you, the Production Manager gets to meet all shifts.
- Q: Oh. Okay.
- A: See if you go to any other, any other time, you may not get to see them all. So that at noon on everyday he sees every crew.
- Q: Yeah. Okay.
- A: And all five of our plants are right now are, four others are working the twelve to twelve operations.
- Q: Uh-huh.
- A: And with the same hours.
- Q: Uh-huh.
- Q: You said that Chris Henson received some of the radiation.
- A: Yes.
- Q: If he was on the shift before Claude, what, what would account for that?
- A: What would account for that is that whatever was inside the cell. You see, if the system didn't go down, there's no reason for the cell monitor to come on.
- Q: Okay. So am I hearing you say then that contamination possibly started during his shift?

- A: It could have started during his shift, but if he didn't go down again the contamination was picked up on the product, and it would not be picked up on Claude's shift because the sources went down and the cell monitor kicks in at .2MR/hr. And then the contamination coming from the pool set it off 'cause it was above set point. So if the cell, if the system didn't go down during Chris's shift, he could run all shift long and not know that there was something inside the cell because the cell monitor is off when the source is out of the water. It blacks out.
- Q: So he possibly could have picked up some contamination?
- A: Off the product. We know he had to get it off the product 'cause what they was unloading was what was contaminated out at the warehouse, what we're surveying now.
- Q: What, what caused the, the first shutdown on Claude's shift? I didn't quite understand that matter.
- A: It was a manual activation of the starter. What they, what we determined is on the power panel out there, there's breakers. And one is for the elevator. That when they went there to clear a jam in the elevator, they hit the wrong starter. So they hit the wrong starter, which lowered the sources. Which, when it came down from the, he cleared that jam, then when he tried to set the safety system again, that's when the cell monitor picked up the background radiation coming out of the pool. And set off our safety system. So had he not accidentally or his material handler, you know, energized the source starter motor, we could have run another twelve hours without the sources going down, you know. So we're just lucky that we caught it at 8:40, from just from a kind of, I guess, what you would want to say is a fluke.
- Q: Yeah.
- A: 'Cause normally they wouldn't hit, they would hit the elevator 'cause it comes down. What they're doing is, they sit there and they bump it. It may come down and be one inch off, and it won't line up. So what they do, they hit the, well they can jog the elevator, then they, you know, they can pull the stop, and then they'll allow them to slide off without jamming right there.
- Q: Do you, that make me think of something, do you shut the system down at shift change?
- A: No.
- Q: You don't? You just, you change on the run?
- A: Change a few, you change, if the system is running good, you don't shut down just to go in there and just see what everything looks like.
- Q: Okay. So if you'd been really doing good, you could have gone two or three days or however long and never known that the pool monitors would have never been activated?
- A: They never would have kicked in. There's not enough radiation coming out the maze. Which is, you know, set up at a much higher...
- Q: Yeah.
- A: ...Mr/hour in the maze. So you never would have detected anything. But the maze monitors are basically set up in case you know, a capsule ever somehow jumped out of a rack and jumped into a tote, and it would shut the safety system down that much. So you're not going to bring out a capsule or a pencil out.

Q: Did you have continuous air monitors in there in your routine operation?

A: There's no continuous air monitors for radiation.

Q: You mean, airborne, it'll pick up airborne contamination, won't it?

A: Not, we don't have any.

Q: Oh, you don't have any?

A: It's not been the design of the system.

Q: In the design of the system?

A: No. No, sir. No. It is not.

Q: Okay. Yeah. So there really was no way to detect anything going on until the pool monitor came on.

A: Till the pool monitor, till the cell monitor picked it up and that shut down that morning. It never would have detected it. 'Cause the only thing that's in the air system of that thing, are smoke and heat sensors.

Q: Yeah.

Q: Claude said something about energizing some breakers and then going into the cell or something. I didn't quite understand.

A: When he went into, when he went inside the cell to investigate, he probably went in there and turned the breakers off so the sources could not come up when he was going in to check the cells. And so when he comes back out again, the only thing, he just flips the breakers. He killed the power to the breakers before he entered the cell.

Q: Okay.

A: Which means that nobody could actually start the system up while you were going inside.

Q: (Jugan) Okay.

Q: (Penry) So and that's standard? I mean anytime anybody....

A: For safety you should either disconnect the marigald of it, you know, you would have to go all the way up the winch disconnects on top of the cell, to lock them out. But you go right there at the power panel and hit the breakers, and it kills all power to the two source racks we have that are loaded in there right now.

Q: Okay. (long pause)

Q: (Hultgren) Any more?

A: We'll go back, and I'll read this here.

Q: Yeah.

A: On Thursday, June 2nd, 1988 at 19:58 hours, the sources were lowered into the storage pool. And the system shut down to remove customer's product concept 8022-D from the first shelf of

the carriers 27, 28, 29, 30, 31, and 32. Personnel in the cell during this exercise were Bob Ramsey, Mike Sheppard, and Ora Fry. A Z-tex survey meter was utilized for entry into the cell. It was checked utilizing a cesium-137 check source prior to entry into the cell and was determined to be operating satisfactory. The readings on the meter were zero and no greater than 0.1 MR/hour directly over the pool area. The carriers were removed from behind stop 5. And the first shelves were unloaded manually, and the product was carried to the process side of the warehouse. The cell was re-oriented into its original carrier positions, safety systems was armed, the system was re-started, and overall operations were resumed.

Q: At what time?

A: Uh....

Q: 19:58?

A: That's when they went down, so whatever long it took them, you know, ten, fifteen minutes, whatever it took them to pull that product out of there. I can find out.

Q: At that time it went out. That's the time it restarted. Ten or fifteen minutes?

A: Ten or fifteen minutes after that. What it took to get the product out of there. Robert went in, one time during his shift on 6/4/88 at 1:01 in the morning. Robert went in, and Claude Beecher went in on 6/5/88 at 04:23 hours, when Claude went in there. And then the next time into the cell was at 8:40 June 6th when the problem was noticed. So there was very little down time in three, four, or five days right through there.

Q: Yeah.

Q: Let me, let me see if I can get this, yeah.

Q: On 6/4 at 1:01...

A: (interrupts) At 1:01 Robert went in there.

Q: Okay.

A: And these are entries of the gamma cell during the weekend of June 4th and 5th.

Q: At 6/5...

A: At 6/5 Claude went in at 4:23 in the morning.

Q: Four, twenty, okay.

A: And that is until the 6/6/88 at 8:39, that was all the people that had been inside the cell over that weekend.

Q: So about twenty-eight hours later, more or less, the next entry was made?

A: Right.

Q: It's six, 6/5 at least at 4:23 a.m., the safety system showed no, the same safety system that shut you down later showed no problem?

A: No. Like I said I'd have to go see why he went in there. They log in why they go inside the cell in our cell entry log.

Q: But he still would have, the sources would have gone down?

A: Yeah. The sources would have gone down within reason.

Q: Down and the safety system, and the cell safety system would have been on.

A: The cell safety system would have been on.

Q: And it didn't alarm at...

A: That's what I'll have to...I'll go...I didn't, like I said, have all the records, but I can find out what, what they exactly wrote into the log. We have what we call a source movement log. It tells the reason why the sources went down.

Q: Uh-huh.

A: And with, you know, the pool product, pm, safety check or whatever is what we log in.

Q: Okay.

A: So I can get the entire information on 6/4 and 6/5 right there for you.

Q: Okay. So it was 6/2, and then there was a skip in 6/3, I take it, huh?

A: I don't show any records of any movements in there on 6/3. We did a safety system analysis on 5/31/88. And the safety check attached here done on 5/31 show conductivity is .2 micromhos water level controls normal, emergency cables okay, emergency stop buttons okay, and inspect the water filter in resin beds were at background. Radiation on that .2MR/hr. This is on a weekly radiation safety sheet that we did on 5/31. So we knew we weren't having any problems at this time. So whatever is was, you know, it had to start sometime around the first of June through June 6th.

Q: Yeah.

A: And more likely it happened sometime on June 5th to June 6th.

Q: Yeah.

A: From the contamination and what we've seen here.

Q: From the looks of that, yeah.

A: But we do know that we have product contaminated back as early as 5/27.

Q: Oh, I didn't know, I didn't realize that.

A: This is all hypothetical now.

Q: Yeah.

A: Is the small, what we call, a leak or whatever you want to call it was...

Q: Spewing something?

A: ...or whatever.



Q: Uh-huh.

A: When the sources go down the, before we could go inside the cell we have a one minute pre-exhaust. So if the radiation levels were in there at .3 or .4 before the cell monitor kicks in, the exhaust is carrying out whatever is in there. So when you go inside the cell, you're back in the background again.

Q: Okay.

A: You see what I'm saying?

Q: Yeah. I see what you're saying.

A: And that's why nobody's ever detected anything because by the time you get inside the cell with your meter, you're looking around and if you're point one, point two, whatever you're supposed to be.

Q: But you do, you have found product manufactured on or about 5/27?

A: On 5/27 we know of.

Q: On 5/27...

A: At least that, yeah.

Q: ...that you surveyed?

A: Correct.

Q: And found...

A: It's in the warehouse where we're monitoring right now.

Q: Okay.

Q: Okay. One minute pre-exhaust before you enter the cell and before that...

A: (interrupts) But it, the one minute pre-exhaust is to pre-exhaust any ozone that's inside the cell so I can go in there. So at the time you are pre-exhausting, you're taking in any of the airborne contamination out of there which would, intense fire off your cell monitor.

Q: Okay.

Q: And the cell monitor is not on for that one minute either?

A: No, see it's tied in when the, it's kicking in on simultaneously through there, I believe.

Q: Yeah.

Q: But that, that exhaust, whatever, happened when Claude went in there?

A: Uh-huh. But see when Claude went in there, there was probably more than what the exhaust system could handle.

Q: Okay. But...

A: And then it fired off the safety system.

Q: ...that's the point. Yeah, that's the point.

A: You see, it hit point three, point four mr per hour. So that's when the safety system said, "Wait, there's something wrong, lock out."

Q: And by then enough stuff had gotten into the pool water?

A: Yeah, see it, it had been building up concentration to the, the levels had gotten, the background had gotten out higher than the set point.

Q: Yeah.

A: And this is what we speculate had happened. And that's the best of what we've come up with.

Q: Yeah.

Q: (Jugan) 5/27, product contaminated.

A: You know, 5/27, four cases out of a thousand.

Q: Yeah. I know who was, it was at the end of April that you had your last...

A: Water check.

Q: ...water check?

A: Yeah. 'Cause see we went back and surveyed the product out in the field, and we had like seventy thousand packages that had been sent out. So the NRC, the FDA, and the state health authorities had gone out, and they found none in the field. So we keep narrowing down the window.

Q: So and the, the 27th is the earliest that you found. Did you find, was it sporadic? Did you find? Have you correlated with your production runs yet that, that have a feel for....?

A: Some had it. Some didn't. 'Cause see, a lot of that has to determine if it is spewing. Some of our product set above our tote where you would, the top part of a box on one end is where we would find it, on one end of the tote. And some products sit lower in the tote.

Q: Yeah.

A: So you have a chance that it's not going to get anything on it.

Q: Yeah.

A: So we've seen some product in between other runs that were contaminated not having something whereas it could be in both ends of it.

Q: Yeah. Okay. But that's the, that's the shroud business where part of it is above the shroud where the shroud...

A: That possibility right there.

Q: ...where the shroud doesn't...

A: This is what we have right here. Let's see, these were all in the system right here. Here's a product got twenty-four cases and one pallet and no reading above background. Here's four cases, no reading above background. One pallet, thirty-six cases, no reading above background. Omnia. No reading above background. Here's eight cases, one pallet, seven cases okay, one case not. He was up, you know, you could tell, here was a hand print...

Q: Uh-huh.

A: ...around the side of it. Zomeds several boxes were found with readings above 3 MR/hour, and survey was discontinued. There were ten pallets of Barnes-Heinz 8055 which had been on the floor since earlier in May. The outside surfaces of the stretch-wrap product was surveyed and found cleared of contamination. The product was then shipped to our warehouse on Morris, right there. So this is what we surveyed real fast out at the plant so we could start trying to narrow this thing down. And this is what the State and Chem-Nuclear is surveying out there now, so we can get this product shipped out of the warehouse. Like I say, this one product that we're doing now was the one that was sterilized on 5/27, and the survey right before lunch, they had surveyed a thousand cases and only found four with just a little over background out of a thousand cases. So it's very sporadic.

Q: Very sporadic and gradual.

Q: How come you all decided to change your cycle from five minutes to ten minutes?

A: We took the cobalt out.

Q: Is that the driver?

A: You take, you take six hundred thousand curies of cobalt, your time goes up proportionally to the amount of curies you have in the pool is a direct relationship. (long pause)

It is June twenty-ninth; it's three o'clock in the afternoon. Tom Fisher is here with the entire board. Tom, just a few questions that we've gathered up after studying documentation and just listening to other people talk. Just want to make sure. We pulled out just a couple of pages out of the operating logs. And notice that I don't have a copy of that with me, but there was one day when they had a seismic alarm, and a fire alarm went off. Guy goes in, resets the system, and off we go again.

Q: Was that a test?

A: No I don't have that page with me. You just, says the alarm.

Q: Do you have the day?

Q: Looking it up today, and it certainly didn't say it was a test.

A: Yeah.

Q: And (pause) haven't, I mean they were both on the same day entry. The question would be, the guy goes in and resets the alarm and then comes back out again and goes on. He doesn't check to see why the alarm went off. It is just the normal procedure I guess that we are used to is that when an alarm goes off, not only do you acknowledge the alarm, but you also go into your system and say, hey, "Why did this thing go off anyway?" And we see that on the area radiation monitors. Because they go off on the twenty-first, they go off on the twenty-seventh,

they go off on the second, twice. So, basically four times, and the individual goes in, resets the alarm, and then goes back to work. I'm a little curious, "Is that the philosophy by which you run the facility?"

- A: No, if you, I don't have them right here with me, but the emergency procedures that we have is they, if they have an alarm like cell monitor goes off, they are to investigate it, so they go inside the cell with azetext. And ours are set at about .2MR/hour now, which is real close to, to this, you get false trips, and we could possibly, should have that about .3MR/hour. And he goes in there, and if he comes out and, and if he sees nothing visible in there, there's no radiation on his, his...
- Q: On his meter.
- A: On his meter, he can come out and restart the system up. If he finds background, over background inside the cell, then he has to notify the RSO.
- Q: Okay.
- A: Now that is the procedure that all five of our plants have, and I don't know if you have seen our emergency procedure book, that's, that's one of the first things I check, you know, if we've had these trips, they're going in and investigating and...
- Q: But before he can go in, the fan cuts on, and runs for a minute.
- A: One minute, so that's why I mentioned to you the other day, that, that the pre-exhaust to be taken out whatever amount of fire at all (?) they go in there with a meter. It's just sitting there on .1 MR or zero, is nothing here, come back out and start up and go again. Might go for three or four days, or a week or whatever it takes to, then might get another trip like that. So we don't know, it's not consistent.
- Q: Okay...
- A: That's the first thing, that I check right there was to make sure, you know, we've been doing something against our procedures, when we find out they are doing exactly what our procedure says.
- Q: (Hultgren) Okay.
- Q: (Jugan) I just thought it was May 8, date of the earthquake and the fire alarm thing...
- A: Yeah.
- A: You'll have to check the, on back of our logs. That sounds like probably when they fire 'em off. 'Cause we fire 'em off once a month, and they might have not written down a test date, but we have it on a monthly log sheet that'll have the date written out there next to it.
- Q: That wasn't an apparent from the log, the...
- A: Okay, we got a monthly check sheet where we fire off everything, and it's initialed and the date out there. We can cross-reference that date.
- Q: Okay, just that philosophy of going in there. The filters, the filters are another unusual thing. HEPA filters were supposed to be on the exhaust line, they weren't so far as we know, as Tom Hill knew. He didn't know that they weren't on there. Could you explain why they were taken off?

A: There is a letter from the State that authorizes to remove the HEPA filters. That was an amendment to the license that we made two years ago.

Q: It's actually in the licensing document?

A: It's in one of the amendments.

Q: We, we got them, right here. (pause)

A: 'Cause when we went back in here to change, see, see you don't have all the letters. I wish I had brought all my letters over here. When we went back in here, into the State, Will Ingram was the person we dealt with.

Q: The name again, please?

A: Will Ingram, he's the guy that was handling...

Q: Most of the correspondences is to that person as matter of fact?

A: Yes, correspondences would be on ventilation system, we changed it here, and sent it in to them. One four thousand blower is located roof to exhaust the air through a roughing filter. This what was sent in to them, as you see it's a different type from our other types. This sent in on a letter for amendment, and the amendment is in our license, but you don't have the correspondence that went back with that.

Q: What's the, was there a date on that?

A: No, there's not a date on that, but I got the letters in my...

Q: I think we may have that somewhere.

A: It's a letter to Will Ingram, deleting the HEPA filters from our license, and we just use a roughing filter.

Q: (Hultgren) Okay.

Q: (Jugan) See that, that doesn't show up in there because it's just a different...

Q: (Jensen) Is, is this ours?

Q: (Jugan) Yes, this is ours.

Q: (Jensen) But it came out of this pile (of paper) here. I don't know it's, but, okay.

Q: (Jugan) See it's, it's in a batch that makes it look like it, that thing was submitted in with the license.

A: No, when we make a changes to a license and they approve it, I go ahead make the changes in this book here.

Q: Okay.

A: You see, there might be some others in here that are in here where we've gone back and retyped them.

Q: You've got January sixteenth.

- Q: Okay, that answers that question completely. Very good. (some mumbling)
- A: That's just me updating my license, they'll have the correct ones in here.
- Q: This is why we want, want you here when we have a question about it then, this resolves that issue. When they check computer system review, the alarm system in your, in your facility. We were told that they literally, basically activated one alarm then saw if the system worked, or they checked the mechanics of it, was there ever a check made on your, your computer, the alarm system to react to two, three alarms at one time. I mean what was the process by which you debugged that computer program?
- A: (Mumbled) I need to talk to Tom Morgan on that, he's our computer person. He's in Fort Worth, or if you have any questions I can call him and get the answer back. He's the one who has got it, the different type of woofers and different type of horns and how they sound and the whole thing right there.
- Q: Just curious, you know, how he made sure when it was all over that indeed that computer program was fully adequate, satisfied all the needs, and did not have any unusual things in it, like, the computer program breaks down when there's two alarms that come in almost simultaneously or perhaps simultaneously. How, how does he, how does he make, how is he assured of that?
- A: We know the horns are tested each time a, sources goes up or down, and the sources go up, going in the up position, prior to when you set the alarm and they're going up there's, there's, you have hear you have to know it with, your ear and your ear right there. But you get a short blast on all four sequences as the sources are going up to make sure all the horns are working. You've never heard it, but you hear the four different distinct noises that are in a very short time span to make sure all of the horns are working, and they're tested each time the sources goes up.
- Q: I'm thinking more of the guy who, there's one person who steps on the pressure mat while another person breaks the photoelectric beam, make sure that they'll cancel one another out. Tom, I have a history of seeing screw-ups in control circuits like this.
- A: That would be two safety failures.
- Q: Two safety, two simultaneous failures or even three or four. How does he, how does he finally make that conclusion that I can go back to Texas and this facility and...
- A: Two safety failures, do the horns make different rackets or, or they highly sound.
- Q: Or, does...
- A: They still sound.
- Q: Does the system lock up, if something happens, two things happen at once, all of sudden everything shuts down?
- A: If it's safety related, I believe now, I would have to check with him but there's one horn for safety, and there's one for mechanical type operations, and the different types of what the horns say right there, so they could have one horn, a whooper or whatever, just for safety related, one for mechanical type situation, and another one just for raising the sources or lowering the sources.

- Q: It's not whether horns sound or anything like that, but, that different varieties of inputs, I mean there's a sheet here that says there's 11 different conditions by which sources disappear in the pool. How does he know that all permutations and combinations, of those 11 different instances will actually activate the system? I mean, you know all 11, I guess all of the 11 happening at one time is ridiculous. All the different combinations, and how does he make sure the software is good, how does he assure himself of that? I guess they're looking for more like a philosophy question than anything else. The other question, another question that is probably a lot easier to answer, and we noted that you inspected the shipment then went out on the 27th and found contamination. When was the earlier shipment, and why was it not checked or why did you decide that the shipment that went out on the 27th was the first one that you really ought to check.
- A: Because we shipped that one Monday morning when we found this. It was being loaded that morning by our operators who found the thing, so that, that one was going to Jacksonville on the 6th, it was Long Life Dairy.
- Q: So, but the shipment of the 27th, what does that mean? I interrupted that to, meaning that it was leaving the back door here on the 27th.
- A: Are you talking about isotope or you talking about the, the...
- Q: Products.
- Q: The products shipment.
- A: Why, why, we went back 27th?
- Q: Correct.
- A: That was the oldest product that we still had in our possession, on the floor. So we were going back to the, and that happens to be Barnes Hines run there, and we were going back and working the farthest and coming towards the accident to see when, possibly the product started getting contaminated, so we could start ruling, we tried to get a cut-off point instead of having to go all the way back to April 28th.
- Q: So the product on the 27th, this 27th shipment was contaminated?
- A: Yes.
- Q: (Hultgren) Okay.
- Q: (Jugan) I'm sorry. The product that was irradiated on the 27th was contaminated.
- A: That's this product right here, yes.
- Q: (Jugan) Not the 27th shipment, Ron, it's the product that was irradiated on it.
- A: That was the load date onto the system.
- Q: Thank you. I appreciate that.
- Q: I, when I hear 27th shipment, I think it's the day the truck went into dock and loaded up.
- A: No, that was the oldest product that had been loaded on the system that we still had in our possession. So we went into the warehouse, and said that well maybe the 27th wasn't contaminated, then we can move up the 28th and 29th and start coming down narrower to it.

So when we found out that the 27th was contaminated, well that just meant, that means we had to go all the way back to 4/28 to get our last clean jump off.

Q: Uh, ha.

A: So we hoping with the 27th would be clean or would be clean that we could move up that we would have to search out all the product that had been shipped out prior to that.

Q: Why didn't you do that? Why didn't you search out the earlier product? Because the product, this 27th...

A: When the 27th right there, then we turned over all our data into the NRC and the FDA, and they went and searched out everything else.

Q: Oh, they did?

A: Oh, yeah. All product, all the way back to the last clean date, has been surveyed in the field.

Q: (Jugan) Okay, and what was there...

A: And nothing was found in the field.

Q: (Hultgren) Fine, that was another fact we did not know.

A: I can give you newspaper clippings on that one.

Q: There, there was one I thought that was found on the road or something?

A: That's this one. That was Long-Life Dairy that was shipped out on the morning of 6/6.

Q: Okay.

A: And we intercepted that one, called them and told them that something might be wrong with it. It was on a sealed truck they turned it around. It was back in our possession on Tuesday morning the 7th.

Q: Okay, I mean it was still the 27th irradiation day.

A: It was irradiated over the weekend, it was on the system more like 6/2, 6/3, 6/4.

Q: Oh, okay, gotcha. (pause)

Q: That was really an open question in our mind, we, we did not know that the earlier stuff had been checked out. I also noticed that when they are going to manipulate the capsules now, they are not going to use either one of the tools that you used when initially load the capsules into the racks.

A: They are going to use Hanford tools, which are grippers.

Q: I had asked you earlier and kinda let it pass about the tool design for that initial tool you made the comment, "I don't remember where it came from. I was given the tool, and I used it and..."

A: It was the same design of the tools that were used to load our Westerville facility a year earlier.



Q: Oh, okay, fine.

A: In fact, we got Westerville tools in our back lot right now. They are tools out there that we had shipped in last night.

Q: Okay.

Q: Are Westerville's tools the same as Hanford's tools?

A: No, the same as our tools.

Q: As same as yours. Okay.

Q: Would Morgan have been the designer of those tools?

A: Him or our design engineer, but we had to get something from somebody to tells us how, how to do it.

Q: Yeah, okay.

A: That's another question to ask him. Where did the design come from? I don't know, I've been talking with him enough, but I didn't write that question down to go back and ask him.

Q: (Hultgren) Okay, that's my list.

Q: (Jensen) Oh, one other question. I think you just answered it. When was cesium loaded into Westerville, do you know? When did they start using it?

A: (pause) Probably about six to nine months sooner than I did.

Q: Okay, you did.

A: No, they loaded theirs in the Fall of '85, and I loaded mine in the Winter of '86, shortly, right after them. I'll have to check and see, it's in some letters up there, they got the isotopes first then, before we did.

Q: That was the confusing part because in this licensing information we got from Hill, it showed where they got the license for the cesium at Westerville some time in July or thereabouts in 1985. But then when we talked, somewhere in some of the conversations were talks about, there was a discussion of the shipments being made 7 or 3 loading or 3 unloading 3, 3 on the road or whatever, and it wasn't clear to us if all of the, if that was just the shipments to Decatur, or if that was the shipments to Decatur and Westerville, or just how that went.

A: In the Summer, if it had been 7 it had to be Barry's (in Westerville). Because mine didn't start until like January, by the end of January to finish the first of April. And that had to be his because when he was loading the cesium in his pool, he was shipping me his cobalt down here in the summer, I got his cobalt a lot.

Q: Okay.

A: That might have been some of the record of what you saw there. I got his 400,000 or 500,000 curies of cobalt 60, that he took out of his pool.

Q: It wasn't anything that necessarily that we read. It was just an amount of confusion about when the shipments came out of Hanford, where they went to, where they all shipped in one shot?

- A: Barry has, I think he had about 182 capsules, and I think he went through about 5 loadings, and I went through 7 loadings.
- Q: Willis, that was the question you had.
- Q: (Davis) I still got it.
- Q: (Jensen) That's all I have.
- Q: (Davis) There was a couple of things I wanted to get from you. I noticed from one of the letters, it looked like the earlier agreement was the 248 capsules, and it look like that most of those went to Ohio. I gathered from the discussion that we had with you on Monday that you thought most of them was down here. I think for our records, what we want to have from you, is a list of the two leases in which capsules under which lease you have. We just need that for the...
- A: I think we only have one lease, but I'll check and see. I have the one...
- Q: I saw, but I don't have it here. But I saw that a piece of paper we got in here where it looked like about two-thirds of that 248 went to the Ohio facility, and you got about one-third of it plus 186, and that was a letter that signed by Mr. Chin.
- A: To me it sounds at first, that my first initial allotment was 248 plus the 4 spares.
- Q: The reason I, now, the 248 is the older lease, and 186 is in the newer lease.
- A: It's probably what they did there 'cause...
- Q: I mean there's not any, you know. It's just a matter of, we just need to make sure the record's straight on it.
- A: Probably the 248 was going to come here, and then we couldn't get it in our facility, and they turned around and shipped it to his facility so they gave him 180 out of his, then they scrambled around the leases.
- Q: Yeah, that's what it looks like, that you got about a third of the 248, and the 186 came to you, but if you could...
- A: I can look at my lease files and see what I have on my lease files.
- Q: What I would like to have is just the two leases and then the serial number of the units that under each one of the leases that you got. I'm sure some place in your records you must have...
- A: I got a sheet that came from Hanford, lists all the serial numbers that came in on each truck load.
- Q: The lease, would it show up by the lease number?
- A: I don't know, I would have to check on all the paperwork that comes through; it's got all kinds of numbers written in on top of the paperwork up there.
- Q: I think some place, though, the records we surely would be able to find which capsule fit under which lease.

A: Goes with which lease...

Q: Yeah, we would have to do that. And then the other thing I think would really be a help to us, is if you got anything like this, I don't know if you have it or not. Do you, have you put together any chronologies just of events, just some kind of factual chronologies?

A: I had in my book over there starting, water sample to when we had our last safety check to the morning of 6/8 and some of the actions we took right after that, it's just written up in a couple of paragraphs.

Q: You don't have any chronologies or logs or anything of all the letters and so forth connected with the licensing arrangement and so forth?

A: Oh, the licensing?

Q: Yeah, just the major events...

A: Now, the licensing for the cesium, no. But the licensing for the State, I have all of those letters.

Q: Okay.

A: I think you all have those letters.

Q: I'm, I'm just looking for a shortcut. We were just looking for a log or something quicker than having to go through there and develop, that might help us some.

A: No, just the amendments to our license here, now I have all of the those, but I don't have anything that would be...

Q: Log?

A: The records of corporate did with Hanford, or with Sylvia Wolfe and Oak Ridge under the lease, that was all handled out of our corporate offices. I got piecemeal information from Hickey (NRC-Washington) and all those different people like that, but I don't think mine would be a complete set or anything on documentation.

Q: When do you think you might be able to check on the lease and the capsules that was under the two leases?

A: Probably, I don't know if I can get to it this afternoon, but I can sure look at it in the morning. Because I got to get into some meeting with transportation people back over here shortly.

Q: Well, I'll tell you, I'll check with you tomorrow and if you don't have it...

A: I can get it to you somewhere...

Q: Sure, just give me an address.

A: You can give me address, and I can Federal it to you.

Q: Okay, that'll be fine.

A: I'll get copies of whatever lease agreements I have on hand and send it to your attention.

- Q: (Davis) We got copies of the lease.
- Q: (Hultgren) Yes, we have copies of the lease.
- A: What I'll do is I'll go back to each of my run jackets and pull out what I have in there. I have seven run jackets for the seven loadings, and there's three trucks and nine casks, and a number of capsules, 36 capsules per shipment. Now I have to do is pull out whatever data is written on there.
- Q: I've not checked on...
- A: Cause if it's not, the only one person I know that may have that data on how they did the lease is Gene Reep.
- Q: Yeah.
- A: Because Gene was my contact at Hanford, he's the one worked out that I'm going to give you four extra capsules instead of shipping one, whatever it worked out to be, 'cause it worked out fine to come to our shipment here. They had four left over from the last agreement.
- Q: So we got a chance to get that record up there, in fact,...
- A: Gene may have it, 'cause he probably had the document that he was taking four off this lease and putting them on that lease.
- Q: (pause) I don't know how well they have kept those records over those years, and I know Tom's got them.
- A: Let me dig into my records and let me see. I maybe have, you know I may not be the best record keeper in the world, but I keep a lot of, I'm a pack rat myself. And I'll just have to go through and throw out what was bad and what is indifferent and keep what's good.
- Q: (Davis) In order, you say, in order for anybody to enforce the terms of that lease, they would have to know that. We would have to know it and they would have to know it. Because there are different dates on those leases, and the thirty year half-life, but somebody would have to provide, we ever, we get ready to make the final adjustment you're going to have to tie those capsules back to the specific lease, or else you're can't make the adjustment on it.
- Q: (Hultgren) Or, or if we just go along normally the terms of a renewal of that lease would have to be tied to the particular capsules. Yes, we must have that.
- Q: Two easy ones. Did you get a chance to get us a copy of Clyde's statement?
- A: Oh, okay, I'm going to make copies.
- Q: What was the picocuries/liter on the sixth?
- A: On the sixth?
- Q: Yeah.
- A: Of June?
- Q: Of June, yes.

- A: I don't remember what they were reported, but I think the water sample that I think I turned over to, sent over to Georgia Tech showed something like 3.4, 3.5 curies in the pool. So the water that works out to be, I can look in my records, I got, it's in my log book over there.
- Q: Okay, just for what we relate.
- A: 6/6; 46,000 picocuries/milliliter, that's probably, that would be the 6/6, and I don't know what that one is. That one might be milliliters, and I know that one was picocurie/liter right there.
- Q: Correct.
- Q: That's the reason I ask, I got 46,000, but I got it from Bobby Joe (Davis), and I wanted to know if it was picocuries per liter or milliliter.
- A: I'll go look on the data sheet that came in on that from Georgia Tech on that right there.
- Q: Are there any more questions?
- Q: Okay, I believe we are complete; we have gotten a bunch of paperwork from the State of Georgia, and that's what we're going to finish off. I really do appreciate your hospitality here. We're going to be taking, at least Mike and Roger are going to be taking a walk through your pool room tomorrow morning, and then you won't see our faces.
- A: You know, if you need some more information, if you think of anything tonight, feel free to come and knock and beat on my door or whatever.
- Q: (Davis) I'll check with you before I leave.
- A: I'll see what I can dig into this thing right now.

(The tape pauses and switches to another conversation with Tom Fisher of RSI)

- Q: At least once and possibly more than once, the State asked questions about contamination, clean up after an accident, and what would be done about that. I don't remember seeing an answer to that by RSI?
- A: I believe there's a small, a very vaguely written one paragraph that they would handle the deal, you know, resin tanks to come in and demin the water. You know it's basically, it's very, I think this has caught the, I guess, whole industry by surprise because nobody really has an outlined, catastrophic emergency plan. I want to tell you this because...
- Q: Oh, okay.
- A: Nobody has one and that it's, outlined, because I know when I was with BD and we had 6 irradiators, and we didn't have anything.
- Q: Okay, so, I read that. I was thinking airborne contamination and your thoughts were and possibly the State, that you answered the question by saying that you would demineralize the water.
- Q: Okay. (pause) Can you maybe. Go ahead.
- A: I was just showing him right here. This is the emergency procedure right here, this is what they follow. If the safety is violated, the cause will be displayed, make preliminary investigation. If after a thorough check of the system, if there is nothing obviously wrong, the

problem was found to be corrected, the system can be restarted. If it still shows a violation then it goes to the RSO."

- A: So they followed our procedure, you know good, bad, or indifferent they followed our procedure, and we are reviewing this right now to make sure that if in the near future the safety systems lock out that they are going to have to report to an, a, RSO, you know, or an Assistant Radiation Safety Officer or to the Radiation Safety Officer, we will have to take a look at it because this was what was in our license, and this is what they are following.
- Q: Well, just to be perfectly frank, you know, in our discussion with State, and with both Tom Hill and the gentleman from the Nuclear Regulatory Commission, it sounds like they are getting cranked up to do other things so there maybe other instrumentation requirements.
- A: Oh, we feel certain that they will be some other monitoring equipment. We do have up in our Westerville facility, but we're getting ready to put on our facility down here and the next ones so (uncertain transcription) the in-line bycran on the water system, so if we would have had that what's in Westerville on our system down here, we would have known in prior to twenty-four, forty-eight hours if we even had a sipping source coming out of there, 'cause it's measuring like  $10^{-7}$ , you know, microcuries.
- Q: Don't you think that this, this log, that the very first one that he finds on the twenty-first of...
- A: That could have been a real legitimate...
- Q: That could have been real.
- A: Could have been real, but we can't say for sure, and if we had, had the in-line monitor that would have nailed it in a coffin, and ours is, we just got ours installed in Westerville. They've gone through with a nanocurie, calibrated it with, like a 5 nanocurie cesium check source, tested it out up there, and it's working beautifully up there, and we got it set up to put at all five plants.
- Q: Is it on-line, is it, is part of it on the demineralizer system, or is it separate from that?
- A: No, it's tied in to the recirculation system of the pool. So it will be constantly surveying the water, and if you saw anything in a nanocurie type thing in there, it'll give you horns, bells, whistles.
- Q: A demineralizer will tend to concentrate it for you...
- A: No, this will probably be on either the outgoing or incoming. Probably on the incoming side of the pool coming out of the pool it will scan. It's just a shame, you know, that we didn't have this one here sooner we could have probably, we could have known and shut down lots earlier.
- Q: Can you also commit a little bit for me on one of the responses to an emergency was will just, we'll call in the sipper from Richland and identify what the leaky source is and take it out.
- A: I wonder who made that statement right there.
- Q: (Jugan) I believe that was by Mr. Chin.
- Q: (Jensen) It was in one of these letters. It says it was in response to, is there a problem how are you going to handle it. And that was fundamentally what it said. Well if we discover a problem we'll call in the experts and have them take care of it for us.

Q: (Jugan) It was a October 1985 letter, you may even have it. Is October '85 in there?

A: No, I wouldn't have anything here. That wouldn't in the licensing for the license here. This is just for my license.

Q: Okay.

A: That might have been in correspondence back and forth, unless I don't remember any letter...

Q: October 10, RSI to Hill.

A: RSI to Hill, maybe I wrote that in there like that. You have the letter over there?

Q: (Jensen) I don't have an October 10 letter on this list, 1985.

Q: (Penry) Well, we got this letter here because we found it.

Q: (Jugan) It might be as an attachment to something else unfortunately which makes it harder to... (pause)

A: It's probably one of our license amendments, probably is what it was. When the State gives us permission to load the cesium, there might have been some correspondence Al was having with Tom Hill at the time on what you do if you ever have a problem.

Q: (Jugan) It's on the first pages of one of these...

Q: (Penry) It was on the first page?

A: (Jugan) Well it was....Yeah.

A: (Penry) Okay.

A: (Jugan) October 10, I'm sorry. (pause)

Q: (Everyone is talking at once.) Here it is a December 10 letter.

A: Now I have a December 10 letter. (laughing)

Q: (Jugan) Let me change my...

Q: (Penry) It's on the front of the first page near the bottom. (pause)

A: Shoot. (pause)

Q: This right here, this information here would have to have gotten this product from DOE. They had the capability to do this right here.

Q: (Hultgren) We don't think they did, and if they did, they wouldn't have hidden now.

A: Yeah, we only had it built now.

Q: We were wondering if you knew something about that statement?

A: No, I would have to check it out with Al and see what he knows about that. (pause)

Q: Okay.

A: That all I got.

**END OF TAPE**



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**Thomas Hill**  
**Georgia Department of**  
**Human Resources**

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## THOMAS HILL

We have Tom Hill from the State of Georgia, Department of Human Resources and the full committee here: Willis Davis, Mike Jugan, Roger Jensen, Judy Penry, and myself, Ron Hultgren. And Judy is going to lead the questioning process.

- Q: Okay Tom, why don't we get started by you just bringing us up to speed and telling us what your involvement has been in the reviewing of the licensing for RSI. Specifically, how this differed another license application, the normal that you review.
- Q: (Jugan) Judy, can I even ask Tom maybe to go back a little bit further? We're not real sure the connection between Georgia and NRC. What is the meaning "the agreement state," and what are the responsibilities of Georgia?
- A: Okay. In 1969, the governor of Georgia signed an agreement with the Nuclear Regulatory Commission. Whereby Georgia assumed the responsibilities for the regulating of certain by-product materials, certain source materials, and certain special nuclear material. The agreement was signed after the NRC had reviewed Georgia's enabling legislation, staffing levels, etc., all the indicators that they need or require for signing agreements. The Nuclear Regulatory Commission since then has reviewed the Georgia program for compatibility and adequacy. Compatibility with the rules and regulations and policy and procedures for the Nuclear Regulatory Commission and adequacy to protect the public health and safety.
- Q: You guys has been at this for a while?
- A: Yes.
- Q: Okay, so when you got the application from RSI about what was the time frame? I noticed in some of the correspondence that we reviewed yesterday that you approached NRC for some support from those folks. Was that normal? Is that how you normally handle these license applications?
- A: Okay the application from RSI was received, as I recall, the end of March of 1984, and the review was started. Georgia requested NRC's assistance in the review of the application. It is not unusual for agreement states, Georgia included, to request NRC assistance in reviewing license applications that are for a use of radioactive material that, the state has not, the agreement state has not previously had experience in reviewing.
- Q: This is the situation for the cesium?
- A: The licensing application originally requested authorization to use cobalt 60 and cesium 137 WESF capsules. At the time of the application, the NRC had not approved the use of the WESF capsules in category four type gamma irradiators. As I recall, that did not occur until some time in 1985, latter half of '85 as I recall. So, early in the review process, in communication with RSI, it was agreed that we would be reviewing the application from that point in time solely for the use of the cobalt 60. And I think there was some correspondence in the files as I recall that documents that.
- Q: Okay so, Roger and I saw a lot of the correspondence that the other folks hadn't, and so maybe if can just summarize some of the transactions: the involvement with NRC, apparently there was a lot of give and take, even with NRC, and what role did you play with the concept of establishing the test, the demo facility originally was supposed to be in Decatur, and then, turns out that the RSI demo is going to be in Ohio.

- A: As I recall, we did not have any input into where the demonstration facility would be. I think that negotiation went on between NRC, RSI, and possibly DOE. Now I'm not so sure about DOE in this case. As I recall, NRC wished to have the demonstration facility in a facility that they licensed. That's what I remember. I'm not sure how the decision was made.
- Q: Okay so you're saying then, that once NRC said, "Yes we will license or accept, whatever the official term is for cesium." Then you said, "Okay, we accept that, and we will proceed with the licensing arrangement for RSI in Atlanta." But the only thing you were waiting on is to get that documentation for NRC concerning their review and of use of cesium. Is that right?
- A: Yes, I think so. Just a little background maybe in order here for you to know how the evaluation works. The agreement states and NRC will one or the other generally review, depending on where the application is placed, a source or a device that is new to the market for someone who wishes to distribute. The review will be for safety. The review is of the construction and environment of use and is all based on information that the manufacturer puts out, provides to the regulatory agency. In case of the cesium sources, NRC was the agency doing the source evaluation, reviewing the documentation provided by DOE...
- Q: Because they decided to do that or did you reach that agreement? Apparently, this is on a case by case.
- A: It depends on where the application is originally filed. If it is a company in Georgia wanting to distribute something, then they would apply to Georgia. If it is a company or entity that is in a NRC regulated state, then the application goes to the NRC. I can only surmise at this point that it was agreed by NRC and DOE that the demonstration was to be in a NRC regulated state. Therefore, the review of the WESF capsules was then done by the NRC.
- Q: Do we have some documentation? Tom, can you remember the time frame for these agreements that the Ohio facility would be the demonstration facility and that NRC would have the responsibility for reviewing this application for the source itself?
- A: No, I don't know the time frames on that. I believe that the of discussion on the use of WESF capsules was ongoing, prior to our receiving an application from RSI.
- Q: Before more, 1984.
- A: I think that there was discussion on-going about that, that had been going on earlier, and one of the reasons, I surmise, is that the application did have the request for authorization for use of WESF capsules. There had been discussions going on, I'm certain, between RSI and DOE on the use of those sources for category four type gamma irradiators.
- Q: Tom, let ask you a little different kind of a question. Was the RSI application and review and questions and answers to questions, process pretty much a typical one? (coughs) In the sense of the amount of time and amount of interaction involved. I know it's the unique application in the State of Georgia, and there aren't very many in the country, but just what sort of process, was it, pretty much a typical, kind of a give and take process, or was it unusual in any way?
- A: I would say that the process was typical, the length of time of the review was much longer than normal. Clearing of the site had begun about the same time that we received the application, so during the construction phases of the facility, I made periodic visits out here to see the status of the ongoing construction and the way things were being installed. This is a little bit beyond your question. But along the same lines, based on comments that I have received from RSI in the review process, they had stated that all their other applications for licensure had been approved prior to completion of construction of their facility. We were not issuing the license until the facility was constructed, and the safety systems that were

described in the application were inspected by the Department and that they were shown to be operating in accordance with the license.

- Q: One of the things that prompted me to ask that question was, as I reviewed the correspondence, it seemed like there were several instances where you had requested information, there was a reply, information was provided, you then requested the same information again saying, "You hadn't provided me what I asked for in all cases." Is that a typical way things go? I'm not that familiar with the licensing process. I'm just curious; it seemed like there were incomplete responses, and they necessitated follow-up for some of the same questions that it seemed to me might have contributed to the length of time involved. If you say it is an unusual, it's not typical because it is a little longer than typical.
- A: Yes, that contributed to the length in time involved to some extent. It's not uncommon that we get incomplete responses to questions, but by no means has it taken that long on other types of licenses to review them. We have taken, as a example, we reviewed a medical device that took almost a year to complete the review. And that was not something that was a typical device request. Those are some of the atypical type things that we receive and sometime will take longer. I think I may have walked around your question a little.
- Q: No, that's fine. I'm just trying to get a feel for the whole process.
- A: Well, one thing too, this was a different type of licensing request for us, so it was a learning process for the regulatory agency also.
- Q: Did you feel that NRC was more responsible for assuring the safety of the source itself than Georgia was? The safety evaluation of the source. The source being something that could be used, and you were more involved with making sure the facility was safe in as the same line as if cobalt 60 were there or something.
- A: Yes, I think that's factually correct. That NRC was doing the safety evaluation on the source, and once that safety evaluation was done, we accepted that criteria. They had the expertise in reviewing that, and we did not.
- Q: So the NRC says that this source is not going to leak. Then you say, "Okay, now based on the assumption that it is not going to leak. Here are the things that you have to do." Is this the proper line of reasoning, from your answer to the last question?
- A: Okay, yes that's the proper line of reasoning but I don't believe any device or source evaluation guarantees it won't leak. Okay, based on the information submitted, will this source work in this environment as claimed by the manufacturer?
- Q: Because when we looked at the application information, we didn't find a whole lot of data in there about what are you going to do when the source leaks.
- A: That's correct. And I believe that question was asked, and the response we received was we're going to call in the experts. We asked at one time for some failure mode analysis, and the response we got back to that was, in effect, sketchy. And it was along the lines that we will call in the experts; we process product; we don't have the expertise to deal with the leaking sources.
- Q: Did you feel confident that when they said they were going to call in the experts, that the experts were going to be able to handle this in a very expeditious fashion?
- A: (pause) I don't know as I have an answer to that in any shape, form, or fashion. When a device or a source has been evaluated, and it's been accepted for the use it was evaluated for, that's when it's accepted or authorized, or can be authorized for use in that manner. I would

say, based on the application review check list and the licensing guidance that we were using, that much detail in that specific area was not emphasized.

Q: (Hultgren) We have seen documentation that indicates that the Richland people, Hanford people, or Westinghouse people, or whoever, were launching off to create a set of tools...

Q: (Penry) That they had a set of tools.

Q: That they had a set of tools, they had a set of detection equipment that was going to find out which one of the devices that was leaking. Did you have access to that kind of information at the time, and again I come back and ask the same question again. Did you in any way rely upon that source of expertise being available out there in the field?

A: As I recall now, no.

Q: Okay.

Q: You didn't have access to the...

A: Didn't have access to that information.

Q: (Penry) But apparently, some folks made reference to that without giving a lot of details that, if the situation should occur that there was the expertise that they had access to call upon.

Q: (Davis) In your mind, who were the experts?

Q: (Jugan) (pause) Would you repeat the question?

Q: In your mind, when you identify, when you speak of experts, who were the experts?

A: I would think in terms of the companies who make their living, whose business is to clean up and decontaminate facilities.

Q: What kind of names, like ChemNuclear, or is that what you're talking about?

A: That type of company.

Q: Or would you have thought things like, would you have thought they were referring to DOE or Richland when they say experts?

A: That is a possibility. I can not sit here and tell you that DOE or Richland went through my mind at the time.

Q: Okay.

A: Generally speaking, the experts on any source or device are the manufacturers.

Q: During the review process, it appears that your review of the facility was taking place about the time NRC was doing their thing on the source?

A: Yes.

Q: Did you have much interaction with NRC in terms of the status of their review in some of the; if it was taking longer than normal and why some of the question were problems getting answers to?

- A: You're referring to NRC's review of cesium WESF capsules?
- Q: Yes.
- A: My main interest in that was along the lines of, I am being requested to authorize licensure for cesium. What is the status of your review?
- Q: Maybe you're getting too much dialogue, they just say, "Hey we're not there yet."
- A: There were various documents, I would receive copies of correspondence, you know on occasion that outlined to, where the review was going. The license was issued to RSI, and the licensee was authorized to use cobalt 60, so they were in business, processing product prior to the approval of the WESF capsules, and there was not an extreme urgency during part of that review process for RSI to obtain approval to get WESF capsules. Yes, they did want them as soon as they were approved and were available. I guess that would be from a standpoint of economics, thirty year half life instead of five year half life. There wasn't that extreme push, as things would progress in the approval process with NRC, then I would get another request or whatever to look at the approval of WESF capsules. And that was done only after we received the...
- Q: As I understand correctly though, it wouldn't have mattered how many letters you would have gotten, from whoever. Until NRC had given their approval or issued their approval on the WESF capsules, you wouldn't have done anything anyway?
- A: That's correct.
- Q: Okay, you would go into reviewing the facility, everything you could have done up to the point of actually having the approval from NRC, and at that point you just wouldn't go any further and tell RSI and say, "This is the status until I get this?"
- A: If, for example, RSI had not had Cobalt in there, they had no isotope, they had been sitting there for six, eight months or whatever, we wouldn't have authorized the use of WESF capsules until we had documentation in hand from NRC that those sources had been approved for that type of use.
- Q: Tom, on a slightly different subject: the safety evaluations that I'm familiar with are for reactors, and they address multiple system failures and then the release of radioactivity out in to the environment and off site. What, what type of safety review? Can you describe the accident scenarios in the safety analysis review that is usually conducted on a facility of this sort.
- A: (pause) Most of the review of the safety at this facility and for most of our licensees, and I'm not familiar with the safety analysis of reactors, but that's foreign territory to me, is the review of the different safety systems that are installed at the facility, the review of the way they are designed to operate and are those systems, redundancy if it's required, are the redundant systems in, and do they operate in accordance with the requirements or the regulations. Now as far as a safety review on a device, take a radiography camera, or a flow gauge or density gauge or something like that, or a source, the review that takes place, is in general, what is the condition of the environment this is designed to operate in? Are the manufacturing specs that the manufacturer provides adequate to meet those environmental conditions, temperature, corrosive atmospheres, whatever, and that the tests that are performed by the manufacturer are done in accordance with various appropriate ANSI standards. So we are reviewing for their documentation of the device or of the source having been manufactured in the accordance with recommended standards.

- Q: I guess, I'm still thinking that things could have been a lot worse, there was some release of radioactive material to the enclosed environment in there, but the possible accident could have been a lot more and possibly could have gotten outside. It seems like that part of the safety analysis wasn't considered very much.
- A: That's probably a fair statement. I would have to say though, that the analysis that was done, and what was reviewed as I recall was done in accordance with guidance.
- Q: NRC touched on the review of something like that in one letter saying that three micrograms would contaminate your pool water very high, and it seems like it stopped around their worry that the pool water got contaminated?
- A: I don't recall the particulars on that one, I just don't remember on that particular point.
- Q: Okay. I guess the answer is there what I was looking for, was no safety analysis that I'm familiar with and beyond the NRC letter about contaminated the pool water, I guess.
- A: Near the end of the review process let me back up. I guess you saw this in the license application. I'll go on that.
- Q: Not really.
- Q: Not all the folks have seen this stuff, so go ahead and repeat yourself.
- A: I'll try to remember a little bit of this. Near the end of the safety review, RSI was requesting permission to bring the cobalt sources in and store them in the bottom of the pool. They were asking for a license for storage only, before the facility was 100% complete. A lot remaining had to do with the programming of the computer, or programmable controller that controlled the safety system of the product throughput system, and we did finally authorize them to load the sources or bring the sources in and unload them into the pool leaving them in the baskets that were in the AECL shipping cast. It was a phased in licensing process. About the same time, we requested additional assistance from NRC in reviewing the facility and the license. They did provide us a gentleman from another agreement state who had experience with irradiators and came in and review that and gave a list of recommendations to the state.
- Q: What was that gentleman's name?
- A: Dick Brisson from the State of Maryland. So he was brought in by NRC, and he accompanied me and a NRC representative from the agreement state program and reviewed the facility, and as a result of that, we came up with several recommendations that he gave to the State.
- Q: Was that the tour around the December time frame?
- A: As I recall, there was a letter dated December 26, 1984, that went to RSI requesting additional information, that was the outcome of that.
- Q: Okay.
- A: I may be wrong on those dates, but that's...
- Q: There was indeed a letter on the 26th that was a long letter. It brought up points that hadn't been brought up in the entire licensing process up to that point. That's why it struck me as an unusual kind thing because all of a sudden new facts or new data were being requested.
- A: Yes.

- Q: The surprise also to me was that the license was granted shortly thereafter, and we didn't see any response to that letter and either we missed the letter, the response from RSI, or somebody made a decision that, "Hey you really don't have to respond to that."
- A: There were two letters as I recall from RSI that did address some of those. I believe one was dated something like January 10 or January 17 or something like that of 1985 that addressed some of those issues. There was two phases in licensing that occurred one in the end of January and one beginning in February that authorized them to proceed. And yes, license was issued and granted prior to all those points being answered by RSI.
- Q: What were the most significant points of the letter that Brisson initiated?
- A: I can't recall. There seemed like there was seventeen, eighteen, twenty different things that he mentioned, and which one was most significant, I don't recall.
- Q: (Jugan) I think Ron noticed somewhere in the license application that it called for HEPA filters and called for monitoring the temperaturing in the cell or on the racks by the sources.
- Q: (Hultgren) Yes, it is specifically called out in the license the presence of thermocouple on the source rack, and there isn't one on there, and when we talked to Mr. Fisher, he presented us with a letter, that indicated the sources at their Westerville, Ohio facility had pretty much of a constant temperature. As a result they felt very comfortable in taking the thermocouple off. The obvious question is, number one, did anybody ever inspect to see that there was a temperature measuring device on the racks here and, number two, did anybody ever give their okay to take the thing off, when it was taken off?
- A: The only way I could answer those is to review the letters. I remember some discussion on the thermocouple. I remember it in terms of the demonstration facility. But I can not tell you that for sure.
- Q: I guess the other thing we can ask them about is the filters on the facility itself. We were surprised when one of the first activities here in the clean-up, was to install HEPA filters on the room. To me that would have been something so obvious that even I would have had those, and what is your response to that?
- A: A very vague response in that I have not gone back and reviewed. Yes, I do remember the HEPA filters were to be installed. I remember some discussion that the air flows were not sufficient with the HEPA filters. I remember some discussion, now if this is documented in letters or not I am not sure, and it would take a review of application to see. If in fact the State did approve the removal of the HEPA filters, I do not remember that, but I do remember some discussion, on it. The exact outcome of that discussion, I don't know.
- Q: (Jugan) Were there HEPAs on there originally?
- A: It's my understanding, as I recall, there were. I don't know if we even have that documented in the inspection reports. I don't know for sure if it's documented there or not.
- Q: I'm curious about one other aspect of this is that the data seems to indicate that there would be about twelve thousand raisings and lowerings of the sources over the lifetime of these sources, and we have looked at the operating logs, and they have some seven thousand cycles on them already, and that's in about two years and a couple of months. Is this a surprise to you? If you had known that indeed there would be this many cycles of the system, would it had made any difference to you, in your licensing process? In your licensing considerations?
- A: As I recall, one of the questions asked by NRC in reviewing those was, how many cycles could these sources withstand. I do not remember those numbers. Some of the safety requirements



for gamma irradiators. I have commented on rules and regs that they have proposed. In 1986, we did amend our rules and regulations. Effective May '87, that includes the equivalent of 20.203(C)(6). It wasn't there in 1982; it is there now.

- Q: That reg requires more than just alarms to enter a high radiation area.
- A: Yes. That requires the redundant alarms. The deliberate entry permitted etc.
- Q: Key access and that type of...
- A: Key access is...
- Q: I, I don't...
- A: ...one way of activating the device.
- Q: Okay. I don't, I don't know what the NRC rules are. I know in DOE facilities there has to be a lock on a door if there is a certain level of radiation inside the cell.
- A: The way the regulation is written, and I cannot quote it any more, but in essence, if there is a high radiation area within one meter of the sources, then entrance to that area, a device shall be activated that shall cause the radiation level be reduced below that at which it would be possible, etc.
- Q: Hm.
- A: It would not be possible for anybody to enter and...
- Q: Okay.
- A: ...receive exposure in excess of a hundred millirad in one hour. So, and then they based when it requires redundant devices. This facility has the initial devices and redundant devices in case of failure of the first one.
- Q: Okay, let me make sure I understand because I might, I think I'm confused about some of this.
- Q: No, everybody else here I'm sure understood this. Okay. The original license was based on; did the NRC change the regs or did the State of Georgia? NRC 20.203(C)(6) was always around except they weren't included in the Georgia regs, and you have amended or you're going to amend your regs to include the portions of NRC? You said the regs have changed, the criteria had changed during this period of time. Did I miss that? Explain it again.
- A: You're close.
- Q: Oh.
- A: In 1984 when we were doing this review, the Georgia rules and regulations only required an alarm. That may seem...Basically one alarm.
- Q: But the NRC regs...
- A: But the NRC regulations required multiple alarms and redundant systems. We have since...
- Q: Georgia...

- A: ...Georgia has since revised our rules and regulations to reflect what was in NRC's rules and regs at that time.
- Q: Okay. And did that prompt, I saw one letter about this detection business, I mean a knowledgeable person entering, remember that letter, and somebody got a little excited about it. Was that prompted by your comment about you were trying to specify some things that weren't covered by the Georgia...
- A: I was making an attempt to have documentation by RSI of how they were complying with NRC's rule 20.203(C)(6). It was a statement made in their original application, that the systems were designed in accordance with that. As I was checking out their system, inspecting it, they were in compliance with Georgia's rules and regulations, but I did not feel they were in compliance with NRC 20.203(C)(6)...

#### PAUSE ON TAPE

- A: ...but on that, part of that.
- Q: Okay.
- Q: Tom, something I forgot earlier in our discussions, was that the way a leak was to be detected, there was quite a bit of give and take on that. First of all, it was proposing a wipe test of the source and it went .005, Georgia was requiring, RSI said .05 microcuries, and then we got to the point that we decided that we detect so many microcuries in the total pool water. Can you comment a little bit of how you feel about this negotiating process, and what the final outcome was along the lines of ability to detect a leak?
- A: I will try to remember. NRC rules and regulations for larger sources require that leak tests only be confirmed as leaking when it's .05 microcuries/100 centimeters or whatever square. .05 anyway...
- Q: Yeah.
- A: ...Georgia's rules and regulations, that's on larger sources than NRC has. On smaller ones there, .005. Georgia rules and regulations have always required .005 on all sources. Teletherapy sources we require .005, NRC is .05. As I recall, one of the processes used by Tom Fisher that he'd talked about using previously had been to wipe the sources. Underwater wipe of the sources was a bit of a questionable for me as for a leak test method. I know we did some calculations, and there is a whole page where I wrote all over...
- Q: Yeah, I remember that.
- A: ...the license application, where we were doing calculations of activity in the pool and what activity would be required to see a certain amount of leakage.
- Q: Um-hm.
- A: And I do not recall exactly what those calculations were and exactly what that amount of leakage was at this time.

#### BREAK

Okay. We begin again. It is now roughly noon, after a short break to allow Mr. Hill to attend a meeting. He is now back with us. Also in attendance is Mr. Woodruff from the NRC, who will largely serve as an observer during Mr. Hill's completion of this interview. And Mike, you have a series of questions.

- Q: (Jugan) Yes. The first one was concerning the criteria for detecting a leaky source and how there was some give and take. It appeared that originally RSI was saying .05. Georgia was saying .005, and I think we got to the point where we said, the license said either 13 or 40 picocuries/liter in the pool was an acceptable means of detecting a leak, and could you comment on what you felt along the lines of these compromises and what is adequate?
- A: (Hill) As I recall, all those initial calculations were dealing with Cobalt 60, and when those discussions back and forth were going on, that was considered to be a reasonable alternative of complying with the requirements for determination of leakage of the Cobalt sources.
- Q: Okay.
- A: Now that's about as general as, without looking at notes and seeing the correspondence or anything like that. Anything that was more specific...
- Q: Okay.
- A: ...that would be a general feeling of that.
- Q: Okay. I guess my thoughts on it were that 40 picocuries/liter in the pool water could be a rather significant leak on one source compared to .005.
- A: Yes. I believe the calculations that we went through determined how much activity had to get into the pool from one or more sources to give you that concentration, and I don't remember what that total activity was. But it may have been something on the order of .005 from a number of sources.
- Q: Yes. Yeah, it was .005 from every source...
- A: Every source that was in the pool at that time.
- Q: Right. Uh-huh.
- A: Or for the 500,000 curies or whatever was...
- Q: Yep.
- A: ...going in initially.
- Q: Okay, so you were aware, and you just decided to, don't let me put words in your mouth, but live with the detection capabilities that industry can provide?
- A: That to a certain extent is what was occurring in that case. I would think that was a reasonable statement.
- Q: Okay. That's what I thought I inferred from the documentation. I guess the other questions that I had was something along the lines of what Ron was asking for additional information. Are, are you aware of any bulletins that the NRC might have issued concerning leaky sources or source surveillance in general, not necessarily the cesium source?
- A: As far as bulletins on that line, I don't recall any.
- Q: Okay.

- A: There may have been some, I don't recall any. I know a lot of the discussion that was going on when everyone was reviewing this. You know, what is NRC doing and what is acceptable to NRC and to other states and similar licensed facilities? And I think that what we settled on there was in line with what was going on elsewhere.
- Q: (Jugan) That was all that I had left.
- Q: (Hultgren) Willis?
- Q: (Davis) I gotta go back and restructure, I think, something you said this morning, but you mentioned that only the alarms were required in the regulations that were in place in 1982? And I think you also mentioned that the NRC folks had a higher requirement. That their regulations required something beyond this...
- A: Yes.
- Q: ...that was not included in the regs by the State of Georgia. And I guess the question that comes to my mind is why would you folks have accepted something less than the NRC? Especially in this safety area?
- A: Okay. Number one is under our law, we cannot enforce NRC rules and regulations. We can only enforce rules that have been adopted, been promulgated by the Department of Human Resources, we have no way of enforcing NRC rules and regulations, legally.
- Q: Okay, let's just deal with this one point right now. The, the regulation, though, is not a statutory document, is that correct?
- A: No. The regulation is not a statutory document. But its adoption, its process of adoption and approval and implementation is based on a State law.
- Q: I understand that.
- A: Okay. Now, maybe to back up and clarify just a little bit. Under the agreement with NRC, they have requirements that they look at when they do their periodic inspections of our programs. Does the state, okay, now wait a minute and let me back up. There are certain NRC rules and regulations that are required by the NRC to be adopted by the agreement states within three years from the time they become effective at NRC. And that requirement is for purposes of compatibility. And, to protect public health and safety. So if this is one of those rules and regulations that was required for compatibility, as I recall, and at the time the application for RSI came in, we had not incorporated it into our rules and regulations. The rule adoption process is lengthy and time consuming, unfortunately. So maybe that gets back a little bit, why would we accept less than NRC? We can only enforce our own rules and regulations and the provisions are there for upgrading and revising our regulations to keep them compatible with NRC. But the time lag for doing that allows for someone to come in with an application to less stringent standards, in the State of Georgia, and I guess in any other agreement state, than the same application at the same point in time in a NRC licensed state.
- Q: I don't want to try to, try to pin the ribbon on you, but the purpose of that licensing bill, the safety element is there of why you issued the license. If you've got a less than desirable situation, for example, if you felt that the NRC had a better rule concerning the safety of the operation of the facility, do you not have flexibility within your own department to enforce what you consider to be an acceptable level of safety for this facility out here? I guess I'm...
- A: (Hill) I don't have the legal mechanism to enforce it.

- Q: Even though you feel like there would be a potential safety concern, you don't have the legal mechanism to enforce the rule? I mean, you...
- A: That's right, because I know of no legal mechanism that...
- Q: (Penry) I guess the mechanism is the fact that it changes the rules. Go back through that process.
- Q: (Davis) I understand. It gets things written down. But I'm getting to the point, they're still charged with the responsibility for the safety of this facility. I mean, when you issue that license, you don't issue a license to an outfit that you feel like that would create a safety hazard to the people of this area, right? I mean, you...
- A: Yes, and the rules and regulations that are in existence at that time, that have been approved and are being operated under, when a facility has complied with those, should have demonstrated an ability to protect public health and safety.
- Q: (Davis) Could I ask you another question? Maybe this is, maybe this a little bit unfair, but are there politics or the political situation get involved in the issuance of these things? In terms of pressure?
- A: Generally not. Generally not.
- Q: (Jugan) So what things, Willis? I'm not sure I understood the...
- Q: Let me make like the guy can't get his license to operate his business. He's got a State Representative, and he has access to the Department of Human Resources in the State of Georgia. This is the kind of pressure, was there any of that kind of pressure involved with it?
- A: Yes.
- Q: There was that kind of pressure involved?
- A: Yes.
- Q: (Jugan) Could you expand on that?
- A: Well, let me think about that for just a minute. In essence, the word that came down from management was to "issue the license." We asked a couple of questions that needed to be asked. And all the big questions that needed to be answered had been answered.
- Q: (Jugan) Could you...
- Q: (Penry) What was the time frame of that?
- Q: (Jugan) Yeah, I mean, issue which license, and is it management within your department?
- A: Yes.
- Q: Okay.
- Q: And to issue which, the original license or the other?
- A: January, the one at the end of January and followed by the one in February, the first of February.

Q: 1985?

A: That's 1985. The initial license that allowed them to put the sources in the source rack, do their integrity surveys of the shield as I recall, and the one to process product. In essence, putting them in business.

Q: So, did these conversations happen like in the November-December time frame or for a longer period of time?

A: Shorter period of time at the end of January.

Q: End of January?

A: And it was, you know, my management supervisor telling me that we need to issue the license. I'm not comfortable with it. That was my response. The word to me is, we'll issue the license.

Q: Willis?

Q: (Davis) Going back to the 1969 arrangement, where you have an arrangement with the NRC, that you basically identify the types of material and the sources that you can regulate that the NRC permits you to regulate. You mentioned this morning that some of this was nuclear. Do you have a file on those discussions and the correspondence that would take place between the State and NRC as to what they would agree that the State of Georgia could look at as opposed to the NRC post. You mentioned something this morning that there was an arrangement that you reached with the NRC on the various types of materials and so forth that you regulate as opposed to maybe their total control of. Do you have a file and the correspondence and so forth that maybe we could look at?

A: I can give you a copy of the agreement. And I think, as I recall, that agreement will spell that out for you. And...

Q: We would like to have a copy.

A: It says in that, that you will exercise regulatory authority over certain by-products source and special nuclear materials.

Q: This goes back to 1969?

A: Yes.

Q: You mentioned there was some kind of agreement. Is that updated periodically?

A: No, there's no update of the agreement...

Q: It's just one agreement back in 1969?

A: One agreement in 1969, and the NRC does periodic audits or inspections of our program.

Q: So the cesium, the cesium material then would have been, it must have been a rather broad agreement in terms. Does it have specifics on it? That's what I'm trying to get at.

A: No.

Q: It's just a...

- A: Its word is by-product.
- Q: Just by-product?
- A: Yeah, also a special nuclear material.
- Q: Okay. I think for the file we would still like to have a copy of that.
- A: Sure. No problem with that.
- Q: Okay.
- Q: (Penry) How about their, how they handle corrected copies of the leases and just the procedural question we had on that replacement page?
- Q: Okay. Ron, you may want, you may want to re-ask that question.
- Q: (Hultgren) What, what we have Tom, and here is a copy of it, is a copy of page two of two of the license number GA868-1, amendment .07. Okay? And one is the corrected copy and it's dated March 12th, 1986, and one is dated January 6th, 1986. And what it is, it shows the top portion, the section 19, the condition 19, is exactly the same, one to the other.
- A: Um-hm.
- Q: But the thing that's different is the condition 32, is omitted on the March 12, 1986 version. And we were wondering just procedurally, is that the way you indicate that that item has been deleted? Is there no overt statement that condition 32 is deleted? Is that what this correction is meant to do?
- A: This corrected copy, as it appears to me in front of me here, is meant to delete condition 32.
- Q: And that's how you would procedurally do that in this case and other cases? You would just reissue the same page, omitting whatever you wish to omit?
- A: Okay, in the case where it's determined in house, by staff, in our office, that something is incorrect here, this is the procedure that we use. Otherwise, it would be a letter that would come from the licensee requesting such and such to be done. In that case, you would see something that said in accordance with letter is amended as follows, condition 32 is deleted.
- Q: Okay. We asked that question simply because we are contract oriented, and generally when we delete something, we overtly say delete number 32, and so we were just curious about that.
- A: Well, in answering and responding to your question about the temperature monitor sensors, I would need to go back and see the letter dated December 10, 1985. In all probability, that would be the one I'd need in responding to your question.
- Q: Why?
- A: That would give me some insight into what went on here. I don't recall.
- Q: Yes, and that's why we're asking for that documentation to be given out at a little bit later time.
- A: This would indicate to me if the corrected copy was based on our review or whether the licensee come to us with a written request.

- Q: I've got a question we should have asked at the beginning. Tom can you tell us a little about yourself, how long you've been with DHR and your experiences till you know, previous to that?
- A: Okay. I started with the Radiological Health Section in July 1979. I came to Radiological Health from Environmental Health. I have been working as a license reviewer and inspector from that point up until January of 1985, I guess. I got a promotion to be the Unit Chief of the Radioactive Materials Unit and supervise the license reviewers and inspectors in that unit effective February 1, 1985.
- Q: From July 1979 to January 1985, you were involved in the licensing of the facilities?
- A: The licensing and inspection of facilities.
- Q: Okay. And then after that, you became the supervisor of other license.
- A: Yes.
- Q: Okay.
- A: During that period of time, I'd attended several training courses sponsored by the NRC on licensing, inspection, including the ten-week, as it was at that time, health physics course in Oak Ridge, Tennessee.
- Q: ORAU?
- A: I attended that in 1980. And several others.
- Q: I have one other question if I could, and I don't come back to this point, but I guess I'm still just a little bit hazy in my mind. I'm a government contractor person that has absolutely no knowledge of safety and environmental issues and so forth, except kind of just a little on the fringes of it. But, could you discuss in, as you view the role of monitoring the safety of this plant out here, what you perceive your role to be and what you perceive the NRC's role to be? I guess I'm just a little bit hazy as to the, the connection and the link between the two controlling agencies.
- A: In a day-to-day activity of any licensee in the State of Georgia, NRC has no role in that inspection or review process. In a day-to-day activity they come into play only when ask them for their assistance, their consultation, and their guidance. I can modify that a little bit in that NRC does provide, on a routine basis, licensing guidance that they use for the states for our modification to fit our particular needs or to use directly as is. So I guess, on a day-to-day basis, they do provide us guidance in that respect. But as far as the on-site inspections and licensing actions, they have no role to play other than at the request of the State.
- Q: I guess coming back though, to this 1969 agreement, where the by-product, basically, that's your authority though to...
- A: Authority to regulate it is based on our State Law, O.C.G.A.31-13, Radiation Control Act, as amended, which was first established in 1964. That law had to be in place, and we had to have the legal mechanisms for the regulatory authority prior to NRC's agreeing to enter into an agreement with the State. Does that muddy it up more?
- Q: Well, I might ask him (referring to Woodruff) the question this afternoon.
- A: Okay.



- Q: 'Cause I, I guess I'm still a little, let's see, the State Law was passed when?
- A: As I recall, initially in 1964.
- Q: 1964.
- A: And it's been amended two or three times since.
- Q: So the NRC, based upon that law, is the basic tenet that flowed to the 1969 agreement where they permitted the by-products.
- A: That one of the basic tenets, one of the basic requirements.
- Q: Okay.
- Q: Let me ask, my recollection from when we talked earlier was that while you said that NRC doesn't participate on a day-to-day basis like you just have amplified here. They do, however, perform an audit function on you.
- A: Yes.
- Q: They do periodically audit what you're doing, a kind of a standard audit function.
- A: Yes.
- Q: Okay.
- Q: Okay. Tom, we thank you a whole lot for coming down here and answering a lot of questions. I'm sure it's a different role for you as a licensor.
- A: Yeah, but I'd rather ask the questions. (Laughter, everyone talking at once). Sometimes I enjoy asking them rather answering them.
- Q: But we do appreciate your help, and we will follow up with this request for, you know, for additional data.

END OF TAPE

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**Richard Woodruff**  
**NRC Region II, Atlanta**

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**RICHARD WOODRUFF**

It is twelve fifteen on the twenty ninth of June. We have Mr. Woodruff on the NRC; the attendees of the Board are Mr. Willis Davis, Mike Jugan, Roger Jensen, Judy Penry, and myself Ron Hultgren, and also sitting in is Mr. Tom Hill from the Department of Human Resources from the State of Georgia. And with that we'll start off. Willis, I think you have a good line of questions to finish with Tom and I think you also want to ask those of NRC.

Q: Yea, I'd like, it might be good for you go back just how tell us how long you've been, at least were, since we're concerned with the cesium, how long you've been working this area but, oh, I especially would like to know what you do, your relationship to be with the State of Georgia concerning the control of the cesium in the facility out here?

A: (clears throat) Well, as Tom earlier explained in 1969 we signed an agreement, broad type agreement under the Atomic Energy Act. Under this agreement, Tom or the state receives authority to regulate by-product, source and special nuclear material, amounts of special nuclear material not to exceed a critical mass. And before that agreement is signed it, the state, has regulations, staff, and other resources necessary to conduct radiation control program. And this guidance is primarily found in 10 CFR 150 as you are aware of. And also there is a policy statement in, I don't recall the exact number, it's PS dash something or other. 10 CFR that provides all the criteria for the states to become an agreement state, and it also provides criteria which the NRC looks at during our reviews on the Agreement State Program. We review the Agreement State Program, usually we review them annually; just recently in the last year we have started going to (cough) well, then we went to an eighteen month frequency now it's at a two year frequency for a formal review of the program. However, upon an annual basis we have an informal visit to the state, to discuss problems and issues.

Q: Okay. At any time during the term of the licensing agreement for the cesium, did you have any knowledge of, or have any inclinations at all that there was any problem with the safety aspects of the arrangement that it had been worked between the company and the state?

A: No, you know this was one of the first facilities that received them, the only other one was in Ohio, was Mr. Chin's, RSI Ohio facility which was licensed by NRC. And this was the second facility. I believe in our line. I really don't know whether the state of Colorado issued theirs or not. Basically this was an identical facility (as the Ohio facility) in general aspects with several modifications that Mr. Chin felt were needed or has computer control of sources. And in 1985, we had a workshop in New Jersey concerning the licensing and regulation of cesium type, well, all types of pool irradiators. Tom was a very important person at that workshop because he had up-to-date knowledge on the current computerized programs.

Q: (Everyone is speaking) Tom:

A: Tom.

Q: Hill?

A: Hill.

Q: Okay, I thought you meant Tom Fisher.

A: Yes, we're not aware of any particular safety problems that are going on here other than we were aware of the differences between the State of Georgia's regulations and the NRC regulations with respect to high radiation areas. And this was not viewed as a compatibility problem at that time because the states still had a three year period of time in which to enact

compatible regulations. And in addition to this, the RSI application was furnished to us by the state. This application and documentation also went to our headquarters people who also provided a cursory review of the application. We did provide some support to Tom in the form of technical assistance by bringing in a person who is an expert in computer modeling and programs to help Tom during the, it was like, you know, a one or two day visit to assist him in evaluating the computer program. But, I'm aware that Tom was on site several times during construction phases in which Mr. Hill was very actively involved in reviewing RSI's plans and procedures, all the way from the initial construction until the license was issued. It appeared to us that the state had adequate control, and that all the safety issues were being addressed by the state and if not through regulations through licensing actions and administrative controls that were required of that licensee. (pause) In addition, during my reviews, my procedure would be to look at the sterilization, over the RSI file and to update all with regard to inspection activities that are going on, new license amendments that were being issued and so forth.

- Q: Did you take a look at the check list that was used. Let me refer to what extent do you look at the inspection that the state does of the facility?
- A: We look at the report. It's usually a combination of and I don't remember in this case whether it was a check list. I think it was a narrative report or a short statement, short and narrative statement in combination with a check list.
- Q: Do you ever accompany the state and come out to the site to do their reviews?
- A: Yes, I accompanied Tom on one occasion I know of, maybe two I'm not sure now. I'd have to refer to...
- Q: Here.
- A: Yes, at this facility and addition I was here at other local visits, chapter meetings. (pause)
- Q: And you were satisfied with the review that was done?
- A: Yes, and keep in mind the inspections during construction phase would not be a complete in-depth inspection of all areas, but it would be a series of spot checks on what the licensee or applicant is doing, what records are being maintained in the regard to the construction in the facility. I don't believe I accompanied any person out here after the facility was completely licensed. I was in the facility on other occasions.
- Q: I was talking about, there was three inspections that they did. Do you accompany the state on the inspections?
- A: I on one inspection that I remember, and I don't recall what, what right now which one it was, without looking at notes.
- Q: Again I might be putting you on the spot with this but since the incident has occurred here, have you had any time to reflect upon the possible corrections that, that may need to be made, improvements in the safety aspects of the facility?
- A: I think it's a little too early to really do that. We have kind of discussed internally the need for a group investigating, a group such as yourself and also perhaps one made up of state and NRC people to really look at the causes and controls and to really decide what needs to be done. At this point in time, it's too early to speculate, now since Tom, since the state licensed this facility, we have had one additional workshop in Texas, as a matter of fact, it was last month. And this workshop involved state people, NRC people, and DOE and industry. And there were a number of issues raised during that workshop that I think will also be

considered.

Q: Is the workshop on sources?

A: It was a workshop on pool, or pool storage irradiators. (pause) Now the report is not out yet. Might be several months. But there are a number of things: one would be I think the running the demineralizer, in a licensee facility. This is probably something that should be done continuously at all times with the radiation monitor on the demineralizer. This would point up any source leak almost immediately. That's the only thing at this point. I think I can really say that, that really points out or heads up at this point. And at this time, I'm sure there probably be additional ones as to when we go up further.

Q: What was, were you, did you ever play a role and review by NRC, the use of the cesium as the source in the first place? We saw a lot of documentation where you were just waiting for some guidance from NRC in terms of the acceptability of the capsules. Were you involved in that or did that take place at another point in NRC?

A: I wasn't directly involved in that, that took place out of our region in our Chicago office, in which the Ohio facility was licensed and the DOE sources were used in that facility and there to undergo a series of test to evaluate their suitability. And, other than passing the information along to the state, I really wasn't directly involved with it.

Q: In reading something, I, a period of one point in time, they would use Atlanta facility as the "test" and somewhere along the way it got changed. Do you have any information, were you involved, do you know what happened there?

A: No. Really, really I don't. I think its primarily because the Ohio facility was licensed first. That's my guess, its only speculation.

Q: Okay. So Ohio facility was licensed by...

A: NRC.

Q: Before any decision was made by NRC on the acceptability of the DOE sources. How did, how did that work?

A: No. They, it was not to my knowledge that NRC did not license the facility, cesium sources until certain work had been done to or at least the evaluations of DOE work had been evaluated for the suitability of the sources they used but, to really get a handle on that you need to go the our Chicago office.

Q: It is also like a chicken on the egg, cause it seems like you couldn't test the sources unless you have a licensed facility? Right?

A: The facility was licensed for COBALT, I think before that. It just didn't have a source license.

A: I got the impression that NRC's evaluation of the cesium sources as generally being suitable, and then they licensed their use of it in one facility, the Ohio facility, as a demonstration and to further evaluate if it should be expanded the use to other facilities.

Q: So then, now is the next point. Once the, whatever period of time had elapsed in terms they thought was a successful demonstration, then at that point they issued the guy "an agreement states" or whatever that you can move out on this.

Q: Mr. Woodruff we have had this speculation on our part. We're looking for your confirmation or disagreements or some types of other.

- A: I realize I have been nodding my head, so you can't hear me. But that is correct the, the what was stated to my knowledge the facility in Ohio was licensed, and based upon the information provided by DOE on the source encapsulation and integrity of the sources, that the Ohio facility was licensed to use the cesium sources, the WEST capsules on a trial bases if you will, the sources would continue to be evaluated periodically, annually, and determine their suitability of their use in pool irradiators. And, it's also my understanding that this type of arrangement between the use of the WEST capsules and the NRC license was, had a lot to do with the license being issued here in Georgia. It was my impression that the licensee asked questions (like, since the sources were already licensed in Ohio, why would they not be licensable in Georgia?). (pause)
- Q: Have you been in your're current position for the last, at least the last two years, so you were the point of contact if you were still with this day on the particular facility. Right?
- A: Yes. I'm their Agreement State representatives for the Region Two office. And, I'm the point of contact for Georgia as well as the other Agreement states in this region.
- Q: Just for information, how many Agreement states are there?
- A: We have twenty-nine, eight of them in this region.
- Q: And the others that aren't an Agreement state is because they didn't want to get the resources and do all this kind of stuff, have it on their own staff and I assume, just rely on NRC capability?
- A: Yes. The NRC has regulatory jurisdiction in the non Agreement states.
- Q: Going back to the law the AEC Act of 1953, and then the State of Georgia statue that was enacted in 1964, and then the agreement that was agreed to in 1969, but the ultimate authority then seems to me to still rest with the NRC. Does it not?
- A: Well, that's a tough question. As long as the agreement is in effect, the State of Georgia has full regulatory authority over this sources. Now we have by agreement, we have agreed to provide technical assistance to the state. Upon their request and as they feel it is needed. Primarily this would be to evaluate applications, such as the irradiator. They can be sent to our office and will pass them along or devote resources as needed to evaluate the application, provide technical information in the form of information notices, new regs., licensing guides, inspection guides, and but the, I guess, Well I'm not sure I answered you're question.
- Q: Let me ask the question in another way. Again going back to the link. In production of nuclear materials, the Atomic Energy Act that governs the regulation of those nuclear materials, the statue that premises the State of Georgia to even to become a state in '64, in the agreement between the nuclear regulatory folks and the state in '69. You know the lawyers can argue who has the ultimate responsibility, but I think the source flows from the 1953 Act, Atomic Energy Act or at least some statue of the AEC act in some point in time. Do you feel that the oversight that the NRC currently provides for the states that are signed up to this agreement is adequate to protect?
- A: Oh, yes to protect public health and safety.
- Q: Yes?
- A: Absolutely. Our experience has been, been more than adequate. We feel like that the states have done, in general, they have done an excellent job of maintaining radiation control staffs and their own resources to protect public health and safety and in fact, we believe in many, in many cases I know for a fact that agreement states have more stringent controls on the

licensees than what the NRC does. More frequent inspection frequencies, that would be one example and I feel that we do have adequate oversight we all need more resources but we call upon the states to provide radiation safety functions for us such as tracking products and so forth. When some very cooperative arrangement, and has probably been the most successful of the federal-state relationships and in the federal and state government.

Q: Willis, let me ask...

Q: Could I ask just one other question and then I'll cease?

A: Yes.

Q: But to follow up on that, for example, this agreement here that we take away the temperature, the capsule temperature monitoring control and you folks were not privileged to be given or asked for your permission to do that, and this was safety measure that was in, apparently in the interest of public health and safety. Would you not feel that this would be something that the NRC should have at least an opportunity to sign off on before this type of thing is done?

A: No, not in this case I, I don't think we need to concur all their license actions.

A: Okay.

A: I realize...

Q: I realize and you may be totally correct on that I guess I'm just again trying to really take a look at the control that has been exercised over them, if they have the privilege to deal with the safety issues then you, you, really do then do look at the state.

A: Yes, we do.

A: Okay.

Q: When you drive off this facility and look at it and everything, were you surprised that the HEPA filters weren't on the radiation area?

A: Well it's never been demonstrated that there was an airborne problem at any of these facilities.

Q: That brings me back to a question that I wanted to ask along the lines of safety analysis reports and whatever. What type of safety analysis reports and risk assessments are done on facilities of these types?

A: (pause) Well I don't know of a specific document if you were, if that's what you are looking for, but the source integrity and the safety ultimately goes to the integrity of the source and their use, and it's my understanding that the safety analysis was provided by DOE and their initial evaluation of the sources.

Q: I guess I'm more familiar with reactors. You don't just consider just the integrity of the fuel and the fuel cladding. The safety analysis doesn't stop there.

A: I, I see what you are, yes well we do look at other aspects of the facility such as the electronic, the computer programs, and use the construction, the physical construction of the pool and the layout of the facility, and in the past we've never had any direct regulations to, to help us in this area. However, the NRC does have a new regulation under consideration. I think will be tentatively about 10 CFR 36 which will deal specifically with the large, in-water storage irradiators. So we have specific regulations for industrial uses well not industrial but medical, radiography, and special nuclear material, reactors and now we will have a special regulation for irradiators.

- Q: So a formal SAR isn't normally required for facility of this type?
- A: No, now that may be in the works. (pause)
- Q: (clears throat) Look, let me ask a follow-up question on the line of the discussion you and Willis had a little while ago about ultimate responsibility and that sort of thing. Is there any mechanism if a state in an Agreement state does not do a good job of licensing and regulating for example, have them to no longer become a Agreement state. How is there any precedent for agreement to policy or anything along that line...
- Q: How do you evaluate the programs?
- A: Okay, the programs are evaluated according to NRC policy statements which we can provide copies with ya, we not only have criteria for establishing an agreement but also criteria for subsequent evaluation of the agreement and we'll, I'll provide copies to give to you.
- Q: So it would be possible then, if, if they didn't follow the continuation that you would have to revisit the agreement state?
- A: Yes, we have our system of evaluation that allows us to, at the end of the evaluation, to issue a letter to the state, the management in the state responsible for the agreement program and we submit our comments to the state. They are given the opportunity to reply to your comments, to make corrections if they are warranted or what ever the correct actions may be. And then once we agree, the public health and safety is being addressed. We continue our business. However, at any time the NRC could request that we, I don't know the proper word, in agreement, whatever the legal term is for that. And also the state can request that, for the sub is provided in the Part 150 on the Atomic Energy Act.
- A: Thank you. (pause)
- Q: As a result of this, have you done anything for the Ohio source, or the other sources or anything like that. Have you issued any bulletins, or have you gone out and done a quick inspection of the Ohio facility of RSI?
- A: I'm really not familiar with what all the activities are going on with the facilities in the other region. We do have one other pool irradiator in this region licensed by NRC. This particular pool has additional controls that were installed after this facility went on line and NRC has used, issued confirmation to action letters CAL to the our licensees that have cesium irradiators. We also provided this information to the Agreement states requesting certain areas to be monitored and, or certain actions to be done.
- Q: So you have issued some of these?
- A: Yes, I don't have it with me but Tom has it or I have it out in my truck. I can get you a copy...
- A: Like he says.
- Q: Okay, this was after the incident, right, not..
- A: Yes, just within the past few days. (pause) And really can't answer you're question about whether the Ohio or the facilities have been inspected.
- Q: Is the source, is it cesium?



A: Yes.

Q: In, in their area?

A: Yes, the Ohio facility has around thirty megacuries of the cesium. That's my understanding.

Q: I think what Willis was asking, was the other pool irradiator in Region Two cesium source.

A: Yes, it is but it's a little different in their cesium sources are always stored under water and their not drawn out in the air for air radiation. Could you make...

Q: Which company?

A: I may be wrong about that, that's Radiant. (pause) Yea, Radiant Energy Corporation. And this, this is a copy of the CAL.

Q: The, is that the company that irradiates wood products?

A: Yes, yes.

Q: Lynchburg?

A: Yes, I inspected them several years ago when I was an inspector here for this here region. (pause)

Q: Can, I got a, can you tell me anything more about, I guess industry experience with the irradiators or sources as I have called them? What they usually do they have to detect leak detection capabilities? What incidences, of, if any, they if, add on contamination problems resulting from leaky sources?

A: I'm not aware of any other leaky sources in this country, now they may have been some in the world. We, we received, heard a statement at the recent workshop in Texas, that in fifteen years experience with these sources there has never been a leak.

A: Somebody had to go and say that to see what happened.

Q: Are there still questions? Judy?

A: None.

A: We appreciate you stopping by, appreciate your cooperation and I guess make a copy of this letter you sent to the folks in Lynchburg and appreciate your attitude.

A: Okay, Thank you.

END OF TAPE

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**Sylvia Wolfe  
Les Price  
ORO, Energy Programs  
Division**

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## WOLFE/PRICE

It is July 7th, 10:30 in the morning. We have Sylvia Wolfe and Les Price from Energy Research and the panel with us today: Mike Jugan, Judy Penry, Ed Wright, Willis Davis, and myself. Ron Hultgren. And we are going to be talking about the background for the lease arrangements. And Judy, I think you're most tied in with this, and would you want to lead the questioning?

Q: Okay. First of all, Sylvia gave me some information yesterday, and I'm the only one that's had an opportunity to go through that. And so, we have some standard questions, but also I've got some specific questions on that, the data you gave me. And I think I'd like to start with some of that, you know, kick it off. In there, there is the Federal Register notice that kicked off the, quote, leasing program sent out for any organization that was interested in participating and what they had to do. And there's a reference that said that the cesium capsules had been offered for sale for many years. Could you give us a little bit of background and exactly what the application of the sale of cesium had been prior to the leasing program, and was that a big activity, and how did they use the cesium?

A: Okay...

Q: ...was basically the question.

A: ...an entire WESF capsules were available for sale because, you know, a couple of instances where we sold whole capsules to a British firm and to the French, and I'm not aware of any other sales. But there wasn't anybody interested in buying whole capsules that I'm aware of. Instead, the market was for small cesium sources that were fabricated at ORNL. After a WESF capsules was shipped to ORNL, it would be cut open and the cesium chloride broken into smaller parts...

Q: Um-hm.

A: ...and re-encapsulated, and so I guess that's what the reference is in the Federal Register notice.

Q: Okay.

A: (Price) It was also in the background that she gave you, I think, a press release from around 1972 or thereabouts where it was announced that these cesium capsules would be offered for sale, and there may even have been a Federal Register notice of around that time announcing the beginning of the sales program, if that's what you're...

Q: Yeah.

A: ...getting at. But the, the original date and basis for a sales program, I think that goes to the 1972, 1973 kind of...

Q: Okay, so what I'm hearing is that the sale program really wasn't a big initiative.

A: It was not very successful.

Q: Oh. (Laughter) Okay. So in terms of the quantities, okay, do you know any, do you have any more information on the, I guess the French and was it the English in, they literally took the capsules themselves as opposed to you breaking them up and doing some fabrication?

- A: Well, I can tell you what they wanted them for. They wanted to cut them up and make them into small sealed sources and sell to their customers, just like we were doing here. And we're getting ready to get written confirmation, I believe we've already got it, from both of those that they long since cut theirs up...
- Q: Okay.
- A: ...and used the cesium and sold it in smaller capsules.
- Q: Okay. So the lease, the lease program that was initiated in the '84-'85 time frame, was the only, the application where we used the capsules as such, and literally took that some place else and didn't do anything to it, the WESF capsule. Up to that point, we, either we, CRNL, or the group that bought it, cut 'em up.
- A: Well, I would have to say that the first application of whole capsules was within the government in some demonstration in research and development type irradiator projects before I think the government decided to make it available to the private sector.
- Q: Okay.
- A: And I, that was before I came to the program, so I'm not real familiar with those irradiators.
- Q: Okay. Was that prior to the sales program of the seventies, or prior to the lease program in the eighties?
- A: Prior to the lease program in the eighties. Just prior to it, there was some use of the use of the capsules and a couple of...
- Q: Demonstrations...
- A: ...demonstration irradiators within DOE.
- Q: Could you suggest where we could maybe get a little...
- A: Yes.
- Q: ...bit more information on that.
- A: Yeah, one of them was the SIDS, the acronym stands for...
- Q: That's the Sandia...
- A: Yeah, that's the Sandia. It's for the Dried Sewage Sludge Irradiation. I know it doesn't sound very glamorous, and let's see. It seems like there was another one. There are a lot of different acronyms that I was...
- A: We have been following up as part of this incident, to make sure that all of the WESF capsules that have left WESF have been accounted for.
- I think...
- Oh.
- A: (Price) In that, we have talked with Albuquerque, and there are four of those capsules at Sandia that were for this dried sludge irradiator that are still there. There are twelve that

were at Sandia that are now at Rockwell.

- A: (Wolfe) Yeah, and I believe if they were at Sandia, they might have been in an irradiator configuration at one time, but I think at Rockwell they're not in an irradiator configuration now, they're just there to maybe conduct tests or something.
- Q: Rockwell where?
- A: Rockwell International.
- Q: Yeah, but they're all over.
- A: I think it's the part that used to be AI, Ed...
- Q: Oh, okay. I'm with you.
- A: ...because he told me the name of the guy. I used to know him back from our reactor days.
- Q: In California?
- A: Yeah. And I can imagine doing gamma heating studies or, the various kinds of things you can do with a gamma source...
- Q: Okay. Do you know...
- A: ...or radiography kinds of things with a gamma source.
- Q: Do you know how many capsules that the Sandia demo program had? Okay, you've mentioned sixteen. I mean was it that level of effort as opposed to...
- Q: (Jugan) We've got that in...
- Q: (Penry) Okay.
- Q: (Jugan)...a report. It's somewhere around 12 to 16.
- Q: (Penry) Sixteen, okay.
- A: (Price) The, the total number that went to Sandia, as I understand it, was nineteen. Three have been destructively examined as part of the program, twelve went to Rockwell, four are still at Sandia.
- Q: Oh, okay.
- A: And we have advised Albuquerque that they should issue written notification to Sandia and to Rockwell about this incident and recommend that they take the same precautionary measures that NRC has recommended to the licensees. That's how come I'm familiar with the...
- Q: Okay.
- A: ...specifics.
- Q: Okay, in evaluating the companies that expressed interest in the lease program, there was some criteria that was in the Federal Register. Do you develop any more specific criteria than what we saw there, and how did you evaluate the particular groups?

- A: Well, there were just a handful of applicants, and even fewer of those were serious applicants. And the amount of capsules that we had to distribute worked out kind of nicely in that every applicant as they were given what they wanted, essentially. Part of the reason why that happened was because one qualifying applicant turned out to be not qualified. He couldn't get ready in time to receive this allocation and so he declined his allocation and that left enough material, enough capsules to satisfy the requirements of the three remaining customers. As far as criteria, we generally just went with the criteria you see in the Federal Register notice. It looks a lot more formal than it, I think, ended up being because it was just, so very few people that could even literally use the capsules. And one of them was Iotech, who had built a facility just for this purpose. The other was RSI, who was getting their facilities modified and their licenses modified so that they could use them. And then that small company in Lynchburg, VA, ARECO. And, they too, I don't know if they modified their facility, I guess they had to, and they got their license. And so those are the only ones that really worked out to be qualified, and fortunately we had enough capsules to satisfy their...
- Q: Okay.
- A: ...their requirements.
- Q: Maybe just for the record, what criteria did we use to determine if in fact they were qualified?
- A: Well, let's see. I'll have to look at the Federal Register notice 'cause it's been a while. It had, one of the biggest ones is the ability to accept delivery within a year of the notice, and I think that knocked everybody out besides the three that ended up getting it, and they had to be licensed, had to possess a valid materials license or show that they had applied for one and that...
- Q: Okay, so we got, in their application to us for the lease program, they attached copies of all that documentation.
- A: They provided the necessary evidence, plus before we would close any sale or lease of material, we would always have that last check to be sure that the customer was licensed.
- Q: Okay, did you contact NRC? Is that how you normally do that check, or...
- A: No, the customer...
- Q: ...how do you normally do that?
- A: ...provides the license...
- Q: Okay, we just get a...
- A: ...and in a couple of cases, I believe the customers, even though I don't, I'm not sure we asked them for a copy of that, I think they provided a copy of their license to us. I don't think we required that.
- Q: Okay, do you know if, reviewing the three groups that looked like they were, quote, contenders, did anyone from DOE, wherever, ORNL, ORO, Richland, or Headquarters for that matter, visit the sites, just to see exactly, get a little bit more information in terms of the use and what their operation was going to look like?
- A: I don't think anybody from ORNL or ORO did that. I can't say whether anybody from Albuquerque or their contractor, CH2MHill or Richland and their contractor, which was

Headquarters might have gone to one or more facilities.

Q: You mentioned Albuquerque. I didn't realize they were involved in... ?

A: Well, I think because they had to demonstrate the irradiator...

Q: You mean Sandia?

A: Yes, they knew about the whole program. They were participants in the By-Products Utilization Program, and they also, I don't know, you know, the real relationship here, but one of their prime contractors here was CH2MHill, which happens to be the parent company of Iotech, which is a totally owned subsidiary of CH2MHill. So, and I think I read somewhere that Garth Tingey went to one of the sites. Garth Tingey is one of the specialists we have working on this. He is from...

Q: Um.

A: ...Pacific Northwest Labs. I think he went to one of the sites. That's the only thing I can tell you.

Q: Okay. I had just hadn't heard about Albuquerque, their role there. Excuse me...

Q: What does CH2MHill do for Albuquerque?

A: Huh?

Q: What did, what did CH2MHill, the contractor for Albuquerque, what did they perform? What role did they perform in the program?

A: (Wolfe) I don't know. I'm not aware. It must have been something involving the By-Products Utilization Program, but it could have been many other things. I really don't know, I think they're still a contractor there.

A: (Price) That was all before our time.

Q: Our, ORO, or... ?

A: ORO's time.

Q: Oh.

A: Or ours, Sylvia and myself.

Q: Okay.

Q: Okay. On the specific RSI lease, were you aware of, apparently, the fact that it was taking a little bit longer to work out, to get the license from the state of Georgia for the facility and some of the background that led up to that?

A: Was I aware of that?

Q: Yeah, at the time.

A: (Wolfe) I really can't remember. I remember...

Q: Do you remember if, was there any hold-ups in terms of from the time that you were ready

to execute the lease and do all the negotiations, where RSI said, "Hey, we need to hold up a little bit because our facility hasn't been licensed yet?"

- A: No, I don't think so. I believe it was probably the opposite. I think RSI was anxious to get on with it and get the material to their facilities, that they were already licensed. As soon as NRC made a determination that the RSI application was licensable, then RSI, I think, was really anxious to go ahead and get the material as quickly as possible.
- Q: Okay. Were you aware of some of the concerns that the State of Georgia, the fact that the Georgia had to license the facility before we could do any, they could do anything with the material? Were you aware of the fact of some of their concerns and some of the negotiations that went back and forth, on that subject?
- A: Between them and RSI? No, I'm afraid I don't think I knew about that.
- Q: Okay. You made the reference to the DOE demonstration projects. There was also that demonstration project up at the Ohio RSI facility. Now apparently, there was, that project, the success of that project had a direct impact on whether or not NRC would issue a license to RSI. What was ORO's involvement in that portion, that demo project?
- A: Okay. Either you're talking about something I didn't know about, or you've misunderstood some information. As far as I know, RSI has a facility in Westerville, Ohio that has cesium capsules in it, and it was one that NRC decided they would like a thermocouple set-up, on a source rack, so that they could have an on-going record of the thermocycling that the capsules, a typical capsule, or worst case capsule undergoes. And to this day, that thermocouple may still be on there, and there still may be strip chart recordings or something I'm not aware.
- A: (Price) But we weren't involved in that activity.
- A: That is no, we in Oak Ridge weren't. Frankly, we in Oak Ridge weren't involved with anything that had to do with licensing. We knew we couldn't complete the transaction without the customer being licensed. That's the rule. But the negotiations that go on between the customer, the licensing authority, between the licensing authority and DOE Headquarters, those, I would only know about incidentally, if someone told me about them. I wasn't, it wasn't part of the responsibility at ORO.
- A: (Price) Let me add that this is not unusual in the Isotopes Program. We sell radioactive materials all over the world, to people, without having any involvement in how they have their facilities set up and what things they have to go through to be licensed by whoever their licensing authority may be. We just have to have evidence that they are licensed by whatever authority does license them for that kind of material and that kind of use. They have to show us that evidence. But as far as us getting into the loop to evaluate that or keep up with it, or any of that, we don't do that.
- Q: But do you consider the proposed use of this material as a, different in terms of either quantities or the application from the other applications of the other materials that we have been either selling or leasing?
- A: (Wolfe) Well, I see two or three differences. One, this is the largest use, largest quantity of radioactive material that I guess I know about selling. Unless that strontium 90 has more material in it that was built in the last couple of years. It is the largest single use of radioactive material in the private sector that DOE's supplied. There are irradiators all over the country and all over the world in lots of different designs, and they mostly utilize cobalt 60, but we don't provide that material. The real world supplier for cobalt 60 is Atomic Energy of Canada. And another difference I can see is that this was a lease instead of a sale, and that was a little bit unusual for us because when we loan material to people, it's usually



small quantities of stable isotopes. I think there might have been a couple of instances in history where a radioisotope was loaned and returned but not anything like these huge quantities. So, to adjust to that difference, we were able to adjust to that difference because we had a loan agreement form that we had used for stable isotopes, and so we had a starting point in Oak Ridge in trying to craft a contract to cover this transaction. And it also seemed reasonable because the NRC was saying, it's my understanding, the NRC was saying that they would not care to the licensee the technology unless DOE retained title to the material. Not so much because they wanted DOE to be responsible in the event of an accident or something, but because they wanted DOE to have ultimate disposal responsibility for the capsules. Once they had, I guess, been leased for a number of years, and they'd decayed or they weren't in use any more, or that the customer wanted to go out of business or something, then DOE could take return of the material and the NRC, I guess, didn't want to see that out in the private sector, and them trying to dispose of the material on their own, in that large quantity. Let's see, I guess the only other difference is that we were accustomed to selling cesium 137 in, encapsulated form, that it was small capsules for medical use, and this was the huge original capsules, and it was for irradiation use instead of medical teletherapy use.

- Q: Do you know if, when the lease was signed and we are doing all the transportation arrangements and all this, at any point in time, any operating parameters concerning the actual use of those WESF capsules, any of that kind of information was provided to RSI?
- A: Operating parameters provided to RSI?
- Q: Um-hm.
- A: RSI...
- Q: I mean in other words, was there something to say be careful about having trucks run over these things, or you know, whatever?
- A: Well, the requirements for use of material would be laid down by the licensing authority and would have been based on probably DOE's...
- Q: (Penry) Hey, when I said use, maybe I would, let me clarify that, handling...
- Q: (Jugan) What would, the design parameters of the capsule shouldn't be exceeded of course, so did we tell them what those parameters were, how many cycles they, how many thermocycles with the maximum temperature...?
- A: (Price) You mean we, DOE, or we, ORO?
- Q: (Jugan) We, DOE.
- Q: (Penry) And if then, if you know, yes DOE, then who in DOE?
- A: (Wolfe) I can only say that I would not know. Maybe I'm peripherally, vaguely aware that the studies and information about how the capsules were made, any test information their history and all that had, that information had to be made available to NRC before they were willing to go forth with that, the licensing and the use of them for irradiators.
- Q: Along that same line. Did we tell them what the purity of the water chemistry had to be that they were in and things like that?
- A: (Wolfe) I do not know.

- A: (Price) Let me tell you, what I assume, the process must have been is that the companies like RSI had to write a safety analysis report and convince NRC or whoever's going to license them, that what they were going to do is safe. And they had to address all the issues that might be considered in such a thing and part of the information that he used was information developed at Richland by the WESF people. And I think there are some reports that those people issued about those WESF capsules. Is that correct?
- A: (Wolfe) Yeah.
- A: (Price) There are some technical reports and whatever information that might bear on safety that DOE might have provided would have been through that mechanism, and it was up to the companies to go beyond that and either endorse or reject that information. But the company like any licensee has to make the case. That what it wants to do is safe.
- A: (Wolfe) Well, I also think that...
- A: (Price) Is that...
- A: (Wolfe)...I think that is true, that would have to be done. But I think that even before that, before the leasing program, there had to have been a dialogue between DOE and By-Products Utilization Program in NRC, a dialogue I'm not aware of, and we'd have to go back to them and ask them what...
- A: And part of that would be the By-Products Utilization Program showing prospective licensees what testing had been done, what these things were useful for. Because, in effect, DOE was marketing to the private sector. A DOE program sponsored and encouraged by Congress, was trying to make use of this by-product material. And so I expect they did testing...
- Q: I understand now that what...
- A: ...to help people understand how they could be used...
- Q: ...I think what we're...
- A: ...etc.
- Q: ...aiming at is what limits or instructions, or "Here's the baby, how do you take care of it." What did we place or advise in writing to these people is how to handle the capsules as we see it?
- A: I'm afraid that Oak Ridge Operations Office and Oak Ridge National Lab had literally nothing to do with that. So, I'm sure there is someone we could find that out from in DOE, but it's not us.
- A: That when you go to...
- Q: When we go to PNI, we'll ask them the same question.
- A: As our role from the beginning, was, we were asked to handle the administrative side of getting the contract prepared and signed. We were asked to do a lot of little administrative details along the way, but not really, you know, the licenseability of the technology. I think that was already a foregone conclusion of the time they were asking Oak Ridge Operations to set up contracts.
- Q: You mean we can move to the contract itself, the lease that is out. Who normally reviews within GRO, participates in the review of the lease arrangements?

A: Well...

Q: The other ones you've been involved in?

A: ...you've got a contradiction in terms there when you said normally review lease arrangements, because we don't normally have lease arrangements, we don't normally create new contracts...

Q: Have you had any others, leases?

A: No. There's one that's been around for a long time, the one I referred to earlier for stable isotopes, the one that agreement forms; leases for a lot of universities and research institutes and so on. It is a standard form; its been there for a long time and requires the customer to have a good use that they want to put the, this precious commodity to, anything that, there's not an emphasis really on safety in that line because it's a stable isotope. It's not really...

Q: Does Martin Marietta issue the lease arrangement for that, or the sale arrangement, for the stable isotopes?

A: I do not know who originally authored the stable isotope loan form. I think it was a combination of people at Oak Ridge National Lab and at DOE Headquarters. And maybe some people at ORO participated.

Q: Who executes the lease? For the stable isotopes?

A: I think that ORNL signs those loan forms on behalf of the Department of Energy.

Q: Okay.

Q: (Jugan) When, when we sell radioactive isotopes, who reviews those sales, and do we provide information on how to handle those isotopes?

A: (Wolfe) I don't think that we provide information on how to handle those isotopes unless that information is requested by the customer. What the main requirement for the ability to use an isotope for business is to have a license. So, if they're licensed, we assume that the regulator has been taking care of those issues.

A: (Price) We don't accept any responsibility for what the purchaser of an isotope is going to do with it and how he's going to handle it and that sort of thing.

A: (Wolfe) That's right.

Q: In what way is that written down?

A: (Wolfe) The boiler plate on the sales...

Q: Okay, the boiler plate.

A: (Wolfe) ...form. Um-hm.

Q: (Penry) Okay, I guess on this particular lease arrangement since apparently it was, since the other one was so long ago, it is sort of a unique situation. Uh, how did you process that, who reviewed it and the... ?

A: How, how did we draft a lease?

- Q: ...or who reviewed it...
- A: Okay...
- Q: ...within ORO. Who was involved in the review process?
- A: The people at ORO, at headquarters and elsewhere that saw the lease in its draft form, included, I don't know if I can name everybody, but included the technical folk at the isotope distribution office at the lab...
- A: (Price) It was originally generated by ORNL, right?
- A: (Wolfe) Well, the, actually...
- A: (Price) They generated the first cut...
- A: (Wolfe) They generated the first cut. I remember I took a look at the first cut and I saw grammatical and logistical things that I thought that needed to be added or changed. Then we routed copies to I think Martin Marietta legal looked at it. ORO legal, contracts division looked at it in here. Let's see at headquarters they let, I don't even know who all saw it, but I think legal at headquarters saw it, the program office at headquarters saw it, even Iotech saw it and showed it to their lawyers because we didn't see any reason to why we shouldn't go ahead and deal with the prospective customers. And they had something they could contribute to this, I mean the contract is a two way street, and we wanted to know if they had any comments to add or questions and they were very helpful. They had some good comments from what I recollect. And the final version of it was routed like one last time to headquarters and then they had to arrange for the Federal Register notice and it was one of the information packet items that we got out to all the customers responding to the Federal Register notice. So, I, of course I don't remember exactly who all saw it, but I, my impression is it got pretty broad base review by a lot of different people and I know it, in particular, later got a lot of scrutiny in the area of liability and that's a big issue later.
- Q: (Wright) What, I'm sorry. Was there a, a letter or anything, usually at DOE everybody has to concur on it before it can occur. Did anything like that happen, or... ?
- A: (Wolfe) I've looked through my files to see if I have anything like that and I don't think I do. So if it exists, I don't have it.
- A: (Price) Who submitted the thing to the Federal Register?
- A: One of the offices at headquarters.
- Q: I see.
- A: I guess the program office.
- Q: Ron Cochran?
- A: Yeah, Ron Cochran.
- Q: Okay, other than the liability issue, were there any other issues that seemed to generate a lot of conversation and discussion when the various groups reviewed the lease, proposed the lease?

- A: (Wolfe) I can't think of a lot of interesting comments. It was mostly, the comments were helpful whenever anybody would give one. There would be slight tweakings of the language or I don't remember our adding an important clause because someone raised their hand and thought of it and said you need to have something in there that covers this, because the original draft was pretty good. It had a lot of, had a lot of different elements in it already. And what it didn't have, see it's like an eight page narrative document, and what it didn't have, the 391 form which was used as part of the lease agreement had. And it's boiler plate language, which is a whole page full of fine print and once you've seen one...
- Q: Um.
- A: ...So, the combination of the two taken together, I think, generally satisfied everybody.
- Q: Okay. After the lease was signed, with RSI, on a day-to-day interaction, who would they contact? Who would RSI contact?
- A: After the lease was signed, who would RSI contact?
- Q: If they have any questions, whether it was on a transportation issue or...
- A: Oh.
- Q: ...anything... ?
- A: We had kind of a two pronged interaction with Iotech, with RSI or any of the lessees. If the question had to do with administrative details, they would normally call me. And if I didn't know the answer, I could find it out.
- Q: Um-hm.
- A: If the question had to do with technical aspects of loading the capsules and getting them delivered to the customer, there was an arrangement where they could freely call the contractor personnel at Richland to get that information. We kept a pretty good split there so that it wouldn't put the contractor personnel in an awkward position having to try to talk about legal or contractual or money questions, because that's not what their job was. Their job was to handle the technical aspects of getting the capsules delivered to the customer.
- Q: The lease hints at a testing program that we reserve the right to remove one of their capsules for destructive examination once a year.
- A: I'm glad you mentioned that. That may be, that is an example where a clause was added because somebody thought of it. The person who thought of that was NRC. NRC wanted that kind of a testing schedule I believe, and they had a memorandum agreement of some kind, between NRC and the program office at headquarters, and I believe I've seen it before but I don't know if I could lay my hands on a copy of it because it wasn't addressed to me, that said we need to test a capsule the first year, I think, and the third year and the eighth year, and after awhile we will revisit and decide whether we need to destructively examine the capsules anymore. So if it looks like nothing's going wrong in the capsules, they're not, the corrosion rates aren't accelerating, or something inside, then there's no need to keep wasting capsules.
- Q: Who, who would have been responsible for carrying out that memorandum of understanding? Who would have been responsible to say, "RSI, give us a capsule?"

- A: (Wolfe) Well, we were trying to be responsible for it here although I don't think the assignment is clearly stated. Headquarters reorganized and the by-products utilization program changed hands and changed titles and everything so much, that to just for continuity sake I think, we in Oak Ridge tried to remember to implement that and we have. The first test capsule has been cut open and the parts examined. And I guess the next one will come up in a couple of years.
- A: (Price) And that was funded, that was a funded program...
- A: (Wolfe) Yeah.
- A: (Price) ...by...
- A: (Wolfe) Nuclear Energy agreed to...
- Q: (Price) By that time, NE.
- Q: I was just wondering you know, Sylvia, if she hasn't seen the memorandum of understanding would be hard pressed to know when to call up RSI and tell them we need another capsule.
- A: Yeah, that's an area that I noticed several weeks ago when I asked I guess it was after this incident, I asked Dick Chitwood whatever happened to that. And he said, "Oh, don't you know? We got a revised memorandum of understanding." And he sent me a copy of it. I don't know that Dick's got the schedule in it, but it does show that Nuclear Energy is responsible for the testing program. So that helps me a little bit. I know who, at headquarters is supposed to be the funding source, plus I believe I've asked the lab, and I did this last year sometime, asked them to see if they could enter into the computer, a tickler system, something that would raise a flag so many months in advance of the next time we're supposed to do the capsule. Because you know, I might not be here, somebody might forget. So, our computer system can give you a reminder.
- Q: Do you know somewhere, or do you have in your file somewhere when they pulled the first capsule? How many hours was on it?
- A: That information is available, but I don't have it. And it's available from probably Garth Tingey would be the best place to, to start.
- Q: We've guestimated from a couple other reports, but nothing really tells us for sure.
- A: (Wolfe) I'm not sure, I'm just going to have to go on memory. I think it got pulled out of the Westerville, Ohio facility about this time last year. So, I'm sorry I don't know exactly, I'm just going on memory.
- A: (Price) Are you finished talking about the lease or in aspect of one of your questions, I'm not sure we finished up?
- Q: I was going to ask, did anyone from safety, QA look at the lease?
- A: At ORO?
- Q: At any place.
- A: Well at headquarters I can't tell you. I would imagine that, that the whole question whether or not we can lease this material is thoroughly gone over, but here I don't think so. I don't remember anybody from safety or QA.

- A: (Price) I discussed it with safety, Egli and Wiley Johnson prior to the leases being executed and some time after that with Dave Howard. But they may have been executed by that time. So they were aware of it. That we were having a leasing program and also it was a fairly well known, at least the board, I remember it having been discussed once that we were being asked to take on this administrative handling of the leasing program for Ron Cochran. But the part I really wasn't sure we completed the discussion on when you were talking about who reviewed it. That was when the lease was in draft and was a proposed lease and what was going to be put in the Federal Register. When the actual lease with a particular company was ready for execution, it went through a formal concurrence chain, I imagine, maybe I'm being the questioner here. Does it not have a yellow with a your's and Bill Wistaom's signatures...
- A: (Wolfe) No, I'm...
- A: (Price) ...Seahorn's?
- A: (Wolfe) ...afraid I don't think that's what happened. I think when the customer satisfied all the requirements and had their license number on there and it agreed to the dollar amount that's on the back and signed it and agreed to all the terms and conditions in the lease, I believe, that procurement contracts signed it. I don't think that it went to safety and everybody else.
- Q: (Price) I was thinking legal in particular, I don't think that's...
- A: (Wolfe) I don't, I don't recall unless procurement contracts themselves asked legal to see if we had any problem with this, is there any reason why I can't sign this. I'm not aware, they might have done that.
- Q: (Price) That would be a better question for Bill or...
- A: (Wolfe) But, but when you're asking about does the lease and the way it's worded, it's contents get a safety or environmental type review, the lease isn't really designed to be like a license and have all the criteria in it for proper use and handling and all that. All that is supposed to be in a license and the lease is supposed to handle the administrative and legal questions, about what do we do when it's time to return the capsules and when you see the lease...
- A: (Price) We didn't consider that we were okay safety responsibility...
- Q: Let me just, let me just drive home another question. The thing that is my concern, is that we at ORO, did sign as a contracting officer, responsible for that material. When the CO puts his signature on that lease he basically is responsible. I mean it belongs to the government, we still retain title to the material. And the question I'm really trying to get at is what did ORO do to assure ourselves that all the reviews, all the safety analysis, all the things that you normally do make sure that government property is being protected or is in a condition that we would feel comfortable with putting it out in the public, in the private sector? What did we do to assure ourselves as the ultimate authority, which we are as the contracting officers, what have we done? That's the question.
- A: (Wolfe) That's a good question, and I think I understand your question. I think that ORO assured themselves that the customer was licensed and was directed by a Headquarters Program Office to sign the leases. And so we had to, I guess, assume the Headquarters Program Office was taking on those responsibilities that you're talking about, ownership of capsules and making certain that the capsules were going to be used properly. Because they directed ORO to take care of it, to sign the lease.

A: (Price) But we actually...

Q: Why...

A: (Price)...went a little further than that later on when the removal of the hold-harmless clause for Iotech's lease came under discussion where we actually proposed and requested that Headquarters send us a memorandum stating...

A: (Wolfe) Directing us to...

A: (Price)...directing us to doing and accepting the responsibility on behalf of DOE for what implications may come along with that.

Q: Well, based on that, did it ever cross anyone's mind that maybe we should go ahead and let them be the Contracting Officers since they were in effect accepting some responsibility... ?

A: (Wolfe) It crossed my mind because...

Q: Did we recommend that maybe?

A: (Wolfe) Well, I didn't think it was my place to resist on behalf of ORO participation in this program when a letter comes down from LaGrone and, you know, two other field office managers from whichever office it was, Headquarters directing us to deal with that.

A: (Price) Wait, wait, there's two different frames involved here. I'm not sure which one you're talking about.

Q: Well, I guess especially when, on this hold-harmless, when we want to get some documentation on that, maybe that point, apparently that raised a concern on our part.

A: (Price) Oh, absolutely.

A: (Wolfe) Yeah, you know I asked...

A: (Price) We were quite concerned about it.

A: (Wolfe) You know I'd have to ask, you know, Bill Snyder how he felt about it because he made the, I guess the final decision on that hold-harmless clause. But that's the second time frame that Les is talking about. If you're asking basically, Willis, you're asking basically why did ORO sign a lease? We signed it because the customer had fulfilled all requirements of a normal sale, only this was a lease and had agreed to the terms and conditions of an approved document, signed on a line, had a license, and we were directed to implement that aspect you probably would get a lease document. Now, that was Oak Ridge Operations Office participation in the By-Products Utilization Program.

Q: Why was Richland not the Contracting Officer on it since the containers belong to Richland and the material was produced at Richland. Why was Richland not asked to be the Contracting Officer for the program?

A: (Wolfe) I think the better question is why Oak Ridge, because anybody could have done this. Headquarters could have done it, Richland could have done it, or Oak Ridge could have done it, or they could have picked somebody to do it on behalf of the government. But Oak Ridge had had for 40 years the sales program for various isotopes, irradiators, and I guess Headquarters knew that and just said, "This is right in line with your expertise. You people in Oak Ridge know how to arrange for the sale of isotopes." And I believe their only negotiations for this program, this was again before my time, the sale was what everybody



thought was going to happen. They thought they were going to sell the capsules. It was only after Oak Ridge had been drawn in that it turned out it was going to be a lease instead.

- A: (Price) In the material you have, I think you'll see some correspondence about a market survey that they had asked ORNL to do. That's how we first started getting in the boat. And I, see we've been selling the capsules since 1972 or 1973 or somewhere in there, or trying to sell them. It stepped up with the beginning of this market survey that was requested of ORNL to do, and through that, it became apparent that ORNL knew what the market was and they were accustomed to dealing with these companies.
- Q: ...In connection with, I guess following to what Willis was saying, okay we've already said that a liability question is one of the key points that was raised during the consideration of whether or not we should lease this material in the first place. Who raised that concern?
- A: (Wolfe) The liability concern? It was raised by Iotech, Incorporated. They had shown the lease to their insurance company, and the insurance company read through it and said they objected to that clause. That it looked like it was eliminating the opportunity for release from the government I guess...
- A: (Price) Which is our intent...

#### SIDE B

- A: When the insurance said that, Iotech reacted instantly. I think they appealed to Headquarters. They told us about the problem, but really the appeal went on up to the Headquarters level, and it was kind of agonizing, I think, for a couple of weeks. I don't know how long this period was, but there were a lot of letters that shot back and forth between the legal representation at Iotech and insurance companies, and between Legal at ORO and at Headquarters, and the outshot of it was, I guess, that Snyder directed Seehorn to draft a substitute clause that removed that offending hold-harmless phrase. You can see from the lease what it says. Then when Iotech and the insurance company saw that, then it was okay. They were willing to proceed, with the revised language.
- Q: Okay. Were you involved in any discussions now that they revised this language and the fact that the insurance company and Iotech was satisfied, were there any following discussions within DOE saying okay, now what does this mean to DOE?
- A: Oh, I'm sure that there were. When it was first raised there was a flurry of dialogue between OCC-ORO and Headquarters and Program Office, and I'm probably not really the one for you to be asking these questions because it's really the Legal folks that had to make...
- Q: I guess where I was heading is, if in fact that changed in any way, yeah, we do need to talk to legal in terms of what the DOE responsibility is and was. Was there an impact in terms of how we monitored the lease in terms of did we have on-site inspections anything of this nature?
- A: I don't remember any...
- Q: From the program management standpoint, was there any changes?
- A: No, even the, the language in the clause puts more of a burden on the customer. Well, I don't know if you can even argue if it puts more of a burden on the customer to exercise due care. It says something about that in that clause, but that's sort of understood whenever you release government property to somebody.

Q: But I understand in this particular program we haven't done too much with that. Leasing government property.

A: No, but...

Q: Okay.

A: ...I think that the technical requirements for use of the capsules still fell into the realm of the licensing authority and not in the realm of the lease agreement. So, since my understanding of the program is limited to the lease agreement, I can't tell you...

A: (Price) I think your question is quite relevant. Obviously, made it the crux of this whole thing is if we maintain that responsibility for it, what should we have done to reflect that?

Q: If I can get on a slightly different subject, we noticed a letter from RSI to their licensing authority, and one of the things says that, "If we have a leak, we'll just get the, the sniffer, the sipper, the leak detection equipment from Hanford, and then send it off to there." Were you aware of any of those type of discussions?

A: No, that's interesting. I'd like to see that.

Q: (Jugan) Okay. We've got...

Q: (Penry) We have the letter, we don't know, where's the equipment...

Q: (Jugan) We don't know who told them...

Q: (Penry) We're trying to track down the equipment...

Q: (Jugan)...who told them that this piece of equipment existed and they could have it.

Q: (Penry) Okay. In some of the information you provided, Sylvia, there was a July 1985 letter from Cochran to Lenhard as a matter of fact. And in that letter, it said that Oak Ridge should make available dimensional drawings of the WESF capsule and any specifications needed to plan use of the capsule and a copy of a PNL safety study. Do you know if we provided that information?

A: Yeah. That was part of the packet that went out to the respondents to the Federal Register notice. That letter you're talking about I believe was...

Q: It had the drawings... ?

A: ...drawings, how to, how to...

Q: Okay.

A: ...handle responses to the Federal Register.

Q: (Wright) Who was the author of that letter?

Q: (Penry) Oh, it was from Headquarters, Ron Cochran.

Q: (Wright) Okay.

Q: Have you seen that? Specifications needed to...

A: (Wolfe) What was the date?

Q: (Penry) July 18, 1985.

A: (Wolfe) Yeah, we put together an information packet to go out to the customers, and it contained the items that the people...

A: (Price) I don't know about that...

A: (Wolfe)...suggested and probably a couple of other things we thought of. I mean you...

Q: (Jugan) I haven't seen it except that the extent it was in there.

Q: (Penry) Okay, maybe that's my question.

A: (Wolfe) Here's a copy of it. The letter you're talking about.

Q: (Penry) I'm trying now to get a handle on the information that we did provide in...

A: (Price) Let's see it, Sylvia.

Q: (Penry)...response to that letter. Off the top of your head, you may not remember this, and you may want to get back with us, but in, to comply with those instructions, did we provide just a PNL report, or did we literally provide that plus the drawings, plus some specifications...

A: There...

Q: ...concerning the...

A: ...there is a drawing in one of the reports, and it may be that when he was writing the letter, he thought they were separate. But I think that the drawing specifications are probably...

Q: In the report?

A: ...in the report, that he's talking about. But, we had ORNL put the packet together so, and I got, I got to see a sample packet I think momentarily before it got sent out, but it was in accordance with those requirements.

Q: Okay.

Q: I want to come back to a point; I'm still just a little bit hazy about, in my mind, about exactly what the role that Oak Ridge had. I know that we had the ORNL people to draft the lease and the lease went through various reviews and it was signed off by Mr. Lynch and Mr. Dayton as a Contracting Officer, authorizing the material to be placed in the RSI facility. What do you view your responsibilities to be with the overall program?

A: Overall leasing program?

Q: How broad are your responsibilities?

A: Well let's see, as I spoke to...

Q: Specifically, let me just tell you what I'm getting at. Wherein does the responsibility lie, for example, to look at the operation of the material, the way it's been treated, to see to it that it's been looked at and cared for and so forth, since it is government property?

- A: (Wolfe) I would have to say that I do not view that as being my permanent responsibility, but management responsibility. I agree that that is a necessary thing to be done, but I have always operated on the assumption that that's part of the regulatory requirements. And...
- Q: Was...
- A: ...not part of a requirement because we loaned the material.
- Q: ...was there ever any discussion with Richland concerning the overview of that material, since it is government property? In terms of who had the responsibility for looking after it...
- A: Not with me and not with ORO. Not that I'm aware of...
- Q: There's never any...
- A: If they had those discussions, it would have been with Program Office at Headquarters.
- Q: There was never any memorandum on who's, who had the, since Headquarters, Richland, and Oak Ridge has got parts of the program, there was never any understanding as to who had what specific part of the program responsibilities.
- A: Not a memorandum of understanding. I think that the document that kicked off our participation in sending out the contract was this one of December 20, 1984, to those three field office managers telling who the customers were going to be, and what ORNL's going to be. And it's pretty short. And I can tell you that my experience since this cesium leasing program first involved me, has taught me that kind of memorandum of understanding with the delegation of roles and responsibilities was needed. At the time this was going on, I can, everybody will tell you that I would say things like this, I felt a little bit helpless or manipulated, you know, and I was doing this very hard job trying to satisfy the requirements laid on us by DOE Headquarters when they hadn't really provided this was not in the nature of a field work proposal for one of our prime contractors to do for lined out tasks and costs associated with it. Instead, Headquarters saying, "Take care of it, if you have any costs you know how to bill a customer, you know how to recover this cost through billing. Just do what you normally do." And in trying to accommodate that, and doing what we normally do, we never had the benefit of a memorandum of understanding or roles and responsibilities document.
- Q: Along with the lines I guess, of Willis' question, I guess that you could very well assume that keeping safe government property was a fairly easy thing to do, considering the indestructible nature of the capsule or that if the licensing authority made sure that it wasn't handled in an unsafe manner, then we would get our material back without damage to it? It would protect the government's interest in the property. Is that the way I'm reading the assumptions?
- A: What we assumed...
- Q: Yes.
- A: I assumed that, and I think everybody in Oak Ridge assumed that, and I believe the contractor personnel up at Richland assumed that the capsules were relatively indestructible, and that this was a useful application of them.
- A: (Price) That assumption, such as what she's talking about is different from a conscious analysis and reaching a conclusion.
- Q: Okay.

A: (Price) I'm not sure that that took place.

A: (Wolfe) No, not here.

A: (Price) Any conscious analysis, conclusion for, well it's okay for these reasons and therefore I will or won't do...

Q: I guess what I was trying to get is the train of thought was not that we were leasing out some very valuable material that we have to go in and audit and look at every so often to make sure we get it back.

A: (Wolfe) Well, this was the inherent thought was the material, I believe, we believe the material would be valuable. We believe it to be dangerous. If a leak ever occurred, or the capsule ever completely opened, everybody knew what the consequences of that could be. But, the questions about whether or not the U.S. government was willing to take that risk, resided in NRC. Not in the Department of Energy. And NRC, I assume, I wasn't party to any of that discussion or thinking. NRC had to go over all the postulated worst case accidents and so on and to decide that the risk was low enough and that the requirements of the license were adequate to assure safe operation.

Q: You made a statement that everybody knew the consequences or the risk if this capsule leaks. What, what are the consequences of a capsule leaking and the risk of doing this? I've never seen a report that says that.

A: Oh, I think that there must be reports on that. I think I've seen something, where did I see it? I just read it recently. I'd never seen it before, and it was a chart...

Q: I haven't read your full stack of information...

A: ...and I remember just now in the last couple of days seeing a chart turned sideways on the paper, where it said the type of accidents that could occur and it had them all listed and one of them was "leaking capsule." And then, there was what you would do if that happened and what's the worst case consequences of that happening.

Q: I would really like to find that.

A: (Wolfe) I, I remember just seeing it.

Q: (Jugan) Maybe it's in our package. I haven't gone through it.

Q: I read the package about halfway through and it's certainly the flavor that everybody at RSI recognized that a leak could occur and what they have to do about it. But I never saw anywhere where there was technical analysis...

A: But it was, I believe it was an...

Q: ...and failure mechanisms...

A: ...yeah an NRC...

Q: ...and what their consequences were.

A: (Price) But that's implying...

A: (Wolfe)...an NRC document, not a DOE.

- A: (Price)...a more precision than I thought existed on our part. We knew that it was dangerous material. It's large amounts of radioactive fission product...
- Q: Right.
- A: (Price)...and I knew that it was at roughly the equivalent amount of an irradiated HFIR core. But I'd ask them.
- Q: The entire core?
- A: Yes.
- Q: (Wright) HFIR is a small core.
- A: (Price) Alright.
- Q: (Wright) It's a small reactor.
- A: Okay.
- A: (Price) But an irradiated HFIR core is about four megacuries of radioactivity, and it's, we're talking 10 or 12.
- Q: Yeah...
- A: (Price) I guess the question at the time, we were worried about lotech, and when people understand the nature of the problem we had here, why would we be concerned about the liability? But even before that, we knew it was dangerous material. But to say we knew the consequences as if we knew one leak would cause so much contamination in any quantitative way. No, I don't think so.
- Q: Um-hm.
- Q: But had you thought about leasing out HFIR spent cores?
- A: (Wolfe) No. (Laughter)
- Q: Why? You got a nice hole in the middle.
- A: We do use HFIR spent cores for gamma, as a gamma radiation facility. And there is one over at the other end of the pool. Where from time to time, they'll bring in something and do gamma radiography...
- Q: There's a, really, a whole lot of satisfaction I hear expressed on the actions on the State of Georgia, and, but nobody reviewed the State of Georgia, nobody looked at the license, or their licensing process. We just assumed they were doing their excellent job and...
- A: (Price) Did you say a lot of satisfaction... ?
- Q: (Hultgren) Yeah, I mean, you know, I mean everybody, I mean paper, there is a lot of paper satisfaction because everything is waiting for the Georgia license, and when it comes true, then we are all satisfied and the contract people apparently have enough satisfaction that they don't go anywhere, they just sign the lease and off it goes. But, from my review, looking at the licensing process with the State of Georgia, I'm a little bit appalled. I see a whole lot of political pressure being brought to there, and I see instruments being removed and HEPA filters being removed, all to the grand and glorious consent of the State of Georgia. They do

not look to me like a really great licensing authority.

Q: (Jugan) For what I might add on this discussion, the NRC representative said that a safety analysis report is not required of an irradiator facility. They're considering it for the future.

A: (Wolfe) Well, there's an ANSI.

Q: I was kind of surprised...

A: (Wolfe)...standard, I guess.

A: (Price) Again, that whole arena was something. We didn't consider our concern. We were asked to handle administrative tasks for Ron Cochran because we were best equipped to do that. And we did.

Q: (Wright) Where is Ron Cochran these days?

A: He's back in Headquarters. He was in Albuquerque.

Q: (Wright) I knew he went to Albuquerque. I didn't know he came back. He in Defense Programs, with Charlie Williams?

A: (Price) I'd say Ron Cochran, I don't necessarily know that he personally was the driver of all of it.

Q: (Penry) I think at the time they had a responsibility for the By-Products Program.

A: (Price) Yes, they did. And he had a responsibility, I just don't know whether personally...

Q: Materials production.

A: ...was doing any more than what his staff was floating up to him.

Q: But, based on your understanding of when a Contracting Officer signs on the dotted line, who has ultimate responsibility if in fact something should happen, that, via that mechanism isn't, the Contracting Officer or... ? I mean is that standard knowledge, I mean... ?

A: (Wolfe) I think the Contracting Officer is responsible if the customer helps to pay the bill. And I think that the Contracting Officer needs to you know, be...

Q: Well, how about the liability issue? Apparently some live responsibility flowed from the customer to DOE, when we modified that clause.

A: The Legal office has said that that didn't happen. They said that when they modified the clause that they didn't change the liability.

A: (Price) Academic advice is practical. Whatever that means.

A: Oak Ridge does not own the capsules, and you have to ask, "Well, what do you mean own the capsules? They belong to DOE." Well, there are a lot of materials and equipment that belong to DOE and apparently the practice in DOE is that they belong to the Program Officers that were responsible for making them, acquiring them somehow, and that officer is responsible for disposition of them. And if you were to take a poll around DOE right now, then you would find that's true. Everybody would be able to ask who owns this, who owns that. There's somebody that owns everything, a office that it's assigned to. If it's not, then it becomes excess property, and then there's a procedure for getting rid of excess property.

So, these capsules were owned by, and I believe they're still owned by Defense Programs.

Q: If we sign a piece of paper receiving these and transferring the property, does anybody know?

A: (Wolfe) Oak Ridge?

Q: Yes.

A: No, I mean, the answer is no. They...

Q: That's the way you transfer ownership.

A: ...they did not transfer ownership to Oak Ridge.

Q: Okay. No, I was curious because on Clinch River, we ended up with 550,000 pounds of slightly radioactive sodium, and when we transferred it to Chicago, I insisted that we get...

A: That's right.

Q: ...a piece of paper where they acknowledged...

A: The ownership papers or whatever, yeah right.

Q: ...ownership...

A: And I'm the same way. When I've been told that there's an excess radioactive source in a place at Savannah River or something, I say well, "We can take that into the Isotopes Program and probably sell it or use it somehow, but I want adoption papers on that..."

Q: Um-hm.

A: ...so that whoever owned it, whoever made it and still owns it, relinquishes...

Q: Right.

A: ...ownership so that I can have it. Yeah, I know what you mean.

Q: But if we signed that paper, then it's ours...

A: I think the issue...

Q: But no, we didn't sign...

A: (Wolfe) It wasn't a transfer of ownership by the way, we're discussing...

A: (Wright) No, we didn't sign any papers.

Q: (Davis) No, we signed the lease. Oak Ridge signed the lease as the Contracting Officer. The transfer of the material, the property responsibility for those capsules and the material in those is still the responsibility of Richland as far as it being on the property record, as I understand it.

Q: (Wright) Okay.

Q: (Davis) That was never transferred to Oak Ridge. That was the reason for the question...



- A: (Price) That's what I would expect to have been the case.
- Q: (Davis) ...that was the reason for the question of the division of responsibilities. We are the servicing organization in terms of providing the Contracting Officer's signature with the ultimate responsibility for that material. But there apparently was never any definition of responsibilities concerning the safety aspects, who would go down there and take a look and make sure that we were satisfied with the licensing arrangement and so forth and that if there were any reviews on site and so forth. Those kinds of things apparently was never worked out with anyone as to what the split responsibilities were.
- A: (Wolfe) I think that Defense Programs owns the capsules. Now what you're talking about being on the records at Richland, I don't believe Richland was ever given adoption papers on those capsules. They still belong to the Funding Office at Headquarters.
- Q: Okay.
- A: Yeah, but I think...
- Q: (Davis) I seem to be corrected on that.
- Q: (Penry) Whoever uses the material, whether it's these capsules, or whether it's any other procured service, material we get from anybody else, you know it's technically maybe on someone else's records, I think the Program Manager, you know, they're the ones responsible to make sure I think that all the conditions of the lease are complied with or the safety you know, concerns, things of this nature. 'Cause obviously Defense Programs delegated. In this particular area, like they delegate in every other area.
- A: Well that's perhaps worth some discussion here. I don't think we ever considered that we had a program management function here. We assisted in providing an administrative service. Let me give you an example of why I say that because one of the most important program management issues did come up at the time when it looked like there were going to be more customers for this...
- Q: Yeah.
- A: ...than we had the material available. We took no substantive role in determining that allocation. We were a facilitator, getting information to DP, but those were decisions made by Jicha and Remeni and...
- Q: Cochran?
- A: ...I don't know who the others were.
- Q: Okay.
- A: DP. They were very strong manager of this. It was Remeni's full time job as far as I know. He involved other people. It was their baby. He had his wagon hitched to that star.
- Q: It appears to me very clearly that a lot of players were in, but nobody was responsible overall for what happened. There were a lot of loose ends between organizations.
- A: Well, I really am not sure I would even say that. I think if you would ask Remeni at the time he would have said, "Yes sir, I am responsible for it."
- Q: Well, we ought to be talking about it.

- A: He's orchestrating things unfortunately...
- Q: We ought to be talking to him.
- Q: (Penry) Well, part of the problem is that...
- A: He was orchestrating things with Richland, Oak Ridge, and directly with the customers. I mean, they were dealing directly with him on many, many aspects.
- A: (Wolfe) And orchestrate and, and be an octopus, and have your arms in everything, is, is what Bill did. He worked real hard at it, and after we got into the program he was killed in a car wreck.
- Q: Oh, for goodness sakes.
- A: (Wolfe) So now, the, that complicates the issue, because all the verbal agreements that were gonna be formalized, maybe didn't at the Headquarters level or if they did, his successor didn't know how to find his way around his office, you know, what about...
- Q: Who did he work for or who worked for him?
- A: He worked for John Jicha.
- Q: (Penry) He was in the official By-Products Program.
- Q: (Wright) Yeah, I want to call John today and maybe Ron Cochran but...
- Q: (Penry) I don't, we might pursue that at a later point. After we get off the tape.
- A: (Price) I'm not trying to be defensive...
- Q: (Penry) No, no...
- A: ...I'm just getting my, Sylvia will tell you at the time, I got after her for spending so much time helping facilitate these cesium lease things, when other things she was responsible for, really responsible for, needed attention also. I viewed this as an administrative service we are performing for Cochran, at his request, and we ought to do a good job. Because he's a big customer of Oak Ridge's and, you know, we ought to take care of him. But I never thought of it in the sense of having the responsibility for the program.
- Q: Based on our...
- A: And even when I talked to Wiley Johnson about the safety of it, I was coming from the standpoint of it, "Is this in the DOE's best interest?" Because one of the competitors, I think I mentioned this earlier, but I did that only because one of the competitors told me privately, that you ought to be really worried about that stuff.
- Q: I guess I have one final question. Based on our, you know, hindsight's great: if someone asked Oak Ridge to handle another leasing arrangement through the Isotope Sales Program for a material similar to cesium, in terms of some of the characteristics of it, would you recommend, as the person that manages the Isotope Program, would you recommend any changes on how we would handle it?
- A: (Price) Obviously, that's the easiest question you've asked the whole day.
- Q: (Penry) Okay. What would you do different?

- A: (Price) Of course we would do it differently. And it would have to be very clear that you didn't have certain responsibilities, or that you did. And if you did, with a material of this nature, you would set up to manage it accordingly.
- A: (Wolfe) Well, in the impression I got from DP, was that they were used to having people do what they told them to do. And even though they weren't giving Oak Ridge any money to support the activity and they were saying, "Go forth and do this," they were saying, "We don't, we don't have to give you any money, you'll get it through the revenues. You'll get it through billing the customer." And I spent a lot of time, and I got a lot of help from Chuck Ottinger from the lab at the beginning of the program, but I spent a lot of time doing what I was told to do, but it was never written down in a roles and responsibilities type document.
- Q: Well, Les, when you said that you, we'd be very specific in roles and responsibilities, with that do you mean this kind of program management? Would you expect more, accept a more, play a bigger role in program management as opposed to just being agents?
- A: (Price) The concept that comes in here is the responsibilities that go along with ownership.
- Q: Okay.
- A: (Price) Responsibilities like that are maintained, even though the materials are at a licensed facility; what is the case that the lawyers I presume are going to be sorting out is what is their responsibility. But the idea that it's your material, and you gotta look after it, and keep up with it, and audit it, that's something we'd think about now that, that we didn't think about.
- A: (Wolfe) Actually, you know, I'm hypothesizing, but I think they would have kept up with it and looked after it and everything if Bill Remeni were still around, because this was a, the part of a bigger program. It was going to lead into the demonstration of irradiators. It probably would have got disjointed a little but...
- Q: (Price) I'm not sure that we would have ever, that we would have ever entered a leasing program. Why would the agency enter a leasing program and have its material, this kind of material scattered around the country, something that's of no benefit to DOE, but yet we're carrying all that liability. It doesn't make any sense. That's why I referred to the thing, when it looked like we were going to take that because of program pressures, take that clause out of the Iotech contract. Had Sylvia prepared, what we wanted DP to tell us, make it very clear, that they were accepting that responsibility for that, for the risk that the agency was taking. Before that, I thought we were covered by having the hold-harmless clause, just like I think we're covered in all the isotopes sales and things. We sell it to them, it's theirs, our hands are clean. And it,...
- Q: But is there...
- A: ...can go bad. You know the Brazilian cesium is one of the small cesium sources, like we've cut up the WESF capsule and make and sell all over the world...
- Q: But is that not the biggest...
- A: ...and just a little bit of it can create huge problems.
- Q: Ah. Is there not a difference in the quantities, even though like what you handle through the sales program?

- A: No, that's the point I want to make. You know the Brazilian have a small medical source, was left in a cancer therapy unit in a Brazil medical clinic or something, that went out of business and in the process of...
- Q: Uh-huh.
- A: ...demolishing things, the cesium was released. And it was National and International news. Several people died.
- Q: From a little bitty capsule?
- A: (Price) From a little bitty capsule. Many tens of people were irradiated, and it...
- A: (Wolfe) It was a disaster economically in Brazil.
- A: ...it was a huge disaster for a whole town. Companies wouldn't drive their trucks into town, and it was news around here because ORAU sent people down to help with the recovery efforts.
- Q: Okay.
- A: (Price) Lots of things can happen just from a little bit of cesium. I'm saying this is, this is not trivial stuff, and the isotope program sells this and many other things that if mishandled, can cause lots of problems. So yes, there is a big difference in quantity, but the quantities that we do deal with can do large amounts of damage if misused, and we all know that.
- Q: And we are depending upon the States to tell them how the use that.
- A: That's right. And we, and if you recall about a year ago, Joe Lenhard got to go testify before Senator Glenn, I think it's Glenn...
- Q: Yes.
- A: ...up in Ohio. Similar kind of thing. Some material that we sold was misused, caused problems, and they called us in, and we didn't take very much heat, frankly. We, what we did as a corrective measure, Bobby Joe actually chaired the panel to look at it and say what else should we do as the seller of this material. And what we did, the only thing I know that we did of substance is that instead of having them certify to us that they have the necessary licenses, they have to send us, they have to do that plus send us copies, so that we have a copy of it. That was, in 40 years that's the first time we've ever had a problem of that nature to meet it, but we still ask for that and now, when we sell it, people have to, we have to have a copy of their license, not just their certification and the number of it.
- A: (Wolfe) Well, I believe the NRC took heat on that, but...
- A: (Price) Oh yeah, NRC took a lot of heat....  
It wasn't regulated....
- A: ...and so did the Air Force.
- A: (Price) I'm, I'm, to get back at this, what should the agency do. We are already liable to that extent through the Radioisotopes Sales Program of having material that is traceable to DOE and very dangerous out in the private sector.
- Q: Do you have a copy of the letter, the DP letter, concerning the hold-harmless issue?

A: (Wolfe) I didn't...

A: (Price) They never sent it. This was when it was being discussed...  
As far as I know...

A: (Price)...at the staff level and we were resisting taking it out, and I was saying if we were going to take it out, we were going to have to have our rear-end covered and something out of Headquarters is going to have to be very clear. That...

Q: But we never got it?

A: ...they made this decision. We faxed up to them what we said they ought to send us.

Q: But you had a copy the fax?

A: Then the whole thing got elevated out of our hands.

A: Yeah, and Snyder will be able to...

A: And we had no further interaction. And they never said...

Q: Sylvia, do you know if you gave me a copy of that?

A: Yes, I did, in the hand-out today. It's the fourth from the back document...

Q: Okay.

A: ...and looks like this. This is just arrived to Headquarters saying this is what we would like you to write to us, please, and that's the hold-harmless clause.

Q: I've got another question. On the, there are two leases. One has the hold-harmless in it; one does not. But what I'm concerned about, do you keep up here in Oak Ridge with the specific capsules? There were 248 capsules in one lease, there were 186 capsules in the other lease. Part of those capsules went to the Westerville facility, part of them went to the Decatur facility. Can you identify which capsule, under which lease are located...

A: (Wolfe) Not me. Richland has, actually Westinghouse, has the records of the serial numbers of the capsules that they shipped.

Q: Under each lease?

A: (Wolfe) Yeah.

A: (Price) As we take one capsule out, down in Decatur, and look at it, and read the serial number, will we be able to tell which lease it was covered under?

A: (Wolfe) Yes. And RSI can move the capsules around.

Q: You said yes, but we could determine it from Richland not from here?

A: Richland has records of the serial numbers as they left their site. Then if you go and take a capsule and look at it and see what serial number it is, then you'll know, "Oh, this is a capsule that left our site when the first lease was in effect, while this is a capsule that left our site when the second lease was in effect." So you can tell by serial number and the date on the leases.

Q: Thank you.

Q: I tried to find that at Decatur, and they did not have that information. He did not know...

A: (Wolfe) I know Richland has have it because they notified us through their reports of phone calls or left a note or something that identified which are the 250 capsules they've got a QA record on the ones they know are down there.

Q: They, they have the capsules identified by serial number, you know, that's in the racks, that are down in the pool. They know exactly the serial number, the location within the rack and so forth.

A: (Price) Not necessarily.

A: (Wolfe) The serial number is inscribed...

Q: (Davis) Yes, that is. We got that information...

A: (Price) Okay. I guess they probably do because...

Q: (Hultgren) They do Lea, we've verified that...

A: (Price) Okay. I'm agreeing with you on the basis of this information.

Q: (Davis) But they do not know which one of the leases though, that those capsules came under. That's what we need to find out.

A: (Wolfe) Well, what you need then is the shipping record that lists the...

Q: (Hultgren) We had access to the shipping records, and they weren't on the shipping records either.

Q: (Davis) Right.

A: (Wolfe) The Westinghouse shipping records?

Q: (Davis) Well, the shipping record they had a copy of down there, there was not any, the capsules are not identified on the shipping document back to a specific lease number.

A: (Wolfe) No, but then are the serial numbers on there?

Q: (Davis) The serial numbers are on there.

A: (Wolfe) That's all you need.

A: (Price) You're saying if you know the date of shipping, you would know...

A: (Wolfe) Yeah, because I think Richland...

A: (Price)...which lease it was done under?

A: (Wolfe)...I don't know what shipping document you looked at, but up at Richland, I feel certain they will have a piece of paper every day, checked off, that's got the list of which capsules went into the cask that day to go down there. And that, compared to the date on the lease, tells you which capsules were under each lease.

- Q: Well, to the...
- A: (Wolfe) That's never been considered a real relevant fact. It may be relevant now that it never was before.
- Q: I would say that with the hold-harmless provision in one of those leases, and the hold-harmless provision not in another one of those leases, that would be a rather relevant fight right now.
- A: (Price) If having the hold-harmless clause means anything.
- Q: Well, it may be. It depends upon where the responsibility lies for the lease.
- A: (Wolfe) That's true too. But I don't think that's what Les means. I think Les means that...
- A: (Price) I'm going back to Charlie Seehorn's memo and see what it means...
- A: Charlie Seehorn's memo, which made it seem, he says he didn't think the whole hold-harmless clause made a hill of beans anyway, whether it was in there or not in there.
- Q: Well, apparently some insurance company felt like it did.
- A: (Wolfe) That's true.
- A: (Price) And quite frankly, I hope it does from the standpoint of the whole enterprise, at least until the government can accept responsibility when it sells dangerous materials to someone and then keep responsibility for what happens after that. There's no way we could manage that in the same way that we didn't try to manage what RSI did with that material. And in the early days of this incident, we were reminded that that material was under the full use and control of RSI.
- Q: Just off the top of my head, I've not seen any revenue figures, I've not gone through your files yet, but of the 252 capsules that are located at the Decatur facility, how much revenue would be generated to the government...
- A: Annually?
- Q: ...in a year's time?
- A: (Wolfe) I don't have a calculator, but you take the number of curies leased and you change that as it decays, multiply it by 10 cents a curie, and you multiply it by .69, which is the self-shielding factor, and you multiply it by the government's use rate at the time, which is published from time-to-time in the Federal Register, at least that's...
- A: (Price) You mean the DOE added factor?
- A: (Wolfe) No. It's a use rate factor. And it was twelve percent at the time, and my understanding is that it's still twelve percent. I think the twelve. You multiply those things and you get something in the order, like there are twelve megacurie leased, a hundred thousand dollars a year, or some number like that. I don't remember what it is. It's plus or minus. I don't have any calculators.
- Q: (Penry) This was the deal.
- Q: (Hultgren) Are there other questions besides comment on the return on their investment?  
(Laughter)

All: No.

**END OF TAPE**

**C-122**



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**Peter Dayton  
Bob Lynch  
ORO, Procurement and  
Contracts Division**

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## DAYTON/LYNCH

Okay. July 7th, 1 o'clock. We have Pete Dayton and Bob Lynch with us. The committee is Mike Jugan, Judy Penry, Ed Wright, Willis Davis, and myself Ron Hultgren, and we intend to talk about the leasing arrangement for the capsules. Judy do you want to lead off as you did this morning?

Q: Okay. Maybe the best way to get started is if ya'll, just based on your recollections, give us a little bit of background of your involvement in the lease arrangement for, the one we're particularly interested in, is the one with RSI.

A: As I recall, the representative from AMERD was Sylvia Wolfe, who was, excuse me, who was handling this thing for her organization, and we were presented a draft lease which is substantially as the one that I signed on June 13, 1985, as I recall. And we talked about the proposed lease with RSI on several occasions, I would guess. I don't recall when, these certain occasions...

Q: Was this over the phone, or did you have some... ?

A: No...

Q: ...kind of over the table... ?

A: No, she brought this by for me to look at. Now I believe, I haven't checked the file to see when the lease with Iotech took place, but I believe with the lease with Iotech, preceded this one. It was conducted earlier. So what she did, I think, was basically bring by the same kind of lease that had been entered into with Iotech. And since we had pretty well had a working document out of the Iotech lease, I guess this one probably did not take as much deliberation as the Iotech did. So she was performing, I guess, what would maybe be called a COTR-type function, but because of her position with respect to the sale and leasing of isotopes there, she seemed to be pretty much in charge of things. She didn't, I guess, indicate that anybody else was. She wasn't following orders from them. I guess the division director may have been Bill Bibb, I'm not sure. But she didn't come representing Dr. Bibb or Joe Lenhard or anything like that. She indicated that this program had been initiated at headquarter's request, and the ORNL group that handles the isotopes was assisting her in getting this thing under way. And so on this particular one, I think, because it was somewhat similar or basically the same as the Iotech lease, I don't recall that a good deal of time was spent in developing individual terms and conditions of this lease.

Q: Maybe we can back up then. So if this was just patterned after Iotech, what, looking at the Iotech lease, what were some of the what you considered issues in developing that at that time that you spent a little bit more effort or more effort was spent on?

A: Well we wanted, I wanted to be certain that we had a legal review. I think there may have been some indication that the Martin staff had perhaps given it some sort of a legal review, but I felt we should have our own legal set-up...

Q: Is that standard procedure as far as you're concerned on any, whether its a lease agreement, contract mod, just you normally look at all that stuff?

A: (Lynch) Well, because this is obviously a contractual document and it was a little different kind of agreement that we were getting into, yeah, I felt that it was appropriate that we both take a look at it.

A: (Dayton) But I think we use our judgment on a case by case basis when we get things that

are a little bit unusual or out of the ordinary like this.

Q: In your opinion, what made this unusual?

A: (Lynch) Well, when you are talking about the Iotech, we had not done that one, we had not entered into any such a lease for these kinds of items prior to that within my knowledge...

Q: Okay, we had entered into a lease or is the uniqueness the type of material?

A: Well, I think both. We really, just, there's not many leases for property or certainly not radioactive material, by product radioactive material. But from a procurement, what made it unique from a procurement aspect, I guess, was as a contractual instrument, was that we really had not done this sort of thing before to my knowledge.

A: Well, I was thinking that we had a leasing program that's been going on a long time, and I know the NRPNC division has some real heavy input. Is that what you're thinking?

Q: Okay, are you thinking the leasing program or are you thinking the loan program?

A: Well, maybe ...

Q: Does that make... ?

A: It is a loan, okay...

Q: Okay.

A: Cause we've heard about a loan program, but I hadn't heard about a...

A: Okay. Whatever you call it. We really weren't involved so, I don't know what it was called, we'll just call it a program.

A: Well, the isotopes, program isotopes, program out at ORNL, with AMERD oversight...

Q: Okay, how come we treated this one differently than...?

A: Because it's government material. We did not look at Martin being able to execute a lease for that since it was government owned property.

Q: Even though they could sell our stuff?

A: Well they sell for us. I guess you can look at that philosophically and say, "Are they selling for us or are they running some sort of a counter operation? And customers are coming up and putting their money down and they're filling the orders. Are they selling the stuff or are we selling it with them, actually physically handing over the material and taking the money, and keeping track of the money for us? I think it probably falls in that latter kind of a category. And I don't think they feel that they have the authority to execute leases to allow government owned property to go out the door. I first of all, you know, this wasn't really under their control anyway, so I don't think they would have felt...it just was a little different from the regular isotopes approach. But they did utilize isotope program procedures, I believe, in developing these leases.

Q: I interrupted you when you were talking about the...

A: In the Iotech case I thought we ought to have legal review and Charlie Seehorn was, I think, the individual who reviewed those for us.

- Q: Okay, then in terms of the review...
- A: And Jennifer Fowler also may have looked at the contract.
- Q: Okay, as you, corporately, you all were reviewing this, looking at the various clauses in whatever, contained in the lease, were there any that you spent any kind of discussion time on? Or was it almost the sort of, you know, it looks pretty good standard kinds of language?
- Q: Bob, did you mention Jennifer Fowler? We heard Bill Snyder and Charlie Seehorn mentioned with the lease. Was Jennifer involved in it?
- A: Jennifer may have looked at a one, one of these, at some point. I don't know, maybe Charlie was out or something, and we had some issue arise...
- Q: We had not heard her name before. There was nothing in the files to indicate...
- A: If it was, it was not intended. I'm not trying to imply that she had the status that Charlie Seehorn did. I believe Charlie considered himself to be the lawyer looking at this category of leases.
- Q: Okay, we are probably going to be talking to him later on so we...
- A: I think Jennifer maybe filled in for Charlie at one time when he was out or something...
- Q: Okay, so...
- A: Her knowledge of it would not have been as in depth as it was for Charlie. Well, the one thing that did come up and that we wrote in was the paragraph 10 or clause 10 regarding the indemnification and hold harmless clause on the part of the lessee to the lessor, the government. In other words, they agree to indemnify and hold harmless the government, DOE, and anybody acting on our behalf. And then that turned out to be a problem for Iotech and their being able to get insurance. So Iotech used its considerable resources to obtain a change in that so that the Iotech agreement has a different clause with respect to this in that. This was deleted and a substitution was made to say they would comply with all of the regulations that they are subject to. And that could help them obtain insurance at that point. I think what happened between the first RSI lease and the second RSI lease. So by the time the second lease came around with RSI, that that change was factored in and Sylvia Wolfe obtained Alan Chin's execution of the lease subject to that paragraph being changed to read the way the clause was changed to read in Iotech.
- Q: Okay, when they, we changed the clause, what was the impact on DOE?
- A: Well I...
- Q: The difference between the two clauses?
- A: I guess, according to, it depends on who you expect to speak for DOE on this point. I guess Bill Snyder felt that it was the more appropriate clause. He...
- Q: The first or the second one?
- A: The second one. That I guess Bill either developed, or helped develop or had developed the one that says that it required all the regulations. Feeling that, gee, in case something should happen with this stuff, there's no way this clause would really stand between DOE and whoever might have been harmed as a result of any accident involving the materials, so...

- Q: Is this a common clause? I mean, do we have this kind of clause in a lot of other things we do?
- A: An indemnification...
- Q: Hold harmless...?
- A: Hold harmless...
- Q: Is that how you refer to that...?
- A: Most people want a hold harmless clause from the government. When they do our work, they want us to indemnify them.
- Q: Okay.
- A: So in this case it was not inappropriate to ask for a hold harmless. We do this in a lot of instances where we want to minimize any future liability we might have...
- Q: So...
- A: You know some actions taken.
- Q: So it's, so in your opinion, do you consider it pretty routine?
- A: Oh yes, I would say so. We try to limit any liability DOE might have with respect to a transaction...
- A: Okay.
- A: ... where we allow people access to our property, for example. We would want, we would hope that a hold harmless would be provided. So it's not all that unusual from that standpoint.
- Q: Okay.
- A: If we provide a sale insurance.
- Q: Okay. Well, I lost my train of thought. Okay, so based on the legal opinion in this particular case, I would assume in all the action subsequent to that, we probably are deleting that clause then?
- A: Well, I can understand where Snyder, was coming from on this thing. Because Iotech made a, I think they made a sensible argument, that said, "gee, if anything should happen to this, looks like Price Anderson would kick in." And so Snyder I think, their counsel, I think, and I don't recall who that was, and I don't recall whether they were talking directly to Snyder or how it got down to Oak Ridge finally, but they made a sensible argument that that probably would be appropriate. So, having them comply with all of the NRC's rules and regulations with respect to their license and the other licenses of the regulations of the states that they were operating in. In that case I believe it was just the state of Colorado. That seemed like a reasonable request.
- Q: Okay, so any subsequent contractual arrangements we've developed since this time, we have deleted that clause. We've used number two...

- A: Well, we haven't done it. The first lease, I guess they were trying to tidy it up and so Sylvia presented an amendment to the first lease which still has the hold harmless clause in it. So we got two leases with RSI. The, I guess, 18 & 19 are the last two numbers. Okay, this one is 19. Nineteen is the modified version. Eighteen is the original version. And Sylvia brought down a proposed amendment to 18 that was a little bit erroneous in that it indicates that it is an amendment to both leases. However, it was not necessary to modify both leases. In that regards, since the second one contained our paragraph 10. She presented this right after this accident started, I thought it would not be appropriate to hastily sign it, although technically it could have been done. I just didn't want to go ahead and sign it until management had a chance to reflect on it to see if it posed any problems for anyone. So we're still stuck at that point, in that she presented me with this amendment on this. And it's a little bit inconsistent in it applies to both leases. But I don't think it would hurt. He ink penned it in. I guess if we didn't pen in the same change it wouldn't be there so then we could make it work so that's where we are with these things.
- Q: Okay. I'm definitely a lay person to this area. For instance, in the toll enriching contracts, where we're performing the service and handling material and all this kind of stuff, I mean, is there a hold harmless clause there? I mean, I guess I'm trying to get the feel, is this in almost all the contracts we write would it be there as opposed to not being there? And subsequent to Snyder's, er, Legal's ruling, are we using the second version of this as opposed to the first version?
- A: (Dayton) I don't remember what's in toll enrichment or not, but I assume there is always one there somewhere.
- A: (Lynch) Price Anderson I think definitely applies in case of toll enriching contracts.
- Q: So probably the first version is still the version we're using in most situations.
- A: The difference is Price Anderson's use is related to a site and while their materials are on our site Price Anderson would apply. Well, okay, I was thinking that while the services were actually being performed. It's the same with the services like in the waste lagoons and the recent incinerator demonstrations and things like that. They want and we usually plan the same kind of thing. We would get the same thing, I think. And we'd negotiate that out of the way as much as we have, so...some kind of...
- Q: Hold harmless... ?
- A: Hold harmless that they would take the liability to Martin employees and anybody with the press who's hanging around or....
- A: Okay.
- A: ...That, that's where I...
- Q: I just didn't know if this, the fact that we've changed the wording, that that was considered a precedent setting kind of activity.
- Q: Doesn't it seem odd to you that they couldn't get insurance with the one clause in, but they can get insurance with the second clause in? I mean, doesn't that strike you as something that somebody considered pretty significantly different?
- A: Well, they hired counsel...yeah, it was significantly different. One view of it is how can they buy enough insurance to indemnify the United States government? I mean, what insurance carrier would want to take that on, and if they could, would it be reasonable to purchase?

Could they afford it? In other words, an insurance policy to indemnify the government. So from that standpoint, you can picture economically, this is probably not feasible if some carrier, insurance carrier is really seriously looking at the extent of their liability. On the other hand, they hired a law firm, I believe in Washington, DC, that said in their opinion, Price Anderson applied to this deal, and all they needed to buy insurance for was the part that Price Anderson didn't cover. Well, our lawyers didn't look at it in the same way necessarily. But, they did agree that they were obliged to comply with the regulations of the NRC and their licensing states. So, that was the compromise I think occurred in that arena. We weren't necessarily agreeing that Price Anderson did apply. But they had hired competent counsel who felt that Price Anderson did apply and all the insurance they needed per this counsel's advice, was the difference between Price Anderson and no coverage. So, it made sense and did solve their problems for them.

Q: Okay. Refresh my memory on that we have two leases, right? Who are the contracting officers?

A: (Lynch) Well, I signed the earlier lease, the one that was dated the 13th of June 1985. And Pete signed the one dated in 1986.

Q: Okay. Do ya'll normally sign at this level, or is this something you delegate down? I don't know.

A: (Dayton) As I remember it right, we have just delegated it down, just recently to Bill Wistrom was the last ORPL change. Because we did feel like it probably didn't need to be at the level of Bob and I.

Q: Okay. The only you all signed it originally was that it was a unique situation? Is that...

A: Well...

Q: ... the deal?

A: ...the authority hadn't really been delegated down. I believe that sales authority had been limited to...

Q: Oh...

A: (Lynch) ...to Pete's position and if I'm not mistaken when the first lease was signed, I was actually acting for Pete, which meant I had the authorities that had been delegated to him in his position as director. But as I recall, that at the time we had not now, sales authority going back to the toll enriching contracts that you have mentioned have all been, at one time handled more or less directly by Pete. And I didn't really have authority to execute a toll enriching contract. I guess I could have in Pete's absence, and I think that's what happened in this case. This was a sales type transaction that we just really hadn't delegated to the extent that we now have delegated to our contracting officers. Willis Davis could have probably had the honor of signing such a lease.

Q: (Davis) I was just sitting here thinking that was your lucky day.

(Laughter)

A: But under today's conditions, even Willis could probably sign one of these.

A: (Dayton) If you'll notice on there, Bob's initials are over there beside my signature, so you know, when I'm just signing things that have already been worked by Wistrom or Bob Lynch, then I usually say, "why does it come in to me? Why can't it be done there?" It just took us

a while to get it done.

A: Yeah. Okay.

Q: Okay, in one of the, I guess, in the Federal Register when they established the leasing program, they set forth some criteria that, to be used and to determine whether or not a company qualifies to participate in the program. What kind of certification did you get to insure yourselves that, yes, this company that we're making these arrangements with meets the criteria?

A: Well, Sylvia had done the business reviews on these proposed lessees, in accordance with her usual business...

Q: Um-hm.

A: ...procedures for the isotope program. So she brought us, in a sense, completed work, with, except, with exception for the execution of the lease document.

Q: Okay. Let me ask another question then. Do you know what the criterion is that we evaluate to see who's in the program and who's not?

A: Well,...

Q: Or do you rely on Sylvia?

A: Sylvia?

Q: ...in that area?

A: ...Yes, we weren't trying to look beyond. We did ask questions and we got...

Q: What kind of questions were you asking?

A: Well, just how do you select people to get these things? How does a person get selected and...

Q: What was the answer?

A: Normally we do open competition.

Q: Why isn't this going out to let everybody have a shot at it if there are other bodies who are interested or want to apply a bid or something?

A: Well, you know...

Q: Yeah, um-hm...

A: ...you do get some sort of competitive approach in the way it was done. What's the price to be established, who establishes the price, what's the mechanism for pricing? You know, the deal about getting those capsules, shipped out of Richland that turned out to be a very hairy deal, and I never got any real good clear answers about how this works. Presumably, we also have another program going on where we were selling some by-product Cobalt. I believe we're selling that, weren't we? She was involved with that. There was some Cobalt that was needed and there were some real hairy disputes about the different people who were claiming that they didn't get what they were told they would get, and so this was kind of going on around the same time as this and it looked like we were getting into the same type problems.



But the thing was still sort of handled out of Headquarters to a great extent, in respect to that Cobalt deal. Some of which was at Savannah River, or a lot of it was at Savannah River, and we're asking Oak Ridge to do these things because of the isotope sales program. And there was a real lack of program rules to operate under it seemed to me because it was a very informal type of arrangement.

Q: Okay.

A: I guess I thought it was always a function of just demand and who was licensed. I never was under the impression that there were more standing in line knocking at the door to participate in the program.

A: I think that's probably true and that's why they managed it in the sort of, what I'll call an informal manner, because they just didn't have that much interest or demand. And if there had been a greater demand for it, I think they would have had to go to a more formal arrangements provided for competition selection. So, I would...

Q: It seems like they were originally anticipating the demand on this lease to exceed their supply. But when in fact they got down to it, I believe they were able to furnish everybody with whatever they wanted to.

A: Well, the way that was handled was ad hoc at best. They couldn't say, yeah, we're doing it in accordance with rules. Or, we didn't have regulations, which specifically cover these things and there seemed to be some, you know, Headquarters dealings with these potential customers and clients and there were. It was just kind of loose and informal form of arrangement from that standpoint.

Q: Robert, your standpoint, who did you view as the program manager for this activity.

A: Well, Sylvia said she was...

Q: The program manager?

A: ...the program manager for it. She quickly identified herself in that regard.

Q: From a procurement standpoint, what are your expectations? What should a program manager do in getting a procurement action out? What support do you get from those folks, expect from those folks, in terms of reviews, and things...

A: Well...

Q: of this nature?

A: (Dayton) Bob, stop me if you think I'm wrong here but, in my view, we probably allowed Sylvia the program manager of this to take a, to do more and take a stronger role than we ordinarily would. Probably because of the ad hoc nature of the Headquarters performance, the ORNL participation and those kinds of things. So, personally, I think at this stage, we had the right terms and conditions...

A: Basically, she kind of came down to us to get the thing executed. Right. It lacked, I guess, it lacked comparison with what we normally do with respect to a program manager in that they would submit their requests for us to do it for them.

Q: Um-hm.

A: Well, they weren't in that, she wasn't in that mode...

- Q: The guy that signed it at the bottom line study?
- A: She basically sort of brought us a completed action and I guess she was trying to convince us that this is not meant to imply...
- Q: Yeah, right.
- A: ...she was trying to pull a deal, I'm not saying that. But basically, I think she probably saw her role was, well, I've got everything else done, now all I need is somebody to sign this. And so she brought us these things. And so, we wanted to make sure, well okay, let's make sure they are legally satisfactory and then so there were some changes that occurred out of that, out of our reviewing it and her reviewing it. But, I mean, and Legal's review of it. And we're including that B-10 as one of those changes. Including that, I don't know, that there were substantial changes, there might have been more minor kinds...
- Q: Um-hm.
- A: ...of adjustments to it. But this just, it wasn't, it lacked the central features you would say. When the program manager wants us to perform a service for him, they don't ask us to come in and sign a document they have prepared. And there was no, we weren't, we didn't have a procurement request, we didn't have any competition. We didn't have any, there was no sole source justification required here. This was not being done pursuant to procurement regulations or our acquisition regulations. This was a different kind of beast.
- Q: Okay, is the rule or the exception? In terms of having safety review procurement actions?
- A: I would say...
- Q: Across the board?
- A: ...I would say it's, generally speaking, the exception with respect to that. We would expect the program manager typically to cover those requirements if he or she had a need in those areas, we would expect, I think our increased sensitivity to these things in today's environment we would more readily ask for that kind of review. But I don't think it would be appropriate to say that we have a built in...
- Q: Automatic...
- A: ...feature or procedure that we rely on consistently. But I think we are getting more sensitized to these kinds of issues. If we saw that it wasn't there, I don't think it would be unusual for us to ask for it to be there. But, again we would want the program person to be aware of that.
- Q: If in fact, you know, someone makes a determination, say the program official that, Safety or Environmental, or whoever needs to look at this. When you look at the yellow or the contract mods being staffed through, do those folks sign off on the yellow? Can you actually see their concurrence, or is it more informal?
- A: No, we use a contract, it's the actual contract document, or modification to it. We have forms that we ask for concurrence on.
- Q: Well, how would you know to put safety on there if the program managers take the lead in that? Did they tell you to put safety on there?
- A: Well, it's really a guess of two judgments that the judgement of the program official, we

would rely on first. But secondly, we would hope the contracting officer would also exercise his or her judgement in who all were the right people we need to staff this through. So, normally we do not staff every contract action through...

Q: Well, right, I was just thinking in those situations where it is determined that yes we want safety. Is the safety review an informal or would it be documented? The, your form sheet.

A: (Lynch) I think it would be, it would probably be documented.

A: (Dayton) It would be properly documented.

Q: Okay. (pause)

A: I guess I would hope that a contract specialist or contracting officer would ask the program official is this something that safety should look at and allow the program officials response to judgement. But we don't send for concurrence.

A: (Lynch) And I don't really think it's that we regard ourselves as being the safety net for that at this point. I don't think that has, I don't think that concert has been thrust upon or assigned to the procurement function to be certain that safety has reviewed those things that should be reviewed. I believe that the management at ORO places that responsibility on the program manager.

A: (Dayton) Yeah, we would be the second point.

A: And where likely we might, as Pete has said we might go to the program manager and ask if that had been done as opposed to maybe putting them on there.

Q: Okay. So there's a possibility, I'm not even specifically referring to this situation, but there is a possibility say, on a, any other contract action, that say safety or environmental could have been involved in the review process. But if you looked at the paper work, you may not see their name or initials on anything.

A: That's correct.

Q: Okay.

Q: What is the general, I'm used to a contract having some sort of negotiation record attached to it, you know, where you get together with the guy and, and he says, "Gee, I don't like that clause and I don't like it for this reason." Was there anything like that associated with this leasing arrangement, other than that letter that comes from Chin and says, "You know, these are the things that I want"? How about for the first lease, was there any negotiations session with him?

A: Not, okay, I had some negotiations with Iotech with respect to the terms and conditions of the lease itself. They wanted to talk about just, generally speaking, the terms and conditions. But the usual contract negotiations I don't think took place in this case, not in our, at least not at our stop. Because it was, like I say, a completed action basically at the time it was presented.

A: (Dayton) Well, too, I think that, a part of the response may have been from the program manager that there is no price negotiations since we established...

A: (Lynch) They had established the price at Headquarters.

A: (Dayton) Terms and conditions may have been one other thing that really wasn't negotiable.

- A: Now, I believe the comparison with the, with the isotope program was pretty strongly made here, in other words, you know, they just needed somebody that had CO authority to sign this. And if they had had it, we'd have never have been involved. I mean they didn't, they just didn't see us as, I think, adding anything to the process. They came to us because we were the presumed authorized signatory.
- Q: Well, how did you feel about it, do you feel you added anything to this process?
- A: Yeah, I thought we added something to it. I think we tried to add, asked some questions about the way in which the thing was being conducted to see if it was, if she'd touched those bases that we would have touched, I guess, in terms of the business deal and trying to put the deal together and seemingly, ORNL's support in this area was roughly equivalent to what we would have done, I guess, if we had been doing it. The things that they asked for and presumably got that we didn't necessarily, we didn't double check that. It would have been perhaps presumptuous for us at the time to, for any of us to have said, "Well, we're not going to do this until you bring us everything and let us see it and all that." The impression was, I think, given that this thing was being handled in a competent manner by people who do this all the time and all they needed for us to do was sign it. So, but I think we did try to make it better. I think we said, "Well, you know, what about other people?" Do you have other folks coming in and want this stuff and want those kinds of things that I guess you would consider to be part of the business arrangements? We did not go into, did you get this checked out with safety or environment, or any of those folks? To my knowledge I don't recall that coming up.
- A: (Dayton) I think the first impression by AMERD was that this was going to be very similar, very easy like the current isotope program, and as time went along and Sylvia and we realized that there were going to be more issues involved in it and a little more complex than we first thought. And we started devoting more time to it than initially, and we saw we needed someone like Wistrom to really help and she was going to need some help. (Pause)
- Q: How quickly did you turn this thing around? I mean, was this done in a week, or a day? You started it in the morning and you signed it in the afternoon or, or was it turned around three or four weeks?
- A: No, I have this one, for example, was, it was originally made up the 18th of April and we signed it on the 13th of June. So it took that much time to get the reviews and changes and so forth made in it, so it looks like it took from April to June. (Pause) And he had already signed this thing too. I guess that's a lot of time. He signed a service order form on April 18, and we didn't sign it until June. And he signed the lease on April 18. (Pause)
- Q: Any other questions? Oh, go ahead Judy.
- Q: Okay, in the lease, I just thought of something, in the lease it says that the material leased will be used only in properly licensed facilities. Okay, how did we determine that they had a properly licensed facility?
- A: Well, that was a matter that the program manager was dealing with and monitoring
- Q: So, even though you signed on the dotted line, you accepted their...
- A: We would...
- Q: word... ?
- A: ... have nothing to add to or input to that, but to just ask. We, what, we would just rely on

them to tell us.

END OF TAPE

C-136

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**Edward Goldberg  
Elizabeth Bowers  
Richland Operations Office**

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## GOLDBERG/BOWERS

This interview took place Friday, July 22, 1988, starting about 2:00 p.m.

On the afternoon of, and I don't remember the date, you'll have to look in your records, but it was the Wednesday or so following the incident report. And when the Westinghouse people got to the Decatur facility, they called back here and talked to Liz Bowers and pointed out that there was some loose contamination in the facility, and the owner of the facility is very concerned about it--Westinghouse is very concerned about it, and they wanted the Westinghouse people to help them in procedures and monitoring. And, of course, Westinghouse called back to Liz Bowers, and she talked with me and indicated this was going on, and I said "Well, those people are down there to help with the sources. The radiological problems are under the purview of the State of Georgia, and if we did anything to help them, other than if it was life threatening, we would, we might be in a position of violating the Georgia State law. And I told her I would immediately call my counterparts at Savannah River that had the dealings with the region in the State of Georgia. They had some pretty close workings with the State of Georgia. And I called Pat Whitfield, who is the Assistant Manager for Environment Safety and Health at Savannah River, and apprised him of the situation. And he indicated that he had talked to the State of Georgia earlier, and they indicated they didn't need any help. I told him that I felt that that was wrong, and they did need help and would he please contact the State again, and he said he would. He called me back about an hour later and said he was unable to contact the State and that he was waiting to get in contact with them. And I said, "Well, I don't think that's sufficient. We're gonna have to do something else."

At that time I called Grover Smithwick at Oak Ridge, for a couple of reasons: number one, the sources were under his purview as the lessor, and the other thing is, Grover is probably the most knowledgeable man in the agency on how the procedures work with regard to regional assistance. And we both agreed at that time that we needed to seek help from the NRC. They were the proper agency to really get involved in this because the State of Georgia had not responded, couldn't be reached. I called Mr. Starostecki--Deputy Assistant Secretary for Safety--at that point and apprised him of the problem, and he called the NRC and called me back and said, "Hey, the NRC told him that DOE was right on top of the situation and everything was okay." And I told Mr. Starostecki that that's incorrect. If the DOE's on top of the situation, all they're talking about are Westinghouse people that work for me, and they sure as hell aren't on top of the situation. Then he called the General Manager to the NRC, Vic Stello, and got action immediately.

Q: And that's how, how you got involved in all of this to start with?

A: That's right, I'm telling you, you know when contamination, loose contamination, get's to where you can't handle it, that's not their problem, that's our problem. Because we're responsible for making certain people out there, and I say "we", we the Nuclear Industry, make sure people who can't handle it get help immediately.

The original transcript was revised during a review to read as follows:

A: That's right, I'm telling you, you know when contamination, loose contamination, get's to where the company can't handle it, it becomes the government's problem. We're responsible for making certain private industry gets the help needed when problems like this arise. We need to assure they get help immediately.

Q: If, now if I can, if my memory serves me correct the incident happened on June the 6th, which was a Monday...

- A: Monday morning.
- Q: ...so this is a two day lapse even before DOE gets it's act together to even get anybody on the scene.
- A: (Bowers) That's not true.
- A: (Goldberg) Well now, no. Wait a minute.
- A: (Bowers) Okay.
- A: (Goldberg) Give him the history.
- A: (Bowers) We were called the morning of the 6th (pause) by both Sylvia Wolfe and by, actually I was personally called by Allan Chin concerning it also, and given the information as they knew it. I talked to Westinghouse, who had also been called by Allan Chin and again, this was Monday the 6th. We weren't, we had a conference call that afternoon, by "we" I mean myself, Garth Tingey of PNL, and a number of folks from Westinghouse, with the Plant Manager at Decatur, Tom Fisher. And based upon that phone call and the information given there, and first thing in the morning, I talked to Daugherty Monday night, and he and I decided, primarily myself, and he totally supported it, I asked if we shouldn't send somebody. And the first plane we could get them on was Tuesday morning and that's when they left.
- A: (Goldberg) And, now remember, Chin, as I understand it, reported the contaminated water to the State of Georgia...
- A: (Goldberg) Yes, as he should have. And they sent people out, according to the information I got second-hand, to monitor this place and they found, yes, the water was contaminated, but they apparently either didn't monitor for it or didn't find any loose contamination. So at that point in time, the State of Georgia felt that the problem was in the pool, and you had to get help to find out what was causing the contamination, and that's what this company did in calling out here. I believe they called Oak Ridge, too, didn't they Liz? Chin called the leasing organization...
- A: (Bowers) Chin called the State of Georgia and Oak Ridge both.
- A: (Goldberg) ...To let them know they had a problem.
- A: (Bowers) Yes.
- A: (Goldberg) Okay, and so I think DOE/Oak Ridge, DOE/Richland responded to what was described to them: a leaking source in a pool. It was only when the Westinghouse people got there that they found that there was more than just a leaking source or sources or source of contamination in the pool, but other sources of contamination around the facility, and actually the facility wasn't designed to contain it. And so, these people immediately upon finding that called back to us for help. Again, it appears that there's a little thing in here, Mr. Chin should have known to get back to the State of Georgia right away to get help. And the State of Georgia could have gotten Savannah River to come over to help them, if it was a situation they couldn't handle. But that's where the breakdown occurred, somehow in the fact that the Richland Operations office had to start calling around to get Mr. Chin assistance.
- Q: Yes, that seems strange, strange communication chain. We've talked to a lot of people here who have said that the communication chain with the lessee is with the lessor, everything should be going through Oak Ridge, and yet when the trouble hit, that's when they come and they call you all.



- A: (Goldberg) Well, the problem is, we had, Westinghouse was down there and they were asking for their help and I can understand that Westinghouse people say, well, I've got to get permission. That's when we got involved. Okay.
- A: (Bowers) We were concerned about the capsules and knowing that, knowing that we were the ones that had the expertise, the most experienced and the expertise in the capsules. That's why we sent a health physicist and a person from, one of the engineers that follows waste encapsulation facility, to Georgia to see, just from an overview of the capsule itself.
- Q: Then the leasing officer knew you were going there?
- A: (Bowers) Yes, we notified everybody that, that they were going to be there and, and strictly in kind of a "Hey, this is going to be something where we're gonna have to get involved just because we have the capsule expertise." Starting with June 8, we did get phone calls from those people back to us, and on the 8th of June the plant manager, in the presence of the Westinghouse people, did call the State of Georgia and supposedly asked for a Savannah River response team, that they be called on for help. At that same day our Division Director of Waste Management, Ron Gerton, after the information that I had fed to him from talking to the two Westinghouse reps that were on site in Georgia, called Savannah River and asked them if they had been contacted, told 'em our concerns, and as early as the morning of the 8th, Savannah River was going to contact the state and offer assistance. And that's also at the same time we found out they had, you know, what got people concerned was the lack of HEPA filters, people were contaminated, it wasn't just, we weren't just talking about contaminated pool area and contamination of the water, we're talking personnel contamination, no HEPA filters...
- Q: And you ought to see their...
- A: ...No air monitoring, etc., and the people who went down were extremely concerned.
- Q: ...Their new modeled carpet, they got every other step there's a hole in the carpet.
- A: Yes, I've got pictures of that.
- A: (Goldberg) Well, getting back to notification, which is the thing I'm concerned with. There is a flaw out there in the dealings of the State of Georgia and Mr. Chin and I don't know where the flaw lies. That's something you guys can determine. And then a flaw in the dealings of the State of Georgia with the NRC. I don't know what was going on at that site, 'cause the first phone call to Mr. Starostecki made to a lesser level, indicate that everything was just peachy-keen and DOE was in charge. Obviously he had some erroneous information. It was only a forcing function, by Rich Starostecki, that got the aid there immediately. And the secondary thing, of course, is why in the world are we putting radiation sources in a facility that couldn't handle a failure if one occurred? I don't know of any kind of work we do in this world that's fail free. I'd like to think it was, but that's another question to be answered.
- Q: Yes, we have made a lot of observations with respect to...
- A: (Goldberg) As far as the sources go, we're going to find out what happened with the sources, if in fact they failed, and why.
- Q: We hope to be on that.
- A: I certainly hope so. That is the limit of my knowledge on answering questions.
- Q: Any more?

Q: No, I think we just wanted to get from your perspective here, how the first immediate response went, how it was handled, and what the pitfalls were, because that's at least part of the charter of this investigating team is to...

A: I recognize that.

Q: Is to go through that and to make recommendations, also we wanted to...

A: And the reason I called Savannah River is, you know, you know I worked there for many years, and I knew we had a relationship with the State of Georgia that we were in fact the assistance team for them. And I felt the easiest way to get Georgia cranked up was to have the people there call them. Well, he could not reach his contact and that sort of bogged down there.

Q: No, I don't have anything

A: Okay.

A: Thanks.

Q: Thanks a lot.

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**John Fulton**  
**Westinghouse Hanford Company**

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## JOHN FULTON

Okay, it's July 19th and, and about four o'clock. We have John Fulton here with us from Westinghouse, and the entire committee is here also.

Q: And John, you really conducted most of the activities at WESF.

A: Um-hm. That's correct.

Q: During the time period of the great success, is this true? When people were really pouring things out successfully?

A: We were the, overcame a lot of technical problems and finally got the production rate up to a decent level, and it was a great success.

Q: When did you actually arrive in the facility?

A: I came to B Plant WESF in July of 1979.

Q: Okay.

A: I was a manufacturing engineer.

Q: Okay. And you stayed through?

A: I, I was in operations until December, 1984. And then I became a process engineering manager for B Plant in December of '84, and that lasted until December of '85. And then I left B Plant and went into tank farm process engineering.

Q: Was the last, last year also associated with WESF?

A: Yeah, B Plant WESF. It was a process engineering arm for that operation, right.

Q: Okay, so you were there while, certainly the bulk of the fifteen hundred and seventy-five capsules...

A: I would say somewhere around a thousand of them.

Q: ...were manufactured. And you saw changes in the manufacturing process as you were there. You saw changes in the geometry of the capsules. Small changes, but still changes in the capsule.

A: They were pretty minute changes, yeah.

Q: I'm curious about how you controlled the configuration? How that process worked.

A: What configuration are you talking about?

Q: Manufacturing step. Well let's say the wall thickness. Somebody's made a suggestion about changing the wall thickness of the capsule, and then it worked it's way through the system somehow or another, and somebody made the decision that yes, indeed, this was the thing to do. Every manufacturing program that I've always been around has had a very formalized process. There is always a very defined level at which those decisions are made and I, I'm curious how your process worked.

- A: To the best of my recollection, that's you know, several years back. What you do when you make a proposal like that, first of all you can't just arbitrarily go in and start changing wall thickness on a capsule. You need an engineering evaluation to make sure it's going to meet the criteria that's been established for the capsule. Do some weld testing, weld qualification to make sure that your weld parameters are right for that thickness of metal. And verify that it's going to meet all the criteria. Then you need to change the fabrication drawings. The capsules were fabricated primarily in the 200 West area fab shops. Change those drawings and the material call-outs to use a different material and cause those new or different dimension capsules to be manufactured over there. That's, you know, goes with that, all the review of the engineering, quality assurance, safety organizations that sign-off design changes. Maybe even a design review.
- Q: Was this, the meetings I'm familiar with is, everybody gathers around, sits around the table, the person makes a proposal and everybody votes aye, or nay and...
- A: No, that's not, not at all the way it normally went. If somebody had a process change or said they wanted to change the process or change the wall thickness of the capsule, they had to justify it. That some reasonable justification. It wasn't some committee vote, that I've ever been in on. It was, "Here is a good technical justification for it. Here is the technical analysis to back that up," and people decide if that's appropriate. Then the qualification process begins, and the drawings are changed, and new capsules are made.
- Q: Did you make those decisions as to, if this, if this is a worthy change to make?
- A: I, I'm sure I probably had a party to it. I don't remember, I don't have the final decision. The way, the way the management structure is situated then, the operations managers had a little, if any, say in that kind of decision making because of the technical decision, so it was more design engineering and the weld development or the capsule integrity. Qualified people, which was a lot of it done in PNL.
- Q: How about going in and tickling your manufacturing process just a little bit, perhaps, the weld current needed to be up just a little bit with the, are you free to do that?
- A: No, well, no, we had a set of welding parameters and we had to adhere to. And they were proceduralized and written procedures. And in order to change that, we would have to get a procedure departure authorization, which means that Engineering, Quality Assurance, and Safety would have to concur that that was appropriate. We didn't go around changing weld parameters. Now we may have done it on a test basis, but in the manufacturing process, the procedure is defined. Where you set the machine is calibrated on a periodic basis and verified that it was running at that amperage, that voltage and the right speed. And that's the way you were supposed to run it, you didn't mess around with, let's try this one out and see if we can run at ten amps less and see what happens. No, not with a, not with a production capsule. We may have done it on test coupons but, that typically was done over in the weld development shop. Gordon Funnel and some of those people over there. Lee Hayes would maybe play around with weld parameters to make sure they're getting proper penetration (Mumbling).
- Q: Okay. And how about when the capsule came off the end of the line, and the person would look at it and say, "Boy, that, you know, it looks good..."
- A: Which capsule are you talking about? The inner or the outer?
- Q: Either one. It looks good, but gosh, I don't know. Who had the ultimate say in, "Yes, this is an acceptable capsule or nope, throw that one back and rework it."

- A: Let's take an inner for example. When you had the inner capsule, then basically you set the weld parameters hoping to get a full penetration weld. But that any test, non-destructive examination, that was done didn't prove that you had full penetration or near full penetration. What was done is a helium leak test. That sintered disk was placed in the capsule filled with helium and then the cap welded on that. Then we took that welded capsule and put it in a vacuum chamber and checked for helium leakage. And all that really tells you is that you've got a seal.
- Q: Um-hm.
- A: I mean, that's what you count on, is that you've got a seal. Now if you've welded to the right parameters, the right control features, you've probably got a real good weld. Then the capsule was bubble tested. The reason they did the bubble test is that if it was welded and had a gaping hole in it let's say, gross failure and you let it sit for a couple of hours, maybe all the helium escaped. So they went and bubble tested it as well as visually looked at it.
- Q: But you couldn't do that. You couldn't let it sit for a couple of hours. Wasn't the test, weren't you required to weld...?
- A: I don't remember what the procedure was. I think it was thirty minutes. You had to weld it within thirty minutes after purging the thing with helium, the sintered metal disk.
- Q: And then...?
- A: What I'm saying though, you welded it, what I'm saying is after the weld, you had several hours before you required to do a helium leak test. If you've got the procedures handy, you ought to refer to that. But it's twenty-four hours if I recall.
- Q: So then when you pumped on that cylinder using that gadget on the top, I mean the mass spectrometer...
- A: Yes, the mass spec had a vacuum system hooked to it and evacuated the chamber, then pulled a sample of gas out of that...
- Q: Wouldn't, wouldn't it seem rather unlikely the helium would migrate out of the sintered disk in twenty-four hours through a very small crack...?
- A: What scenario are you playing now?
- Q: Suppose it was a leak in the capsule? And it seems unlikely to me that all the helium would migrate out of that, out of that leak.
- A: Very unlikely.
- Q: But yet we've heard capsules in, which apparently passed the helium leak test and then found to not pass the bubble test, which to me is a really gross...
- A: Yeah, you know I've, I guess you might have heard that. I've never saw one, in all the time I was there, I never saw one do that. Never did.
- Q: Okay.
- A: I wasn't aware of any of them that would pass the helium leak test and fail the bubble test. I'm not aware of it, but maybe there was. I'm not aware of it.
- Q: Okay.

- A: I never personally saw one.
- Q: That's reassuring the basic physics in my body.
- A: Well, that's...
- Q: I wonder about that. I mean to me, it would be exactly the opposite because if, say, the helium all did migrate out, and you then pumped on it and created some sort of vacuum on the inside of that cylinder and dropped it in the water and watched it, nobody could detect when the water got sucked into the cylinder. And now you've created yourself a really nasty problem I would expect.
- A: I wasn't aware of any. I don't even know if it's possible, to be honest with you. But I do know that there were failures, there were inner capsules that failed helium leak tests. You're allowed to do an attempted re-weld, and if you couldn't re-weld it, typically if you tried to re-weld it, you blew a hole in it, and we reworked it anyway, so...
- Q: You were allowed one rework. Is that, is that true?
- A: Yeah. You were allowed one attempt at re-weld, but typically you couldn't even do that because, just your weld parameters were such that the metal quality wasn't sufficient to allow that. You could only have, you could only do that on a very localized basis. You know, it was pretty hit and miss. And then you still had to pass the helium leak test again.
- Q: Again? And go back and do it again.
- A: Yeah, and naturally we weren't very successful in doing that.
- Q: In actual operating practice, how many that passed the, the, or that failed the leak test or had failed weld integrity test did you really in the long run end up trying to re-weld? Did you, did you...?
- A: I would say we were, just on intuition, not having any numbers to back it up. I'd say one in ten you might have been able to, one in ten that failed the helium leak test, you might have been able to overweld the leak. First of all we had to find it.
- Q: Yeah.
- A: And sometimes a very small pinhole could give you the leak and you might not be able to see it with the eye. And next you had to be a good enough technician to set the weld up to get a good weld. It's not very frequent.
- Q: That helium leak test only told you that you had a leak somewhere in the circumference didn't it?
- A: Right.
- Q: Never brought it down to an angular orientation on the capsule at all.
- A: No.
- Q: Can you give us an idea of maybe of what percent of the capsules failed the helium leak test?
- A: To the best of my recollection, I would think it would be about, we have statistics, I mean you can get the statistics, which Process Engineering used to do that for us. So they're available.

But to the best of my knowledge it's somewhere around ten percent. Eight to ten percent failed the helium leak test. Really it's a, really it's a function of getting the weld area prepped properly. One of the most common things has some contamination in the weld surface area, and it causes a gas out and then you have a hole.

- Q: Can you, for us non-welding people, can you tell us something about welding prep required and are you talking about cesium contamination?
- A: Yeah. Typically it would be, see when you did a tilt pour, the nozzle, the capsules fit under a nozzle in the tilt pour mechanism, and sometimes you get a little leakage of cesium right around the lip.
- Q: Okay.
- A: And even the cell was you know, pretty contaminated. I mean from our standpoint compared to this room.
- Q: From, from a physical point of view as opposed...
- A: Yeah, I mean, you know...
- Q: ...dusty and...?
- A: Well, no. It wasn't real dusty but a little cesium goes a long way, if you know what I mean.
- Q: Well I know it did from a radioactive point of view but I didn't know...
- A: Even a speck or two on the weld would cause you a failure.
- Q: Oh, okay.
- A: And what we would need to do is we would have a capsule, had a capsule brush. It would kind of brush the surface of the weld, prepare that, then you had to handle the cap carefully with the manipulators set in place. And make sure you had the surface area clean, the welding surface clean. That, that was the main thing from keeping it from blowing out. Now, the other parameters, on making sure, making sure you had good weld. I'm not a weld expert either, but I know from a practical point of view, you had to make sure the torch was aligned properly, you had the proper gap and you had a good fine edge torch and you had the cover gas you know, the way you ought to have it, so. There are a lot of techniques in that.
- Q: The cold end of the cylinder, both the inner and the outer were tested ultrasonically.
- A: Um-hm.
- Q: You felt real comfortable with that, that inspection technique obviously.
- A: Not necessarily. Not necessarily.
- Q: I, I was surprised that you didn't provide some sort of helium leak check on the cold end of the cylinders.
- A: It's pretty much impractical to put a helium leak test on a cold end. It would be hard to put a sintered metal disk in there with helium...
- Q: Oh, no, just put, put helium on the inside and you know, just pressurize the inside with helium and, and do a leak check.



- A: Oh, you mean in the shop.
- Q: Yeah.
- A: I thought you meant in the capsule.
- Q: Oh no, no, no, no.
- A: In the capsule...
- Q: No, while it's, while it's still open.
- A: I'm not enough of a NDE expert to tell you whether a helium leak test is better than an ultrasonic. The ultrasonic show your penetration. It has some, from what I know and my experiences, it has, it has some drawbacks in that your orientation has got to be, your geometry has got to be just right with you know, the angle of the weld and then hitting where the weld surface is. But there's some technique involved there, but it gives you a better look at the weld quality than just a helium leak test. You know a leak test tells you you got it sealed. It doesn't give you any degree of penetration or any void space.
- Q: I can't remember. Was there an ultrasonic check of the finished cylinder? On the hot end of the cylinders?
- A: The hot end on the outer capsules, yeah.
- Q: Just on the outer capsule?
- A: Outer capsule, yes. Conditions were such in the process cells, that equipment is so delicate, ultrasonic equipment, that it wouldn't survive the environment. A lot of the electronics wouldn't survive the high background, high radiation background in that D & E cell processing area. So that's why they, they weren't capable, either they didn't have the technology or the environment in order to do an ultrasonic test of that inner capsule.
- Q: You didn't do an ultrasonic test of the inner capsule?
- A: No, ultrasonic at all on the, on this, on the, on the, WESF weld, right. Not ultrasonic on the shop weld.
- Q: The, the exact geometry of every capsule is not exactly known. I, we've been told, well, we know just about when something would change, but not exactly every, we know within plus or minus five or ten capsules when that change would go into place. Is that, that, that's a true statement?
- A: I, I couldn't speak of that. I don't have any better knowledge than you have right now in trying to go back to my memory banks for four years, five years, so, I couldn't tell you. But as I remember, the capsule data packages had some pretty detailed material on what the materials of construction were, and it's dimensions..
- Q: If you changed the dimensions of a capsule, wouldn't you have to change the, the welding specifications?
- A: Most likely you would, yeah.
- Q: You think that there should be some correlation then on our, on specifications came into vogue?

- A: Yes, he said you could do it within a, within a maybe a week but the precise capsule number. When did it change, maybe that's a little, a little more hard to track down. The same within five capsules. That could have been one day.
- Q: One day. Seven capsules per shift.
- A: Typically, when you were running well, running well, you might have been running you know, one day you could have reached seven capsules, then twenty-four, thirty-six hours later have another seven produced.
- Q: And you wouldn't know under which spec, under which welding spec a capsule was welded.
- A: Yeah, you could tell from the weld chart, what the parameters were. You could read it right off the chart. It's in the data package. You read what, it's got a recording there what the voltage and amperage was on that weld. You can read that right off the chart.
- Q: It wouldn't have the spec number on it. This was done according to spec...?
- A: No, it would just show you the parameters.
- Q: Okay.
- Q: You also operated your facility under the philosophy that you cross-trained all your workers. Every guy could do every task.
- A: That's not necessarily true.
- Q: Okay, maybe you could tell us a little bit what was the philosophy.
- A: There was some, there was some people who weren't, who weren't really you know, who were better at things than others. If we had a, we had a tough weld to make, let's say we had a weld that was important, say we had failed capsule and we wanted to try to save that capsule. We had one or two people on each shift that were better at welding than others, and we would call them in. And they were typically, I'd say if you look back through the data sheets, you're going to find that probably seventy-five percent of the welds were done by ten percent of the people in the building.
- Q: Okay.
- A: Different welds.
- Q: Uh-huh.
- Q: Which was the, which, I mean I look at those capsules and that's the step that looks like the most critical, and that's where I put my pros.
- A: We did. Because we didn't put all the time and effort and money into making a capsule and then not do a good weld.
- Q: How many degrees did you weld on an end cap?
- A: Well there was a, there was enough tail-over, so I would, I don't know exactly, but I'm saying probably three hundred and eighty, something like that. There was an overlap and it tailed the weld off. It wasn't a butt weld, or you didn't butt the ends together.

- Q: You started away from the vent holes and went around past the vent holes...
- A: Now, you're talking on an inner capsule.
- Q: Okay. I was talking an outer.
- A: Outer you didn't have, yeah, you had the vent holes, yeah, you would start, you would weld the vent holes over last.
- Q: Yeah.
- Q: And then you'd go beyond that...
- A: And then you'd tail off just a little bit.
- Q: ...twenty degrees or so.
- A: Cool it off so you didn't blow the weld out. I mean, all that's described in the procedures, weld procedures and the operating procedures. You shouldn't rely on my memory if you want exacts.
- Q: (Hultgren) Willis?
- A: (Davis) I don't think I've got one.
- Q: (Wright) I have a question. If he started this job ten years ago, he must have been mighty young.
- Q: (Jensen) He's older than he looks.
- Q: (Hultgren) He doesn't, well it's like Mike I guess.
- Q: (Jensen) And that has to do with, with how you felt when you were in Manufacturing and also in Engineering there, about the, about the push for production. Production versus quality trade-offs, or lack thereof. Impact on decisions that might have been made relative to design changes or whatever for production enhancements versus quality improvements versus award fee incentive kind of thing. Just kind of your feeling and your time there, kind of how the operation went, how it kind of changed with time, if it changed with time, how you felt as a, as a Operations Manager and Engineer, how you felt the pressures that existed.
- A: Okay. Well, once we got the, obviously once we got the line running, a lot of the pressure lessened ironically. Because in '79 and 1980 when the plant was struggling to even get any capsules out, there was a lot of pressure in solving the technical problems that caused us to be down. And once we got the, once we got the line up and running, and solved the technical problems, I mean things went very smoothly. Now, in terms of quality, I don't, I don't know that there was any pressure put on anybody to bypass quality or take a short cut, to hurry up and get this capsule out. I mean, every one of these capsules went through the exact same testing, the exact same overview, first to last. And we had NDE Level 1 people in there, I think that's what they called them. NDE specialists, the best you can be in QA that are trained on reading ultrasonics, evaluating ultrasonics, looking at the weld charts, doing visual inspections on the welds. And I, I really felt comfortable with the quality of the product that was turned out. You know, one of the things that quality that you, that cause you more trouble than not, is you know, people's quality at doing their job every day. You know, that's really what it comes down to. And I think that got better with time. You look back at the history of the plant, and a lot of the shut-downs in '79 and '80 were caused by what I call conduct of operations, or discipline in operations, not following procedures or not doing things

a hundred percent right. If you look at it, they were averaging you know, six or seven, maybe eight, maybe ten unusual occurrences a year. And in the '84-'85, '83, '84, '85 time frame, '82 in there you talking two or three years without one. Two or three consecutive years without a single unusual occurrence happening. To me, that speaks well of people's conduct of operations, following procedures, doing things right. And following the rules.

Q: How do you define an unusual occurrence?

A: Well, it's the DOE/RL definition in this case. The DOE orders define what an unusual occurrence is, an unusual event to report.

Q: What, what is that for WESF manufacturing?

A: What, DOE order is that?

Q: No, what, what type of examples, what does an unusual occurrence mean?

A: Well, I had, I remember after I took over the plant management, I had one about two months after I took over where a person did an improper cell survey coming out of a zone. Didn't survey themselves properly and you know, contaminated themselves and four or five other people as well as the lunchroom, and a couple internal depositions. That's an unusual occurrence.

Q: Yeah.

A: And you know, another unusual occurrence would have been a water back-up in one of the cells that caused the flooding, that caused a contamination spread in part of the radiation zone. You know, that's an unusual occurrence. So, those are, that's what defined as a significant event, something that, that was of some significance. So from that, I don't know if I answered your question, Roger, but yeah, there was pressure like there is in any manufacturing facility to run the plant. And our emphasis was to run it right. And when we started running it right, the production came. It really did. The people really pulled together as a team. Not everybody I would, I wouldn't kid you about, you know as well as I do that in any work group, you're going to have ten percent of the people that cause eighty percent of the problems. And we had our ten percent, but the people really pulled together and, and you know, basically did what was right. Ran the plant. We didn't get production out because people were being hammered on necessarily, we got production out because people were thinking ahead and saying, "Hey, if I do this, I'll stop a problem down here. I can do it smarter and better." That coupled with the learning, getting way up the learning curve, about how you solve problems quicker, you know, stopped the down time.

Q: Were you responsible for the material that was used for the capsules, the, the ordering of the material?

A: No. That was done through the fabrication shops. All that came through the shop. We just, they were delivered from the shops to us. We were responsible for making sure that we had the proper specification records with the capsules when they were used and we documented which capsules were used and kept a traceability record.

Q: Did anyone ever go out to the manufacturer's plant to do any inspection of the material?

A: I couldn't tell you. I'm sure they did, but I couldn't tell you that. You'll have to talk to some Procurement Quality people on that and find out. I'm sure they did, but I couldn't say, "Yeah, this person went at this time." I couldn't guarantee that.

Q: John, let me ask you a question. Was, was the WESF job to, to encapsulate whatever B Plant

sent over to you, or was, was the, did you have the freedom to take a look at the batch of stuff that they sent you and say, "Hey, this stuff isn't fit to be encapsulated. Rework it and give us some good stuff?"

- A: We had feed specifications that had to be met. And they couldn't ship it until it had been sampled and shown to meet those specifications. There were operating specs on the product out of B Plant which then became a feed to WESF. And that had to be done.
- Q: What kind of...
- A: If they didn't meet their criteria, they didn't get shipped.
- Q: What kind of specs were those? Do you remember?
- A: Yeah. It had you know, cesium concentration, trace metal impurities, certain impurities I don't recall. Impurities like aluminum and other metallics. Certain limit on those impurities and, you know, that was based on, you know, the basic analysis that PNL did when they designed the capsule and the process.
- Q: Alright.
- A: It had the feed you ought to be running, iron, aluminum, sodium, those kinds of things.
- Q: That, that data is in the records...
- A: Oh, yeah.
- Q: ...along with the batch data that includes how close that meets that...?
- A: Sure. Um-hm, um-hm. Absolutely.
- Q: Okay.
- Q: That's really important because apparently the corrosion capabilities, cesium chloride on stainless steel is, is strongly dependent on the impurities.
- A: Yeah. We were under that knowledge. It is impurity dependent. But there are, the question is, does your spec call out all the impurities that are important to you?
- Q: Yes.
- A: We got a spec, and it had to meet that spec to be, to be processed. Now, did you specify the right things?
- Q: We haven't seen any of that data. We're going to talk with Gelman tomorrow and, and you know, begin the process of looking at the data batches. Whether we do that tomorrow morning or make arrangements to do it now. So we're talking...
- A: Okay. Do you have copies of the spec that tell you what the feed spec was?
- Q: No, we have not gotten any of that information yet.
- A: Process Engineering out there ought to be able to dig that up for you.
- Q: We haven't asked for it. We haven't tried to get it.

- A: Okay.
- Q: John, do you know of any leakers that have developed, that have developed you know, after they passed all the tests in the pool?
- A: Never. Never had one.
- Q: Do they do any, do they do any examinations of them in the pool to see if there might be a leak of the outer cylinder only? Or would you, or would they not know it unless it leaked from the...?
- A: You're not going to find it until, now we did periodically bring ones out of the pool, sent them to Oak Ridge and had them non-destructive evaluated. But there is not a routine test in WESF that says, have we got water in the jacket you know, a annular space between the two.
- Q: We have a bubble test. (Laughter)
- A: No, what you're going to see if you fail both capsules, you're going to see a rise like the people down in Georgia did. You're going to see a rise in the pool activity.
- Q: See there's, they had more of a mechanism to get a rise in the pool activity than you have though. In the, they can take the cap, the capsule keeps going through thermocycling and you can you know, pull water in with the cesium and squirt it back out as it heats up and, going out. You can do real good things with aerosols and back into the water and everything with their system.
- A: Plus you got both capsules failed, it's not going to take a lot of activity, take a lot of imagination to get some cesium activity in the water. Okay. You've got enough thermal gradient there I think, that you're going to see some migration anyway. When you got a lot of water pressure, you've got a little pinhole and you're under twelve feet of water, you're going to force some water into that annular space, or void space. It's going to go back. Thermal gradients are going to cause it to come up. But I was just getting at that there was no routine.
- A: Is, is anybody here from Oak Ridge that worked on the capsule analysis when they were sending it down there? You guys haven't talked to any of those folks? We sent a lot of capsules down there and, and they would send the, you know, weld results back. They did a lot of integrity checks on the weld. I don't recall us having any problems with any of them.
- Q: I've read the reports, but would, none of us were involved with that.
- A: In addition, we took them down to Battelle and left them you know, insulated and wrapped at high temperatures. Both cesium and strontium relatively high temperatures. Brought them back and cut them open and evaluated the weld segments.
- Q: Right.
- A: And never saw a problem with the inner or the outer, so. I don't know, I don't know what the situation is down in Georgia but it's some kind of a maze, but maybe it's the thermocycling that's generating some of the problems. I don't know but, those big capsules are basically selected at random, the cesium capsules. I think they have the...
- Q: Do you know how they were selected?
- A: ...same kind of, of population here.

- Q: Do you know how they, the criteria, what the criteria were for the selection?
- A: There was some criteria. They were selected somewhat at random although they wanted higher activity capsules if possible in order to get, to get their dose rate where they wanted them. They may have seen some selectivity on, on radioactive or cesium analysis, calorimeter that shows you so many curies of cesium. But beyond that, I think they're pretty much selected at random. Most of that shipping was done after I left, so.
- Q: I understand that Oak Ridge got the very highest activity.
- A: Yeah, they got, they got two, there were kind of two criteria for shipping to Oak Ridge. One, we wanted to get the oldest capsule we could that had been manufactured the longest, just kind of give it some age. You know, to get some history on how long since it was manufactured. And then they looked, they wanted real high activity material, high purity material because they used the cesium for other purposes afterwards, medical applications and so on. They re-encapsulated the cesium into other, smaller sources. And so that's why they wanted the high activity material. To meet their needs.
- Q: Were capsules ever topped off, in that you filled them, somebody looked at them and said, "Hey, that guy's not filled far enough..."
- A: Absolutely.
- Q: ...and brought back to be filled again?
- A: Yeah, the fact if they weren't two thirds full, they were put back in the cooling jacketed storage vessel and filled on the next batch. If we had a partial capsule, sometimes you would get a batch that would fill all seven capsules and then a little extra.
- Q: And what if...
- A: Sometimes you would get a partial batch, or a shorter batch that would fill, let's say five full and maybe two half-full.
- Q: So when you filled them completely full, what would you do then? Just run them through welded up and...?
- A: Yeah, put the sintered metal disk in, and purge them, weld them, leak check.
- Q: Okay. Well, when you topped off, say you had a capsule that was half-full, okay, when you topped it off, was the half-full portion cold when you added the new cesium chloride on top of it?
- A: It was whatever self-heating temperature it was going to get to.
- Q: It was just at the self-heating temperature?
- A: Yeah. It wasn't extra heated, but it was whatever it would self-heat to in air and standing in the capsule magazine. It was kept in the cooling jacket, in the jacketed storage tank until the capsules were loaded into the cylinder, into the magazine. And then it was left in that rack until it was poured.
- Q: So it would definitely be in it's lowest volume crystalline state.
- A: Oh, yeah.

Q: You can almost guarantee that.

A: Oh, yeah. Yeah, it wasn't molten.

Q: Or even in the higher volume crystalline state.

A: Had it been molten it would have run back into the tilt pour.

Q: (Jugan) I think the next, the lowest high volume is like six, 650 or something like that?

Q: (Wright) There's a phase change at about 465.

A: There's phase change at 470 I think.

Q: Which you have to hold it there for what period, I've never been able to read and you get a volume change of 16 to 18 percent...

A: Right.

Q: ...they batter 16, 17, 18 around...

A: I don't recall it's ever been able to self-heat those even partial capsules to anywhere near that kind of temperature you know, when it was sitting in air. It's just not going to do it.

Q: So how much space was really left then over the top of, of the topped off liquid? How much space existed between that and the welded...?

A: We had to have room for a sintered metal disk.

Q: And that was it?

A: Pretty much. That sintered metal disk was just a little bit below the top lip of the capsule and then the lid would fit into the groove, the machined groove, for it to sit in. So you're maybe an eighth of an inch to three sixteenths of an inch from the very top of the capsule, the top of the sintered metal disk would be that close.

Q: So doesn't it strike you as being conceivable that somebody could have over, basically over-filled the cylinder and if it, the capsule was then lifted out of the water in the RSI facility, that the inner capsule could have ruptured just because of the expansion of the interior material?

A: What do you mean by over-filled? You couldn't over-fill it. You could fill it to it's, to it's maximum allowable...

Q: Yes. But the material that you're, that you're adding to the capsule is already in this phase changed state. And it has a smaller density, if you wish.

A: Yeah.

Q: Whereas the material that's in the bottom, solid. It has a higher density, it has a higher density.

Q: (Jugan) I guess what Ron might be asking, was there a limit to how many grams of cesium you could load in the capsule?

A: Yeah.



- Q: There was?
- A: Yeah, there is. There's a max, an upper maximum to the number of curies of cesium that could be in a capsule. Capsules backed like seventy thousand curies as the maximum you could load into a capsule. In terms of activity. But you're talking activity, or are you talking material, you know, see? Depends on the purity of cesium you're dealing with. You could fill it up with stuff that was low purity cesium and have twenty thousand curies.
- Q: (Jugan) Okay, but who, I think we're talking about the maximum quantities...
- Q: (Hultgren) Quantities of material.
- Q: (Jugan) ...of material not curies. Either grams or cubic, cubic centimeters, cc's, or...
- Q: (Wright) Some places they described it as like seventy-nine percent theoretical density. If you go beyond that and if you heat it up through the body center, the face center phase change and then melt it, you can over-stress and potentially rupture the capsule. But seventy-nine percent was the number that I remember.
- A: All I know is that the process was designed such that you had a certain concentration of cesium that you worked with and when you melted that, precipitated it, and melted it, you ended up with the right amount.
- Q: Why should...
- A: It was designed that way.
- Q: Why shouldn't it fill seven capsules though?
- A: Pardon me?
- Q: I say, why shouldn't it fill seven capsules every time and not five sometimes and two partial?
- A: Well, it just depends on the batch size that you got over from B Plant. It was not that precise on transferring a batch. You got over there, you've got a three thousand gallon tank and you're transferring fifty liters of it. Try to do that on a bubble tube system, on getting the right amount. It's pretty tough to do. That's about as accurate as you can get. It would specify a batch would be so many liters. And send that material over as close as you could regulate it.
- Q: Okay. I understand it.
- A: It's just you know, the error band in that kind of measurement. Really kind of inconsequential.
- Q: Um-hm.
- Q: But you didn't, the cylinders I guess weren't...
- A: I never heard of any kind of technical question or problem about re-filling a capsule that was half, partially full. That was never brought up, any problem associated with that.
- Q: Okay.
- A: If they were you know, two-thirds full, we went ahead and welded them up. If they were less than that, it's kind of a judgement call. If they were less than that you went ahead and put

them in the storage and used them in the next batch.

Q: John, this might, this might not be a real fair question, but I'm going to ask it anyway. You know, we know, based on what we've talked with you and others, that the certainly production rate was much lower in the first years and they were trying to get the plant to run...

Q: Um-hm.

Q: ...and my question's probably not fair because you weren't, you weren't there at that time, but I just want to ask you just for your impression on this, how do you feel about the quality of the capsules? Albeit not nearly so many of them in the early years as compared to the quality of the capsules in the later years?

A: You talking about the early years, meaning the time I started there?

Q: No, before you were there. And that's the reason it's unfair.

A: I have no idea. I couldn't answer it, because I was not even there, a party to it or whatever.

Q: I just wondered if you had any impression, any impressions on it at all?

A: No, I have nothing to base it on.

Q: Okay.

A: I have nothing to base it on.

Q: How about the quality of the early...

A: I'm going to tell you one thing that I know the time I was there. From the early time I got there until I left, ultrasonic capabilities down in the tail-end on outer capsules improved dramatically. They got better equipment, they got better engineering on it, and I think that in the last two or three years when the bulk of the capsules were produced that the ultrasonic capabilities down there were at a higher degree of technical quality.

Q: So you had more confidence in the results...

A: Yeah. Absolutely. You can ask some of the operators that operated the early C scanner, what's called the C scanner, and what we got finally was an X-Y scanner that looked at two dimensions at that capsule at the same time. So you got a scan of the top and the side at the same time, where as the old C scanner you used to just look down perpendicular to the weld surface and one dimension. That's all you saw. So in terms of outer capsule scanning, you know I, I'd stand behind it, that trend of improving technical capability towards the end of the line. But actually how, you know, what technique was used in the welding or quality control at that time, or adherence to procedures, I wouldn't be able to speak to.

Q: John, did, am I remembering properly that there was something in the manufacturing spec that required at, you to load the capsules into the pool, in the water, sometime you know, within an hour after completing the last leak check? (Pause)

A: No. Don't think so. Now, certainly there was restrictions on the time that it could be left out of a cooling environment, in other words you couldn't just leave them set out in the cell overnight. When you're done processing it, you needed to put it in the cool storage tank, for an inner or into a water bath, let's say you put it in the electropolisher or a bubble test tank, or you had to put it in the pool cell for an outer or the pool, the outer capsules also had a shielded storage tank that would hold like nine capsules. And it had a water jacket on the

outside of it that kept it cool.

Q: Did the procedures require I think, cutting out and redoing the capsule if it was left overnight or...?

A: Yeah, if you exceeded a procedural limit for being out of cooling, you had to cut them up.

Q: Can you give me an idea why that was, why that procedure was instituted?

A: Yeah. I believe it was for a concern just about corrosion. If you kept them out of the water bath for too long, you were concerned about an accelerated corrosion rate.

Q: But yet they were shipped dry from Hanford here...

A: It was a pretty conservative control. What we tried to do was minimize any impact we had on them while we had them in the process. It was highly conservative. There wasn't any technical data to back it up that I knew of. You know, we shipped the capsules dry back and forth several times to Oak Ridge and did a destructive evaluation and didn't find any significant corrosion.

Q: I thought I remembered that in the spec, and I couldn't think of a reason.

A: Yeah, that's why.

Q: Did you know if the purchase orders are still around for the material that was bought?

A: Well, I wouldn't know, but I would suspect it might be.

Q: Normally they destroy those things a long time before this.

A: I don't know. I really have no idea. I didn't get involved in that at all. But I know, you know, when we first started shipping capsules out, both the operations and the technical people and the plant management people expressed a concern that, "Hey, when these capsules leave here, you ought, you ought to set up a criteria that they're handled in similar methods that we handle them here." We had pretty tight control on how we handled those capsules.

Q: Who did you express that concern to?

A: That was expressed to, well at that time, Rockwell program office, who was handling the arrangements for it, for the capsule transfers. And I don't have anything to back it up other than my memory, being expressed to RL, that you ought to really make sure that we got control on them before they go out. That we ought to put some controls on how they're processed to handle. That was a concern of people in the plant. But hey, we really follow these rules very tightly and rigidly. Now we're going to give these to people, what's going to happen to them then?

Q: But we've really seen that breakdown in communication and we're trying to weave our way through that and, and find out where the ball got dropped.

A: Um-hm. Have you been able to unearth any written documentation to that effect?

Q: Curtis Stroup says that there are memos he's written and we've...

SIDE B

- A: ...that we ought to have a contingency plan ready and part of the committee. I guess you call part of it being selfish, but we wanted WESF kept available in case a capsule did begin leaking somewhere. We wanted the capability of bringing that back in and cutting it open and finding out what happened to it.
- Q: Do you suppose that that's documented somewhere?
- A: I would think that it may still be in the same batch that Curtis could give you. On handling procedures?
- Q: Do you have a, maybe you're not in the chain anymore, but do you have contingency plan if you get them all back here?
- A: No, I wouldn't know. I'm not on the waste management side anymore. I, I would hazard to guess. There wasn't one prior to this. Just about guarantee it. There was not one prior to this event. They're probably developing one, but I'm sure there wasn't one in existence prior to this.
- Q: I was told today they're thinking about it.
- Q: Um-hm.
- A: Yeah. It was pretty well, wasn't really followed up on. I think part of it was they didn't expect to have that kind of a problem. They didn't see it as much of an insurance policy.
- Q: I guess the final question I can think of that we ask a lot is, do you have any idea of why there's a leak or leakers, and twenty-twenty hindsight of what we should have done different?
- A: You know, I don't, I don't have really enough technical data to go on. I would be guessing and I'm not sure that's worth a guess. I really don't. Really I wouldn't want to hazard a guess at all without, without seeing some technical data.
- Q: We don't have much either yet.
- A: I really don't. I was still trying to come up with a mechanism for a double failure in that kind of an environment. Just, I was just flabbergasted when I heard that it had happened. I don't have any magical answers for you. The scenario, the leak scenarios we always based our planning on, you know, for our in-pool cell is that, is that for some reason, really the worst the case scenario is that somebody operating a crane dropped a cover block on them and crushed several of them. You know, that was the worst case scenario. And what we expected maybe over time, the worst that you might see on an individual basis is inner capsule corrosion followed by outer capsule corrosion over a long, long, long period of time. And we had done some work on what's called a leaky capsule locator. A lot of development work. I don't think it was ever brought completely to fruition, but a lot of design and engineering work went in to coming up with a way to, if you had a pool cell full of capsules and you've got a high background, how do you find the one that's leaking. You know, how do you isolate it.
- Q: Another question that I just thought of. Did you have any interaction with RSI?
- A: I had none whatsoever. I wouldn't, I think the only interaction I knew is that they were going to lease the capsules. I said I think about ninety percent of that shipping was done after I left the facility.
- Q: Their application was during the time that you were, you were the manager here

- A: Um-hm.
- Q: So, maybe they had done some pre-homework that I was wondering about.
- A: Yeah, that interface was handled by the Richland office and our, Rockwell at the time, program office.
- Q: Who was the program manager at that time? Was that Reep or was that before Reep?
- A: Ken Gasper.
- Q: How long was he program manager down there?
- A: Well, I don't recall. At least a couple of years. I don't recall who was immediately ahead of him. Who the program manager was, just ahead of Ken Gasper, I don't recall.

END OF TAPE

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**Gordon Funnell**  
**Westinghouse Hanford Company**

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## GORDON FUNNELL

It's the 20th of July. It's 9:30 in the morning and we have Mr. Gordon Funnell from Westinghouse. And Gordon's the expert on the welding development of the cesium capsule and also the weld inspection techniques for the capsule. The entire committee is here for this discussion.

Q: I think I'd like to open it and give you the freedom to discuss the evolution of the welding process and also the welding inspection techniques that were used and just let it go and we'll pop in with questions as you go.

A: Okay, I'll briefly explain my participation in it to start with. Of course I'm a welder, who worked in the shops out in the west area, and then when they initially talked about the encapsulation program, then the weld engineer came and discussed whether I would consider going over and working under him as a technician. Which I did, and I think that began in 1970. And at that time all the background work had been essentially completed. The material had been chosen for the capsules, and they were just looking at developing the welding parameters and somewhat at the joint design itself. And the joint design was selected on the basis of the best UT capability. That was developed by Battelle, and if I remember right, Crowe was the man that initially did that particular part of it. Then we took it into our lab and developed the parameters for the particular product that the capsule was going to be used for. The welding engineer developed a design for the fixtures and worked in conjunction with Vitro at that particular time. And as it evolved after we had developed the parameters and everything else, we developed burst-test capsules, and they were subjected to burst tests for a certain penetration. And we tried to develop a certain minimum penetration that was required to withstand the burst pressure of the tube. And from that, we set a seventy-five percent minimum penetration that was required for the acceptance of those capsules.

Q: And that was for the thin-walled capsules that were...?

A: Yes. That was the original, that was the, the original tube specifications that were required. And of course that changed down the line, and I think there were four or five changes, but many of them were just dimensional changes because we had a problem originally of getting true oval tubes. True concentric tubes that we could use and every time we took them into the machine shop well, we could not, after they'd chucked them up in the lathe, we couldn't get the cap on. So, we had to modify tolerances in order to be able to. And, and so doing that, then we had to go back to get different material in order to help out.

Q: Let's see now, that came machined and then they went oval on it...

A: Yes, yeah. And we found that was because of the holding method that we were using in this originally designed fixture.

The original transcript was revised during a review to read as follows:

A: Yes, yeah. And we found that was because of the method used to hold the capsule during machining.

Q: Okay. You were stressing the tube...

A: Yes, yes.

Q: ...beyond the yield and went you took it out it stayed oval, or went oval...

A: Yeah, that's correct.

Q: Okay.

A: And, and so, that, as time went on, when we introduced it into the facility, we had all our parameters and everything. Then we brought in another criteria that we were unable to address and that was the effect of this cesium salt and the strontium salt on the materials themselves. We were able to assimilate that with any product only just salts beforehand, which we would heat up and try to assimilate that condition. And of course with the fixture inside the cell, these things were introduced. And we had another major problem to start with--the type of shielding gas that we used. We went through a shielding gas selection process. We found we could realize the depth of penetration with the type of autogenous weld that we desired through the use of hydrogen and argon mixtures. Then we ran a series of tests. The welding engineer selected a ninety-two percent argon, eight percent hydrogen as a shielding gas. Many capsules were welded with this mixture, but later on we found that there was a pinhole problem that had developed and if you have any knowledge of hydrogen, hydrogen has always been a kind of a no-no in the welding game. But it had been used over in Germany, and the welding engineer came across the information from some textbook that he had. So we tried it and it worked quite well, and we did not have any trouble during the weld lab tests. But then when we went into the cell sometimes. This problem developed. So I went through a re-test situation. I might add, during this, this time frame we're talking about, there were five welding engineers on this project, and I was left as liaison between one and the other as things evolved so...

Q: Not at one time, but they just kept changing it.

A: Yeah. See, one would leave and another would come on board and he would be left with that responsibility and I would try to carry through, under different direction than generally than less happens. But anyway, that's what happened, so I made the welding engineer that had come aboard, aware of this gas problem and I explained to him how I felt that it could be resolved.

Q: Could, can you explain that a little bit more, the problem with pinhole leaks in the...?

A: Well, I'm going to get into that, yes...

Q: Oh, I'm sorry.

A: And we found the choice of the mixture of hydrogen was in excess and that if it was reduced down to ninety-five percent argon and five percent hydrogen we didn't have any further problem. And that's the type of gas that's been used, till the completion of the program.

Q: These pinhole leaks were detected during the helium leak check?

A: No, it was visually. You could visually determine those.

Q: Okay.

A: But however, the initial capsules were welded with that gas...

Q: Um-hm.

A: ...and I suppose we could go back in the records and determine how many of those were welded under that condition.

Q: Do you happen to remember about the time frame when the, when the argon-hydrogen



mixture changed, change in specification was instituted in the whole thing, Gordon?

A: I, I could not give you a time off-hand, but I could go back because I have all my records from the day this program started.

Q: Okay.

A: So any, any further information that we go, I think I could support with everything, and I could give you that particular time.

Q: Not as a weld expert for sure, but I keep thinking I remember something about hydrogen embrittlement in materials. Is that, was that also considered, or is that a problem in this case?

A: That was certainly considered at that particular time. And, since that time, there have been three or four evaluations of that whole program.

Q: Okay.

A: In fact, one was ran in 1980. That was a waste encapsulation evaluation program. And they went to the whole sequence of welding capsules up under those conditions and subjecting them to stresses and everything else. I have the final report of that.

Q: Okay.

A: There are others, but I say I have my copies. I have more available.

Q: And I think if he showed no problem with that, the hydrogen...

A: No, absolutely not. In fact the recommendations were finding that there was no problem that the integrity of the capsules that were being produced there in the facility; they exceeded any requirement that was there. The big question was UT examination. You have to understand one of the problems that developed, and I'm going to be very free when I say it because when this first was brought into the facility, the recommendation was made that a welder or welders be chosen to operate this equipment. And the reason behind it was that they would be cognizant of the problems that could develop during the welding of a particular capsule. They would be watching how the material in the melt condition would flow, things like that, which the ordinary person without background in that particular field would not be able to detect. And it was at that time, it was put before a labor relations board and because of past practice out here, at the old zipper program in the 300 area, it was awarded to operators. So, I was given the responsibility of training the personnel to operate the equipment in the facility. And a new facility, people that had never done welding before nor anything associated with it, were given the responsibility of welding those capsules. So it was a real bothersome problem to the welding engineer and the welding specialist and myself because we all worked together on that originally. And as the capsule welding program evolved, then many of the operators that I would train, then they would in turn train somebody else.

Q: So that these people were, not you, but a group of operators who were not welders and you had to teach them...?

A: That's correct, that's correct. I trained the original ones, but then management took it upon themselves to train their own people. And so several times during the course of welding the original capsules, any time troubles would occur, then we had specified that they would call us. Any time there was a fault or, or problem, or a capsule, or a weld that not meet their requirements, then the welding people would be called in. And that

was the weld engineer or myself. And...

Q: But you didn't run the production welds?

A: No. We were unable to do that.

Q: Okay.

Q: What was, what was the reason given for that decision? That it was precedent in...?

A: Yes. That was the precedent, the usual precedent.

Q: Okay.

Q: Was there, was there evidence brought to the whole process for example that said that, "Aw heck, this UT inspection is so good, anybody can do this?"

A: No. That was not part of the argument, it was strictly precedent working rules.

A: And might I address that UT, just for, as a discussion, the weld engineer was quite well, quite familiar with the UT process? I had never had any work with that whatsoever, had never been subjected to that. The original work was done by this man, Crowe, for Battelle. And they set up the whole program. They even had, I believe, at least conceptually designed the unit that they would use in that cell. Then I think project management or, or I don't know whether that's correct, but anyway one of the groups assigning responsibilities to develop these systems elected to do their own. And therefore, Battelle did not have any more involvement in it. So, when the equipment was brought out here, we had to work and try to complete development of the system and of course working from the basic knowledge that Battelle had developed the design for the equipment and everything. We tried to develop the system so we could get good scans of that capsule, and we had Nortec involved and everything else trying to help develop this. So we, being welding people, our first consideration is that visual is the best acceptance criteria there is on anything. And if it does pass visual then you want to use something else to further investigate quality. That's the position that we were taking that, UT would be the second acceptance criteria. Well, as time went on when, when production became involved in it, then they would say, well, as long as it passes UT and passes leak tests, we'll let it through, okay. And in many instances that's what you would have, that one of those welds would not look, would not appear visually acceptable, but yet they would subject it to that other criteria and buy those capsules off.

Q: And it would pass the other criteria, even though it looked a little odd?

A: Not I. Others were responsible for final acceptance.

Q: Were those, were those noted anywhere in the production records, the visual thoughts on...?

A: I don't know. I really couldn't tell you that. I only know of the ones that, and I could give you examples of capsules that had those problems and we would be called in to inspect them and a lot of times we would just have them cut the cap off. Our position was that if we didn't feel comfortable with it, it should be recapsuled.

Q: That's interesting. I had asked a question before and the gentleman wasn't able to really answer it. What's your, what's your thoughts on UT examine, er, examinations being a good indicator of weld quality?

A: Well, we were never satisfied with the degree of error that we found with the UT. And I

guess I was the person in the background here all the time, saying that I can't depend on ultrasonics. And that...

Q: Can, can you tell us why?

A: Pardon?

Q: Can you tell us why you...?

A: Well, from, from our original development we could never really correlate, we could correlate but with some degree of, of, let me take and give an example, maybe that would clarify that a little more. If we were to read out a capsule and try to determine the penetration, that particular weld had on the capsule, sometimes it was very hazy whether you're getting accurate readings or not, so you'd have to go back and scan that two or three times in order to try to determine whether that was an accurate scan of that capsule. And if you did get a good close scan, then you'd have to be able to determine what percentage of error was in that. And this, we tried to accomplish through cutting up the particular cap and correlating the scans with the end result.

Q: So, they did cut up some capsules...

A: Oh, yes.

Q: ...tried to correlate them back with the...

A: Yes.

Q: ...UT test?

A: Yes, a gross number of caps.

Q: Is there any paper, paper on that or a study on it?

A: I don't think anything like that would be available to date. Not to my knowledge.

Q: Then you weren't real thrilled with the correlation or at least...

A: No.

Q: ...the way that a person would say this was a good weld after it was cut up versus a good weld when they were looking at the UT?

A: Yes, I was, to a degree, yes. We were the ones that made the final decision.

Q: Um-hm.

A: That's why we said that visual should be the primary acceptance criteria.

Q: Gordy, as I read through some of the background material that we have, one of the things that seemed odd to me about this whole thing was that there were questions that were raised in some of these documents about that correlation and the answers would seem to be like, "We never found less than a hundred percent penetration, even when the scan said it was seventy-five or fifty-five or whatever."

A: That's correct.

- Q: Yeah, and that seemed odd to me that the scan was telling you fifty-five but actual exam was a hundred. What was the scan really telling you?
- A: That was my feeling all along, and you can see by I never was very satisfied with the UT, but yet you'd go to the UT people, oh yes, they can scan this, and Battelle, for instance, said that there was no problem in doing it. But then when we'd come and start dealing with the particular materials that were selected, which had to be selected because of the, the temperatures and everything that these caps were, then that's the kind of thing that you would see, they would, and I guess, well today for us to look back, there's many answers today, and I'm not knowledgeable enough of ultrasonics in order to explain that to you.
- Q: We got some pictures this morning of what the UT scans did, and it looks like, you know it looks like there is a significant part of some welds that are, the circumference is different than the other ones. Is that an artifact of the UT picture taking or do you think that it's accurate that the welds weren't the same all the way around?
- A: Well, there's so many things involved. It's, it's the selection of the transducer that you use and then being able to duplicate that transducer. And that's one of the initial problems we would have. We'd get one brand of transducer matched with our particular instrument and we'd get very good results from it. So what you'd have to do is take that transducer down and have them try to duplicate that. And they're a well engineered little item, but they are very hard to reproduce that, and I think there was a percentage they gave us of how well they could reproduce these to. And you might get that identical transducer and you would get a totally different scan. And noise is a factor. A noise in the material itself. My question has always been is what happens when you bring that material up to temperature with the weld process and how is it affected, and we've never been able to really get any answers to that type of thing.
- Q: So, it must have met your mind with a certain degree of cynicism, that they changed the specification from fifty-five percent penetration, or from seventy-five percent penetration to fifty-five percent penetration?
- A: I was probably the only one against it. (Laughter)
- Q: Gordy, in the evolution of the, the welding process, there was a change somewhere along the way that we, that was talked about, at WESF yesterday, where the, where the end of the capsule was machined. Could you go through that? What the, what the actual equipment and the process change was?
- A: Well like, like I explained originally, the first fixture that was developed, was developed by Vitro. And because of, because of their contractual responsibility I guess, towards DOE facilities and everything else, we were unable to do much modification to that original unit until a certain time. And then I think it was about 1975, that we were given authorization to look to a different type of a fixture. And we went off-site, had one fabricated and that did not meet the requirements. So, I was given the responsibility to develop one myself. And that had a cam that rode on. See the problem is that the way that the capsule was being held before, it was very hard to control the contact tip to work distance. Now, I explained that to you, that's the position of the tip of the electrode in reference to the weld zone itself. And what the, what they originally did they made a collet that collapsed around the tube itself, and the capsule would wobble and it would change that distance. Well, in changing that distance, that's had a great affect on the weld heat being produced in the metal, because you have to keep those things constant. I developed a fixture that would turn the capsule. But the old tube, the OD of the tubes were not very accurate, so what we chose to do on the original ones, we had a cutback, a machine cutback a quarter of an inch from the outside. With this, we felt that the cam, in order to provide no possibility of that distance changing, that we would extend that cutback to three quarters of an inch from the end so that this cam would ride on this

machined surface. And that was the purpose of that extra cutback. However, prior to that, you'll, you'll notice there was a material specification change where they changed the OD of that material and I think the original material was .109 wall I think to .250 OD. Something in that area, but I know the last material specification called for .134 OD I think it was. The original tube didn't give enough material there for to clean machine the full circumference of the tube end. And we felt, in those unmachined areas on the end where we were trying to machine it to accept that cap and make a weld in that area, there might be impurities that might effect the weld. So in order to eliminate that problem, they increased the size of the tube so that we could have a fully clean machined area.

Q: So that was the, that was the reason that you went from the thin wall to the thicker wall tube.

A: That's correct. To have more material for the machine operation to clean that area.

Q: Okay. That's one thing we've been hunting for all week, is where that came from. Well, I'm glad we finally found the answer to that. (Laughter)

Q: And when they changed the thickness of the material they also changed the weld penetration required.

A: No. No, the machined area is the same.

Q: The machined thickness through which the weld...

A: Yes.

Q: ...is made is exactly the same for the thick or the thin cylinder?

A: That's right.

Q: So, the, okay, the weld was done over a machined area?

A: That's correct.

Q: Okay, I didn't realize that.

Q: I didn't either.

Q: I was thinking it was only a little portion in the top of the cap that was machined.

A: No, it's a three quarters of a...(Everybody talking at once)

A: If I had a piece of paper I could show you quickly. Could I, I mark on that?

Q: Sure.

(Pause)

A: See that's what the tube wall would look like and that cap would sit on here like this. And that weld nugget would come in here like this.

Q: Weld nugget? What's a weld nugget?

A: That's the melted area.

- Q: Okay. Okay, so it was machined.
- A: This here is what I'm talking about. This is the wall thickness of the pipe as received. Okay, and that was changed to .134.
- Q: Okay, okay.
- A: And this is the area where it was machined. Before, it was machined only a quarter of an inch back from this end.
- Q: Okay.
- A: In order to prepare that properly. This here was extended back to three quarters of an inch.
- Q: Okay. And the thick wall was done so that your minimum distance here was the same OD as without the machining?
- A: That's right. This never changed, but in the course of going around the ovality of this tube, we found that there wasn't true. It wasn't a true circle. And when we had machined on the old tubing, you would have areas here that wouldn't clean up. And clean up, I mean the tool would not protect that area because it was not a true circle. So, then in order to provide clean area, to remove any opportunity of, of something to cause a reject in the weld, we wanted more material there so you could clean that off and have clean surface.
- Q: So what, what was the drive to reduce the penetration thickness from seventy-five percent to fifty-five percent? What was the reason for that?
- A: They welded a whole bunch of capsules and they had them sitting over there and, and I could give you a number if I had my records here, but, there was a number of the capsules that could not meet this seventy-five percent acceptance criteria. So that's what they said. Then they wanted to go through this test and determine, well why can't we reduce that down because we had proven before that sixty percent of the, of this tube wall penetration, of course now tube penetration we're looking this area. This machined area. Sixty percent of that would withstand almost to the bursting pressure of the tube. And those tubes when you burst them, would burst way out in this area. Because there's not no restraint there. See when the cap is on, this whole area is restrained. We found that above sixty percent, the tube would burst, and if was under sixty that it would generally blow the cap off. If were it over sixty it would be up in that area there. So, with that, as a basis then, we had put down in our report that if it were sixty percent we felt it would, would be, burst itself out into the middle of the tube itself.
- Q: And as a result of that decision there were a fairly significant number of capsules that had been rejected that are now acceptable?
- A: That's correct. That's right. So, so they made the choice then that, and my, see, our concerns first were we had established that. We had felt very comfortable with that. But with UT and this percentage of reliability on the ultrasonics, we felt that seventy-five percent was the very minimum that you could go with it. So that was, that was management decision, that's the way that they go for it.
- Q: Would you tend to pass more, more welds on a visual inspection or an a UT inspection? If you were just doing one inspection, which ones would pass more welds as being good?
- A: Well, for myself, I would say the visual inspection would be most acceptable to me. But I'm saying that I would rely on the UT...

- Q: No, I, I think you misunderstood the question.
- A: Yeah. Take a, take a bunch of welded up capsules and you were just visually inspecting them and you didn't have a backup, would there be a higher reject rate more likely with just the visual inspection being, only visual, than if you visually inspected them and then you went ahead and inspected them with the UT? That's, that's the question as I understand it.
- Q: All I'm saying if you just, if you just...
- A: Or different, one or the other.
- Q: ...if you just did the UT or if you just did the visual...
- Q: Which would have the highest rejection?
- A: Well, see what your dealing with there is reliability on your UT system. You have to be assured with the ultrasonic system that it's giving you the end result that you want. That it is telling you what's actually there.
- Q: Um-hm.
- A: And from my position, because of those errors, I would rely more on visual. Because I had cut these capsules up and I know exactly what kind of characteristics to look for in that finished product. And that qualifies what the statement I made.
- Q: Okay, so well, I'm still not exactly sure I understand. Would you say that a person would pass more bad welds by only using UT versus by only using visual? Somebody that knew what they were doing on a visual and a UT?
- A: I, I would say probably you would with UT.
- Q: Okay. That's, that's what I was trying to understand.
- A: And you see my reasoning is because you can't--visual you gotta have a certain degree of reliability on what you're looking at. And the same thing with ultrasonics.
- Q: Yeah. Okay, I just wanted to make sure I didn't understand the, that maybe one was better for production versus better for making sure the weld was proper.
- Q: I was surprised to learn just recently that the standard that was used as a means of comparison for the fifty-five percent penetration was the old standard from the seventy-five percent penetration. They never changed the standard. How difficult a job do you think it is for a normal inspector to look at a seventy-five standard and then try to compare some unknown and hope that the weld has gotten a fifty-five percent penetration?
- A: I think it's pretty difficult. Of course, I'll have to say again, now the original transducer that we had, there was one transducer that we could make these readouts and it seemed like it just worked real well. But there's so many things in ultrasonics, that you have to be assured that that is giving, and that has always been my question, is whether that transducer you can really rely upon. I guess what I would have to do is take that transducer and take a, take an example of that cap under that condition and be able to actually try it out in that condition.
- Q: So, before you inspect an unknown, you would inspect a known?

- A: That's right.
- Q: Inspect the unknown and then inspect another, inspect the known again? Now you would have two standards against which you could immediately compare the unknown and the variation of the transducer head would then be eliminated from that.
- A: And that's exactly the way that they were set up.
- Q: They were doing that?
- A: Yes, because when we put the system in there, we made a weld with seventy-five percent penetration on that capsule. And when you went in, you read your calibration standard, you read the seventy-five percent standard, which is, I think this is the one here and then you went in here and read this actual and that's what they're doing right here.
- Q: I see. Okay, I had the impression that what was happening was that there was a fixed picture against which they were...
- A: No, no. The way, you see, this is, this is a scan of the new system that's in there and the way that they have it set-up. They have the new calibration standards set-up there and they have the seventy-five percent standard here, and then this is the actual capsule itself.
- Q: The unknown, right?
- A: And then this runs back across here.
- Q: Okay.
- Q: Oh, and you can see all three at the same time?
- A: Yes. That's all in the same plane. You have established the same water path and everything on that unit.
- Q: This weld is done with a water coupling and a focus...?
- A: Yes. It's right in the tank.
- Q: ...and a focus transducer?
- Q: A question. Can you comment some on the helium leak checking, versus visual and your experience with that?
- A: Helium, helium leak check is a very good system. And of course that's what they relied upon for the inner capsule. That was all we subjected to that. And the inner capsule is, see helium, if you wanted, you can pull helium right through that outer capsule, if you want to put enough vacuum on it because it's that type of an element. But, here with the mass spectrometer they had out here, that if there were just a little crack or anything else you could pull it out of there. So, that's one thing that we felt very comfortable with. And we proved it out, that once you've subjected to that helium leak test, providing that unit was calibrated properly and everything that you could be assured that that capsule would not be leaking.
- Q: But, but you didn't know the penetration very well?
- A: No, no way in the world. No, that's just like pulling the gas through the crack, that's all that is. There's no way you can determine the penetration of that.



- Q: Okay. And was there a visual check also in the, in the procedures as well as the helium leak?
- A: Visual check for what?
- Q: On the inner?
- A: On the inner.
- A: Yes, oh, yes. Yes.
- Q: I mean, I guess...
- A: Visual is the criteria.
- Q: ...I guess I just have somewhat of a concern that you know, you could have a problem, maybe a pretty bad weld, but it's got one percent penetration and that's all you need to stop the, the helium.
- A: Well, not really with helium. The helium has to have a pretty good mass in order, like I say, you can pull that through that side wall of that capsule if you want to subject to that, to that enough vacuum in order to do that.
- A: But as far as saying the depth of penetration or whatever, no way that you could determine that from that.
- Q: Whether a, whether a weld passes a visual inspection or not, depends, sounds to me like depends a whole lot on the skill level of the guy that's looking at it. And you described the qualification, if you will, of the people who were monitoring the welding, or doing the welding as being operators that, that you had the responsibility to train obviously, but that as time passed there were other welders who were trained by the welders that you trained, so, so there's, I'm not trying to put words into your mouth, but seems to me that there is really no, no way that anybody has, has a good way of verifying the qualification of the visual inspections if you will. In other words, you know, it's just sort of somebody that's got some amount of training looking at them with not maybe a good experience base, saying yeah, looks okay to me.
- A: That's exactly what took place.
- Q: (Jugan) Roger, are you talking about visual directly on the capsule or visual on the, even the UT scan?
- Q: (Jensen) No, I'm talking visual on the capsule.
- Q: (Jugan) Okay.
- Q: (Jensen) That's what I'm talking about.
- A: Well, as I remember the system, I'd have to go back and check with, but as I remember, the acceptance for a capsule is required by the operator and the manager, shift manager. And that was a sign-off sheet. And you know, what the operator would do is make the weld, then he'd check it over himself and then he'd go and ask his supervisor to come out there and make that check. And that was required. So it was just not one independent party, but it was also that manager.
- Q: Okay.

- A: But, of course this comes back to the other thing that dependent upon his ability to make that judgement.
- Q: When even the same thing I guess with, were the UT people, trained what was the extent of their training I guess, to read and use the UT?
- A: That is, the only thing that I was able to do was pass along what knowledge that I had and train those people to that degree.
- Q: So you trained the...?
- A: I trained those initially and then they, we were really concerned about that, so they tried to get other expertise in here to help them along as time went on. And then of course, I think after '75, I had no more part in that ultrasonics at all. Plant operations took over that, then QC got involved in it. I was happy to see them come out there. At least that's some kind of...
- Q: Half the welds in these capsules could have been inspected any way at all because they're cold welds. They were out in the open, no contamination, and yet the inspection of those welds was also, I believe, the ultrasonic technique.
- A: Yes.
- Q: Do you think that was appropriate, the appropriate thing to do for those welds? Or would you have tried some dye penetrant tests or leak check of that or something else, because here we didn't have the constraint of the radioactive material?
- A: Yeah, I think many of those were subjected to the dye penetrant testing.
- Q: They were?
- A: Those capsules. They may not be recorded, but I know it was done in the shop a lot. They were done to the fluorescent penetrant inspection. You know, I know that for a fact.
- Q: But whether it was part of the actual inspection process or not, you don't know?
- A: I think it was, but I'd have to go back and verify that. But I know that they were, because they set up a special booth over in the machine shop for a fluorescent penetrant. And they were all subjected to that.
- Q: Okay.
- A: And I would be very surprised if any of those welds are found to be bad. The cold welds.
- Q: Considering the freedom that the individuals had and all the variety of inspection techniques that are available, I have to agree with that and, you know, it does cut down the failure mode than by fifty percent of the weld situation.
- A: That's right. And they were, they were examined by experienced personnel and everything and I, like I say, I feel very comfortable about those capsules that were took into the facility.
- Q: Let me ask a question. On the hot welds, there was a problem in, in eccentricity, machining, cam follower, weld development and so on in order to make the quality weld

and whatever. On the cold welds, what was the process that was used and was there a similar kind of a problem there in terms of making a quality weld?

A: Similar problems, yes. In fact, a lot of our investigations were done on the, see a lot of these units, we bought two of these units. We bought one and then had a spare. So we used it over in the capsule development facility, over in the machine shop. And there's where we'd determine a lot of these problems. When we would see it in the cell, we would go back over there and try to figure out just what was taking place and how we were going to correct that problem. And that's what, and all the final capsules were done in the same identical fixtures, just were done over in both facilities.

Q: Oh, so you machined the end of the cold weld in order to do it with a cam follower also?

A: Yes.

Q: Okay.

Q: That how you did it?

A: Yes, they're all done that way.

Q: Okay.

Q: Was the, did you machine the end of the inside cylinder also?

A: Yes.

Q: Okay. So there's four machining operations.

A: Yes.

Q: What was the, what were the end caps made out of?

A: The end caps were made out of plate.

Q: Plate?

A: And the reason behind that was that we could have bought round bar but we're, that has a leak path through it that we were concerned about. It's the way the grain lays in it, and so we felt that it was, it was best to use a cross-grain in the pipe and end cap, and that's why that was done that way. So in the process of, of the plate material, then we had to have those punched. We had them punched out into little blanks and, of course, then this punching process would upset that outer edge so we would have to make sure they would machine back away from that, that they didn't get that, where this deformation had taken place and those caps would do that. And, and one of my concerns for a long time is that they did not do that. They did not get in far enough and some of that would be rolled down you know, and that grain structure kind of, but I don't think that followed through, but I was always trying to be careful of that particularly. But it is a possibility you know, that it could happen. Of course, when we first started up the facility and went inside the cell there was an awful lot of problems I believe, we were faced with. One thing is the cesium salt itself, when it becomes, it becomes molten under temperature because that's how they make the transfer. Well, as soon as you start heating that capsule...

#### SIDE B

A: See, initially the program had incorporated a little neck on the top. There was a hole

through that and after the cap was welded on it, then you would plug weld that hole to seal it. Well, that created such a, another burden with, inside the cell that we incorporated those little drill holes on the inside, the side of the cap, as relief vents. So then we needed to develop another method to hold the helium in there to support our helium leak check. And that's when we developed this sintered disk that goes in there. And we went through quite a development effort in order to develop this disk. Well, now that disk goes in there and that accomplished two things. It provides the helium in the capsule to support our helium leak test, and also provided the stopper to prevent this stuff from coming up on inside the cap.

Q: Why wasn't the sintered disk put in the outer capsule?

A: In the outer capsule?

Q: Um-hm.

A: Well, it could have been, but let's remember that helium was the only type of, of method to examine it on the inner capsule. Where the outer capsule was they felt UT was the method to use.

Q: Can you explain, can you explain again what you just said on, that what was used before the two little holes on the side?

A: What, what they had there was a little cap, and it had a little neck up on top here. If you look at some of the old first designs and there's a hole right down through here. So you make this weld around here to the, to the tube itself...

Q: Uh-huh.

A: ...you'd make that weld and then you'd come in here and fill this capsule, purge it out with helium. Then you'd come in here and make this weld up in the top here.

Q: Oh, okay. We thought there was some references to previously being a hole on top but...

Q: Were those ever production, were production capsules ever made that way?

A: No, no.

Q: Okay, so we won't expect RSI to have any more, I mean...

A: No. You wouldn't have anything like that.

Q: Would RSI have, I guess, older capsules with the sintered disks in them?

A: Yes. On the, on the inner capsule. And that sinter, I guess, is designed so that it presses into the end.

Q: Right. I noticed that.

A: And many, there is another reason that we, because those capsules were so thin in there and we could keep that OD true of it. So that was another method to keep that, because when you, when you allow this to sit out in the room waiting to be welded and everything, then it's building up temperature. And, and the more heat you get in, the more easy it is for this to deform, see. So I, what we used that sintered disk for that purpose too.

- Q: Gordy, you said that during the evolution of this whole business, that there were, I think you said, four welding engineers or five welding engineers.
- A: Yeah.
- Q: Who were they, just by name out of curiosity? The reason I ask that is because some of the background information that we had, had different authors of different things about pertaining to the welding development. Do you, can you recall who those folks were?
- A: All but one.
- Q: Okay.
- A: John Wormley was the one that initiated the development of the whole system. And then John went up to Alaska, \_\_\_\_\_. And Bill O'Brian come on board and then Bill passed away because of cancer. And then the other fellow, Dave was his first name, I've been trying to recollect, I was thinking of that last night. And after Dave, I might think of his last name, then Ralph Neugent came on board. And Ralph was here when we did this WE program, this Waste Evaluation program. And that's when we went to this great degree, to really assess what was over there, because mind you, all during this program I was sitting back and saying I didn't feel comfortable with those things, but I couldn't get people to respond. But Ralph took, and I think Roger you were over...
- Q: (Jensen) No, I didn't know him. Jim Hauptmann was the...
- A: Okay, okay.
- Q: (Jensen) ...there when I knew about it.
- A: Anyway, Ralph was a real good engineer. He came up from Rockwell in California. And then they called him back there because they had a problem. And then after that John Klekner was this young engineer. He came up here and he worked on the program and then, and then Jim of course.
- Q: The, the program, the whole thing was, had to be basically complete by the time Jim Hauptmann...
- A: Yes.
- Q: ...was involved with it.
- A: The only thing that really Jim was involved, Jim was a welding specialist over in the shop, and he was pretty knowledgeable of the program. Anytime that we were discussing something, Jim was pretty well involved because we always liked to get his input on everything. So he knows pretty well what was going on. Jim was the one that was real concerned about this UT. In fact he took it to ask about the ultrasonics at the final part of it and then they made a choice at the time, and the funding didn't allow it.
- Q: Do you think it would be worth our while to talk with, with Jim?
- A: I think it would. I, I think you need all the information you can, because I'd say I'm biased for a reason you know, because...
- Q: Sure.

A: ...I've tried to do my best to develop good products and a lot of times there was nobody there to kind of help you, you know. (Laughter)

Q: You haven't told us, what was the time period you were working over there? Through the whole production run or were you...?

A: From the beginning.

Q: To the end?

Q: To the end?

A: Yes.

Q: Okay. That's...You were the continuity...I think you're the first, if not only one we have talked to that could say that.

A: That admits that. (Laughter) Well, I don't have anything to hide so, I just know what happened.

Q: Willis, do you have some questions?

Q: Was there any discussion during all the concern about the quality of the welds and so forth about where these capsules may eventually be stored, located at?

A: Well, I can show you a report that, where prepared originally, and the only thing they address is for storage in these pools out here.

Q: Out here?

A: Nowhere else was it ever...

Q: Was there never any discussion or consideration given to the fact that they may be taken off site into the hands of a private contractor?

A: That subject came up, I think it's '84 or '85, somewhere like that, and where I was called into a meeting and Jim Hauptmann was the weld engineer right then. And we were asked then, what would, what would you, how would feel if we were to ship these capsules off-site? And I told him and the weld engineer told him, that we felt that those capsules should never be shipped off here until they were inspected, until they were subjected to a very close visual examination and the, the best UT examination possible. And any capsules that were questionable they should never be shipped. And that was said in the meeting.

Q: Is there record of the meeting?

A: Yes.

Q: Do you have a record of the meeting?

A: I don't, I don't have a record of the minutes of the meeting.

Q: Do you know when the meeting was held and where but...

A: Yes. That's right.

Q: Yeah.

- Q: Could you, could you elaborate on any discussions that took place at the meeting. Other than your own concerns were there other concerns about the management?
- A: Well, the management at that particular time felt that there was no problem with sending them off site. So, we were essentially out-ruled as far as our suggestions were concerned.
- Q: You had a concern. Was, were there anybody else who had concerns about the quality of the capsules?
- A: The only one was Jim Hauptmann, because of my input to Jim. And the only other one, I can't remember. I couldn't say for sure.
- Q: I'm from Procurement.
- A: Um-hm.
- Q: I normally think in lines of what we do with purchase orders and contracts and so forth. But you bought the material under a set of specifications from how many suppliers?
- A: I couldn't tell you that. See that's...
- Q: Okay. What kind of inspection procedure did you have both at the plant and here at Westinghouse for the reading, for the acceptance of that material?
- A: Well, originally, and that's all I can speak for is what the original plan was, and originally the tubing was. There was a specification set up, but it was all ultrasonic examined before it was ever purchased. The tubing that was brought on site here.
- Q: Before it was purchased or before it was accepted?
- A: Before it was accepted.
- Q: Okay.
- A: And that was done at the plant itself.
- Q: At the plant. What type of inspection, when the material was received here, what type of quality inspection did it go through?
- A: Originally I don't think it went through any. Then later on, each tube I think, was inspected here on site. When that was initiated, I don't know. Because...
- Q: Was that a visual inspection?
- A: ...no, no that was ultrasonics.
- Q: That was ultrasonics.
- A: Yes. But when it took place I don't know. Because like I say, now that wasn't my responsibility after that. I was over on another program, so I don't know when it took place.
- Q: The type of material, the specifications, were there any changes in the specs as the program began to work through some of the problems that you originally encountered?

Were the specs ever changed except for the wall thickness?

A: Not that I know of.

Q: To the vendor, did you use the same set of specs?

A: That I couldn't tell you, because there you are, Procurement should be able to answer that for you. I am unable to do that. Because they would purchase this lot of this material.

Q: There was nothing they relayed to you for a possible change in the welding spec at least?

A: No. Absolutely not.

Q: Do you know if it were a competitive bid process or was it a sole source type of environment?

A: I, I would not be able to answer that.

Q: When you set up the critical parameters for the weld, was a lot or specific heat of tube or end cap one of those critical parameters?

A: No.

Q: I'm sure the weld engineer is well aware that the delta-ferrite content of either would have a big effect on the weld, and I was just curious as to why the matching of the heats would not be a critical parameter?

A: No I, no direction was ever given to me of anything like that.

Q: Would, can you say anything about how you made sure that there was no cesium or other impurities in the weld area when you made it. I mean what degree of cleanliness did you specify and how did you insure it?

A: Well, in our procedures, we had to make sure that they swabbed that area. But you see, with the cesium especially, and explaining what I did before about this, creeping up into the weld joint, and if you have to look at the loading system, that they made this transfer, they would heat that up till it became molten and then transfer it into the capsule. And then, with the loading fixture itself had a neck on it that come down and seat on that little ring, if you had seen that there was a little sealing ring that set down in there. And that could become contaminated. And we found as, as welding progressed on capsules, that sometimes there would be seating in there, and as we became more familiar with what happened, then you could determine that was cesium that had come up into those welds.

Q: Could cesium still come up even past and around that sintered plug?

A: Oh yes. Because the plug is just pressed in there you see.

Q: Okay.

Q: To pursue that same line of questioning, on a visual inspection, what, when there's cesium contamination on the lip, can you detect, do you get a defect and can you tell if that's a cesium contamination defect?

A: Pretty well because it would generally be burnt. See, it would have a little black spot on



it or something like that.

Q: You would expect you'd get a burn through or some indication because that greatly increases the conductivity in the arc and that concentrates power in a smaller spot. Yesterday when we were out there they were saying that early on those cells were really dirty, that there was strontium powders flying around everywhere and cesium around everywhere and they also mentioned that when they would partially fill the capsule and then later come back and fill it, they would get cesium in and around the weld zone. Can you comment on that?

A: Well, you have to understand that that was a learning process too, of how they were going to load those capsules same as...

Q: Was there any that went out into the field welded under those dirty, hot cell conditions and re-pours?

A: That, I couldn't tell you because our responsibility was to set up the program and train the people. And then as the production continued on, the only time that we would be called in is when there was a welding problem that developed. And a lot of times, they would try to make a repair or something. And if the repair didn't take place or they wanted us to suggest how to repair something, we would go back over there and that's the only time we would be involved. If they, if they welded the capsules up in that condition and they didn't have any trouble, then we would never have been called in on the project.

Q: When you put those two little notches in the end cap to relieve the internal pressure during welding...

A: Yes...

Q: ...did you get any blow-outs or failures there?

A: We did originally. That's why...

Q: Did you continue to heat that up, and it self heats to push whatever's inside out, and I just wondered how you really were able to make good welds and seal it, and still not have a vent?

A: We were, we didn't have any problem after we put the second vent in. But originally we just had the one vent.

Q: And you did about a three hundred and eighty degree weld is what I...

A: Yes.

Q: ...on the down slope?

Q: Who would be the, who would be the person we could talk to about the, the inspection of material and the problems that were encountered in the inspection process, rejected material? Would the production engineering folks be the source of that?

Q: Who, who do you think Roger?

Q: (Jensen) I, I don't know. Maybe somebody in the shop.

A: Well, I think QA has, QC would be able to because they do all that work out in the

facility.

- Q: (Jensen) We talked with QA and maybe the thing to do is we sent Gelman back off to see what he could find out and maybe what we ought to do is see if they have it and if not, he ought to be able to get it for us.
- Q: Okay. We've got another QA guy coming in this afternoon, so it was actually their...
- Q: (Jensen) It was actually their...
- Q: Langston's coming in here? Who's coming in?
- Q: (Jensen) Langston will be in here tomorrow we think. Harry Kohl is going to be here. Now Harry doesn't go back to nineteen, to nineteen seventy-seven, seventy-eight or somewhere's around there so if we need to go back farther than that, he won't be the guy. But maybe he can aim us in the right direction too.
- Q: Well, I think it just depends, I don't know what time the material was bought, they're having trouble coming up with the purchase, purchasing records and so forth.
- A: Yeah.
- A: Well you see, it, it, that material was bought and it was almost a special run. And so it, what they'd have to do is ordered it in one big lot. And whenever they had to go back and purchase material again, it was a special mill run.
- Q: Was the material purchased at different times throughout the program?
- A: Yes.
- Q: Okay.
- A: But they tried to keep enough of that ahead to cover the whole project when they got it received.
- Q: Do you know of any problems they had in terms of rejecting material and having to send it back?
- A: The only problem I think, was straightness.
- Q: Straightness?
- A: Straightness.
- Q: Gordy, I've got in one report I read said there were three different types of capsules. One from seventy-four to seventy seven, seventy-seven to seventy-nine and seventy-nine to the end. But I can't find out what those different types were. Do you have any idea?
- A: Three different types of capsules?
- Q: Um-hm. I don't know the number in the report right now.
- A: How, how did you mean, how do you define the different types?
- Q: (Jugan) I don't, I don't know. That's all it said. It said there was like two hundred and sixteen of type ones that were produced first, one hundred sixty-five type twos, and the

balance of type threes. And I'm wondering maybe if you could tell me maybe what they meant.

A: I'm just wondering if that could be the quality of the product that was all. Is that a possibility?

Q: (Jugan) I, I don't even know, I don't even know the quality of the product, of the cesium that was put in it?

Q: Was there a change in the...

A: Well, I'm just wondering...

Q: Oh, okay. I don't know.

A: ...because that's the part that I don't know about. And as far as any two different types the only types of capsules that were used is what we were talking about as dimensional changes.

Q: Thin-wall and thick-wall?

A: Yes.

Q: Okay.

A: So, the other type must have been another classification that came out of WESF.

Q: I thought maybe you knew of some you know, other major change that I could put in for type one.

A: No.

Q: The, the amount of curies seems pretty much the same in the type ones as in the last ones.

A: I think Darryl Lamberd, have you talked to Darryl Lamberd? Is Darryl here?

Q: No I haven't.

Q: We haven't talked to him.

A: Darryl was in, was the plant engineer at that time in the WESF facility. And he should be able to give you a good background on that because he covered our welding and was very observant on the things that took place. And really, it was because of him that much of these improvements at that facility did take place.

Q: Okay.

A: So, I'm sure that Darryl would give you all the help he possibly can. And he is probably the one that can answer that for us.

Q: Is it, how do you spell his name? It's Lamberd, isn't it.

A: D-a-r-r-y-l Lamberd.

Q: Judy?

Q: (Penry) I don't have anything.

END OF TAPE

C-186

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**Bob Gelman**  
**Westinghouse Hanford Company**

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**BOB GELMAN**

Okay. It's July 20th. It's eight o'clock in the morning. We have the pleasure of the company of Bob Gelman, who is responsible for quality assurance during the time of production of the cesium capsules. Bob is here along with the entire committee. And Bob...

A: Let me make one correction right from the start. I've been in the quality assurance organization from 1986. I was not around during the fabrication of the capsules. I was not in the quality assurance organization during that period of time. Most of my knowledge is therefore hearsay and what I've done through the records review.

Q: Well, who was the person at the time?

A: Harry Kohl was the manager of the organization at the time.

Q: Is he still around?

A: Yes.

Q: Okay. But you have reviewed the records?

A: We have, we reviewed the fabrication records of the 252 capsules. And when I say fabrication records, fabrication records for the, for the WESF portion of the manufacturing process, the hot portion of the process.

Q: Okay. That's an interesting part, because I was going to start with the description of what was the assurance that the material supplied to the capsule sealer was right. What was the assurance that that material had the appropriate chemical content that the, weren't the impurities there that seemed to have a strong influence on the corrosion of the stainless steel?

A: During the welding process or during the fabrication?

Q: (Penry) Fabrication.

Q: (Jensen) For clarification, do you mean the, the cesium and strontium, or the cesium product that came from B plant?

Q: (Hultgren) Yes.

Q: Okay.

Q: (Penry) Oh, I thought we were going back to the material, the same material.

Q: That's, this is the first part, and then we'll talk about the, the actual raw materials that you worked with, the stainless steels and things.

A: Okay. Let me do this in chronological order. Of course this information that I have here is information I've gleaned. Okay. I do not have first hand knowledge of the process. This is something that I have prepared and for a presentation that was not given. During the receiving inspection process, receiving inspection of the capsule material, there was a quality assurance review of the vendor certifications. This was for the tubes and the end cap plate material. Okay. There was also dimensional, visual, and ultrasonic inspection of the incoming materials.

Q: On a random basis?

A: I do not have that information. I am speculating that it was a hundred percent inspection.

Q: And what did that consist of?

A: I do not have that information right now.

Q: You don't know whether they UT'd it or dimensional inspection, air gauged it, the OD or...?

A: The information I have right now is that it was dimensional inspected, visual inspected, and also UT'd.

Q: Okay, now, is that information available in the QA records somewhere?

A: What we have right now in our records, we've been able to track, that is, we have been able to track and got our arms around all the cold fabrication processes, all the hot fabrication processes. We have identified where the vendor records are. We have not as yet got our arms around them and cataloged it in.

Q: But they do exist...?

A: They do exist.

Q: You just haven't compiled them yet.

A: Right.

Q: Okay.

Q: There was only one manufacturer of the stainless steel, is this true?

A: Do not know.

Q: Okay. Let's talk about then the cesium chloride. How was the quality or the chemical content of the cesium chloride that was provided, assured?

A: At this point in time, I do not have that information.

Q: Okay.

Q: Do you have any idea where that might reside, that information about the quality, the analytical data on the cesium batches that were transferred to WESF? Do you know, do you know where that, who would be the keeper of that kind of information?

A: No, Roger, but I can get that information. Okay. I do not know where the chemical data is.

Q: This is extremely important because, number one, determination of the chemical content is found to be a non-trivial task. I mean, this is a difficult thing to do. And yet, the corrosion capability, the corrosion capability of the cesium chloride has been found to be strongly dependent upon the impurity content. So...

A: I, I am just curious to the fact Curtis did not know that information or maybe the question was not asked.

Q: I'm not sure that we asked that question. I believe that we asked that question, but I'm not

sure that we requested the source or the record site of that information from Curtis. And we may very well recall Curtis and probe that and some other areas.

Q: Okay. Then maybe we could let you pontificate a bit and tell us about the findings that you have gotten from your perusal of the records.

A: Okay. When we found out about the problem at RSI, there was the effort to go take a look at the records. At that point in time, the source of the defect was not known, or, or the defects. What was our option at that time, was go and look at the most likely source, if there was a leak.

Q: Okay.

A: And we concentrated our, we focused our effort on the WESF production facility. We focused it on the WESF production facility primarily because maybe this was a QA bias, but we were very, very actively involved in the cold machining, the cold welding, while the WESF process was a much more remote process. So, we took a look at the production records for the actual 252 capsules. Okay. When we looked through the records, and this was early in the game, not knowing the, the source of the reject, we took a look at for any missed operations, any use of rejective material, or any other anomaly in the paperwork that was pretty obvious. That, that was the first thing we looked at. The second thing we looked at, did all 252 successfully pass the helium leak check. In other words, was the inner capsule integrity verified. The third thing we did was looked at the UT traces on the hot weld of all two hundred fifty-two. This was the final hot weld. Let me handle those one, one at a time. As far as missed operations or using a reject materials, we found that the retrievability and traceability of all the records verifying that all the operational steps were conducted was good. In retrospect, some of the data taking does not meet today's standards. In other words, the data was crossed out without being initialled, this sort of thing.

Q: Okay.

Q: Could you tell, tell me, what standards were in use at the time that were followed?

A: Standards in respect to what?

Q: Quality assurance.

A: Give me a...

Q: What I'm thinking of for example is RDT standards were in use by a lot of the AEC at that time.

A: At that point in time, I do not know what kind, what standards were being used, okay. I do not know now.

Q: (Jensen) Mike, RDT standards...

A: (Wright) RDT F2 was the QA standard that was in general use by DOE type vendors.

Q: (Jensen) I'm not familiar with that. What, what's that stand for, RDT?

A: (Wright) It's the equivalent of 10CFR50 Appendix B for NRC or NQA-1.

Q: Okay.

Q: (Jugan) It is Reactor Demonstration Technology.



A: This is the reactor standard....It probably, I believe, became the basis for NQA-1.

Q: Yes.

A: It also was the basis for 1050CFR Appendix B.

Q: Okay.

A: The information that I got was that all the NDE people who were qualified to read NDE traces were certified to SNT TC1A.

Q: SNT?

A: Society of Nuclear Testing, I think. Yeah. It's part of EA TNS group.

Q: So your information said that, that all the people were qualified...

A: Were certified, yes.

Q: ...were certified. Do you happen to know how they get certified? They take a course, pass a test or what?

A: It, it was a formal training and the details of that, I do not know.

Q: Pursuing Mike's point, normally anything done for AEC, ERDA, DOE, whoever was in the control at the time, I guess it was DOE, followed a basic, I guess it was like F22, which was RDT QA standard, or 10CFR50 Appendix B, or NQA-1 came in later. And that required that you have a quality control plan of how you implement the eighteen criteria that's in all of these deals. It's a QA program and how you manage it, like how you manage deviations and how you calibrate test equipment and vendor control and it's on and on and on and on.

A: We have been evolving in NQA-1 since 1981 here. The time period you're talking about manufacturing these capsules was 1978, really, you go back in the capsules, but '75, '75 through '83. So NQA-1 was implemented during the capsules fabricating process, okay. I believe before that it was 10CFR50 Appendix B.

Q: You, but you're not sure?

A: I'm not sure I, I can verify that.

Q: And it was, NQA-1 was implemented in '81?

A: It, it was the latest...

Q: It was issued in...

A: It, it was issued in '81, and then you have NQA-1 in '83. We wrote a letter to our customer in the 1983 time frame stating that we in compliance with exception of two specific areas. In the '86 time frame, our NQA program was screened. Areas of non-compliance were really highlighted, and now I say we are totally in compliance with NQA-1.

Q: Was the last capsule fabricated in December of '84 or '83...?

A: '83.

Q: Okay.

Q: Is there any way you can go back and find what QA program and what your QA plan was during the time when you were fabricating any and all capsules that went to RSI?

A: I can sure give it a good try.

Q: Okay. Then why don't you continue on?

A: Okay. In our records review, as I say, retrievability of the data was excellent. Now, the data we were focusing on was the WESF production data. Traceability was good, some, some minimal shortcomings as far as meeting today's data taking requirements, I think. From our record review, there was actually no evidence of using any rejected material or any missed operations. We found a couple of anomalies which we thought were very, very interesting. One of the outer capsules that is currently at RSI, was accepted on deviation with a dented cap. Was accepted on deviation with a dented cap and that's documented. We also have one capsule that is currently in our WESF pool cell that the outer capsule was rejected on a deviation and yet it's still used. We have done nothing to assess the one in the pool cell. But on those, on those 252 that are currently in Decatur, we found that there was no evidence of any rejected material being used, no missed operations.

Q: I'd like to interrupt this here. I may forget my train of thought.

A: Go ahead.

Q: I wouldn't expect anybody to put in rejected material in the capsule, but I would expect that somewhere that you put in a deviation or waiver that somebody deemed was okay and that was then no longer rejected it was...

Q: Yes.

Q: ...it was accepted on a deviation or waiver.

A: Yeah. And one of the two hundred and fifty-two capsules in Georgia has an accepted deviation for a dented end cap.

Q: Is that the only accepted deviation that you found record of?

A: There was also deviations where capsules were rejected for missing the seventy-five percent weld penetration criteria. They were put on hold and then once the weld penetration criteria was reduced to fifty-five percent, the acceptance criteria, they were subsequently accepted.

Q: Is there a cross-check? Now my understanding is, is that that change in criteria was coincident with the change in wall thickness of the inner capsule material, from ninety mils or ninety-five or whatever it was up to one hundred and thirty-six. Is there, can you verify that those less than seventy-five percent acceptances were in fact on wall thickness material that was a hundred and thirty-six mils? Did you, did you make that, did you look at that?

A: No. It was...

Q: Do you see, you know what I'm saying?

A: The weld penetration criteria went from seventy-five percent to fifty-five percent in April of '83. It was my understanding that that criteria was equally as acceptable for the thinner wall capsules.

- Q: Well, my understanding was that it was only acceptable if the capsule inner wall thickness was a hundred and thirty-six mils instead of the earlier thin walled. And that would be an interesting point to pursue.
- A: What was the thin wall?
- Q: It was ninety or ninety-five mils as, as I recall, from having read the reference documentation.
- Q: Were there any other accepted deviations other than the one dented end cap and, and the, and the less than seventy-five percent weld penetration?
- A: No.
- Q: Okay.
- A: (Jugan) An interesting point, Roger. If, if that spec was changed in 4/83, it was way at the end of the program.
- Q: (Jensen) I, I, and I believe that wall thickness was much, much earlier than that, but I don't, I've never seen that data so I don't know when it was.
- (Pause)
- Q: Do you have, Bob, do you have a number of capsules where that happened? How many of them, how many of them were there which were put on a hold and then subsequently accepted? Was it five or fifty?
- A: I believe it is a small number.
- Q: That would, we'd like to find that out. How, just how many of them there were.
- Q: And do the records indeed indicate, can you tell exactly which capsules have the thin walls and which have the thicker walls?
- A: We were able to have the outer capsule number. I do believe it's, 483 was the one. We went through a search and were able to pinpoint that I believe, by a lot of material, okay. Just the transition capsule ID number is 483.
- Q: Number 483 is when they switched from...
- A: The thinner to the thicker wall. From ninety-five to the one hundred thirty. And now 483 is a number that is, yeah, it, it was in the upper four hundred series.
- Q: Okay.
- A: There is a number, there is a capsule number out there. I believe it's 483, is the number that comes to my mind.
- Q: Okay. See one thing that could have happened and we, and we won't know until we look at the record, but there could have been a capsule welded before number four eighty-three that was put on hold.
- A: I understand what you're saying. And then accepted later.
- Q: And then accepted later.

- Q: Yeah.
- Q: Why did you change from the standard of ninety-five mil to a hundred and thirty mil wall thickness?
- A: I do not know. As I say that was before my time on the, being involved in this.
- Q: I heard one theory I just was curious as to what you think about it.
- A: Okay.
- Q: If what, what was, and this is just a little side to follow on an earlier question, what was Harry Kohl's tenure if you will or longevity in the QA program relative to this effort? Do you know?
- A: Oh, Harry's been involved in this as long as I can remember. I succeeded him in '86. I think he goes back, but I can't tell you specifically when.
- Q: Okay. We probably want to talk to Harry.
- Q: Sure do. Okay. Let's continue on.
- A: What, what was the most interesting in our record review is and I'm going to second element right now, is that there is objective evidence in the records for the 252, that every one of the them successfully passed the helium leak test. And that is, that is documented.
- Q: Was this passed on the first try?
- A: Cannot answer that.
- Q: Okay.
- Q: Does the record show, does the QA record show if there were, if a capsule was reworked, if the weld was reworked.
- A: Yes, yes.
- Q: It does show that?
- A: Yes. The records do show it. We had problems when we went and did our record review initially. We found helium leak test dates that were prior to weld dates, you know weld dates. And we were scratching our head and, and we finally going back and walking through it, found that they were rewelds and it was the helium leak check date on the first weld with the second, associated with the second weld. But we were able to walk through each one of them and said before outer capsule fabrication, outer capsule installation, that they all did successfully pass a helium leak check.
- Q: Can you give us an idea of what percent were reworked?
- A: Cannot. As I say I was not associated with them.
- Q: (Jugan) No. We thought when you were going through the records and you noticed the anomaly in dates you could have said...
- Q: (Jensen) But, but, we or you, or someone would be able to, from an analysis of the records be able to determine what the, the rework rate was of the accepted capsules? Now you, you verified this for the two hundred and fifty-two capsules that are at Decatur. Have you done

any of the similar kind of thing with...

A: No.

Q: ...the balance of the hundred seventy, or fifteen hundred seventy-six capsules?

A: We have not. It, it was, with so many parameters out there and not knowing the failure mode. The decision was made to hold off until you know which to look at. We're basically, went and looked for a needle in a haystack. And we tried to limit the size of the haystack to something where we figure, that had the potential failure.

Q: What was the potential that you identified? What type potential of a failure?

A: ...we, we figure that either okay, let me go back. Either there was a missed operations or use of rejected material. There was a capsule that got by the helium leak check. Or you had a hot weld failure. Now this was early on in the game before we had any, before we had people going down to RSI.

Q: Okay. Who fills, who completes the QA records, like for each of these capsules as they were going through?

A: There was no overall certification of the records packaged before they came back to the QA for storage. They all came into the QA for storage in 1983, okay. QA was involved during certain periods of time, with certain parts of the process. From the '78 time period, the QA involvement, independent QA involvement, was minimal. By the time you got to '83, we were actively involved in most stages of the helium leak check and the ultrasonic weld.

Q: Well, the reason I asked the question, it seems to me, obviously someone wrote down say the helium leak check. You look at the records and say that nobody missed a helium leak check. Well, if you looked at the records and somebody had missed it, somebody had to have written that down. And if they were having to write that down, it seems to me they would've gone back and checked it. I got, I'm not that up on how this works.

A: Okay, very simply. There was a block...

Q: And someone's, someone supposed to check it.

A: ...in the data form. More, more than just checking there. Putting a number down there, ten to the minus, I believe ten to the minus sixth. There was a gauge reading that went into the block.

Q: So you verified that it was done because something was filled out in that block.

A: You got it. Okay, now, there is a percentage of helium leak checks that was overviewed by the quality control organization for the 252. These were very few capsules, in the independent overview.

Q: Okay. I guess my thing is, for some, okay, when they sent out this record if something wasn't in that block, I mean, immediately could you not do that test? I mean isn't it happening that quickly? So I'd be real surprised if something would get out that either they didn't just say, "Hey I don't have time to do this test, I'm going to put something down here anyway." I can't imagine something getting out that there wasn't something filled in the block.

A: Well, we were...

A: I can, I've...

- Q: Really?
- A: ...when we're doing our records review, we were looking for, hey, was there something that was, how do you say it, the obvious didn't happen, okay, like the use of rejected material, okay, and operations not being performed. The objective evidence that we have that was performed is because a operator or craftsman filled out the block. And that's the objective evidence that we have.
- Q: The helium leak check is a good example because that had to be performed within forty-five minutes of the welding. And was indeed that information supplied that...?
- A: There, there is no objective evidence, even though that was a procedural requirement, there is no objective evidence from, from the records that it was done within forty-five minutes.
- Q: And that has the potential of invalidating the helium leak check?
- A: Because the procedure requirement was what, I believe, in forty-five minutes, there is an object of evidence. Looking at the records in the 1988 time period that they did it in forty-five minutes.
- Q: Okay. Let's go to this thing about rejected material. Again, this is not my area. You're saying that someone could use rejected material and indicate that on these records that they used rejected material?
- A: When you, no, what I'm saying is when you look at the process flow...
- Q: Uh-huh.
- A: ...okay, you, you're following a given outer capsule and got an inner capsule okay. If you all the sudden it says rejected scrap, then three or four steps later you got the same serial number showing up again, you say, hey, we scrapped it here on a deviation, but here it's being used again.
- Q: Okay.
- A: That type of thing we're looking for.
- Q: Okay.
- Q: Let me ask Bob, what is the, what was the check on, on, on whether the data sheet was filled out, in other words the authentication that the stuff had been done? If there wasn't a QA inspector that was in there and he signed and verified was it, was there a procedure that the operations supervisor sign it or was there any authentication?
- A: For most of the operations in the earlier time frame there was no authentication. A second party looking at it and verifying it.
- Q: Okay, there was not data entry process.
- A: There was not, no.
- Q: Was there objective evidence as to the time in the electropolishing bath? Did they record the seconds in it, when power was applied?
- A: I don't recall.

- Q: Okay.
- A: As a matter of fact I did not, my staff looked through the specific records, matter of fact the individual who looked at most of the records is down in Georgia right now, or is on his way back.
- Q: Well, they made a point that the forty seconds I think it was...
- Q: Forty minutes.
- Q: Forty minutes.
- Q: ...forty minutes maximum time, I just wondered if anybody recorded how many they really did?
- Q: Did, is there any chance that you brought over a sample of one of the records?
- A: I did not, and I can get a sample of one of the records.
- Q: Or maybe we want to go and thumb through some of ourselves.
- Q: Yeah, I think we may want to, want to talk and decide how many of them that we really want to look at.
- Q: Okay. Back on it.
- A: As I say, there was evidence from the records that the helium leak check was performed for each of the 252. Okay. At that point in time we went through the 252 ultrasonic traces for the hot weld. Of the four welds on a capsule, we looked at only the ultrasonic traces of the one being done in the hot cell. Okay. The outer weld. We did something very interesting as we did not look at it really against an accept/reject criteria. What we did was, we gave the 252 capsules to quality control. And when I say quality control, for the, these were the individuals who, the last survivors of the individuals who were around back then, who did the same inspection, okay. One hundred seventeen were clearly acceptable of the 252. One hundred thirty five of them may or may not have been acceptable. We were looking for pimples and warts. We were looking for a failure mechanism. It was our thought that even though it met criteria, there's something strange or unusual about it. We are looking for anomalies, artifacts or anomalies, okay. So we pulled out a 130, a 135 for further evaluation and gave them to the Process Engineering organization. They clearly accepted a 108 of those. And said that, "Hey, those are acceptable, don't worry about them. Clearly, clearly not a problem." They kept, before the troops went down to Georgia, kept a list of 27 capsules for further evaluation. And we've called those 27 in suspect. Not because they were, not because they were met or did not meet criteria. Because they had anomalies on it. Anomalies from the records that you could not justify. Once the word got out that there was 27 suspect capsules, the word was turned around and you had 27 reject capsules. And it really, it was 27 suspect for further evaluation. Those 27 traces were then given to an NDE Level 3, and Ed Proudfoot was the individual. And of those 27, nine were acceptable, he judged to be totally acceptable by the criteria. The remainder: six were rejectable and 12 were quality indeterminate. And I'll talk about these six and these 12. And please when I talk, when I talk about them, NDE is not my forté. Ed can give you a much better picture, and he probably should give you a better picture, but I will try to explain the best as I can about these six rejectable and these 12 quality indeterminate.
- Q: Who, who was the individual? What was his name again?

A: Ed Proudfoot.

Q: Proudfoot, okay. We, it's somebody we'll probably want to talk to in some more further detail.

A: Okay. The six rejectable, three with localized weld penetrations between fifty and fifty-five percent. Now understand of these six, all six have been accepted back in the '78 through '83 time frame as meeting criteria. I separated the fifty to fifty-five percent from the other ones because Ed's comment to me was, three with the fifty-five percent criteria, if you had something between fifty and fifty-five percent you have a sufficient amount of judgement in there that one individual would accept it and one individual would reject it.

Q: But, let, let me pursue that. I thought back in that early time frame that, that seventy-five percent was the acceptance criteria. So these may have been those that were, some of those that were put on hold and subjected to the later criteria and then marginally passed on the later criteria. That, is that what you're telling me?

A: Roger, I believe that the fifty-five percent criteria was applied, now this is speculation on my part without evidence, was applied to all those that had thicker walls.

Q: Okay.

Q: What, what did you say was the manufacturing date of those three?

A: I cannot give you the manufacturing date.

Q: Oh, okay. I thought you said that.

Q: Somehow I got the idea that those were done in the '78 or '80 time frame before the, the criteria had been changed from the seventy-five percent penetration to the fifty-five.

A: I, I, I believe retro, the fifty-five percent criteria was retroactively applied to everything.

Q: Okay.

A: Based upon burst tests.

Q: Okay.

A: Okay. Three with localized wall penetrations of 22, 30, and 37 percent. Now those three you can't pass off between the difference between two inspectors.

Q: Well, would you say that again? I, I was...

A: 22, 30, and 37.

Q: That's a percent weld penetration?

A: Yes. Now I want to go into that for a second and then I'll go back to these. Okay. That, that is what the records look like today. What you have is you have a standard that show you your weld penetrations. You have a standard here that shows, I'm sorry. These are three drill standards for clarity, and this is a seventy-five percent weld penetration standard. Even though we went to a fifty-five percent weld penetration criteria, they never change the standard from a seventy-five percent standard. So you're measuring against the seventy-five percent standard. This I, this is close to the maximum weld penetration here, this is less. Now, most of your, most of your weld penetrations, most of your ultrasonics will have a hundred and eighty degrees looking like this and then the rest of it looking like this. The



main reason why, I believe, is because as you start welding you cinch up on one side, the end cap on one side and then as you go around your capsule or your end cap is closer to one wall than the other.

- Q: The, a very dark line around indicates...
- A: The lack of, the lack of penetration.
- Q: Oh, the lack of penetration. Oh, I'm sorry.
- A: Okay. This is almost full penetration here. Now as I say UT and NDE is not my field. Okay. But here is one that Ed said, "Hey you have about, you have a very localized area of about thirty percent weld penetration." And as far as talking to these traces in detail, we can put you in contact with Proudfoot or someone else who can talk about UT traces. I cannot.
- Q: Do you have an extra copy of your handout?
- A: Yes, I'll leave it, okay. What is interesting and this is just, I find very interesting. I don't know how germane it is. When we found one capsule down in Decatur, with water in the annular space, we immediately pulled off the trace. The trace is almost clear, almost one hundred percent penetration all the way around. And it, it is a beautiful example of maximum penetration. It, it, it is almost the textbook type of thing, okay. As I said, there were six that Ed Proudfoot considered as being rejectable and 12 which were quality indeterminate. Now quality indeterminate, from the records, okay. Because you get something like this. These are your drill standards, this is your seventy-five percent, okay. What you're looking at here is a two dimensional view of a three dimensional process, okay. What you have in the end cap is multiple laminations, okay. Some of them, over the weld zone but not in the plane of the weld zone, okay. When the UT operator has the, has the capability of viewing the scan through Z axis and can tell whether or not these here are part of the, these here, whether they are laminations or whether they are part of lack of penetration. Okay.
- Q: You say he does have that capability?
- A: He does have the capability at the time that he's doing this back in 1982, when you look at the records in 1988.
- Q: He knew to take infinite amount of pictures.
- A: Yeah. So when you re-evaluating this today, the only thing you can say is quality indeterminate. Okay. That's, that's one of the two types of cases. The other cases is there are some, a small amount of traces that have so much noise in them, both in the standard and the actual, that you scratch your head and say, "Hey, can I really measure that?" That was basically our record review of the, of the two hundred and fifty-two we gave the crew down at RSI a list of the twenty-seven. I am unaware right now whether anybody has correlated the twenty-seven on our list with the thirty or some that were found with actual defects. The only thing I know for darn sure is the first one that contained water in the outer space was one of these....
- Q: When they're looking at RSI, with these things with ultrasonic, are they also looking straight down on the weld?
- A: I, I missed the question. I'm sorry.
- Q: Are they looking, are they looking at the capsule the same way that the inspector did?
- A: No. The ultrasonic at RSI is not an ultrasonic of the weld area. It, it is basically an

inspection for water.

Q: Okay.

A: It is, as I say UT is not my bag, but it's basically looking at difference in density.

Q: Okay.

A: To figure whether there's water slashing or sloshing around in the outer space.

Q: Okay. This direction probably.

A: Yeah, but they're not looking at the weld specifically.

Q: That would be interesting.

A: Yeah. The only inspection of the weld that I'm aware of at RSI, is a visual inspection. It is interesting that my man down there who was doing the visual inspection is the individual who is one of the few survivors of the visual inspection up here. So we do have some commonality there.

Q: Well, there's an obvious question that can be asked and you know, using your quality assurance expertise, is this the way you would have inspected the welds in these capsules had you been the king of this process at the time?

A: Do you, do you mean UT?

Q: I don't care. How, how would you have inspected the welds?

A: I do not have enough knowledge to really as I say, NDE and non-destructive testing is not my bag. I really don't have enough knowledge to say how I would have done it. I would probably called in individuals with that kind of expertise.

Q: I, I was curious that the helium leak check was only done on the single weld of the inner capsule.

A: Well, it also checks out the second weld on the inner capsule. In other words, it's basically the integrity of the environment of the second, of the inner capsule.

Q: No sir. Because the fixture that was put onto that capsule only went over one end.

A: Okay.

Q: And the other end was not covered by that fixture. So only the one end of the hot capsule, of the inner capsule, when the hot end of the inner capsule was tested with the helium leak check. I was surprised that they didn't test the two cold ends with the helium leak check. That would have been so easy to do. And if a sintered pellet could be put into the inner capsule, it certainly could have been put into the outer capsule also in the same check that seems to have such great validity could have been applied also to the outer capsule, and that surprised me. It still surprises me...

...these are those still available.

A: The one area right now, well, we have not done this yet, is the purchase orders. We know where those records are. We have not got into it, to, and we cannot right now say what's in those records. We know where those records are physically located.

- Q: Okay. Could you just make you a note that one of the things that we'd love to see would be a copy of the purchase order for the basic material, the specifications that were attached to those purchase orders and the memo to the file by the negotiator?
- A: A copy of the...
- Q: Now those are just three basic items. A copy of the, of the purchase order or the request for quote or proposal, usually on the vendor, that will be the same document. But I don't know what Rockwell's system was. Anyway we want, we want the request for quote that went out, the request for bid or whatever that they use, the specification that went out with that request and the signed copy of the purchase order. So it might be three or four pieces. And also the negotiator's memo to the file of that buy. For each one of the purchases of the raw material of the cesium. If you've got files I'd be glad to take a look at that for you.
- A: Okay. You're talking raw material, you're talking about right now the stainless primarily, right? Okay.
- Q: I guess I'm just a little bit, and again I'm, I'm from the Procurement area, a novice in the area, and I guess in looking at eighteen of these things, twenty-seven of them I guess, six, twelve, and nine, what type of procedure would have been in place whenever they saw for example that three of these had these, did they actually look, did the people that were doing the work this time, were then knowledgeable and aware of this...
- Q: Are you talking about in the '88 time frame or back in the late seventies and early eighties?
- Q: No, I'm talking about the time that, that they were actually putting these things in place, that the work was actually being done. Were these people actually looking at the, did they have the knowledge that you have here concerning the, this...?
- A: Okay, we have, okay, we have twenty...
- Q: The 22, 30, and 37 percent and the three that was in the 50 and 55 percent range. Did the people at that time actually have...?
- A: Those people back then were fully certified. Okay.
- Q: Okay.
- A: That's the only comment that I will make right now, is that they were fully certified back then.
- Q: Well, I guess I'm, again just being purely novice in the area, but if they have the knowledge for example of this twenty-seven, thirty percent weld and what would they have done or what should, what was actually done, what was the procedure in place for reviewing that with someone else or...?
- A: The judgement call or the call made back then on all six of these is that they all made the fifty-five percent weld penetration criteria.
- Q: Okay, would that judgement have been made by the welder?
- A: Well, it would have been made by the individual reviewing the traces. Okay. Which was a QC individual.
- Q: It was a QC individual?

A: Okay. QC, what happened was QC started reviewing the traces in August of '79, okay. In November of 1984, QC went back and reviewed all traces that were not previously reviewed prior to August of '79.

Q: By reviewing traces, you mean all the...?

A: Evaluating, evaluating these pictures.

Q: Evaluating the pictures?

A: Yes.

Q: Okay. The actual weld inspector was not a QC person?

A: The individual who, the actual machine operator of the UT equipment was not a QC person.

Q: He wasn't, okay.

A: Okay, a, the role that the QC people played was reviewing the traces.

Q: Okay.

Q: I guess the thing that sticks in my mind, is that we can go back now as the Monday morning quarterback and take a look at the records and...

A: Yes.

Q: And you questioned, why wasn't it ever done when it was being manufactured? I mean, especially in view of the fact that we, the sensitivity of this thing, why wasn't...?

A: Okay. Let me make the statement I think I just made, okay. There are six of those that we judged in 1988 not to meet the criteria. Those same six were judged in the '79 to '82 time frame as meeting the fifty-five percent criteria. Different set of eyes. Okay.

Q: Also possibly a different type of equipment?

A: No, because what we went back and reviewed were the traces from the records.

Q: Whose paper?

A: All we do, in the 1988 time frame, all we did was go back and did a second call on the same piece of paper.

Q: It's essentially like grading apples or eggs. One guy will call it one way and one another.

Q: Okay. I was just thinking the recent, okay, I was thinking recently, okay we were, yeah, I was thinking when they went from C...

Q: C scan to the X-Y in water...

Q: ...yeah, the X-Y. You still get the same piece of paper and result at the end.

Q: I think that's all the questions I have.

Q: Okay. Were there any QA/QC audits of the WESF operation, formal audits where the quality assurance department went in?

A: Do not know.

Q: Okay. Are there other question? Bob, we certainly appreciate your help and, and we will appreciate even greater your help in getting these two other gentieman to come down.

A: Okay.

Q: We are open this afternoon, and we would really love to have them come by.

**END OF TAPE**

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**Jim Logston**  
**Westinghouse Hanford Company**

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## JIM LOGSTON

Okay. It's 11:30, and this is July the 21st. We have Jim Logston with us, and Jim is, did some of the ultrasonic testing, the helium leak testing from a quality assurance standpoint of the capsules. And Jim, maybe you could tell us when you started doing this and how many you personally dealt with.

A: Oh, it would be difficult to really tell you exactly how many that I dealt, quite a few of them. I started for Rockwell in '80, and I think I was at WESF probably in the latter part of '80 or '81 somewhere in there is when I actually started. And then I left that area probably around '83 or '84 time frame. I was transferred over to another facility. So, '81 to '83, '84 time frame was basically what I was involved in.

Q: Okay. The primary question or that is associated with the ultrasonic testing. Did you feel that was a real reliable technique to determine weld quality?

A: Well, at the time I felt that it was. I know that engineering was not really enthused about it at the time because we were rejecting quite a few capsules due to the fact that they were showing less than seventy-five percent of weld penetration. And that's when they decided to come out with a least stringent of fifty-five percent due to the, due to them testing and cutting up. What they'd do is they would weld the cap, capsule together and then they'd cut it up and then they'd do the test on it, and it did show ninety-nine and nine tenths that it was a hundred percent or better.

Q: Okay, we just heard Gene. You were, Gene Reep, say that they cut a variety of capsules up, and they all seemed to be through welded. Where as the ultrasonic tests might have shown less than that. Now that's a conservative approach, but it does leave a considerable tolerance band on the inspection technique, which leaves me a little uncomfortable. How does that, how do you feel about that?

A: Well, at the time, when we were doing our scans, I felt that engineering was putting out the criteria for this, and if they felt that it was, you know at fifty-five percent through all the testing that they've done--I as a quality person, I have to verify that everything is done out there per what engineering people want. That's my job. If they change it and they have the documentation to back that up, there's not a whole lot at that time that I could have done. I just have to go ahead and maintain the quality that they want and make sure that it stands up to the minimum requirements.

Q: How'd you feel about checking a weld for fifty-five percent penetration, when the standard against which you were comparing was a seventy-five percent penetration.

A: Virgil Blanchard would probably be able to answer that question a little better. But he had a formula that he put together for us to do that with. And there was a formula that, that helped us out drastically on this, when we are comparing our actual standard to the capsule that was, that we were scanning. I, I felt that it was, at the time it wasn't bad at all. Plus I had the back-up of that formula, and I had my Level 3 helping me out, throughout the entire process. If I really had a question on that, and if I really had some problems, he would come over, and he would look at it, and he would discuss it with engineering and, and if it was bad, we'd write an NCR and go from there. So basically it was off my shoulders. It was the Level 3 and Engineering.

Q: Did the helium leak check, in your mind, provide a better check of weld quality than the ultrasonic technique?

- A: Now, we have to back up a little bit. The only thing that was helium leak checked was the inner capsule. The outer capsule was not helium leak checked. Now the inner capsule was not ultrasonically inspected except for the shop welds. The only thing that was done was the hot end that was welded once they poured the cesium into the capsule, they'd have a disk, a sintered disk that they would fill up with helium, and then they'd weld the outer cap to it, and then we'd do a helium leak check on that only. The ultrasonic was done on the outer capsule only.
- Q: Then maybe I can ask the question more objectively. Do you feel a helium leak check is a better check on weld quality than on a ultrasonic test?
- A: For the inner or was...?
- Q: Either, just generically.
- A: Generically? Both of them support each other I feel.
- Q: The obvious question is why didn't they put a sintered helium impregnated disk in the outer capsule and provide that back-up check then on the outer weld also?
- A: I don't know if their dimensional would have been able to do that. There wasn't a whole lot of room in between.
- Q: Create the room.
- A: That was engineering's decision on doing that. I, I can't answer that question. But when you have two NDE systems working, they, they work together. Like PT and UT. Both of those work in conjunction with each other. PT, the only thing that's going to do is, is basically surface discontinuities. Ultrasonic is going to pick up anything that's below surface. All they're doing is complementing each other. That's basically all they're doing. And engineering at that time felt that the ultrasonic would suffice for the outer capsule.
- Q: These two weren't complementing each other.
- A: No, that's what I'm saying.
- Q: Okay.
- A: They're not. But I said they could have been if they, if engineering wanted it. And engineering felt that the ultrasonic would be sufficient for the outer capsule at that time. I'm sure, or they may have wanted something else.
- Q: Isn't it an obligation also of a quality assurance organization to not only follow orders but to feed back to the engineering organization that's doing those specifications to say, "Hey, try something else?"
- A: Our Level 3 did at that time.
- Q: And a decision was made not to listen.
- A: I can't answer that for all the quality assurance people. No, for the management at that time, there's just no way to answer that question. Because everyone had different philosophies at the time. We have different philosophies now. That's changing; it's always changing.
- Q: On the ultrasonic, let me ask your feeling about this. Here you're doing an X/Y scan, and here apparently it's a standard which is magnified here for a hole which you are doing for a



flaw. This is the standard which you are doing for percent penetration. Now if you have a, if you have a crack which is coming through from this side, this being the top and this being the weld seam, if you have a crack or a pore left in that weld, if it's smaller than ten mils which really doesn't resolve on here, but do you think there's a good possibility that ten mil or smaller cracks or holes could be left in there that would not be detected by UT? Now remember this crack is going to be oriented like this. The standard you're looking down on it like this.

A: Your sound I feel, would have picked it up because your resolution and sensitivity as long as your, your holes are being picked up here, you should be able, your sound would not attenuate through there. And you'd, I feel you would be able to pick it up.

Q: Well, there again, remember it would be at the most a line going across that way.

A: Yes.

Q: Very faint.

A: It would, there is some laminations and stuff that we picked up...

Q: Yeah, I know you did laminations and...

A: And some of them were pretty small and they were, the UT was picking it up.

Q: Yeah, they have a better chance though because it will hit and echo right back.

A: Yeah.

Q: This one is just going to be on the edge of a crack and...

A: Well, you're talking on the outer or the inner? I, I'm talking inside in, you know like if we did a visual on the outside of those capsules also.

Q: I'm talking about through the wall of the outer capsule at the weld.

A: I, I felt that at the time that it would have, might, the set-up on the machines were continually watched and I, we watched the monitor and the CRT, and as long as I was there I know that it was checked. And I felt that it would have picked up anything that would have been detrimental...

Q: And the X/Y?

A: ...to the weld on the X,Y,Z and the whole thing.

Q: That gave a better indication than the C scan that you used earlier?

A: I wasn't involved in that first one. That was, I felt, was not the best set-up. That's why they changed to the different system. Because on that first one, from my understanding, I wasn't involved in it, but they had to do three separate scans. One on each one of these. They had to do one scan here, and then they had to do one scan here. And then they did the actual capsule.

Q: That's the way they did that one. This one here, that they all three of them just sit here, and they just rode back and forth, and it does them all.

A: This one, yeah, right, the actual transducer and, right.

Q: Have you got a recommended dye penetrant to do the test of one of these hot capsules?

A: No, we never did.

Q: No, but we're going to do it in Oak Ridge, and I just wondered if you have a good recommended penetrant that might be able to take 400° C.

A: I was going to say, you have to, there's so many of them out on the market right now, that you'd have to do some research because these capsules go up what, seven hundred, four hundred and seventy-five degrees?

Q: They'll probably be up to 400° C.

A: You'd have to go through the manufacturers to really to..

Q: Okay. I just don't want to wait until Oak Ridge get them and say, "Oh gee, we don't know what." I wouldn't know out of the top of my head what penetrant to use.

A: Virgil Blanchard would. He, he's been keeping up on all the different penetrants and stuff. He might be able to answer that question for you. I haven't been keeping track since I've been out of the NDE field for quite a while now.

Q: Somewhere we got an impression that for the first part of this project, QA had very little involvement. The operation people ran it, but starting about '83 it did have a lot of involvement. And then you went back and re-read the traces. Does that make sense or how do you remember it?

A: You lost me there. I don't...

Q: Early on, QA...

A: Okay. Are you talking helium leak checking or UT, or both?

Q: What I wrote down is no certified records or QA records. QA barely involved up till '83, then they were fully involved in the latter stages. Now that's what I wrote down. Either as a result of talking to Gelman, yeah, it was.

A: I think that's pretty close to it. We, you know, we were on again, off again on our helium leak check. On our UT, we were basically involved all the way throughout. As long as I'd been here anyway.

Q: And you were there in eighty, year eighty what?

A: '81 basically. We were in all the UT.

Q: Were you involved in the bubble test too?

A: No.

Q: Okay. We were trying to get somebody to explain how it could work because...

A: No, I was not involved in that bubble test.

Q: I don't have anything else. I would, if Virgil comes, I would like to talk to him.

Q: Willis? Judy? Roger?

A: But like I said, Virgil would, he...

END OF TAPE

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**Ed Proudfoot  
Harry Kohl  
Westinghouse Hanford Company**

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## PROUDFOOT/KOHL

Okay, it's July 20th, about 1:30 in the afternoon, we have the privilege of talking with Mr Ed Proudfoot and Mr. Harry Kohl, and the committee is here in entirety except for Mike Jugan, who will be coming on in a little bit.

Q: Okay, I think we would like to talk about Quality Assurance aspects of the cylinders first. In particular, was, what were the Quality Assurance aspects in starting at the beginning, what were the Quality Assurance aspects that were put on to the material, the cesium chloride that was coming into the facility?

A: (Kohl) Unfortunately, I'm not the person who can answer that kind of detail. I had managers that were working for me that had people working for them that were actually involved in the details. I was not personally that close to the process. I knew, you know, the generalities of the process; I'd gone and watched some of the welding ----. I've gone to B plant, to WE3F, and watched the encapsulation process and the UT scans. I've watched, you know, did an overview, but, unfortunately, I've not been anytime really involved in the details of the activities of that encapsulation system.

Q: Can you tell us some names of individuals who might...

A: (Kohl) Sure, and people that are still around, and that's the difficult part.

Q: Right.

A: (Kohl) Now in the, in procurement, I believe there's a Quality Engineer, Cliff Hover, who was involved, if not Cliff Hover then Dale O'Donnell. One of those two should be well aware of the procurement of materials of the capsules that we were involved with at the time.

Q: What was the last name? Dale...

A: (Kohl) Dale O'Donnell.

A: O'Donnell.

A: (Kohl) Yes, Donnell.

Q: Was there a procurement guy or a QA guy?

A: (Kohl) They're both procurement and Quality Engineers.

Q: Do they work in procurement or QA?

A: (Kohl) They work in QA.

A: QA.

A: (Kohl) Right, and their manager's name is Jim Lauck, (spells out) L-a-u-c-k, and they're here in the eleven hundred area. (Pause) In the fabrication area, the fellow I can recall who was involved in the capsules and the buy-off of the machining of the endcaps and the welding was a fellow named Bill Emshousen, (spells out) E-m-s-h-o-u-s-e-n. And Bill is a quality control technician. His manager is named Steve Scott, and he is still in the 200 west area. Now, the NDE specialist, the Level 3 that did a lot of work on the capsules, is Virgil Blanchard. Virgil is currently working for Process Engineering, and I don't know who his current manager is.

He is no longer in Quality Assurance. The fellow who is involved in the WESF encapsulation process was Jim Logston. Now Jim is currently back in Georgia; he's been there for what the last several weeks now, but he's the only one I can think of right now that was around at that time at the WESF facility. Now the two managers, Bob Caddick and Jim Deer, both Rockwell people that Jim Deer went with Rockwell when they lost the contract and Bob Caddick retired, he's up in, Coer'd Alene now.

Q: What was Jim's last name?

A: (Kohl) You mean the manager?

Q: No, the guy that was Logston.

A: (Kohl) Logston (spells out) L-o-g-s-t-o-n. (pause) I'm not helping you here an awful lot because I, I am just not that familiar with the details of the process, but those are the people who were actually involved in the process itself.

Q: Okay, let's try another tactic.

A: (Kohl) Okay.

Q: The Quality Assurance system that you had in place was, we were told, not up to NQA-1 standards.

A: (Kohl) Yes.

Q: Could you tell us what QA system you were following?

A: (Kohl) We were following NQA-1 with a letter of exception to DOE. The basis for our quality system was NQA-1. We had a matrix that we used where we could identify any activities that were in compliance with NQA-1 and to say that we were non compliant is not true. Like I'm trying to think, some of the record storage requirements did not meet NQA-1, there were, seems to me, calibration system that did not meet NQA-1, but overall the quality system was in compliance with NQA-1.

Q: And, but that was an evolutionary process?

A: (Kohl) Yes.

Q: So, was it that way during your entire tenure there with those capsules?

A: (Kohl) Yes, I would say it was pretty much that way through the time Rockwell left.

Q: Mike, you want to go into the QA system any further?

Q: Well, I guess except where was the QA system in '74 when they were starting?

A: (Kohl) Well in '74 I have no idea what I mentioned before, I came on board in '81 from outside the company, and Rockwell took over in '77, I believe it was '76 or '77. At that point in time, let's see I don't, I don't believe NQA-1 was released at that point and time, it almost seems to me they working for the RDT standards...

Q: That's what you worked too on those tubes.

A: (Kohl) Yeah, we worked RDT-F-2-2 on the duct program.

- Q: Can I asked a question?
- A: (Kohl) If you want to.
- Q: You did have, you said you had, you were up a couple of layers, a couple of layers underneath you did have the responsibility for the QA?
- A: (Kohl) Yes.
- Q: Well along about the '84/'85 time frame, thereabouts, there was some questions that began to be raised about the possibility of these capsules been put out to the private sector, and we know at least that there was some meetings, there was one meeting that was attended by some folks that talked about some of the potential problems that could develop and some of the concerns. Were you in on those meetings?
- A: (Kohl) No, no I wasn't in on any of those meetings. Now it's...
- Q: Could you care to elaborate, kind'a feedback that you would expect from you're people if they have QA and QC concerns in an organization such as the kind there that was manufacturing these capsules?
- A: (Kohl) I would expect feedback from them?
- Q: Yeah, I mean if they have concerns about these capsules and the safety and the problems that potentially could develop in the hands of a private contractor, how would that flow of information get back to you as the guy that is responsible? You were responsible at that time for the QA program.
- A: (Kohl) Yes.
- Q: How would you expect to get feedback on that information?
- A: (Kohl) I would expect the, the feedback would come through the quality representatives to their managers if there were concerns. Now, I know there were concerns at that time, and I'm really trying to recall, and unfortunately I'm really speaking off the top of my head, that there were problems in the weld penetration, the UT scans. That's where Virgil Blanchard, who is NDE Level 3, really got involved in this. And he was working with engineering and, did we have the right kind of UT system to be, to be measuring weld penetration? Could we really detect the inclusions? I know they did a lot of sectioning at that standpoint and they, they made some sample did UT scans from, that's pretty well documented.
- Q: What's his name again?
- A: (Kohl) Virgil Blanchard (spells out) B-l-a-n-c-h-a-r-d.
- A: (Kohl) I got, got it right there.
- A: (Kohl) Yeah.
- Q: Can you give us...
- Q: Was anyone, was anyone, well let me, I got two requests done. Did you have anyone talk to you about the concerns, about the problems, as the guy in charge of QA for that organization? Does anyone, has anyone discussed it with you or talked to you about it?
- A: (Kohl) I'm not sure of what kind of problems you're referring to.

- Q: I'm talking about the potential for leaks and hands on contractor, the identification of those leaks, the cover up of that capsule.
- A: (Kohl) No, I have had no discussion on that.
- Q: There was no discussion?
- A: (Kohl) No.
- Q: What are the concerns that have been expressed in that area?
- A: (Kohl) I was not.
- Q: You were not?
- A: (Kohl) No, I was not.
- Q: Were at the meeting that took place were some of those things were apparently...
- A: (Kohl) I wasn't even aware of that. Now it's possible that my boss was involved in that. That was the Director of Quality Assurance, and it may have been that on the level that he was involved in this and I was not.
- Q: When you found out that the capsules, at least the consideration had been given, of putting them in the hands of a private sector?
- A: (Kohl) I didn't know that.
- Q: You didn't know that?
- A: (Kohl) No, I wasn't aware of that either.
- Q: If I can jump back, I'm sorry. I guess I'm a little bit concerned with the flow of information that takes place that you would at least, would that not be something that, that QA/QC people would have a concern about?
- Q: See, we need...
- Q: For example, we were told this morning that back in '81 that there was some development at least engineering development began to be started in the area of identifying a defective capsule, a recovery system for those capsules, and so forth. So probably there was some concern, the confidence level was not all that high, that there was never going to be a leak down the road.
- A: (Kohl) Yeah.
- Q: I guess the question I would really like to zero in on, in view of the fact that these things that we really did not have that much experience with at least over a long period of time, and there was some concern. Wouldn't that be the type of thing that would flow up through the organization to the QC/QA guy?
- A: (Kohl) If it had really been considered serious enough it certainly would have been. But, you know, if they were involved in it, and I'm not aware of the fact that they were involved in it. It may have been handled right at the first line management level, and the quality representative in the Level 3 NDE.



- Q: (pause) I had two questions. One was you mentioned some studies of correlating the effectiveness of the UT process to the detecting bad welds. Can you give us a name of some of those reports, and maybe Roger could formally request them for us?
- A: (Kohl) Again Virgil Blanchard was the one who worked on that and did the exercises with engineering. Virgil, I think, could pinpoint those pretty well.
- Q: The other question was, did the QA organization as a whole do any appraisals or audits of the WESF production...
- A: (Kohl) Yes.
- Q: and could we...
- A: (Kohl) Now that was another organization, it was part of QA. See what you have to understand, the QA organization was different then it is now. We had, Bob Hammond was our Director of Quality Assurance. Bob is with Rockwell and has gone back to California. But he was in a box up here, came down and there were two organizations reporting to him. There was Quality Assurance Program Development, and Quality Engineering and Control. I had Quality Engineering and Control, and I was pretty much the hands on inspection, Quality Engineering activities. And so the audit activity was over in the other branch, the Quality Assurance Program Development. But I am sure of this, I know that there were audits performed in the fabrication area, there were in...
- Q: Somebody called in?
- A: (Kohl) Yes.
- A: (Kohl) Okay.
- A: (Kohl) There was at least one audit performed of the WESF operation. May have been two, I'm not sure of that. The person--the best person to contact would be, I think, Doris White, and she would have access to any of those audit record files.
- Q: I have a question, are you done?
- A: (Kohl) Yes.
- Q: In light of the, in light of the fact that they manufacture of these capsules were done on, in a evolving QA environment if you will.
- A: (Kohl) Yes.
- Q: And basically after, after all these standards had improved and so on and that evolution was nearly complete. A lease program to take these out of hands of protected storage and make them available for the lessees. Would it have been a reasonable kind of thing to have a wholesale reinspection, if you will, of this as essentially a new use, if you will, for it. Seems like, it seems to me like in light of the whole evolution that, that that might not have been, that might have been a good idea and prudent thing. And I'm curious if there, if you were involved in proving to or know anything about any discussions or thoughts along that line?
- A: (Kohl) No, I don't. I would say this. With the program we had established, unless there were change of requirements or acceptance criteria, I doubt that they would have been any kind of wholesale reinspection of the capsules.

- Q: The change in program if you will or end the use of it wouldn't necessarily have triggered a reassessment by QA?
- A: (Kohl) No, not in and of itself, not unless there was a change of acceptance criteria.
- Q: Roger in a point of one of the letters that we referred to this morning, apparently that question was raised within Rockwell, and the decision was made that they didn't want to do any other verifications. So that it was raised, but it doesn't say why the decision wasn't--it doesn't state the basis of why they came up with that position. And the person that wrote this, and I think were going to be talking to him, is Darryl Lamberd.
- Q: Roger, back on Mike's point, could we get a copy, could you see that we get a copy of any QA audits and surveillance of the shop where they did the cold welds and the WESF facility?
- A: (Kohl) We'll pursue it with the folks at White's areas; we'll make some phone calls and see what we can do.
- Q: Okay, I'd like to forget the reports and go ahead and get the resolutions.
- A: (Kohl) I think with the, with the audits, now I certainly don't want to put words in their mouth, but I know they are very sensitive to releasing copies of audits, I'm sure what they would be willing to do is have you come out to the 200 area and take a look at that, the audit files, they'd be perfectly open to that.
- Q: (Hultgren) Ed, you had a series of questions that you gave Bob Gelman and...
- Q: (Wright) I gave him a lot questions but apparently he's not prepared to answer them, like because he wasn't here, and maybe the guy in QA Engineering and Procurement is the guy we need to talk to. Were there vendor visits made on the raw materials for the tubes and the endcap plates and if so?
- A: (Kohl) You know, I'm sure questions like that are going, you're just going to have to go back and take a look at the record files, but the files should be available.
- Q: And were the deviations from the specifications accepted by your organization somewhere along the line? If so, what were they? And after you got them, WESF got them, what did they do with them, what kind of...
- A: (Proudfoot) We're stuck in between there. I know this that, like the endcap material came in a plate and that was UT scanned. Okay, now where they found inclusions, it was actually marked...
- Q: We found a lot of deviations out there.
- A: (Proudfoot) That's right.
- Q: I guess they had a standard drilled hole up from the bottom and pick that up or what.
- A: (Proudfoot) I don't recall that exact size.
- Q: We'd like to understand that (everybody talking)...
- A: (Proudfoot) If I could interrupt, there was a standard there with a flat bottom drilled hole, and I remember the size of it now, there were probably two or three drilled holes.

- A: (Proudfoot) Well, I was trying to remember the one they used for acceptance, and I don't remember if it was a quarter inch or what, but yes they did have these things.
- Q: Well those are the things I was looking for answers to and the control of the material after he got it and the record of any deviation on a cesium chloride feed material you have to spec for it. And what if it was out of spec, just a little here and a little there, were there deviations, if so how do you handle it? And looking for a record of poured capsules that were partially filled, like you're filling 7 and you would only complete 5 complete and 2 partial, and I understand some of those, if they were like two-thirds full they went ahead and welded an endcap on. Some of them they sent back and waited till the next pour and then filled them up and that would make those more subject to cesium contamination in the welded area, plus they sat out in the air a lot longer, and how do you verify cleanliness prior to welding. I mean I can go through this list, but they have a copy of it.
- A: (Proudfoot) Yes, I saw a copy of it.
- Q: (Hultgren) Are there any of those questions you can answer?
- A: (Proudfoot) No. You know, I can make some guesses at it, but that's not what you're interested in.
- Q: We really don't need guesses, that's for sure.
- A: (Proudfoot) What really needs to happen here is to get people involved, take a look at the records and go back and see what, what we can bring out of it.
- Q: Okay, Ed you've got the records, is that true or do you access to them or you've been working with them.
- A: (Proudfoot) No, I don't have the records you are asking about.
- A: (Proudfoot) I think most of the records you're going to find are out in 2101 ---- I'll look out in the 200 area.

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**Eugene Reep**  
**Westinghouse Hanford Company**

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## EUGENE REEP

- A: (Eugene Reep speaking) ...and as far as my background and association with the Waste Fractionization and Encapsulation program. In January 1982, I was assigned as Program Engineer for that program, and I was responsible to the Program Manager who at that time was P. F. Shaw (Pete Shaw). I was responsible for all of the engineering activities associated with the program. This included engineering changes needed, improvements in the Waste Encapsulation and Storage Facility (WESF) to improve production, productivity, and to take care of production problems. Also looked at long term solutions to potential future problems and in particular there was a concern expressed about the potential failure of a cesium capsule. We thought a capsule failure would be remote in our storage conditions. The probability being very remote, bordering on what we estimated to be incredible. Nevertheless, accidents could occur that would cause capsules to fail, and so based on that we identified and had studies completed on how to recover or prevent failure of capsules. Some of these were such things such as designing pool cell cover blocks so that they would not fall into the pool cells and putting a remote control system on the crane so it could be operated from outside the pool cell area (the same area you saw here earlier this week). Another key item, and it became an item of highest priority, was a way to recycle our potentially contaminated cooling water from the WESF back into our B plant, which is our chemical canyon processing facility. There we could recover the isotope of concern, either cesium or strontium and concentrate the waste streams and transfer it to our tank farm facilities for storage in underground million gallon tanks. Of course, this would be a very, very remote possibility, but we needed to be prepared for that. And so the first thing that we designed and installed, starting about 1983, was a pool cell flushing system, which was operationally tested several years later. We had mechanical problems to overcome, but I think in about '85 or '86 we had those systems installed. This way we could remotely pump out our water basins and get the water out of there, replenishing it with fresh water. Up until that time, we would have had to have done it manually by putting fire hoses in the pool cells. The original facility was not designed with these safety features as part of the basic definitive design. As I recall, there were several other safety related upgrades, but they did not deal directly with the capsule storage basins. One was a ventilation control system upgrade for the WESF so that we could control contamination a lot better in our operating cells and in the canyon. Also, our main ventilation system, which is our K-3 Ventilation System had a problem in that the duct that goes under the cells and out to the main filter banks, which are in underground boxes. There are two filters, an east and a west filter. The duct to the filters had become contaminated years ago with a process upset. That contamination had a way of working its way out to the filters, and then we had to change these filters out, which was very difficult to do because we did not have a roughing wash down filter capability. This is a new project, which you may have seen with all the dirt on the southwest corner, of WESF. That project was started in 1985, and it's now reaching completion. It should be completed in the fall of this year. It will provide a prefilter wash down capability to get large amounts of contamination that might come down the filter duct and become collected on the filters. If that should happen, we would wash the prefilters down, collect the waste water, and pump it to a storage tank and back into the waste handling system in the B plant. And this was probably one of the greatest environmental improvements that we've provided at the plant. Following Program Engineer (I served in that capacity for about two years), I became what we called in Rockwell an Activity Manager. And in this role, I reported to the program manager who at that time was K.A. Gasper. This was in October 1983. As Activity Manager, my responsibilities were somewhat changed. I was responsible for the general program support, which included safety analysis, QA, general program support, and engineering management systems, and in addition to that I had the capital construction projects and capital equipment under my responsibility as well as technology. With WESF going into stand-by, there wasn't any technology needed for WESF because it wasn't operating. The fact that WESF was going into stand-by also changed the complexion on our ability to support funding requests for upgrades.

- Q: October '83 was the time frame when the last capsule was really made, isn't it?
- A: The last capsule was made in January 1983. This was a strontium capsule. Cesium encapsulation was completed about a year earlier, I believe. At that time, I was Program Engineer, and the cesium line was finishing up and working very well. The strontium line had a lot of problems, primarily in the furnace area and taking care of some little things that occur in processes that you have to work around. My responsibilities also were to act for the Program Manager when he was out, or unavailable. This was important, particularly in the 1984 time frame when there was a lot of activity associated with preparing to lease the cesium capsules. We both were sent back to DOE Headquarters for a meeting in October, I believe it was in 1984. A one or two day meeting was held with representatives from several of the DOE sites, Albuquerque, Oak Ridge National Laboratory, Rockwell Hanford Operations (Rockwell), and PNL. Ken Gasper and I represented Rockwell.
- Q: Was there anyone from Richland Operations Office?
- A: I believe there was an individual. I have the complete minutes of that meeting if you would like. I took the minutes for the meeting, and they were reviewed by the Department of Energy at Richland, and they made some suggested changes, and they were issued as the official minutes of the meeting. They were quite extensive, and you may wish to have a copy of the minutes.
- Q: Could we have a copy of the minutes of that meeting?
- A: Yes. The minutes have a lot of information. It talked about responsibilities for, who had what responsibility and, and of course at that time we didn't realize a lot of things that we realized several months and years later as to how we would really go about it. We didn't know if we were going to buy shipping casks, or the DOE was going to lease them, or if the commercial radiator was going to lease them.
- Q: At this meeting, was there any reservations expressed? Was there anybody from, from any place saying, "Wait a minute, you know these capsules were made for one purpose, and all of a sudden we are sending them off site"?
- A: No, because our capsules at that time met special form requirements as far as shipping was concerned. The requirements were pretty severe. You can heat them up to 800° C, you can drop them 35 feet onto a hard object. The standard tests required for special form were exceeded by far. They had been used for a number of years in the CIDS irradiator at Albuquerque. (This is a dry irradiator). And one capsule had been evaluated at the end of two years of service, and essentially no corrosion was noted at all in the inner capsule and of course the outer capsule looked great. At that time, Oak Ridge was conducting, in cooperation with PNL, a number of metallographic examinations, and some of that work had been turned over to PNL in later years, and we had a series of five capsules tested. And I think it was documented probably in one of these reports that you have. Those are reports that I requested for the investigation committee because there is a lot of background there. It was a several year program that was funded out of our technology program. The reason I remember this is I was Program Manager of Technology at that time before I became Program Engineer for B Plant and WESF. I left the technology program and in that capacity, I was interested in continuing the corrosion studies at elevated temperatures simulating geologic disposal. This was prompted by the National Academy of Sciences (NAS) review conducted in 1976. But at any rate, they were concerned about the disposal of these capsules in a repository like the salt dome, where the capsules get very hot. They were concerned about the geological media, and we were concerned about the capsule integrity itself. So, for those reasons, we went ahead with those studies. They have now been completed. The last capsule was held at temperature of 450° C, approximately, at the cesium chloride inner capsule interface. At that temperature,

there is some concern because of impurities in the cesium; there are always some impurities. The impurities have a way of moving, as I understand it from our metallurgical people, and I'm not a metallurgist. They have a way of migrating to the surface, the interface, and providing additional capability for corrosion. Typically, when something gets corroded, I understand, after a period of time after the impurities are expended, then you have pacification and the corrosion stops. But, if you allowed this liquid to flow, you might have this and we were so concerned about that as a matter of fact. Later on, we will discuss some of the constraints that we put on the operating conditions of the capsules during shipments, which limited the temperature at which they could be shipped.

Q: I was saying the melting point of the WESF cesium, what would that be?

A: Well, pure cesium chloride melts at in the high 500's or low 600's C.

Q: Yes, we have the pure stuff melting at 645°.

Q: Okay, 645° C. We've had eutectics in our actual cesium chloride simulated in the labs melting in the 500° C area. But if the temperature of the cesium chloride is 450° C at the interface, it will be much higher at the center of the capsule, and so there are parts of it that might be molten and could migrate out toward the capsule wall. And at the weld, we wouldn't expect cesium to be molten at the interface.

Q: I see some of the documents that said the melting temperature might be as low as 430° to 450°.

A: I don't know what to say on that. In the information that I recall, the, the melting point of CsCl was based on test runs conducted by PNL. Dr. Garth Tingey of PNL could supply all of these references and could explain that to you. I don't know. I really don't. But we were concerned that we would not have that occur with some margin of safety. You never operate a facility at the ragged edge of technology. You always provide a margin of safety for your operating conditions. And so, although we recognize that the cesium chloride should not be melting at 450° C, in fact it should be much higher than that, we didn't want to jeopardize the condition of the, of the inner capsule. And we put a temperature limit on the cesium capsule. The concern was that at the elevated temperatures, the inner capsule wall could corrode through in something less than twenty years. That's based on the latest report that came out on the fifth test capsule. Another report will be coming out soon on the results of the sixth test capsule, which was opened at Oak Ridge, and I think parts were evaluated by PNL here recently.

Q: Is the report out for the fifth capsule?

A: I think it is. At least in draft form. And again, Dr. Tingey of PNL. (phone number's 375-2419) could tell you.

Q: 375-2415?

A: 2419.

Q: (Jensen) We have that in our, in our portfolio...

Q: (Jugan) We do?

Q: (Jensen) ...in draft form, in the latest draft...

Q: (Jugan) We do?

- Q: (Jensen) ...yeah...
- Q: (Jugan) Oh, good.
- Q: (Jensen) He gave it to me. It's not released or anything, but he gave me. It doesn't look like it's in draft form.
- Q: (Jugan) Okay.
- Q: (Penry) Okay, back to this October of '84 meeting. Apparently at that meeting, the gist of it was more the logistics. Who does what, how are we going to take care of the transportation, and things of this nature.
- A: Yes.
- Q: But prior to that meeting were you involved in, or were you aware of any questions that, whether it was just off of the top of someone's head saying, "Hey, exactly, you know, how are they going to use this in these facilities, and are there any, the applications that they made, be thinking about, you know, should, is there any concern...
- A: Yes.
- Q: "...that we may look at?"
- A: At that time in the early stages, we weren't even certain which irradiators (some of them weren't even built yet) or what the process would be. We were not concerned particularly about a dry/dry irradiator, which is dry storage, dry operation. Because that's essentially what we had at Albuquerque, and at that time it had operated a number of years without any problem. We had evaluated one capsule and were in the process of evaluating several additional capsules for a total of three out of the nineteen shipped there. These capsules were shipped to Albuquerque in the late 1970s. The first capsule was evaluated in 1982, and two more capsules were evaluated in 1985. The results were no corrosion. Not any more corrosion than we would occur at the initial cesium pour. There was a small, minor amount of corrosion upon the initial pour and then none thereafter.
- Q: Okay, this Albuquerque project. This was a DOE-Sandia project.
- A: Yes, it was operated by Sandia for the government, for the federal government.
- Q: Okay, so did the fact that it was a government operation versus a private operation and the fact that maybe some of the procedures and safety procedures that were in place may be a little bit different? Did anyone discuss that?
- A: Well, I would explain our responsibilities in this way. Our responsibilities as explained at that meeting and ever since, had been strictly in the following: support capsule shipments, do a visual inspection of the capsules as they leave, provide a sorting plan so that we could, in a equitable way allot capsules to the various irradiators so that we could keep track of the capsules that went to each irradiator for each of their respective leases, and to provide whatever technical briefing or information requested by the respective commercial irradiator owners. Those were our instructions.
- Q: Okay, who, at this meeting, who's responsibility was it to make the final determination whether or not these capsules, the applications that were being proposed, were appropriate?
- A: This would have to be the Nuclear Regulatory Commission, they would have to license the operation of the facility. It was our understanding that the Department of Energy did not



have the responsibility to license facilities that were out of their purview, like commercial irradiators. Now the one that was operating at the Sandia laboratory was a DOE facility and, and they were at that time designing one for the city of Albuquerque. That one would have had to have been licensed and I'm confident that there were discussions at, preliminary discussions, about the safety and use of this facility. They had an advanced design, it may have even been to the definitive design or at least advanced conceptional design stage. So there probably was some licensing involvement, either from the state or the Nuclear Regulatory Commission. I am not sure. But Dr. Tingey and I were requested to go back to the Nuclear Regulatory Commission at the request of the DOE Headquarters, who was coordinating this effort, to testify. It was on an informal basis. It was before a, a group of representatives from the Nuclear Materials and Safety Systems Division. I think it's Cunningham's group, back in the Nuclear Regulatory Commission at Silver Springs, Maryland.

Q: When was this?

A: This was in 1984. This was prior to the DOE headquarters meeting in October 1984.

Q: Okay.

A: I believe it was. I'll have to verify that. I believe it was in the spring of 1984, and I think there were several trips back there. Garth and I both went back to answer questions. I was asked various questions about the use of the capsule, how were they made, what kind of QA we used, and what reference documents they could have. A lot of information was gathered and provided to the Nuclear Regulatory Commission. As a result of that meeting, Garth Tingey and I provided a lot of the information and gathered a lot of the details. I had a stack of documents I forget, was about that high.

Q: Do you have a, minutes to that meeting? And a list of the documents that they received?

A: Somewhere we have a list of the documents that were provided to the NRC. I will attempt to have my secretary search for the list of documents. Whether they used them all or not, I can't say.

Q: Do, do you know if NRC and/or headquarters saw the SAR of the WESF?

A: I can't answer that question. I don't know that they did or didn't. But, WESF was one of the few facilities at the 200 areas under, under Rockwell's control at that time, which had a facility Safety Analysis Report upon construction because it was a new facility. It was one of the newest facilities. It was built in 1974.

Q: We, we haven't seen that yet, but we understand there was one.

A: Okay. I may have copy of the original SAR if you're interested in using it. It's a relic right now because we have revised it. We've issued a new SAR and revised that one eight times.

Q: I would really like to see the one that was in use around the 1984 time frame.

A: The WESF SAR was being revised at that time, which was one of my responsibilities as Activity Manager reporting to Ken Gasper. The first revision was issued in 1985, I believe.

Q: Is that the first revision after '74?

A: Yes. We were not funded to do any safety, well we had none on B Plant at all of course and, and we had one on WESF, but it had never been updated. And so now we update it once or

twice a year, even though the plant's not operating, there are operation, operating safety requirements that have to be handled.

Q: Okay. What was the time frame for all the safety related upgrades to the WESF? When would you start those again?

A: We're still working on them as a matter of fact. We had completed the first and most significant one in the 1985-1986 time frame. That was the remote controlled pool cell flushing system.

Q: Okay, so you all had identified the need for these upgrades prior to all these meetings?

A: Yes.

Q: Okay.

A: We shared some of our safety upgrade information with the various irradiator owners. We have a documentation log or letter index which contains, I believe, all the external correspondence and even some of our internal correspondence dealing with the cesium capsule shipping program. And the reason we have that is about this time last year, we had the DOE Oak Ridge folks out here. Pryzbylek, what's his first name?

Q: Okay.

A: Tyler Pryzbylek. Bill Wistrum and Sylvia Wolfe were here, and then we had some representatives from the RSI, Allan Chin, the president and Bill Allen, the chairman of the board, plus one of their engineers, I think Jones. We had our legal counsel and DOE/RL counsel at the meeting. The concern was the shipping costs. Allan Chin didn't want to pay because, even though our estimates were high, and I admit that they are high, it was because of the way WESF was designed. It was designed to easily store capsules, but to ship them, it's a little more difficult. And although we, we got better at it, and under-run our estimates, Mr. Chin chose not to want to pay his bills as I understand it. As a matter of fact, as we speak, we are supposed to be having meetings with, with representatives from RSI out here, going over and auditing our books for that purpose. But we'd asked that it be held up a little bit until we get through this other issue.

Q: Gene, on this...

A: I'll get back to your question, Judy. Go ahead.

Q: ...on, on this point on the briefings and correspondence. Do you have, did you have any briefings with RSI on a technical nature about the sources or about their facilities and any documentation on it?

A: Commercial irradiator facility designs are privileged information which we are not privy to.

Q: Well, maybe along the lines of what you would have suggested to them?

A: Okay. We provided them, at the request of the Department of Energy, and we provided everything they requested. There was some technical information we gave to several different commercial irradiator owners we were dealing with. And what we specifically supplied Allen Chin, I do not know. But, it would be easy to find out because we would have a letter documenting it. We had the following information made available for all commercial irradiators: we provided all of our operating procedures and capsule handling procedures and shipping procedures. A whole package, including the flow sheet. We developed a handling flow sheet that was descriptive as to how we do it. In addition to that, we provided them

information on designs of capsule tongs that would be useful in handling the capsules so that you would not injure them. And we also provided some conceptual information on detectors; we told them that we had available a conceptual design, in fact a definitive design of a failed capsule locator. It was not fully developed. It was a water sipping system. We just completed development of that last year, but we had the designs of it, and we had prototypes we were testing at that time.

Q: Let me just clarify. You said you had it available.

A: Yes.

Q: Was there a, a program in place? Did you communicate that to the folks, to the RSI's and the Iotech's...?

A: No. The Department of Energy at Oak Ridge National Laboratory was responsible for communications to the irradiator owners.

Q: You would not communicate. You're saying...

A: Strictly on shipping only. Any problems with operations that impacted the RSI facilities, with permission from both my DOE monitor and the DOE folks at Oak Ridge, we would have communication. It got to be pretty cumbersome.

Q: I understand, but I, I'm saying you basically had this package available that you would have provided to anybody that wanted the, the information...

A: As a matter of fact, we did.

Q: ...operating procedures...

A: We went so far as to conduct tours. And I know Allan Chin was here and I think Chuck King was here. Did I say Chuck King was the chairman? Was that the name I used?

Q: You said that earlier.

A: Okay. Good. Both Allan Chin and Chuck King were here, and they received tours of the WESF facility. They may have even seen a demonstration of the failed capsule recovery equipment because we had them in prototype stage in the development laboratory.

Q: Okay.

A: And they were available. Whether or not they saw the operation of them, I don't know. They saw our tongs and how we used them in the pool cells. I don't know what information we provided them, but we can verify that with our documentation records.

Q: Well, Gene, the clarification on the availability of the equipment. Was the equipment was available to demonstrate (this is an important point) or available for somebody else to use?

A: It was not for someone else to use. The equipment was developed for WESF, pure and simple. If someone wanted to use our designs and develop similar equipment then they could do that.

Q: The designs were available...

A: Yeah.

Q: There was equipment available.

- A: We had equipment in various stages of completion. Some of which was far enough along in completion to demonstrate the principle. But as you can see, Ed, we were a long way away at that time from being able to actually implement it. In fact we were testing (OTPing) the equipment this spring when we got the call of this problem at Decatur, Georgia. Some of the equipment.
- Q: If he saw a demonstration of the prototype, what might he have seen exactly?
- A: He would have seen our remotely operable capsule overpack equipment which as it turns out did not prove out because of concerns for hydrogen explosion. But we didn't realize that until after the fact. After we had the first prototype developed and reviewed this operation, there was concern for hydrogen build-up in the overpack. We could accommodate that, but then that presented other problems and, and so we have gone to an entirely new approach. In fact, we had already decided that before the RSI incident occurred, and we're aiming at something in the direction that's being used at RSI. Something similar to that. Some kind of an overpack that we can put into the water basins and pull that capsule into that overpack or cask. It might be one piece of equipment, a heavy shielded cask, rather than a liner in a cask like we're going to use at RSI. Pull it up into the canyon and put it into the appropriate cell for disassembly and removal of the capsule. We had that as a new concept that we just are looking at in the last I'd say twelve months. Because the overpack had a lot of safety issues with it.
- Q: How about the locator?
- A: The locator was the piece of equipment that was probably applicable to RSI. As a matter of fact, we did send designs back to ARECO in Lynchburg, Virginia, and I understand they've developed some kind of a model after that. I don't know; I heard that. As far as other upgrades; the coverblock upgrade was being factored in as our funding became available. We are doing design on the coverblock protection this year. We had our coverblocks off the cells, and we weren't using them during processing. We didn't have our coverblocks on because during operations it was cumbersome to have coverblocks on the cells.
- Q: Okay. I don't think we need the coverblock upgrade for the RSI part. What might he have seen in the way of a demonstration of a locator?
- A: He would have just seen it laid out in the development laboratory in its various pieces. I don't know that we had the locator developed to the point to where he could have demonstrated anything. We had conceptual drawings. We had the concept.
- Q: Okay. I thought maybe you had something you could have shown him...
- A: No, I don't think so. As I recall, I don't think so.
- Q: Who would, who might remember? Was there anybody from the development organization who participated in any of the discussion and...?
- A: I forget who it may have been. Maybe Virgil Blanchard would remember. I wasn't involved in all of these discussions myself. We could find out from Process Engineering. Somebody can go and track back what the schedule was for development of the failed capsule locator, or as you call it, the water sipper.
- Q: The reason we ask, was Chin's answer to the State of Georgia on what they would do if there was a failed capsule back in the 1984 time frame was, we would get the locator from Hanford and ship the thing back to Hanford. And you know, there is, in fact, a report, in July of 1985

that certainly makes it look like the overpack and the locator are in existence and are a part of the WESF.

A: I don't know which report you're referring to.

Q: There is, there is a documented report, and I was surprised to read it...

A: Let's see which one...

Q: ...that says that, and it's dated July '85.

A: Yeah, but what's the title of the report?

Q: Well, here's the, there's the...

A: This is a flow sheet. I don't know what to say about this.

Q: Yeah.

Q: The first couple of pages somewhere say in there that the purpose of this report is to document what's in existence at WESF.

A: Um-hm.

Q: (Hultgren) And it was an important factor in the licensing process.

Q: (Jensen) It would appear certainly that...

A: Well, in any event, the locator might have served WESF's purpose, and the locator may have developed, but it was not operationally tested. Because we had problems with the detector. We had a lot of other problems. We're talking about several hundred thousand dollars worth of modifications to the water sipper just to make it usable down there at Decatur, and we're talking about several months of development effort. Okay? So I mean, even though Allan Chin thought we had an operational water sipper, it is highly likely that it would have taken months for us to modify it to suit his needs. That information you referred to wasn't communicated to Hanford to my knowledge.

Q: Doesn't it seem unusual to you that Hanford, the birthplace of these capsules, is going out and spending a great deal of money to take care of possible leaking cylinders. And yet we just placed these capsules in other facilities where this kind of equipment would not be available? And those other facilities are out in the private sector and really out in the public.

A: That is a concern for the nuclear regulatory licensing process.

Q: You do not feel it was a responsibility to...

A: I don't know that my personal feelings, would have mattered too much on the subject, okay? I have personal opinions and feelings, but I don't wish to express them here. I don't think it's appropriate.

Q: Were they ever expressed to the NRC and in the informational filings that they conducted before the licensing process?

A: I think the only concerns that were expressed to the NRC, were of a technical nature relating to the integrity of a capsule itself. Not to the locating of a failed capsule or identifying it and recovering from that incident. My information is that I think our technical people were

concerned about it. And that's one of the reasons why we got the package of technical information together. I think that the local DOE was concerned too, and put together all the design media that could be available for them to develop their equipment. How that actually transpired was by another government agency unfortunately or maybe even a state agency. How that actually took place, I really don't know. I'm finding out now that from what I'm hearing that a lot of things didn't happen that presumably should have happened. I know that in the DOE facilities there's great care taken in how these capsules are handled. And not just here at Hanford. They use them as irradiator sources down at Canoga Park, and they have a very well defined safety program to inspect the capsules and check them for integrity on a very frequent basis. And at the Gamma Irradiation Facility where the remaining capsules that were shipped to the sewage irradiator program and stored at Sandia, likewise they have a good safety program. The government facilities, I think are in pretty good shape. PNL has some capsules they're using for irradiator programs, irradiating spent fuel, in oxidation studies and such as that. Commercial facilities, I'm not really plugged into them at all.

Q: You said the one DOE facility regularly inspected the capsules. Do the other two, to your knowledge?

A: Yes. I don't have copies of the documented procedures, but we have been informed by them, in fact we asked the questions after this failed capsule. Someone at DOE headquarters sent out a letter and even in parallel with that, I personally contacted the representatives and received information. I received a documented letter from, from Albuquerque (it's in my file somewhere) as to the way they handle their capsules.

Q: So you think they all do some routine surveillance and leak checking of some sort?

A: Yes, they do. In some cases it amounts to dipping them into a pan of water and measuring the radioactivity that would be there. That's a neat way of doing it. They're in dry storage. Most of these, I think, are dry storage type capsules. Another way to do it, is to smear them, and visually check. Visual inspection is an excellent way to (at least on the outer capsule) determine anomalies. But swipes are also an excellent way. They should be clean. Now if you've got a highly contaminated cell, you've got a problem.

Q: You've expressed the point that you have made data packages and had them prepared to be sent to people on request, basically. Did you ever get a request from the state of Georgia, or did you ever provide any information to the state of Georgia that did licensing of the facility.

A: To my knowledge, we provided no information directly to the State of Georgia. We may have provided some information to Dr. Tingey or others at PNL, which made their way to the NRC and ultimately made their way to the state of Georgia. I have no knowledge on that for sure. But I would think that the state of Georgia would have some, if they are an agreement state and are licensing the irradiator owners to operate. They should have some technical knowledge and cognizance of this information.

Q: How would you assume that they would have gotten it?

A: I would have expected that they would have gotten it from the Nuclear Regulatory Commission or from Pacific Northwest Laboratory. I'm not familiar exactly how they operate, but we have not been contacted to my knowledge, and being in the Program Office I think I would have heard about it, by the state of Georgia.

Q: Gene, I'd like to, I'd like to go back a little bit and pursue a point that I think that the board is just vitally interested in. And that's, that has to do with the, with the apparent inhibition or reluctance or, or something about, about the transfer of the technical data to the end user. I detect a, from, from your answers here, a kind of a feeling of, of a block up there. I can't get that past it. I either have been told it's none of my business or, or for some reason you

give the impression of, of well you, you give the impression of operating under the assumption, or under the directions that, that it's not my business to pass this technical operating information to the commercial people or I'm only supposed to respond. I've been told I'm only supposed to respond if somebody asks for, I can't volunteer it. I'd like to pursue that a little bit because I think that's a key issue here, and I want to find out why it seems that way.

A: Well, let's cover that.

Q: I don't know...

A: Our primary function at the Hanford Site, in our division, is Waste Management. Pure and simple. And, under Rockwell particularly, and I'm sure it's true under Westinghouse, just as true, any work we do has to be funded and carried out in a proper manner. And as Program Manager, that's one of my responsibilities is to audit that operation. If we are requested to do work, we have to have approval, written approval, from the Department of Energy, Richland Operations. Because somebody calls us on the telephone and says go do this, we don't do it. Anybody could call us from all over the country, and we wouldn't be getting any DOE work done. And it would be a violation of our contract. Okay? So, it was very well defined what we were to do and what we were funded for by the NE program at Headquarters. We had a very well defined scope of work. And that scope of work included: providing information to the commercial irradiator owners. And we went out and gathered and collected a large amount of technical data and went through a clearance process and cleared it for public dissemination, including the commercial irradiator owners. And the commercial irradiator owners were made aware of this as I understand by the Oak Ridge National Laboratory and upon their, upon requesting it, we provided it. To exactly whom, which irradiators received it, I'd have to go back and check the records. I'm sure that RSI received it.

Q: (Penry) Okay.

A: ...the technical information.

Q: It was officially transmitted from Westinghouse to the commercial group, right? It didn't go through ORNL and then they passed it on...

A: That is correct. We would keep at least RL on copy of it, plain carbon copy. This took place under of course, Westinghouse's predecessor contractor, Rockwell.

#### SIDE B

A: ...So our responsibility in the shipment of the capsules to the commercial irradiators was in the shipping of the capsules and to make sure that the capsules arrived at the irradiator facilities in good shape, and did not violate any of our operating specifications. And one of the specifications that I mentioned earlier, and one that will impact any receipt of capsules back here, is that the outer surface temperature of the cesium capsule can not exceed 400° C. Now, that's a high temperature. What this translates to is a temperature on the inner capsule, cesium chloride interface, of something on the order of 450° C. And we had enough technical data from PNL to indicate that we could have exceeded that probably by another 50° C, but our engineering people, and this was reviewed all the way up through our Director of Engineering, was that we will not move from that number. Now, we had Allen Chin calling. I, I don't know if he called Secretary Herrington or not, but it's only because maybe Secretary Herrington was out of his office. He called a lot of people, including politicians. There was a lot of pressure put to bear on that temperature limit. And, and I took a lot of verbal abuse and beatings over the head with Allen for a number of days, but we stuck to our guns on that. I was just an arbitrator. Whatever the Engineering people declared was the specification and was what was used, even though I'm a professional engineer, I'm not in an engineering role. I'm in a program managing role, and I dealt with the customer accordingly and tried to get the

two groups together and agree on that temperature limit. What Allan Chin wanted to do was to ship five cesium capsules in one of his Model 1500 casks. He manufactured nine of them. He manufactured the casks to the outer limits of the specification on the Certificate of Compliance. I think the inner cavity design diameter can vary from seven to seven and a half inches. And the GE-1500's are made at the seven inch diameter to allow greater shielding. Allen had his made at the seven and a half inches diameter so he could get an extra capsule in. And he designed a capsule rack, and I suggested to him on telephone calls that this had to be verified by a thermal test, and they cost about fifteen thousand dollars apiece. These thermal tests had to be conducted to verify that temperature limits would not be exceeded. He said, "Well you've already done them on a GE-1500 cask." I said, "Yes, but that was with only four cesium capsules and a different rack. A four capsule rack." So we went round and round on that for a number of days. And there's documentation in our files that follows these telephone calls and the resulting resolution I guess I would say of the issue. But what it amounted to was we had to conduct several thermal tests to verify that we could ship even four capsules in his five capsule rack, and it turns out that when the capsules get very close together, they get hot. And so we had to be careful in avoiding that. And the cask does insulate the capsules and then over that you put a heat shield. Things get pretty well insulated in there. That was our biggest concern, and we have a letter to DOE documenting that concern. They asked about it, and we sent it in, a draft specification, dated July 30th, of 1985, that addresses that issue.

Q: Did you test every batch before they went out?

A: We tested them under worst case conditions. A lot of it has to do with, whether or not the truck has a canopy. If it has a canopy, you can shade the capsules. Another has to do with DOT requirements. There's two issues here. One is DOT requirements for either exclusive use or non-exclusive use casks. Alright? If it's exclusive use, I think we can go up to a 180° C on the outer shield surface, the outer package. If it's non-exclusive use, it has to be a lower temperature. So the trucks were obviously exclusive use (cesium capsules only). That was one of the issues. We had thermocouples on the outside, but we also instrumented the capsules that were inside the cask with thermocouples. Thermal tests were completed on the first shipment of a given configuration, shipping cask, and shipping rack configuration. If that changed, we conducted another thermal test and that took engineering, instruments and operating support. It took several days to do this. And it normally costs, with all the overheads and everything, ten to fifteen thousand dollars, about fifteen thousand dollars.

Q: Did you put any temperature sensitive tape or something on these capsules inside, to sort of verify what happened during transport?

A: No, they were strictly instrumented at our facility and allowed to reach some stable equilibrium and this took up to several days to do.

Q: Okay. That wasn't every capsule or every shipment?

A: No. We did it on a number of them. I think there are a total number of thermal tests on the order of seven or so. Seven or eight thermal tests that we've done over the years in support of this effort. And once we complete a thermal test it's documented, and then if that cask and the same type of design rack come back, we can use that as a basis for eliminating the need for another thermal test. (Pause) I don't know if I finished up your original question, or initial question on safety upgrades or not, but we are, we are actively pursuing still some safety upgrades even though WESF is in stand-by, and there's no plans to ever reactivate it again. Since it does store a large inventory of cesium and strontium isotopes, we are pushing to keep WESF upgrades on the priority list for funding. And, and we are making some progress. I'd like to make faster progress, but there are a lot of people at the funding trough for lots of real good things they need to fund.



- Q: About how much money have you spent on the R&D effort. That is development effort on the locator and on the removal of the capsules from pool cells.
- A: From, removal of what from the pool?
- Q: It was mentioned yesterday that you're doing some development work, engineering and development work. One was a defective cask locator..
- A: Capsule locator, you mean?
- Q: Yeah. Capsule locator. And also the second area was to be able to put the cover over this thing and take it out of the pool.
- A: Yeah, overpack it.
- Q: Yeah, how much money has been spent on the...
- A: Well if I go back to about 1981, all the money spent on documenting and supporting safety upgrades to WESF and this is in bits and pieces all over the place, I would think it would run up into the several millions of dollars. And this is not including the construction project upgrades. These are the capital equipment upgrades and perhaps some expense work we did like documentation of studies. In fact the individual, Ron Orme, was a technology engineer who seven years ago did a very thorough evaluation on the types of upgrades we needed to do at WESF. And we used those as a basis to order our priority and get through. In fact, that study was used as a reference for this RSI problem. And that engineer in fact, was working on this effort for a few weeks. But I would say on the order of several millions of dollars, a combination of capital equipment and expense funding.
- Q: Did you receive any funding from the By-Products Program per se, or was most of this out of your basic, you base budget?
- A: We received direct funding from the Nuclear By-Products Program, and it was managed here at RL by a separate DOE monitor, who's responsibility was the By-Products Program.
- Q: What activities were included under the By-Products Program?
- A: I could give you a specifics. One way to check is to look at the cost estimates that we provided. It included administration, which included program management, a little bit of my time, scheduling and keeping track of costs, and it included technical support, which included thermal tests of the shipping casks. It included gathering technical data together, getting it cleared. It included documentation of the thermal tests and answering questions that we may have received from the irradiator owners. Dealing with irradiator owners on either shipping or handling questions or problems. It included providing whatever technical data they requested; it was basically charged to each irradiator owner. We tried to keep track as much as we could, who asked for what. Because these guys paid for it. Whatever they asked for, they paid for. Okay. And so you know, they may have been a little reluctant to ask for too much because they would have been paying for it. And my job was to try to keep it straight.
- Q: You mean everything of a technical nature that was provided to the commercial sector that we weren't reimbursed for, as opposed to us just giving to them like...
- A: Let me say this, it was not paid for by the Waste Management Operating Program. Okay. It was paid for either by the Nuclear Energy funding source at DOE headquarters, which at that time was under DP, but it was a separate packet of money that we were given a small amount of funding for start up costs. It also funded a capsule sorting plan. It's a document about so thick that allocated all of the capsules to the various commercial irradiator owners. The last

- time it was revised was about two years ago. And it paid for developing that, the computer programs that went in and did the sort. We had to do it on a random basis.
- Q: So what, let, let me understand this. So what you're telling us is that if Allan Chin or somebody else at one of these irradiators wanted some information from you, he ultimately had to pay for it.
- A: If it was a conversation to call up and ask me a question or something I wouldn't charge him for that. But if it required assigning an engineer to go out and do something, yes, he had to pay for it. You bet.
- Q: (Jugan) What if he wanted a document?
- Q: (Penry) Yeah, how about a document? If he called up and said give me everything that has ever been written on the use...
- A: You better believe he'd pay for it.
- Q: Okay.
- A: Because we'd have to go through our clearance process. We just can't send anything out to anybody who asks for it, even if he is an irradiator owner.
- Q: Would he have to pay for a tour if he came out here?
- A: The time that spent by the individuals associated on the tour, yes.
- Q: He paid for it, or did the By-Products Program?
- A: I don't know. I would have to go back and see how that was divvied up. But somebody paid for it. Waste Management Program did not pay for it.
- Q: Okay. Not necessarily, then is there also the possibility that he wouldn't have paid for a document, maybe the headquarters money would have paid for a document?
- A: It's possible. You see, we had lots of documents and a lot of things we were doing. I know that the DOE Headquarters Program had some funding that we used at the start-up. But back in the second year of operation, we basically didn't, I don't think that we had any Headquarters funding. It was all from the Nuclear By-products Program managed by Oak Ridge. And we factored that into our estimates. We estimated so much for administrative support and so much for technical support and then we had a five or six line item estimate there with a contingency on the bottom and a bottom line.
- Q: What, what was second year? What year was that?
- A: It was the second set of shipments in 1986 where we may have had the problem. I don't know. We didn't really have a large pool of money that we could draw on to provide this general support. We had some funding and we had to manage it very carefully.
- Q: In other words, your request for funding was higher than what you actually received via DOE programs?
- A: I don't know if that was true or not. But I do know that we had to watch very carefully our expenditures and keep track of them because we are dealing with three or four different commercial irradiator owners, and we had to keep the cost separate because we were providing the actual cost to the Oak Ridge field office based on what was actually spent on each

commercial irradiator. And we wanted to be doggone good and sure that we didn't get our costs mixed up, and we were charging the wrong guy for the right thing.

Q: Okay. The development activities for the leaky capsule locator. The schedule on which you are operating right now in terms of development, was that your original schedule? Did you want to do it quicker or because of funding limitations, is that the reason it's taken this long?

A: I'm not sure what the question relates to.

Q: Okay, this is 1988 and you still don't have a...

A: We don't have an operationally tested system.

Q: Right?

A: Yes.

Q: What was your original schedule to have it operational?

A: I don't really know.

Q: Was it eighty, when you started this the program 1984, when you said that we had something that a commercial vendor could come and use. You didn't intend to have it in place until '89?

A: Nope. I'm sure that we had intended to have it in place in probably 1984-1985 time frame. We may have had something in place.

Q: What was the constraint? Was it a technology constraint or a funding constraint?

A: I think it was a technology constraint. One of the things is that we were using a state of the art beta detector, that has a sensitivity greater than any other detector in the country, or even in the world may have. I don't know. But it was developed by PNL to be used in our detection system that we have in our pool cells that we're working on right now. And that has been installed for several years, but we've had equipment problems. We've had manpower and technical problems; that is why the particular system isn't on line (at OTP).

Q: Okay. Well obviously...

A: That detector is a key part of the failed capsule locator and pool cell detection system.

Q: Okay, we, that's what the gentleman yesterday indicated that. Well, if that's the case, if this was a technology, on the cutting edge of technology in developing this unit, then I guess I'm surprised that we went ahead, initiated the program, got this out in the commercial sector, said, "Hey guys, it's up to you to be able to locate your own capsules if you have a problem. Considering that we, you were operating with an organization that had billions and billions of dollars and all..."

A: Wait, back up for a minute. The reason is that cesium is not a beta emitter. Cesium is a gamma emitter, and you don't need very much to tell you that you got a cesium capsule leaking. You could buy one at the local store to find a cesium leak. The reason that we are using state of the art technology, going back to Ron Orme's technology document of several years ago, was to detect a strontium leak. It was never a question about detecting a cesium leak. The, the only question was, is which capsule is leaking okay, in your array. We had detectors all along in the WESF pool cells and, and we were under the impression that Allan Chin had detectors on his ion exchange column.

- Q: Okay, let me ask you...
- A: But I understand it wasn't working.
- Q: Okay, if we have this equipment already, how come we don't know which capsules are leaking at RSI?
- A: We do know.
- Q: We don't know, do we? How come we are randomly taking four, I mean we've narrowed it down?
- A: Well yes, but we've inspected the capsules, and we've discovered two capsules that are leaking, and we don't know what they're leaking, but they're leaking, and a third capsule is highly suspect. And in about two weeks we're going to be shipping them to Oak Ridge. I just put a cost estimate together for that.
- Q: Well, I guess from the other side we don't hear that, with that much certainty that they have identified them.
- A: I don't know. The indication is, is that we have.
- Q: Well, let me ask you another question. How come it took us six weeks or eight weeks to do that?
- A: I don't know. Partly because my own estimate is we completed it faster than we thought it would take. In any event, there's nothing that says it's going to take less than six weeks to find a failed capsule. My estimate would have been much longer than that. Even in the WESF water basins to identify a failed capsule.
- Q: I think we're getting distracted from the original question about the equipment and what it would or wouldn't detect, but that didn't get completed over here. You were in the process of trying to explain that the system was being designed to detect strontium leaks.
- A: Yes, primarily.
- Q: ...and because you have both strontium and cesium capsules in, in the WESF pool. And the fact that you had difficulty with the, with the cutting edge of technology, had to do, as I understand, correct me if I'm wrong, had to do with the fact that you, what you were trying to get designed is a system for WESF which would detect...
- A: That's right.
- Q: ...either beta or gamma?
- A: That's correct.
- Q: Okay.
- A: Our system, would have been real expensive. You might call it a Cadillac system for a commercial irradiator. I don't think a commercial irradiator would have wanted to use our particular system because the sensitivity was so great that it would have, been more costly and more difficult to use.
- Q: Let, let me ask you a question...

- A: But it was available if they wanted to use it.
- Q: But here I think is the thing that is bothering us or it certainly is a question that we feel the need to have an answer to. If locating and detecting cesium capsules was a relatively easy job because you can go buy a detecting unit off the shelf.
- A: Detecting a cesium leak is easy.
- Q: Detecting a cesium leak...
- A: As it was determined at RSI, when they had a failed capsule they immediately detected it.
- Q: They knew they had a leaking capsule, but locating that, there's no easy way to locate a failed capsule. Equipment to locate a cesium capsule would not have required development of a beta monitor. That has been a part of the reason that the thing is not on line. You didn't need a beta monitor, if all you had was cesium capsules in there. You wouldn't have needed to develop the beta monitor to the cutting edge of technology. You could have done it with existing technology and, and had at least that part of this whole system done a long time ago.
- A: Yes. I think that's basically true and although we're looking back at it, the beta detector part of the system isn't really what is giving us a problem. It's all of the paraphernalia that's associated with it. The valves and the pumps and the, all of this other stuff that is the, giving us the problems at least in redesigning it to be useable at another irradiator facility.
- Q: So what you're saying is this system here is a built-in system, the one you're trying to design, is a built-in system for WESF, capable of doing both strontium and cesium?
- A: Yes.
- Q: Is that right?
- A: Well, it's not necessarily built-in, Roger, because it can be moved from the WESF pool.
- Q: But can it be moved to RSI and do the job?
- A: No, no way.
- Q: Or to Iotech and do the job? So it's built in as far as WESF is concerned.
- A: Yes. It would not be applicable to other facilities for a lot of reasons.
- Q: You can't if it was completed, operational and working slicker than heck, could you load it on a truck and take it somewhere and locate a capsule with it?
- A: You would have to, modify it extensively. In fact that's what we're doing right now is modifying the system to accommodate the Decatur facility.
- Q: Why did you feel like you had the luxury, and I'm using my own words, my impression, the luxury of letting the development program go on and on, if you will, and not have operational capsule locators in overpack capability while you were pursuing, the strontium capability.
- A: Well...
- Q: Why didn't you put in an interim one if we had a cesium capsule, by God, we can find that and we can take care of that. We may not be able to find the strontium one until we get this system developed, but we can at least find the cesium one and take care of it.

- A: Well, I guess...
- Q: Why did you feel like you could do that?
- A: I don't know that we felt like we had the luxury. But as far as WESF is concerned, we have opened up collectively at the WESF, nearly 200 cesium capsules. I mean we have opened the outer, and we have opened the inner and we have visually found no anomalies. We have even inspected some of those that we have opened.
- Q: So, what you're saying...
- A: That's fifteen percent of all the capsules that had been made. Fifteen percent had been opened.
- Q: So what you're saying...
- A: Those had been analyzed.
- Q: So what you're saying is you...
- A: Hey, no problem.
- Q: That answer, you're telling me is that...
- A: They're good enough. Double encapsulated, meets all the requirements. There's no indication that we have a problem under pool cell storage conditions. Secondly, we had installed as fast as we could our pool cell flushing system, where we could remotely, all day long flush the water out through an ion exchanger, clean it up, and replace the water until we could have manned entry. Okay? That was the second one. We realized that we could do that, we could stabilize, but how in the world would we identify the capsule? And that was, that was our real problem. Quite frankly, I'm not sure that this capsule locator is going to work as well as we envisioned it originally. It seems like under the conditions of the actual incident that occurred, that underwater viewing and ultrasonic testing which were quickly brought on line separately, for other uses, are going to be a very helpful tools to find capsules in WESF or anywhere else for that matter.
- Q: So that says that perhaps the concept was a bad concept from the beginning, and that may be the reason you don't have a usable one.
- A: Yes. We felt that the probability of a WESF capsule failing under the current storage conditions, not accident, but storage surveillance conditions, is incredible. I'd be more concerned about meteorite strikes personally. Alright? And I'm not looking around for meteorite strikes when I go to work everyday. Secondly, if you drop a coverblock, you're going to be able to tell which capsules are leaking. So there really wasn't the serious drive as far as WESF storage of capsules was concerned as there might be for other facilities that are handling capsules in a different way. I personally am disappointed that we aren't able to make faster progress on that particular development effort. But I'm pleased that we made such a rapid progress on the finding of what I believe were the, (or will support finding it at Oak Ridge), the two capsules which appear to have leaked. Now when I say leaked, I'm saying the outer capsule has leaked. Whether or not the inner capsule has leaked we'll have to verify that.
- Q: Gene, I want to get back to another point again. You stated earlier that in October of 1984 at that meeting you had the experience at Albuquerque with the dry/dry usage, and I have a brief note here that says you really didn't have any concern about that usage. But RSI

obviously doesn't have a dry/dry unit. They have a dry/wet unit. Did you contemplate those potential uses in the October 1984 time frame?

A: No.

Q: And if you did, were there concerns that you had at that time?

A: No. I didn't contemplate that. I was not aware of what the design of commercial irradiators were, how they were used whatever. (wet/dry or dry/dry). These were not issues in my mind. I know that the Nuclear Regulatory Commission was concerned about the wet/dry irradiator and required some additional work to be done by PNL and others, to verify that they could be used safely. It seemed to me that the most harsh condition would be in a dry irradiator where you're not cooled. But they were concerned about thermocycling evidently.

Q: And do you know that there were some seven thousand thermocycles at RSI in the twenty-six months they were operational? If you had known that, in 1984, would you have felt a little queasy?

A: I wouldn't have, I don't think I would have had the knowledge to be really aware of that being a problem. I'm not convinced even now. There's nothing that tells me thermocycling is a problem. Okay.

Q: Okay.

A: I'll be very surprised if the report comes out and indicates that that's the primary cause. However, the evidence certainly points in that direction.

Q: I know.

A: It might be a contributing factor. And it probably is. Who knows? But Battelle ran theirs up to 8700 or some thermocycles under supposedly even more stringent conditions.

Q: I, I'm not aware of that one.

A: It's one of the reports you've got.

Q: I think it's 3800.

Q: Was it 3800?

A: Well, it's supposed to simulate once a day for ten years. I guess that's right, it'd be about 3800.

Q: Right.

A: I didn't realize that RSI had cycled their capsules so many times.

Q: Yes. In some cases they were out of the water as long as eight days. But most of the time it was...

A: Up and down.

Q: ...up and down.

A: So that would have been almost twice what the tests did.

- Q: It's leading the test by that much and it, you contemplate the ten year usage period at this rate, we would have indeed a large number of...
- A: Number of cycles.
- Q: ...cycles.
- A: And it appears that our tests at PNL were not extensive enough to support that. But again I'm an ex-aviator and I know that the regulating agency there, the FAA, maintains a record of all the landings an aircraft makes. And if there's any problems in the field with an aircraft, the users are notified by the FAA.
- Q: Yes. After the first problem.
- A: After the first problem.
- Q: That's exactly what we're doing here.
- A: Yes, but the problems are observed even before that. If an aircraft is experiencing a severe amount of use, like the Aloha flight in Hawaii. They were notified well in advance that they were leading the fleet in the number of cycles their wings and gear were taking. And it would seem to me that if it's true what happened at the RSI facility that the State of Georgia would have been very interested in the fact that in only two years of operation they were exceeding the test results by factor of almost two.
- Q: Except that the State of Georgia did not appear to be, understand the effect of those kind of effects.
- A: They were the licensing agency.
- Q: Postulation for twelve thousand cycles would open up a crack less than a mil.
- A: Is that right? That was what that report predicts? I noticed it was very, very minute.
- Q: I mean like zero, zilch. Don't worry about it.
- (Everyone talking at once)
- A: Oh, I'm sorry. You said something first.
- Q: You mentioned something about approximately 200 capsules at WESF that were opened and examined.
- A: No, opened and emptied.
- Q: Oh, I'm sorry. Opened and emptied.
- A: They were visually examined. I mean, you've got to watch what you're doing. The operators are trained to look for things. This is not documented anywhere.
- Q: That was the question.
- A: No.
- Q: Did they have failures in the inspection of them?



- A: No.
- Q: Why, why were they opened?
- A: Somebody wanted our cesium for the Federal Republic of Germany to make glass logs. We had some cesium left in B Plant that had not been processed and purified for encapsulation. That cesium was sent, and they still needed more. So we looked at existing capsules and we said, "Let's give them the low curie capsules because the irradiator owners will like the higher ones." I suggested that we take a number of randomly selected capsules from the hottest to the coldest (I think we picked fourteen), and that are out of that range of the low heat and archive those samples. It wouldn't cost that much more to package the metal samples for ultimate examination some day. Then if had a problem with a WESF capsule, we would have an already supplied metal coupons that we could ship to PNL and start examination.
- Q: Okay, so you think there was about ten random samples that...
- A: I think there was 189 that we opened at WESF. We kept metal coupons on a number, and I don't know what that number was. I'll say roughly ten, and we shipped some of them to PNL; I think some of them might be stored in our water basins. I'd be happy to confirm that. We re-encapsulated them in capsules because they were contaminated.
- Q: Um-hm.
- A: And then we would have either stored them in WESF, or we would have shipped them to PNL. (Capsule parts.)
- Q: Of the 189 that were cut up, were there any that were leaking,...
- A: No.
- Q: ...no water in the annulus...?
- A: No. No anomalies whatsoever.
- Q: Could, could we go to a little bit different line of questioning on the lease and the program management?
- A: Okay.
- Q: I don't know what time you have to get out of here.
- A: Oh, I, I don't know either. This is the only meeting I know of today.
- Q: You mentioned once to headquarters and, that you had a meeting where I guess you talked about who was going to be doing what in the overall program of the leasing. Was there any kind of written document that ever set down the various responsibilities of you folks as opposed to headquarters, as opposed to Oak Ridge as to what the Program Manager's responsibilities were? Did you ever have any kind of official document?
- A: To my knowledge, the key document that I could refer to would be the minutes of that October 1984 meeting. I don't recall what other. We do have other documentation, but it was associated with the program management and costs, and established our scope. I'm sure some of that information is available; some of it has been transmitted as external letters to DOE/RL and we could, if you wish, look through this documentation. I got a three inch binder full of letters. You might want to look through that to see what you could find. I put that together last year. You could go through the index and see the letters that might be of interest to you.

And it also will tell you what our scope of work was and what our agreements were with each of the irradiator owners.

- Q: Do you have anywhere documented what you transmitted to DOE, Oak Ridge, or during the meeting in which Sylvia Wolfe and others were here of how they should instruct the irradiators on what precautions to use on these capsules or anything?
- A: Well, when Sylvia Wolfe was here, it was last year...
- Q: Shipping?
- A: Pardon?
- Q: Shipping and the costs?
- A: ...Shipping costs and specific to the RSI primarily...
- Q: (Wright) If Oak Ridge quote Sylvia Wolfe was supposed to, I think you should pass on the operating instructions, parameters, and stuff like that to the irradiators. How did she know what to pass on?
- Q: (Davis) I don't think he said that.
- A: I didn't really say that. What I'm saying is that the direct interface with the customer is the lessor. And we were not involved in that.
- Q: I have a note that DOE/Oak Ridge responsible for communications to the irradiator.
- A: That's correct.
- Q: And I want to know, if Oak Ridge was responsible, how was Oak Ridge educated on what to communicate?
- A: I don't know.
- Q: That's the question. Was there a program planned? Let me just go back to the, to the way the thing evolved. Who actually took the initiative for the program that's in place? Where did it first initiate from?
- A: I don't know the answer to that question. I do know that I was asked to attend a meeting, I think the initiative probably started back twenty years ago, when WESF was originally built. Under Isochem.
- Q: Sixties.
- A: Sixties, yeah. That's when the initiative...
- Q: That's the point. Are you saying that the, in the development of the WESF facility that it was contemplated that there would be a public leasing program with those capsules?
- A: Or sale. That is one of the reasons why Isochem, which was just before the Atlantic Richfield Hanford Company took over the contract. They hopefully were going to sell isotopes, manufacture isotopes for the Department of Defense and for commercial uses. As that program didn't materialize, Isochem which was a consortium of several companies, pulled out, and Atlantic Richfield Hanford Company came in, and we continued the program at Hanford with the primary purpose of storing and encapsulating radioisotopes, and that's why WESF is

a Waste Encapsulation and Storage Facility. That was the original intent. Through the years, various ones wanted to use our capsules for other purposes, and that meant that we had to ship them. So as a result of that, we did special form tests which were documented in an ARHCO report. Additional tests were documented in PNL reports. Now Sandia, in the late seventies wanted to use our capsules for an irradiator. Ultimately, they would have been used by the city of Albuquerque in a commercial irradiator. But the reason that didn't pan out was that there was such an interest in using these as lease capsules. It was felt that the city of Albuquerque wouldn't be able to acquire the amount of cesium they'd need for their irradiator program. That was one of the aspects. Also support funding from a government agency was missing, and that was another part of it. So I think it goes back many years, and I really couldn't tell you why. The interest in it seems to develop and wane on some kind of a cycle. I was new enough in the program where I heard other people talk about, "That the interest is now coming back," and at one time there was a serious interest in cesium irradiation.

Q: Okay. Let's take a look at the lease just a minute. Did you have an opportunity to review the lease? Was it sent out here, was there any review?

A: No.

Q: Was there any discussion at headquarters about the leasing arrangement?

A: No. We basically were not involved in it as a contractor. I think the person you need to talk to is our DOE monitor at that time. He may be knowledgeable on it. The Program Manager at that time was Ken Gasper. I didn't see a lease. I wasn't asked to review the lease.

Q: You said we need to talk to the DOE monitor, who was who?

A: That was Mosi Dayni. He has since transferred. I don't know where he's at.

(Everyone talking at once)

A: That's the Darryl Lamberd letter.

Q: (Wright) Mosi is now with TVA.

Q: (Davis) Let me follow a little on the grounds about the lease.

A: Let's see. I was Activity Manager at that time in October of 1984. This was not the lease agreement though. We didn't have a lease agreement. We didn't have a lease until after we started shipping capsules. That was February of 1985.

Q: October, but that's only what, four months?

A: Yes, but at that time we didn't even know who we were shipping to. This was a loan agreement that was...

Q: But obviously reading that letter, those are the conditions that would you know, be included in any lease agreement, whether it's RSI or whoever.

A: Probably.

Q: And so, if we read that, that's our understanding of the concerns that Westinghouse...

A: Um-hm, um-hm.

Q: ...had at the time in terms of any lease program for the use of cesium capsules.

- A: This is 10/31/84, and it's 65, 9/21/84, 162. These comments were collected and provided to DOE as I understand it. I don't know if we can find the documentation that supports that or if they were provided informally or formally.
- Q: That, that's Mosi Dayni...
- A: Mosi, M-o-s-i D-a-y-n-i. Lease was for ten years so that we know if capsules are moved from one location to another. That's true. We had concern about that. It should be recommended that the Department not provide the shipping containers, okay, good. The capsules containers had to be returned in accordance with DOT requirements, fine. And WESF receives containers which are free of all smearable contaminations, lots of luck there. (Quotes from letter) "Does Rockwell have financial responsibility while the shipping containers are being loaded at WESF? Definition of shipment, it could be stipulated that it would be based on the original (continues to quote from letter, and transcriber cannot understand)...should be stipulated to verify the weld quality. The verification at the time the capsule was produced and no other verification is necessary." This paragraph needs rewording, two, two, two. Coordination of transportation is defined here as the responsibility of the shipper, yeah. Expand the second that preparations of empty containers, empty shipping container for shipment is accomplished in accordance with existing shipping standards. Are there any conditions under which the Department would not accept return of capsules, does the buyer accept the last statement, not knowing what the disposition of the return of capsules might be?
- Q: There's a lot of motherhood that we've thought about.
- A: Yeah.
- Q: There's several very cutting comments in there too.
- A: Yes. Some of the comments were redundant because we weren't going to be involved in the shipping (in the ordering of the shipping casks). I mean, what was your question?
- Q: What...
- A: Now that was not a lease agreement. That was a loan agreement. And it was, I think, a draft that was prepared early on. My knowledge is as follows: That we were not, we did not review the lotech lease agreement. As I recall we did not review the first lease agreement, and that would include both the lotech and the first RSI leases. But we were involved in the second lease agreement, and I think Sylvia Wolfe sent out a copy of it. To my knowledge, the first time I saw the first lease agreement was here a little while back when someone faxed a copy out from Oak Ridge, or from RSI, on the first shipments that took place.
- Q: Okay you got to my next question. The capsules themselves are not specified in the lease. Now I was a little bit, just confused, about how the government leases something without at least specifically identifying those capsules.
- A: I agree.
- Q: Okay. Well, the question is, how, under the various lease agreements that we've got, were there specific capsules ever identified either by the program office to the respective leases? That's my first question.
- A: We provided to the Department of Energy, and I believe they provided this to the Oak Ridge National Laboratory, a capsule sort plan. And the capsule sort plan would have had the capsules listed for each irradiator. That was our allocation. I would think that information would be available both at Oak Ridge and at RSI.

SIDE C

- Q: ...and those leases have separate provisions in them. It's in the leases. If I came to you and asked you to identify by each one of those leases a specific capsules that are related to each lease?
- A: If I were asked and funded to do that effort I would do it. Yes.
- Q: Do you have that data?
- A: Of course. When we ship capsules, we take it serious.
- Q: Well...
- A: And we have the information. We know the date, the time, the cask number, probably the truck number, and the capsule number of each shipment that we've ever made.
- Q: Do you know, do you have the lease number for that...?
- A: We aren't involved in the lease. We're involved in shipping.
- Q: (Jensen) But that's what, but that's what...
- Q: (Penry) But where do you ship it to? Do you ship it...? Do you ship it to ORNL?
- A: Well, you have to look at the shipping record, and it'll tell you.
- Q: Did you ship it to ORNL?
- A: No. We have shipped them to ORNL. We've shipped them all over the world.
- Q: The RSI capsules, do they go to ORNL?
- A: No. They go to wherever the truck is headed. Either Westerville, Ohio, or Decatur, Georgia, it depends on where the irradiator is.
- Q: See, the problem that I had, and again, I didn't do that detailed look at the records but I, down at Decatur, I looked at some of the shipping documents. I talked to a guy by the name of Mr. Fisher down there, and he is not, he cannot tell which one of those leases that are related to those capsules that he's got in that pond down there.
- A: Well, it's not necessarily a shipping document. We're talking about a log. The shipping document should have information that would tell him which capsule number he received...
- Q: It does.
- A: ...And I would hope that he would know what lease he's on.
- Q: He does not.
- A: He does not?
- Q: (Jugan) My indications are that the license to store at Decatur started in 12/84.
- A: But they didn't load until later.

Q: (Jugan) Okay. It looks like there is a license to store and Ohio's 4/85. I'm just wondering if you call tell by the time period something was sent...

Q: (Davis) No. I mean, we've got two leases down there, and we know that we have capsules for two leases.

A: I think I know what your problem is.

Q: I cannot identify which one of those capsules relate back to a lease.

A: Okay, okay.

Q: And yet we have two leases with different provisions in those leases, and now it depends on which defective capsules we got, how in the world are we going to be able to identify that back to a specific lease period?

A: With a process of detection I think we can sort this out. But somebody will have to come out to our area and look through our records, or we could go through by process of elimination. In the initial lease, we were to ship, as I recall, approximately twelve megacuries of cesium to the Westerville, Ohio, RSI facility. We got to chucking down the road, shipping capsules, and all the sudden we get a call from Allan Chin saying, "Whoa, I can't take any more capsules. Stop." Because he could not get relief on the number (total number of megacuries) that he had in his facility. I don't know what it was, but he must have had some cobalt and some cesium. Whatever the reason, we had to stop at a 180 capsules.

Q: Do you have a record of the first 180 capsules...

A: You bet. You bet we do.

Q: ...you sent? You know what those numbers are?

A: We can find them because our operations people maintain a daily log. And in that daily log you'll have that information. Now I don't know how extensive that information is. I've seen the daily logs and they do have a lot of information. That was 46 casks and divide that by three, that doesn't work out does it? It must have been a 180 capsules. Anyway, it was...

Q: I think it was a 186 and 248 if I remember correct.y.

A: Well, would that have been 286? It may have been. It may have been. But we shipped them in twelve capsule lots though. That's...

Q: There's 248 on the first lease.

A: Yes. Two hundred and forty-eight on the first lease. But we didn't ship them all. We only shipped a 184 as I remember. (Actually, it was 180 capsules).

Q: (Davis) And there was a 186 on the second lease.

Q: (Jensen) So those are two different numbers.

A: You're talking leases, and I'm talking about what really was shipped to where.

Q: (Jensen) Yeah.

Q: (Davis) Yeah. But I guess the other...

A: Two forty-eight, one eighty-six. Does that add up? That is not right. They did not get a 186. See, what's this add up to, fourteen?

Q: But what you're saying is...

A: They got 432 capsules as I recall. Well, I can tell you in a minute. I've got some information right here I think. I just happened to be calculating what the cost of capsule return would be to do that, I got some data out. I may have it in here. And we can answer that question real quickly.

Q: (Wright) Four thirty-four seems to be it, maybe the number is...

A: Okay. The number is 432.

Q: 432.

A: You bet.

Q: So it must have been 184, right?

A: They did not take the last two capsules because he would have had to send a truck back. You see, if you take 432 and divide that by twelve, that's 36 truck loads, and Allan Chin was not about to send a truck back for two capsules.

Q: I've still got, I've still got a point though.

A: Okay.

Q: It's a contractual point with the lease.

A: Yes.

Q: Did we know, the shipping document and the way we distributed the various capsules, was sent to the Oak Ridge National Laboratory you said. Not the shipping document but the...

A: Sort plan.

Q: ...the sort plan.

A: The capsule sort plan was...

Q: The list of capsules that would go where...

(Everyone talking at once).

Q: Yeah.

A: But as far as actually what went, I don't think we sent anything.

Q: No, I understand. But was that done prior to the time of the lease or after the lease?

A: I don't know. I don't recall. I didn't send it to them. I think it was sent by the Department of Energy, Richland. One of the DOE monitors.

Q: Gene, do you know, what was the time of this first batch of shipments, the time period?

- A: Do I have that information handy here? Well, we shipped to IOTEC in February to I think March of 1985. And then we started in the summer of 1985, it seems to me. We started to make preparations in June and by the time we got the thermal tests and everything done, it was July before we started shipping. And we shipped 184; that doesn't make sense. But that's fifteen, fifteen weeks probably. That'd take about three months to do that I guess. July, August, September, so we probably completed it in mid, mid-September, 1985.
- Q: The reason I ask this...
- A: We got a lot of information...
- Q: ...the second lease wasn't signed until 1/1986 I believe.
- A: You're probably right.
- Q: No, 4/86 was the second lease. So if you shipped everything, everything you shipped in 1985 would have been part of the first lease.
- A: That's right. Everything we shipped in 1985 was part of the first lease, and then what they had to do is I think, is move some of those capsules. I don't know what they did when we started up efforts again. Then we started on the first lease, and then the rest of the capsules were on the second lease.
- Q: Okay.
- Q: So you could obviously, at least you could tell on the first 100 and...
- A: Now, where we have a problem is, we would have to take a look at our shipping record and the date. The Operations Manager's log could probably tell us. It's only one truck. Because as it turns out, the first lease had 248 capsules. Okay. And that left four.
- Q: Part of them are Westerville and part of them...
- A: Yes. Sixty-four capsules on the next lease. And so, if you have sixty capsules, that would have been five shipments. The first sixty capsules would have been the first five shipments. Then on the sixth shipment what we'd have to do is look and see what the first cask would have been. One cask would have been part of the first lease agreement and then the next two casks would be the first capsules on the second lease agreement. Okay? And that would be on the sixth shipment.
- Q: So the sixth shipment had the split in it.
- A: Yes. I remember we had a difficulty about that. Something, I don't know why, but that sticks in my mind.
- Q: Could you take, could you take the two lease numbers and just identify which capsules...?
- A: I think we could do that. We could assign somebody to it. It would take a little time, but I think it could be done. I'm confident it could be done because I've seen the operating records that show at least the capsule number, and we would know the destination and the times that they were shipped.
- Q: (Davis) We really do need that.
- A: Okay.



Q: (Jugan) Where, where do they go? Where did the first shipment go to? To Decatur or to...

A: Westerville.

Q: (Jugan) ...Westerville?...They went to Westerville.

Q: (Davis) See, the indication down there was that about two-thirds of these things went to one of the leases and about a third was meant for the other lease, but they didn't have any idea...

A: Yes.

Q: ...in that pool which one...

A: I see a difficulty. From the counting point of view.

Q: Well, from a contractual point of view.

A: A contractual point of view. Yes.

Q: (Davis) From the standpoint of the claims and so forth that may come in underneath this thing. You're going to have to identify them.

Q: (Jugan) Well obviously, you get the last 186...

A: Well, we can...

Q: (Jugan) ...is from the second lease...

A: We can.

Q: (Davis) Don't know.

Q: (Jugan) Well, we...

Q: (Davis) Don't know.

Q: (Jensen) Seems to me like, like you got a storage-only modification...

A: We have to look at a sort plan that will...

Q: (Jensen) Cobalt license...

Q: Let's go back to the sort plan.

Q: Yeah, before you got...

A: Can I take a short break?

Q: Yeah, go right now.

A: In regard to your question on who had responsibility for identifying capsules to various irradiators, commercial and otherwise. The Department of Energy headquarters provided general guidelines at the October 1984 meeting. And they set aside so many megacuries for medical irradiator programs. That was the Oak Ridge capsules we ship periodically down there for implants and other types of small sources. And for the Department of Energy

programs (irradiator programs) as well as the commercial irradiators. Within the context of that broad guidance, we were instructed to develop an equitable sort plan. And to do that, we, after subtracting out the high-density capsules that would have to go to Oak Ridge and be opened for their use, and other capsules that were set aside for the Department of Energy use. We would use a computer program to develop a sort plan on some kind of a random basis so that each irradiator owner got a representative sampling of our inventory. And so to that extent, Westinghouse, alias Rockwell, did identify specific capsules, to specific irradiator owners. But it was in the context of the general guidance that we received from headquarters throughout our...

Q: I've got one more questions and then I'll...Yesterday we heard from some of the people, one of the gentlemen that was a welder, and there was another individual that talked about some concerns about putting these capsules out into the private sector.

A: Um-hm.

Q: And you, in 10/83, you said you began to serve in the QA role, you had the QA responsibility. Did I hear that?

A: No. I was Activity Manager, which is a kind of Assistant Program Manager. And one of the activities that I fund is general support to the program, which includes general QA support..

Q: Okay.

A: ...general safety support and that sort of thing.

Q: Okay. As Program Manager though, the fact that there was some rumblings of concern about putting these things out into the private sector. Was there any ever any discussions, ever any meetings at all either with Richland or with your top management about the safety aspects of the program?

A: I don't know. I know of no rumblings back in 1983, 1984, or whatever time frame that you're referring to, on the relative safety of the cesium capsule, I mean. I just don't know of any. Until this investigation, when this board was convened, I don't know of any rumblings about the safety of cesium capsules in commercial irradiators. I think people, some people were concerned that the irradiator owners may not live up to the same quality of workmanship in handling the capsules as the WESF staff.

Q: That was part of their concerns...

A: Yes.

Q: Were any discussions ever passed up the line to Richland or to your senior management concerning that?

A: I think our...

Q: Or headquarters?

A: ...I think our concerns were related to some way of inspecting the capsules once they return here. I think the reasonable person would not expect that we as a operating contractor here could control the operations of a commercial irradiator, which is either licensed through an agreement state licensing arrangement or the federal government through the Nuclear Regulatory Commission. I think it's just not in the cards. Those agencies have the charter to, and the responsibility to ensure the safety of whatever operation they are conducting. Pure and simple. Cut and dried! Secondly, we had concerns on the receipt of the capsules. And

what condition they might be in and what type of inspection plan we might want to implement. We made several proposals to the Department of Energy which my understanding was, were submitted to headquarters for funding. And this included inspection plans, periodic inspection, not only of our capsules in our own basin, but capsules that might return. Because we knew in ten years or earlier, we would be returning capsules. And we would like to have had this process already implemented. We're doing a lot of that right now as a matter of fact in answering questions on costs and plans for receiving capsules back.

Q: But the concerns about the operating conditions and so forth that may exist, were being surfaced at least by some folks from the organization.

A: They may have been, but to my knowledge, I wasn't aware of that though.

Q: Okay.

A: I just wasn't aware of it. Maybe somebody can refresh my memory, but...

Q: On a different subject, I guess, we noticed that when you looked through the concerns and that memo we talked, that internal memo on...

A: Yes.

Q: ...the shipping casks will be returned clean, and you had a little bit of an exclamation, and we've also heard that one of the shipping casks has come back...

A: Yes.

Q: ...contaminated. Can you expand on that?

A: Sure. Well there's no way in a lease agreement. That comment was not appropriate, because there's no way that it could be placed and hold any weight in a lease agreement. And we realized that, at least I did. I don't know if those comments were provided to the DOE, but I don't believe they were entered into the final lease agreements. Because when you are transporting radioactive shipments, you've got to abide by DOT regulations. You can stipulate all you want, but as long as you meet DOT regulations, there's not a lot you can force anybody else to do. You might try to, but you're not going to back Allen Chin in a corner. That guy's too sly.

Q: I guess I sort of disagree with you there. If you lease a car from somebody, they can put a lot more restrictions on you than the highway commission will.

A: I don't believe that that's a good analogy. The capsules are shipped in casks that have Certificates of Compliance that they have to meet. The DOT has regulations that are specified. And the capsules are special form which have certain limitations. And as long as you meet those minimum requirements, that's all that's expected. The reason for the contaminated cask was, is it would add a lot of cost at our end, and those are a lot of costs that we would have to have added to our estimates, which we thought were, you know, would, would make the customer unhappy. And so we made it quite clear up front that if the cask comes in contaminated, we will clean it up. It costs money. It's strictly a function of cost and impacting his schedule.

Q: Well, apparently you did have a contaminated cask.

A: We had several.

Q: What was it contaminated with?

- A: Well, whatever it was hauled with, a year earlier, or two years earlier.
- Q: Oh, it was his cask and on the first time you got it...
- A: Well, it depends on which cask you're talking about. Are you talking about his cask or are you talking about RSI shipments? The biggest problems we had...
- Q: RSI shipments.
- A: ...are with the GE casks. I don't know, you see, when this loan agreement was written, we didn't know whose casks we'd be using. This was written before we even started writing lease agreements. This letter that was referred to that was written in October of 1984. We had no lease agreements in place at that time. We didn't know what we were talking about. We didn't know what kind of casks were being used. In the case of RSI, they used new casks. They manufactured nine of them.
- Q: And they were...
- A: Under license to GE...
- Q: ...and they were contaminated when you got them or did they get contaminated during a shipment back and forth?
- A: Well, they could have become contaminated because they were used for shipping things other than cesium. They shipped cobalt, and they may have been used to ship spent fuel. I don't know. You'll have to talk to Allan Chin about that because I don't know the answer to it. But other shipping casks that had been used in the past, like the GE-700, the GE-1500, and the NRBK-43 had become contaminated because they had been used to ship spent fuel and other material. And even though they are cleaned up, contamination comes out of the metal and recontaminates it. It's just a never ending battle. You just have to keep working at it.
- Q: Can you go a little more on the specifics if you remember or tell us somebody who might if you don't, on the contamination involved with Allan Chin's casks. Did you have to decon, you know, did Richland have to decontaminate...?
- A: I don't recall. It would be in these records that Willis and I were talking about reviewing to get information on the lease agreements. If we have any contamination, it would've been noted there. Where we had serious contamination problems, was with Iotech, shipments there in I think it was Englewood, near Denver, Colorado. Also the ARECO shipments to Lynchburg, Virginia. We had some serious cask contamination problems, and that was mainly the GE-700 shipping cask. That cask shipped fourteen capsules. It's licensed to ship that many. And it meets our requirements and the DOT requirements as far as temperature limits are concerned.
- Q: Was it, if you categorized any contamination from any of these sources that you got back, any of the you know, I take it this is internal contamination.
- A: Um-hm.
- Q: Okay. I...
- A: I don't know that we have or not.
- Q: ...I mean was it a cesium contamination?

A: I don't know. Our main concern was that it's contaminated. The cask surface is contaminated on the inner cavity.

Q: Correct.

A: And we found contamination outside too, on these other casks. But as far as the RSI casks are concerned, I can't think of any contamination problems that we had involved in the cesium shipments. But we can verify that by checking the records and talking to the Operations Manager.

Q: I would appreciate that because I thought it came up as a part of the billing question previously. How much, how much RSI was...

A: Well, let's see. Here's a, here's the cost rackup. Now check up next to the back, the last bullet, and you'll see cask decontamination noted.

Q: Oh, okay.

A: And there wasn't any cost charged for cask decontamination.

Q: Okay.

A: I just don't know of any.

Q: Okay. The person we know is not...

A: Well we shipped so many different casks and stuff. I happened to have that table with me for another reason, and that's the easy way to check it out. We charged them for it.

Q: So you don't feel that they gave you a cask that you had to decontaminate?

A: No. Well, we wouldn't expect it because they were going into relatively clean facility at Westerville, Ohio. We were a little concerned because it had been used earlier for cobalt. Then we found out also that the Decatur facility had cobalt in it before we shipped. But we found nothing to be concerned about. We were able to turn those casks around in a real fast time. We could turn around three shipping casks in sometimes as little as twenty-four hours.

Q: You could see where there would be a serious concern on our part or a question if we found out that you got a cask back with a lot of cesium in it.

A: Yes, but his detection system should have picked that up too.

Q: We under, I know that. But that's...

A: And we just wouldn't have expected it. But sometimes the unexpected does happen.

Q: (Jugan) Yes, yes.

A: As we're becoming more distinctly aware...

Q: (Hultgren) Do you have another question?

Q: (Jugan) No that's all I had.

Q: (Hultgren) Judy?

- Q: (Hultgren) Just one quick one that I have left. You were also responsible as Project Engineer for changes that were being made in the facility and the capsules geometry is that true? I think that's what you said almost in the beginning of the, of this conversation.
- A: I was, I was a Program Engineer, which is kind of like a Project Manager I guess you might say. But it's for a program rather than a major construction project.
- Q: Yes. Were you cognizant of a, a change control process that was in place at the time? Was there a configuration control process in place to handle changes in say, your configuration of your capsule or changes in your manufacturing process?
- A: I would expect that there would have been. That particular area was an operating area which I wouldn't have been particularly knowledgeable in. At that particular time I was new in the program. I had been there about a year and a half. We had engineering drawing control if that's what you mean, and we had configuration control also.
- Q: Well, let me give you a for-instance
- A: Okay.
- Q: When the thickness of the capsule was changed, and the weld penetration depth...
- A: Yes...
- Q: ...was changed to seventy-five percent, to fifty-five percent,...there was not a change in the comparison standard for the weld inspector. He now had a capsule which was penetrated seventy-five percent, and he was now, his unknown capsule he was checking for fifty-five percent penetration and that made his job, I would expect, a lot more difficult. And it was indicative to me that perhaps there wasn't a systemic configurations control process in place at the time.
- A: I can't answer that question. I can't. I really don't want to answer it. The only thing I can answer is that all the welds we ever cut, no matter what the ultrasonic testing showed, were a hundred percent. I do know that, but that's all I know. And we've cut lots of them. But that, I don't know. That is an interesting point, but I don't know the answer to it. Maybe some of these gentlemen here can answer that question. I don't know.

END OF TAPE

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**Marc Stevenson**  
**Westinghouse Hanford Company**

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## MARC STEVENSON

Okay, it's July 20th; the time is about 11:00. We have Mr. Marc Stevenson who is going to be talking to us about the development of equipment for detecting and removing the, any possible leaking capsules here, at the WESF facility. The entire committee is here. Roger do you want to lead the questioning?

Q: Sure. In our background information that was provided to the committee a week or so ago, there was some documents that talked to proposed equipment development, for the purpose of locating potential or locating leaking capsules in the WESF facility should that ever occur. Subsequently, recovering and handling and dealing with capsules that might leak in the future. What we're interested in finding out is kind of the time frame on when all this was all proposed. Your perspective on how that went, the success or failure, the condition of readiness of said equipment and so on. And if could, why don't you just start out from your beginning knowledge of that thing and kind of just tell us about it. And we'll just chime in with questions individually if we have them as we go.

A: Okay, I guess firstly, there's four upgrades that are being done for the WESF facility or done or have been done, and I'll talk about each of those individually as you wish me to. So I guess the starting point for me was when I became the manager in process engineering in April of '84. One of my responsibilities has been the WESF facility. I took over that position when Curtis Stroup left or shortly after. I think there was an acting manager in the meantime, so it starts with me at that time, little prior knowledge of any plans before that first hand. I got some second hand ones that I'll try to talk about. Firstly, the, when I, covering it chronologically is probably the best way to do it, cover it, starting at that time there was some plans that were, there were some plans for the implementing these four upgrades, the plan. Might as well state now what they are. First is a pool cell flushing system; second, an upgraded pool cell monitoring system, which provided lower detection capability where we put monitors on the stream; thirdly, a failed capsule locator; and fourthly, a failed capsule overpack. We can just emphasize it as like we said, we are only talking about use on the WESF site, any use, off-site use--there's been no plans for that to my knowledge. The, at that time when I started there were some plans, say plans were in place to implement these four items. The current status of those is: the pool cell flushing system is in place. Has been in place for a couple of years now, I don't know the exact date, that's not a relevant one to use off site because you just can't send you're contaminated water back to a plant like we do. We send it back to the B plant, which is the first plant all of you were in yesterday when you saw the film downstairs. Again that's in place, been in place for a while. The second item, the upgraded pool cell monitoring system, call it beta monitors; however, they do pick up the gamma also, gamma from the cesium and at a much lower level than our prior monitors did. I can't tell you all the details on how they work, but they pick up much lower, much lower concentrations. Those are being tested right now. There has been some priority as well as operational problems with implementation. They are coming along. Current status is they are being tested. They are used as an integral part of the capsule locator. They are the monitoring system when you put a capsule locator over a capsule. They are the way you tell if there is anything coming out of the capsule, which is the third item, the failed capsule locator. In fact, Roger Jensen, I don't know, you may have some perspective on some things I'm not familiar with because of your past involvement at least with a couple of levels down from within your staff. Roger used to be the head of our development organization.

Q: (Jensen) And I might just talk about that a little bit. There was, I was the manager of development engineering for Rockwell for a period of time at which these two efforts were part of approximately a hundred tasks that the whole department was involved in. My knowledge of this is from two levels above in management, so other than being aware of the effort and overall, you know, well, managerial responsibilities, my detailed knowledge of that is very



minimal. And the second thing is, is about that that effort continued, in some fashion or other, after I had no involvement of any kind in it. So, I'm honestly not a, very knowledge individual to talk in any but the very highest managerial responsibility level on that.

- A: And I can certainly talk in general terms on it. So that's fine. Like I said, the capsule locator has to be used with the beta monitors so it can't be used until the beta monitors are in place so realizing that, as I said a minute ago it's being tested. There has been some technical problems with the failed capsule locator, one that we've overcome is how long do you capsule, how long do you leave an overpack, how long do you leave a locator on a non leaking capsule of which all but one probably will be the case. Do you leave it on for two hours or two weeks, or two months, two years, and the answer we've come up and that's only for a capsule that has that maybe a capsule that leaked at one time that's not leaking now. In fact, quite frankly at RSI right now, I can't see using our system because it appears as so it's stop leaking. Unless somebody would give an okay to bring it into air, and I'm not sure I'd do that.
- Q: Could you describe this capsule locator?
- A: Yea, I guess I can talk real general on what it is. It's basically a bucket, if you will, it's a little more than that, but it's basically a bucket with a pump on it and returns and exhaust lines that have a monitor on the stream and if something, I think a term used in industry a lot in the nuclear industry is a sipper. I think they use them on fuel rods. That's what it is in general terms. It's got a locking mechanism and a place for the capsule to be put in so it's effectively sealed.
- Q: It doesn't completely enclose the capsule to allow for some self heating?
- A: It is a closed system except for the pump.
- A: Okay.
- Q: Is the capsule cooled enough to prevent steam from falling and blowing out whatever water there may be inside?
- A: That should be, that came from our development people that was a given, we've tested it and...
- Q: That would depend on the heat of the capsule and how deep down in the pool it was?
- A: In which, worse case is your hottest capsule of course, and which is fixed at WESF.
- Q: Would you take the capsule in the bucket out of the water?
- A: No, because WESF, for example (the pool cells that we were in yesterday) unlike RSI, are not shielded.
- Q: Okay.
- A: No, you would locate it, and that would take us to the next one, the failed (coughs) capsule overpack, which I will talk about in a minute.
- Q: I guess--when did you start the development on the defected capsule locator?
- A: Before me?
- Q: Started before '84?

- A: Yes, I think you've seen Ron Orme's Document. I believe a document was provided by Ron Orme that states some of that. If I recall it was issued in 1981.
- Q: (Jensen) I believe that the document was dated 1981, and I think that was the engineering study phase of, I'll have to, I didn't read the whole document. It's that big thick one like so. Just exactly when between '81 and '84 actual engineering hardware development work started, I don't know. It was sometime in that time frame; I just don't know when.
- Q: (Hultgren) I'm going to ask the obvious question. If you started that in '84, before 1984, and all it consists of is a bucket a couple pipes with a monitor on it, how come it's taken this long?
- A: Well, one thing I can say is you can't use it without the beta monitor, and the beta monitors haven't been implemented. It's being tested. One specific problem--the specific problem I recall on the beta monitors is we spent, we installed some relatively expensive valves that we went around on for a long, long time trying to get them to work. I hope they work now as we're going through an operability test.
- Q: Are we pushing any the state of the art on the detectors?
- A: The beta monitors that we have installed, have something, it's basically an accumulator so you set the time on how long you want to look at something. If you're trying to look at, basically, you get a lower detection limit by setting the time longer. We believe, to my knowledge, those are state of the art. Bill Clem developed those. I believe he has some patents on them, if I'm not mistaken, patent applications. They are the best I know of.
- Q: You don't try to absorb the radioactivity on, accumulate on a column or anything like that, you just monitor...
- A: Just set the time longer, and it's an accumulator.
- (pause)
- A: I guess that's one of the problems that we've overcome because if at WESF the pool cell radiation levels are coming up, and the volume in the pool cells are known, and it's something like 10,000 gallons. Compared to the volume that is inside this locator in the cell approximately one gallon maybe, I forget what it is, but it's on the order of a couple of gallons. If it's one gallon then it's 10,000 times faster than it would be coming up in the locator than in the pool cell. Of course if the rates zero if you got a capsule. That's the other problem, if you got a capsule that's not leaking anymore what do you do? I'm personally real happy to see the ultrasonic technique is being used at RSI, and that's going to have some applications for us at least again to the case where it's not a gross leak for when water gets into the capsule.
- Q: This bucket, is it, is it an insulated jacket type thing?
- A: No, it's, it's basically, with this being the capsule in some kind of container to make it stand up right, some kind of stand, it just slips over the top, and I think there some fingers that fit over a machined, a machined circumference. It's about 2 inches in diameter larger than the capsules.
- Q: (Jugan) Two inches larger than the capsules. Okay.
- A: Yeah so.
- Q: (Wright) Internal diameter is that much larger than...

A: About a inch bigger I think.

Q: It's steel or something?

A: Yes, I think it is 316L stainless is the exact material I believe is the capsule. (pause) Those are a couple of the things, currently the status on the failed capsule locator, at least before efforts to working at RSI, is it was being tested. My belief is we will start that test again after some priorities are established.

Q: All of it didn't come across, the status of the failed capsule moritor is what?

A: Right now it is being tested.

Q: Being tested?

A: Being tested, at least it was...

Q: Yesterday we were being told it was over in the shop and they were still working on it.

A: But that's part of the test too.

Q: That's the sipper system for potential use at RSI...

A: Right.

Q: But that's not this one?

A: Yes, we may use some of that, unless it's contaminated down in the irradiator (at RSI).

Q: Differ?

A: Yes, it was a separate piece of equipment at one time, I'm not sure a few of the parts haven't been pirated for that system because they didn't exist, but the operability test has been started, the operability is not complete, but that, like any development program, if you need to fix something as you're implementing it, then you'll stop and replace the equipment. We're in between the beginning and ending of the test right now.

Q: There's two sippers, one being...

A: Something is being done for RSI, and I only know that indirectly....

Q: Ah, okay...

A: ...because I've been trying to do all my other work. I spent the first week myself at RSI, and one of our rad engineers were the first people down there on the 7th of June.

Q: So you think there are two sippers being developed, one for your facility and one for RSI?

A: There's at least one difference at RSI: the water is a different level; it's a deeper pool, and I don't know if there is any difference other than the rod length being used. I know there is one other difference, the beta monitors aren't installed in-line like they are at our pool cell so the beta monitors are an integral part of this cart or whatever is being used.

Q: Whatever is being used?

- A: Whatever is being used at RSI. I don't know how their beta monitors are located. Ours are right in-line with our beta system that normally goes to our ion exchange column.
- Q: Yours, I read that you may go in and say cover a number of capsules and try to isolate it.
- A: At one time, at one time there was some words, there were some plans to do more than one capsule at a time with an obvious, with an obvious benefit if you're doing ten at a time, it takes you one-tenth of the time.
- Q: You can isolate where, what happened?
- Q: Okay.
- A: I think you can see that in earlier reports, probably Ron Ormes.
- Q: The one that was found in Decatur when I was there, was that yours?
- Q: Locator, I mean overpack?
- Q: Overpack.
- A: No. There's no overpack that works...
- Q: There's one down there.
- A: I believe Alan Chin did some work. I heard he was doing something when I was down there, he had some plans to go to a machine shop or...
- Q: Well, there was one sitting there because I looked at it.
- A: When I was there the week of the June 6th, Alan Chin commented that he was going to try to have something built off site.
- Q: Okay.
- A: To be compatible with the system, with the cask so not to my knowledge. (pause). The status of our failed capsule overpack is that there's some problems with that. In fact, there problems similar to problems you had at TMI to try to bring resin back and trying to bring contamination back. One is a water problem.
- Q: (Jensen) Let me talk to that for just a little bit. This is a little bit unusual for one of the members of the investigating committee to talk, to this aspect of it, and this is a little bit more than hearsay, but it's partly based on conversations with individuals involved with this problem. And the reason I know something about it, after I had no longer had responsibility for it, I was still interested in what was going on. My impression was that there was an overpack design, development design, that was completed and felt to have satisfied the criteria and so on. And then there became a question about the hydrogen mitigation aspect of it. We have at Rockwell and Westinghouse our staff at that time, a guy I guess who's considered to be one of the world experts on this problem. He was involved in TMI, he was involved with N-reactor and any place else. He analyzed the design and concluded that it was inadequate from a hydrogen mitigation standpoint, and again now, this is from my recollection, there was a problem in modifying the capsule to adequately address the hydrogen mitigation problem and being able to transfer it physically within the WESF transfer system. There was an incompatibility, if you made it long enough to contain a capsule and have sufficient hydrogen absorption media, then you couldn't get it through the transfer port.

- A: And I can speak to that.
- Q: (Jensen) And that's sort of where I kind of lost track of what was going on.
- A: And that's a good summary I think. Specifically where all of you looked yesterday in the pool cells where the capsules are located, where they get capsules, where the capsules were located and the transport out of the pool cell area. Where those are transferred to G cell for any work for shipping or whatever. In the case of an overpack where they would be transferred for reprocessing, cutting off the overpack, cutting the inners or outers or whatever happens, they would be moved through the pipe, to G cell. It is about 50 degrees, and goes up to cell. The problem being the overpack length, like you said Roger, there is not an infinite room to work with. I believe we only had about three inches extra, what the individual, and we can mention names if you want?
- Q: Sure.
- A: What Jim Henry said, the individual that Roger mentioned a minute ago, who I also think is a national renowned expert on hydrogen generation, is that he wanted to have, this overpack, have hydrogen recombinant catalyst, and it would, reversing, the reaction that goes on from radiolytic decomposition of water. And what he wanted is, he wanted enough recombinant catalyst so that in any configuration it would be not immersed in water because when it's immersed in water, diffusion is blocked and the catalysts doesn't work. The answer to that was at each end of this overpack, with this 3 inches that we had to work with longer than the capsule. Which is a given, we installed enough catalysts that would do the job at each end basically something about one-third of the volume of a coffee cup at each end about 2 inches in diameter and one inch deep maybe. That deals, with the hydrogen problem like Roger said it was not part of the original question.
- Q: (Wright) Question of RSI what we are doing, on radiolytic generated hydrogen but I forgot it. Is someone from Westinghouse going to look at that before they put the overpack there and ship it?
- Q: (Jensen) I don't know Marc, do, do you know?
- A: Well hydrogen is only a problem, of course, if there's water there.
- Q: (Wright) Well there's going to be water when they pull it out, but they're going to blow the water out, but they are going to have a condensate trap. As long as the have moisture in there, they are going to get some hydrogen.
- A: There's going to be nitrogen, I believe the plan is to nitrogen purge the system for 24 hours.
- Q: (Wright) Yes, but nitrogen is to get rid of the water, but then they have a condensate trap because I assume they still think they're going to have some moisture in there.
- A: The place where I'm most concerned is where the big source is inside the capsule. And the small volume because a small volume, of course, accumulates much faster.
- Q: Incidentally, looking at the overpack, it looked like the tops with all the screws on it had been worked a lot of times. If Al Chin designed and built that just recently, it looks like he tested it a lot. It just looked like it had been used, it didn't look like a new piece of equipment.
- A: Our overpack is to be not reversibly, only destructibly, opened you can only cut it open.

- Q: Well he's got a whole bunch of them, which I thought was the weirdest part of it, is putting that down and putting the capsule in and finding all those bolts to tighten them down is a weak part of what that was.
- A: Well besides that, I believe if you're going to somehow qualify it under some special form, it can't be, it can't be non-destructively opened. And I don't know if they need to do that or not.
- Q: (Wright) They've tested it, but they had to retest it again in the presence of NRC or something. It passed the test just for holding the pressure.
- A: That's the other side of coin besides hydrogen, I don't know the answer on how they're doing it there. I know what was proposed here like I say using the hydrogen recombinant catalyst. The problem using the catalysts by itself is the other problem. If you've got, and I believe it's on the order, for our overpack, with the volume we have in our overpack, it's on the order of something like 30 grams of water will give you a pressure that's higher than our system has been tested to. That's just because it's a pressure vessel, and you lift it up in the air where it's going to heat up to some assumed temperatures. It's going to over pressurize; something is going to fail. In fact, where we are right now on that, we've asked our remote systems engineering people to look into developing us a cask because the way our overpack is used, at least it's been implied is it's always under water, so it's never lifted out of the water and so you rely on the shielding of the water. But it looks as though we don't know how to solve those two problems together. I don't know how you can remove all the water.
- Q: We going to ship one run, it's supposed to be the 24th that we can get NRC to buy off on it.
- A: My boss is down there, and I know he is real cognizant with that problem at WESF. I don't know what they are doing but for our facility and that's not counting any DOT regulations. I don't know how to, I don't know how to move a capsule with our overpack to our G cell, and that's where we are. So I don't know how to solve, I don't have the solution. One solution like I say is to develop a cask, where the cask gives you the shielding. I believe that that's being developed, but I believe one of the plans is to put a HEPA filter on there that's water resistant, that will work under water; however, and I am told these exist, but I don't know if they do.
- Q: Fading?
- A: Pardon.
- Q: I say you're fading, your voice is getting lower, lower, lower.
- A: Oh, okay. Saying something like you said the...
- Q: Your overpack hasn't been manufactured then?
- A: There's been (coughing), one's manufactured but it's not ready to test. Say the hydrogen problem.
- Q: Somehow...
- A: I don't know how to get rid of the water.
- Q: Let's not let your knowledge of the overpack, your's meaning Westinghouse's, slip by getting down to RSI and let us do something dumb or stupid when you guys knew better. And that's what it looked like on the specification for operating these capsules. You guys had a good handle on what ought to be done but somehow that never got transferred down.

- A: Is that the 400 degrees...
- Q: We're getting ready (everybody talking) to ship with an overpack within four days, and I had heard it had been put off a month but...
- A: With the pressure problem solved, that's the only problem...
- Q: I don't know. If you know something they don't, please be sure you or your boss transmits that information to us.
- A: My boss is very cognizant of this matter.
- Q: The one in Oak Ridge when they get it and open it, be sure they don't get a hydrogen explosion in that cell.
- A: If there's no water again, there's no place for it to come from.
- Q: I understand, but I think we have egg all over our face if they.....
- A: Of course, you need to have a spark source too. Cause there's hydrogen there doesn't mean there's necessarily a problem, you've got to light it somehow. Now what they did at TMI is they transferred things in resin, and that was dewatered somehow. I don't know if they just put in something like a colander for making spaghetti for and sucked the water out, and I don't know how it was removed there.
- Q: But Blaine Barton who's down there, is he still there?
- A: Yes, coming back tonight or next week.
- Q: (Jensen) He's certainly cognizant of the recovery overpack equipment deficiencies and the problems associated with them and should have had the opportunity to participate in the recovery overpack. I can't imagine that he wouldn't have. That input should have been into the process down there, but it maybe worth our while to verify, if he's coming back tomorrow, to verify that with him.
- A: I, now the reason they're doing it, I believe to be a 24 hour purge with nitrogen is to do to that, get rid of the water. And it's probably dry nitrogen too.
- Q: I understand that but they still have a vapor trap on there. And they have had that on there for a purpose.
- A: Inside the cask?
- Q: No, it's off to the side, but it's an integral part of the unit, but it is connected by tubes. I don't know whether by hoses or...
- A: The other part of radiolytic hydrogen generation is there is a, something called an F value, and when you calculate, when you calculate the amount of hydrogen generated and that's the fraction of energy absorbed. If there's something over here 6 feet in air with F value for that material 6 feet away, and if it's 6 feet away under water, it's going to be effectively zero. Assuming there's no source term there. We're talking kilocurie quantities for a capsule, and we're talking 4 curies is the last number I heard in the entire pool cell compared to 50,000 curies in an average capsule. I think Blaine is very knowledgeable, but that's the one thing I know they're doing.

- Q: Could I go to a different line of questioning on this. We basically, at least we've been told so far, that is I guess the original plan was to store these capsules down in the water here at Richland.
- A: Everything I know that development planned for WESF capsules was to put them short term in the pool cells. Later, I believe it's in the EIS, calls for repository storage, and that comes out in the next number of years. I'm not sure what that ultimately will be, but that's the current plan.
- Q: There was, at least, some indication that some folks here at Richland expressed some concern about these capsules going off site. Were you involved in any meetings that these discussions were held?
- A: I've put together four or five questions that, with this committee's acceptance, I would like to ask and have answers to that are perhaps relevant.
- Q: Were you ever involved in any discussions with the management concerning the concern of putting these capsules into the hands of private contractors?
- A: I've had some discussions with Garth Tingey over the year. I don't know if you've talked to Garth yet. Garth is the PNL person who's been primarily responsible for all the development work on the capsules. Documented discussions with him, by myself or my staff, I believe are in packet; of materials, Roger, I think you passed out. There was a comment, there was a letter written from Darryl Lamherd who was on my staff at that time to Gene Reep saying there were comments to the lease agreement.
- Q: (Davis) And is that something everyone has?
- Q: (Jensen) Yes, that was included in the packet; it is about a 2 page letter as I recall with about a dozen bulleted comments (something of that nature).
- A: And a couple of questions are, I think I have a copy here that I can pull out and talk about it if you like.
- Q: (Jugan) Did we get a copy of that?
- Q: (Jensen) It was in my packet of, of, the set of copies, and I just assumed that it was in the one I sent to Oak Ridge.
- Q: (Davis) As early as 1981, at least, we were in the process of developing systems to locate a defective capsule. So at least there must have been some concern that these things may leak or certainly have some possibility of some problem (interruptions). We were also developing, spending the Government's money to try to develop a system to recover one of those capsules. I guess the question is why would we have put the capsules out in the hands of a private contractor before we at least had the engineering work done on recovery systems.
- A: I guess I can only...
- Q: There's not any management discussion or concern?
- A: I guess I can only speculate, like I said, like we talked in the beginning today. But maybe, it needs to be said more explicitly. The equipment development work done at Hanford has been only to be used at Hanford. And it's at Hanford because...



- Q: But we've still got the point. You had a concern, okay, there was a concern that you may have a leak, there was a concern that we were not going to spend money on it. It looks like to me that the concern would have been even greater when you put that into the hands of a private contractor who's primary soul moment in life is to make a few bucks off of this stuff.
- A: Like I say, we made comments to the contract, similar to the questions you are asking, we made some similar comments on the capsule use environment and what's going to happen to the capsules. I don't know, I don't know if those are in the lease agreement, maybe they are.
- Q: Well, they're not in the lease agreement. But, I guess I'm wondering about the responsibility, Westinghouse's standpoint with Westinghouse management here and the DOE management here, if we had concern about these leaking to the point that we were developing the subject systems and locator systems; wasn't that at least being discussed at the top level of management here before these things were put into the hands of private contractor? And if even I don't gather that we ever even, at least from what we've been told, there seems to have been very little or no communication with the contractor concerning the concerns of the leaking capsule.
- A: That's one of the things I actually prepared; that's when we decided to focus it on, on WESF development work for these items. I'll talk about in a second if you like. I know in September of '85 and I believe this was in the packet of information. We, Rockwell at that time, provided something to C. R. Delanoy, Bob Delanoy, DOE/RL. I'll just read the words, it says, "Attached (is from Gene Reep to C. R. Delanoy) attached is a flow sheet we've discussed today that shows a general scope of possible requirements for cesium capsules returned from beneficial uses." Again, this is in the packet I think too; does anyone recall that?
- Q: I think it's also in the packet.
- A: It goes through that they come to Rockwell (at the time at Hanford) or they go to another site, Oak Ridge, whatever. If they are failed capsules or if they were non-failed capsules and that, was presented as I recall, that was presented to, to say we need to develop this kind of a plan.
- Q: Who, who in Westinghouse, what individual at Westinghouse actually made the decision to recommend to the Government to put these things into the hands of a private sector?
- A: Gee, I don't know. Each company's got it's president, I don't know...
- Q: Somebody had to have the ultimate responsibility for making the decision.
- A: I would say that the direct interface with RL is with our normal direct interface: program manager.
- Q: Gene Reep?
- A: Or Ken Gasper perhaps?
- Q: Gasper is who?
- A: Ken Gasper was a prior program manager, but when he was program manager, Gene Reep was also still at the facility under Ken.
- Q: (Jensen) Let me interrupt here in just a little bit. In the way that Rockwell operated, they operated on under a program management matrix operation where the technical organizations typically did not interface with the customer and that with, and the program office was the interface with the customer and that those kinds of things were handled through the program office, approved through the program office, approved by the local office, the DOE office. And

so it's not unusual for the engineering folks not to, not to be cognizant of the approval process for those sorts of things and that, you know, the engineering technical organization did not participate other than on advice basis.

- Q: (Davis) I don't really think that's a concern Roger. I'm just trying to figure out where within the management structure is the decision process made to say, "Yeah, it was okay."
- Q: (Jensen) This is germane to that because I think Reep is our avenue to find the answer to that question.
- Q: (Davis) Okay. I could only speculate. But I mean I still don't think Westinghouse has, if they had these concerns, they certainly had the responsibility as minimum to express their concerns to the appropriate level of management.
- Q: (Jensen) Absolutely.
- Q: (Davis) Okay, I can voice mine there in one place. Especially, I guess this is the real concern that we didn't have a recovery system in place of the time these things were put out. And we still don't have a recovery system in place.
- A: One thing I should say is also is that I'm an ANSI sub-committee member and what that sub-committee is, is dealing with design and use of irradiators of different kinds and including the type Alan Chin has. That's a question I've had, at the subcommittee meeting is, "How do you return a failed capsule?" for one, part of the question any way and many other questions too. You know, it's an exception to the rules.
- Q: I don't think that it's "We're going to have egg on our face." I know we've already got egg on our face. Would you agree?
- A: Would I agree? I don't know what you mean.
- Q: I know we have a problem down there and we don't know how to deal with it. And were trying to figure out somebody to get a, an identification system and a recovery system in place for that product.
- A: I don't know what's been installed down there. I just don't know, but I know the facilities are.
- Q: It's been June the 6th and this is July the 20th and we still don't have the capsule identified or removed. I think we are going to fail.
- Q: (pause) (everyone talking) I recognize that Roger set the bounds to what you're doing with WESF, but what is your personal opinion of the reliability of the sipper that is being developed for RSI?
- A: I don't know if we're going to have to use it. I don't make that decision but if you find the capsule, I guess on a probability standpoint, how many capsules would you think will leak on a given time? I would think one would, could be more if you dropped up a 1,000 pound block on 10 capsules you would have some fail, but if, if...
- Q: (everyone talking) Well hopefully, the ones with the water in them, I don't know the final total?
- A: Two is the last I heard.

- Q: Will have a probability that the outer capsule at least is leaking, but if it isn't and it turns out that all these things "suspect" are from the water then what do we go?
- A: We at Westinghouse will do what we're asked to do, I guess. I guess I can say that I would think they would come back to WESF and they would be cut up, and they would be examined, whatever that examination process would be.
- Q: The question I was getting, if we have to use the sipper, do you have confidence in it. It will locate a leaking, double leaking capsule?
- A: If it's still leaking, yes. It sounds like it will to me, if it's not leaking, however, which it sounds like it's not leaking to me, being that the pool cell levels have not come up, then it's based on leak rate. If the leak rate is zero, the time to find a leaky capsule is infinite-- you'll never find it.
- Q: Let me ask you just a hypothetical question. Again I'm a novice, contracts, assuming that the inner capsule, the end had been blown out and the outer capsule had been blown out.
- A: And the outer, okay.
- Q: Okay, and we got this stuff flowing freely into the pool. What kind of problem would that have created? How would that look like to the other capsules that were in there?
- A: I don't think any for the other capsules as long as they are in water there. Um, one luxury, there's some advantages to RSI compared to WESF, and there's some disadvantages. An advantage at RSI is that it's a shielded area. You can have all that, you can have all that dose there and an unshielded position and from radiation standpoint, you don't get anything. And that's how they use it. One disadvantage is, like I said in the beginning. You can't just flush the cesium to B plant like you do at WESF. WESF, however, doesn't have a shielded area either. The area we were in yesterday is just an unshielded building. We've got cover blocks which can provide sufficient shielding.
- Q: Would the fact that they didn't have any, they removed this HEPA filtering system down there have any problem, we had that kind of occurrence?
- A: Are you referring to the use of HEPA filters system that was normally installed and I understood that was the case, I wasn't sure. But it was a fact that it's normally in this system, it's not in this system, now.
- Q: Yes, if you had had one of these things that's completely pulled apart and all that stuff, would that have been a problem?
- A: If we were doing it at WESF, I would have preferred to have HEPA filters, even if you've got diffusion as the driving force. I would not have a non HEPA filtered system at that facility. That's our standard, whenever we're on site, whatever the standard is off site. I think it would be worse. (i.e., a more controlling system)
- Q: The license originally called for HEPA filters at RSI but it seems that, you couldn't get the air flow through the facility that they designed with the HEPAs on they got an amendment to the license to remove them.
- A: Who approved that? I know who...
- Q: The agreement state.

- A: Or the NRC or the agreement state, that's just a comment.
- Q: (Davis) I guess I'm just, you know, the thing that, in view of the fact we knew the potential or the damage to the public and the environment of this stuff and the fact that we did not even have a system to locate a defective capsule and on top of that we don't have a system to remove or to deal with a defective capsule. It seems to me like there was just a like a blasé attitude. With only part, and I'm not trying to point the finger, just on the part of everybody that was responsible for letting this stuff be put out into the public sector. Just, especially from people that you guys were the closest to it and certainly should be the most knowledgeable of the possible damages and problems that could develop for the Government and to yourself as well as to the folks at RSI having to deal with the stuff down there. It seems to me like that there were rumblings kind of, you know, down at the manager level of the plant, but I guess I'm really, I'd like to have seen some rumblings on up at least to the manager of the Westinghouse organization and to the manager of this operations office and at least to the headquarters. And I guess that's what I'm looking for and I'm not seeing much of it.
- A: What happened after me, I don't know. When I gave our comments, for example, on that letter which asks a lot of this questions, environment, etc. They went to our focus with RL. What happened from there, I couldn't say. I could assume NRC made them do all that, you told me they haven't.
- Q: But I guess I didn't from that letter, re-review of it. Did Hanford have any concern or shouldn't they have had concern that a commercial company would get a leak and couldn't recover from it?
- A: Like I said I prepared some information, but I can tell you what communications that have went on between each of the three users, commercial users of capsules that were in my records. But maybe a five minute on that is what I...
- Q: (everybody talking) Let me ask just before we do that, one more question. I'm still somewhat unclear on the hardware status of the Richland capsule locator, the Richland overpack, and the development thing for the RSI locator. Could you, I mean is there, can you just tell me was there a prototype, is there a semi-unapproved decision in existence...
- A: The development people, correct me Roger if you think I'm wrong, developed a prototype.
- Q: Of what?
- A: Of the locator, of the...
- Q: There is a developed prototype.
- A: Developed in, yeah, I guess a prototype is just something less than that approved for use. It's not approved for use until it's been operability tested and accepted at the plant.
- Q: When was that accomplished?
- A: It was staged before I was involved, it was also tested, there's been some various testing done over the years. Let me think, there was I know some test development results that exist on how much pressure the overpack will take.
- Q: No, I'm talking about the locator still.
- A: Yes, there's been some testing on it.

Q: Because I've got, I've got all, I showed you yesterday the reference...

SIDE 3

Q: I'm just still trying to find out the existence of any hardware, maybe not "qualified hardware" but...

A: I know of one location that has one, ARECO, Applied Radiant Energy Corporation in Lynchburg, Virginia

Q: No, I was meaning here though.

A: No, like I said.

Q: There was a prototype locator.

A: Not tested, so its basically...

Q: Not tested

A: You can't use it until it is tested at least here.

Q: What's your definition of testing, somebody?

A: Specifically, it has to be operability tested to work in our facility before we use it.

Q: Has this been physically been in existence but not been tested for a long time?

A: There's been, like I said earlier, some problems that we've been dealing with that we need to resolve.

Q: (Jensen) Look, let me clarify something here.

A: (Jugan) Okay.

Q: (Jensen) Test has to be completed and approved as successful.

Q: (Jugan) All right.

Q: (Jensen) Testing can go on for a long time, but until the test has been completed it's not released for use. So it's not, what Marc is not saying is that it exists and hasn't been tested; what he is saying that it exists and hasn't passed the test. See what I mean.

Q: (Jugan) Because it wasn't completed. Right, I'm trying to get an ideal of the time frame too.

A: I can't use anything on site at our facility until I have until I have a beta monitor system.

Q: (Jensen) Let's recap what he, what he told us when he first started talking about it. The beta monitor system is an integral part of the capsule locator.

Q: (Jugan) Even the prototype?

A: (Jensen) Even the prototype.

Q: (Jugan) Okay.

Q: The beta monitor system is right in...

A: It was built to plug in to the...

Q: (Jugan) Okay.

Q: (Jensen) Beta monitor system you said is undergoing operational testing right now.

A: That's correct.

Q: (Jensen) The failed capsule locator could not be accepted for use to complete its test until after the beta monitor system is, has an approved test. So even though it's been in development for, however long, it's impossible for it to have passed its test until the beta monitor passed its test. (everyone talking) That is how the whole process works.

Q: Was there not maybe a old beta monitor, previous system it could have plugged into?

A: There was a gamma monitor on the system but it had a much, much, much, much higher levels of what it can see.

Q: And the prototype could not plug into it?

A: No, there was no plans for that. It would take a long time to implement.

Q: (Jugan) I guess I'll, where I'm coming from is I don't hear dates and I'm not understanding.

Q: (Penry) Maybe your question should be is when did they start the development activities on this prototype?

Q: When?

A: The same answer as before, before '84?

Q: (Penry) Yeah, okay, you can tell us when before '84?

A: The manager in Process Engineering prior to me was Curtis Stroup.

Q: I guess I'm wondering when was the prototype done being, when was the prototype completely fabricated even if it hadn't done any test?

A: We've started an operability test, started, we can't complete it like I said earlier, a while back. About...I'll guess 3 months ago.

Q: That would have been when this thing had finished, had been finished manufacturing or what that test...

A: Ready to test or plans ready to have personnel to do the testing, whatever that takes. Not complete the test because again the beta monitors are required.

Q: (Jugan) But it wasn't that the thing was sitting there for 2 years?

Q: (Penry) I think we need to, if you can answer the question. "When do they start development activities?"

Q: (Jugan) Right, and then when will...

- A: After '81 and before '84.
- Q: And when was, when was the locator prototype completely manufactured, and the manufacturing of it?
- A: And maybe even a bigger question, when was it manufactured and when was the plant ready to test it? (everybody talking) That was 3 months ago.
- Q: I can understand the 3 months ago, I'm trying to, getting along the same lines as there's a capsule pulled from Westerville. Yes, the capsule was pulled on schedule in '86, but I have no ideal when testing was completed on that capsule, if it was completed. The report still isn't out.
- A: Garth's people I think PNL's, not quite got that document done. That's typical, it usually takes, well I've seen a 6 month period to get a document out.
- Q: (Jugan) We beat them on the award fee when they do this.
- A: Okay, I don't know how Battelle works, but I know the documents that I review, and I review some of them, that's a typical time before you see it published.
- Q: (Jugan) I was just wondering if there was this long delay time between end of manufacturing of something and start of the testing?
- Q: (Jensen) I think there is one kind of clarification thing it's helpful to do. When you talk about development, you talking more or less about inventing, and it's easier to ask the question and then think about the answer, "When is the completion of the invention schedule?" That's a very difficult thing to do, and so when you say you know when it was done, it's being, it's still being invented you might say. That's by definition.
- Q: (Jugan) Right, I was trying to understand, is there a reasonable explanation why Mr. Chin thought that there was a sipper available back in the '84, I don't know, whatever time frame.
- A: Do we concur in that letter?
- (everybody says "No" and laughs)
- Q: But I'm just wondering if...
- A: Let me tell you when Iotech was at Hanford, when RSI was at Hanford, and when ARECO was at Hanford, those are the 3 people, 3 companies in the order that they start out receiving WESF capsules.
- Q: Let us go to...
- A: At least let me tell you what I have in my records.
- Q: Sounds good.
- A: Firstly, Iotech, Iotech's a company in North Glenn, Colorado. They are the first people, the first commercial facility to receive capsules. I don't recall the exact number they have, but they have a large quantity similar to the amount of capsules at RSI. I don't want to quote the number without it being in front of me. The second facility, the RSI plants, both at Westerville and in Decatur, Georgia. The second people to receive our capsules. The third people is ARECO (Applied Radiant Energy Corporation) in Lynchburg, Virginia.

Q: Say that name again.

A: Applied Radiant Energy Corporation, abbreviated ARECO. They only have 25 capsules, again they're in Lynchburg, Virginia. What my records show, well firstly, the Iotech people...

Q: The first company that was there?

A: The first company to receive capsules, Bob Dart their program, I believe he was their project engineer. He was at least at a very high level for their company from the engineering side. He visited our facility, had many, many conversations with primarily with our operations management at that time Bob Higbee, the fellow that gave you a tour yesterday.

Q: When, when was this?

A: I didn't look up the dates. However RSI, RSI was at WESF in September of '85, that's when Chin and King (chairman of the board at RSI) was at WESF. So it was before that, uh, Sylvia Wolfe has all the records on what capsules were sent. And it was before they started receiving capsules.

Q: Correction, she does not have the record of the capsules that were recently leased, we have been unable to determine that data.

A: And did you find the sort plan by the way. I think you were going to ask, ask, Liz Bowers for a copy...

Q: (Jensen) We have not talked with Liz Bowers since, since yesterday.

Q: Are you sure about that 9/85 date for RSI?

A: I'm sure in the fact, that Ken Gasper sent a letter, to King and a letter to Chin giving them a copy of our, our flow sheet document, the flow sheet letter, flow sheet, which is the sketch that you all saw yesterday in the WESF operating gallery. What he says in his letter, a paraphrase, "Thank you for coming to WESF on September 3, 1985. As Marc Stevenson indicated to Ken Gasper, our program manager at that time, attached is, you wished for a copy of the encapsulation flow diagram," and that's, that was sent and that is what our records show.

Q: Okay, did they get any other documentation besides that?

A: Should we talk about all 3...

Q: I'm sorry.

A: Let me...

Q: I'm sorry.

A: (everybody talking) I commented on all 3 because it's...

Q: Go ahead the way you were planned.

A: Iotech, again what I've got from my records is, have no references of letters found as to if they formally got or received anything. I suspect they did not receive anything, meaning technical documents, 'cause see they've talked many, many times, primarily to Bob Higbee at our facility. Second plant, RSI, the same thing no reference, no references or letters found about anything communicated to them. No, I guess I need to preface that before I go on any further



that the same thing: I don't necessary get all the documents. The only person who is always on distribution, the way Rockwell was run at the time was our program manager. I say I got most of them, but if there's more, you should ask Gene Reep or you should ask someone is the program office. But what I've found in my personal records for RSI is that there is no references. The only thing I found was these two letters that I just quoted that send a copy of our flow diagram to one Alan Chin and to Charles King, the CEO at RSI. Ah, they were at our facility like I said in September of '85. There also was many, many phone calls, primarily again with operations management. Maybe with the program office I don't know that.

Q: Now, RSI was, was licensed to use cesium in 4/85 at their Ohio facility.

A: Okay, well this was when, this may have been in the midst of their shipping.

Q: Okay, it was before they were licensed to use the Decatur facility.

A: And that's all in the request for services I believe we talked about yesterday at least that's the way Bob Higbee implied that that was the only time he signs a radioactive shipment record is when he has been asked to do it. Some what's been talked to on Alan Chin again from my records and from my recollection is his questions were on thermal testing. We ran a thermal test and said you can't put more than x number of watts in a GE cask and that was what we talked about yesterday. There is a four hundred degree centigrade outer capsule temperature limit. We sent a note at the end of this testing that we have a spec in place with a copy to RL saying these are the results and here is what our spec is for receiving capsules back. That's RSI, that's all my records show. ARECO, the third and last plant again, is, they have something like 25 capsules, much, much fewer than the other plants. There are some letters and telecons, which with the telecon just being a telephone conversation between someone at ARECO and someone at our facility. There was, there was letters and telecons found that were received and sent by Hanford. ARECO happens to have like as I said earlier, I believe they have in place a capsule sipping technique. I think it holds 5 capsules. I know when I was at RSI someone had talked to ARECO, maybe it was your people, Oak Ridge people, and found that they do have one. That was for ARECO, was the only document, formal documentation that I found that communicates some of things we use and some of things they may use. I guess I can speculate for a minute. What I speculate is everyone thought that these are NRC controlled facilities, NRC licensed facilities, and whatever controls being done there is by the licensee's. I don't know again I can only speculate, I'm not part of that.

Q: I think, you're absolutely correct.

Q: The licensing individuals are earnest, intelligent individuals, and they operate on the knowledge base that they come into. And if they had the knowledge base that Westinghouse or Richland company at the time had, was never made available to them. That a good earnest, intelligent individual will operate on the basis of the information that he had available and proceed with the license.

A: I think they all, I think the system relied a lot on the PNL work. I don't know, I only know that second hand too.

Q: It appears on the base what we can find out, that it's fair to say that the concern for the ability to locate and retrieve a capsule based on, on, our knowledge at Hanford and the unavailability of equipment to even do that for ourselves. Any concern about how, what kind of a problem a lessee might have was certainly not at least to your knowledge communicated vigorously, vigorously, if you will, to such that it got to or had a potential to get to the lessee. So far as your knowledge is concerned.

A: I can only hope that it got to the lessee but I don't know.

Q: Okay.

A: I only passed it through our channels, the concerns I had.

Q: Marc, if I may ask one more question. The engineering and the development work that you're doing on the locator system and the overpack system, would it be safe to say that that would not necessarily work at RSI or at one of the other facilities?

A: I think it is a big assumption to say it would work. You would have to look at it.

Q: Okay, let me, the second part of the question. We were told that the racks that these capsules were in, in Georgia, were modified racks that they used for the cobalt 60.

A: I was told that also when I was at RSI.

Q: Okay, that's my understanding. Which would mean that the system that you are developing here might have to have some modifications or even significant modifications before it would work down there. So...

A: I, I...

Q: Your system, let me go on, so I guess the question is, based upon your knowledge of what you have seen in working with this stuff. Would you recommend that these firms that we go to in the private sector at least have an identification and recovery system before we lease any more capsules?

A: I can say that I personally say I would like to review that lease. I would personally like to review the controls of the...

Q: I'm not talking about the lease, do you think...

A: The controls.

Q: The controls.

A: As I will in retrospect anyway, I would like to look, I would like to be able to review, I personally or somebody that was knowledgeable with our capsules would like to review that system, like to review any facility before it received another capsule. That would be my personal opinion.

Q: (Hultgren) (pause) Any more.

Q: (Wright) That's a good answer, I don't think you really...

END OF TAPE

**Curtis Stroup**  
**Westinghouse Hanford Company**

## CURTIS STROUP

We're off and running again. It's June 19th, we're at 1:00. We have here with us Mr. Curtis Stroup who will be talking about the background of the waste encapsulation and storage. He's an employee of Westinghouse. Also present on the committee: Willis Davis, Ed Wright, Judy Penry, Mike Jugan, Roger Jensen, and I'm Ron Hultgren.

- A: Okay, this morning, we've had a review of the facility, walked through it and looked through the facility, got an explanation about the manufacturing process, and we asked a number of questions there. What I think we would like to do is give you an open table here for Operation and why don't you just give us a little bit of background of the Waste Encapsulation Program, and then we can ask questions as we go along.
- Q: You may want to start off by telling us what your involvement with the Waste Encapsulation...
- Q: And for how long?
- Q: Yeah, and what you did and all that kind of stuff?
- A: February of 1979 I became the team leader of the Waste Encapsulation and Storage Facility Process Engineering crew and later, a couple of years later, that was made a management position. I remained there until January of 1984 in that capacity. When I first started we had four Process Engineers and when I left there were eleven, so the crew went up substantially in size. Would you like for me to tell you a little bit of the history...
- Q: What does a Process Engineer do?
- A: Okay, the roles in the plant, there's three major roles: operations, maintenance and engineering. And then there are support service organizations such as: QA, Safety, the Fab shops, and on down the list. But the Nucleus for those three, there's WESF's organization structure. There was a plant manager responsible for WESF, and he reported directly into the manager of B plant/WESF. All right. Then the Process Engineering was independent from Operations and I reported to the Manager of B plant/WESF Process Engineering. All right. Now the maintenance crew was organized just a little differently; there were four major areas of maintenance support; there was an electrical support shop, there was a mill right shop, there was a fitter shop, and then there was an instrumentation shop. And those reported into a central B Plant/WESF, maintenance manager. During my time at WESF all of those were independent. Since that time maintenance now reports in under Operations. Did I give you a feel for that?
- Q: Yeah, okay.
- Q: But what is the role of Process Engineering?
- A: The Process Engineering role is to prepare the procedures, to maintain the procedures, to provide the run plans, the instructions to operations to run, to identify safety concerns, to prepare sections of safety analysis reports to interface with organizations like safety, to provide, technically trained people to review certain parts of the Operation, basically provide technical direction for Operation. The ultimate responsible for the facility operation rests with the Operations Manager.
- Q: Who was that during that time period, while you were over Process Engineering?

- A: There were two: Lars Edulson and later John Fulton. In WESF's history they have had a number of Operations Managers and prior to myself they had a number of Engineering Managers, that was since the '74 time frame. I don't think I could name them all right now.
- Q: We've heard that in that early period things were really rough, never could really get things really operating.
- A: The building has a really interesting history in that light because in the late 60's the process was developed to remove cesium and strontium from the tanks, to increase tank life, you know like, in that process they were developing the WESF process, and they started construction on the building I believe in '71, and the building started up in '74. Prior to start-up, that building won national design awards for the set-up and the equipment. It was one of the first step production facilities using manipulators in that type of environment. And, in the early years there was a lot of difficulties because basically the equipment didn't function, prior to startup there was extensive work on criteria, all the good engineering practices establish your criteria to design your equipment to meet the criteria, but you know as things go, when you put them into operation there's lots of variables that you can't always consider and that's what happened at WESF. We replaced, either before my time or during my time, every major piece of equipment in that building with the exception of the calorimeter. The...
- Q: What building do you...
- A: WESF.
- Q: Is that a new building, I thought it was an old building they remodeled?
- A: That was a new building.
- Q: That was a new building, was it an addition?
- A: It was in addition put on to the B Plant. Okay. The Waste Encapsulation drain lines are all tied in with B Plant, so our lines go all the way back through there their tanks transfer to B Plant.
- Q: I thought it looked new...
- Q: And when did that new part open?
- A: It opened in '74.
- Q: Okay.
- A: Construction began in '71. The major difficulties with the building were centered around the use of manipulators in the environment. Initially, the cells were not kept clean. Manipulator boots failed very readily and the building wasn't designed to handle the failure rate of manipulator sleeves the building experienced. The equipment, various reasons for failure, contamination basically clean cell philosophy, was a big item for many things from the welding process in which if we got it in a weld zone there was a real good chance that we would have what they call a "blow out" of the weld, to the strontium line where we had so much dust in the cell that a boot's average life on a manipulator was right around three days.
- A: Okay.
- A: So you can get a feel for the problems. During the time that I was there, we replaced on the strontium line the furnace, the welding equipment we totally rebuilt the filtration system. On the cesium line, the siphon pour was replaced with a tilt pour, the welding process was

replaced; and in our decontamination cell we, the development work done on the scrubbing system, proved to be inadequate. We put in an electro polisher to decontaminate the capsules. Some capsules on the scrubber would be there for hours and they would wipe them and sinear them and they would still have contamination on them, so the electro polisher installation, and I believe that was '78 when the electro polisher was installed, really improved the decon time on the capsules.

Q: You were there in '78?

A: No, I came in '79.

A: Okay, I thought all these changes were after you got there.

A: No, these were changes that occurred right before me, I mean within 6 months of me being there were the tilt pour, the electropolisher. I believe those are the two major ones.

Q: Is there any way to check back and see what each capsule, what basis it was made on there?

A: Well, the cesium, each run of capsules there is a book maintained called the Cesium Run Book. And all of those books exist in our QA archives. The run books are accessible, and they follow the history of the fabrication, of the WESF fabrication of the capsule. The cold ends that, cold ends of the capsules are welded in our shops cver in West area. And then they were transferred over to WESF, and then they were degreased once we were ready to use them and then passed into the cells. The run books have the records that came with the capsules from the West area shops.

Q: Are we going to see those or not?

A: We're going to talk with QA Manager tomorrow morning first thing and make arrangements with him to see whatever it is that's in the QA record that we want to see. That's really the reason for having him in here.

Q: I imagine with 1,500 plus capsules of, a lot more than 1,500 pages.

A: So, yeah.

Q: So we'll just have to be a little selective about what we, you know, ask to see.

Q: I'm just saying it's just a little to big for him to bring it in here, we'll probably have to go to wherever it is.

A: Oh, not necessarily, I guess what would be, I could see being beneficial to you would be an example of the run book. Where you can see the different elements that are in it. Such as the weld scans, the, how the, records are maintained 'cause there is a book for each one of the runs. For instance for the tilt pour you could pour up to 7 capsules at once. So you will see the records for those 7 capsules from start to when they were placed in the WESF pool.

Q: As I said I don't know how massive it would be but I would think I might want to see a whole lot more than selected ones.

A: That's, you know, that's, there's boxes and boxes of these books, that's up to you.

Q: Okay, tell us some more. You came on in '79 and that's about the time, if I remember correctly, that PSR's and SAR's and OSR's were kind of, came into their own. Did you write or direct the production of those documents for the facility?

A: The facility had a SAR when the building started. Okay.

- Q: In 1974?
- A: Yes.
- A: Okay.
- A: It was a start for the building, the Quality Control, I was involved in a, would say mid 1979 with our outer capsule of the encapsulation. The cold welds in our, were fabbed in our shop at West area shop and were actually inspected, at that point, by our Quality Representatives over there. They did the scanning, like the first 200 hundred capsules were made, cesium capsules, were actually scanned in WESF in the Operating Gallery. But right at the start of WESF that building was set up as a Quality Control lab for cold welds. The, I don't know, does that answer your question?
- Q: I'm curious, how about the rest of the safety documentation the Operational Safety Reviews and all the rest. Were they done at that time also or they done later on?
- A: We have, our terms out here are readiness review for start up of a process, safety analysis for our reports which included our Operational Safety Requirements. The Operation Safety Requirements were included in that SAR. The readiness review process for start-up I really can't tell you because I've never reviewed those. I do believe that there was a readiness review for start-up of WESF.
- Q: In 1974?
- A: That was completed in 1974, I think the process was much ---- than that.
- Q: Was it ever updated as you changed the equipment out and changed things in that facility. Did you re-do the various portions of that?
- A: What we did was assessed whether or not the change was significant enough to warrant a change to the SAR, if it was the SAR was upgraded. And, for the most part, the changes to the building were not, didn't warrant any upgraded SAR.
- Q: In your memory, did any user of these capsules ever make a request to look at the safety analysis?
- A: Oh, yes. In fact, we were continually packaging these up; documentation's such as the SAR, flow sheets, those types of documentation for either Headquarters review or for review from other sites.
- Q: So the people who actually got the capsules also received, in some fashion, the safety analysis reports that you have done?
- A: I can't specifically speak to these four because the capsules were transferred to these facilities after I left. But the facilities that were involved when I was there that were transferred capsules so the answer to that question is, yes.
- Q: And those facilities were like ORNL or...
- A: ORNL would be a good example, we had a lot of tours and a lot of request for information from those facilities.
- Q: RSI one of those facilities?
- A: I can't specifically speak to RSI because that was after.

- Q: Okay. You set up the processes, also, for like the inspection of the capsules?
- A: There was a lot of debate by our West area shops as to the quality of our welds that we made at WESF. It was in the early years that our welds, they questioned our welds, so there were a number of occasions where we, the welds that they questioned, they were all reworked that they questioned. Our weld failure rate in the early years was like 20 percent both inner and outer.
- Q: This is a '74 to a '78 time frame?
- A: Actually it went on into '82/'83 time frame, so it there was pretty extensive rework of the capsules. But the, there were a number of programs that we had that actually sectioned up the welds that they said were bad and sectioned the caps off and cut them into pie shapes right where they said the weld was bad and looked at them. In no case did we find a capsule that was less than 100 percent weld penetration.
- Q: Were there reports written on any sort of that thing going on?
- A: There were reports written. I think Gordy Funnell, who you have on the docket for tomorrow, can speak to those reports.
- Q: You say that in no case was there ever less than 100 percent weld penetration?
- A: That's right.
- Q: I thought the specification was minimum 55 percent?
- A: Well, you see that again, Gordy can explain this better but the scanner scans a region of the well that is greater than the weld zone itself and so you pick up laminations in the base material. All right. And so when they looked at the scans they saw the laminations on the outside and they said that that was because they couldn't tell whether or not it was a lamination or a lack of penetration in the weld; those welds were rejected. And then when we later cut up the weld, we could see that the weld was full. That the penetration, I mean the lamination, was what caused the problem. Alignment other major issue.
- Q: Was there in lamination such that, like be angled so they can penetrate the end cap or the wall or wherever the laminations were?
- A: Not to my knowledge. No. The, we went with the quality inspection to, I wasn't as concerned at that time that we were actually going to improve or, the quality of our final product at WESF, but, more or less, as an additional assurance to management and our customer that we were, in fact, to having independent review beyond the independence of engineering over Operations.
- Q: These laminations in the spool or the endcap?
- A: They were in both. The, part of our problem in our welding process, and again I think Gordy can speak to this better, is initially our welding operation was in the vertical position, and later we went to the horizontal position. When we did that our, we did improve, essentially eliminate, any weld failures that were visual of nature, such as blow outs or those types of things.
- Q: Can you give us an idea of how many weld failures or rejects were actually, bad welds rejects for either...



- A: Lack of penetration is that what you are saying?
- Q: Yes, or leaks I guess exactly what I thinking.
- A: You're talking about helium leak checks?
- Q: Helium check visual.
- A: I, this, there is a document on this, its one on the welding history. It talks about weld failures per year and the reasons for them which could provide you better information, but my belief is that, I'd say in the contaminated cells which would have been our entire capsule welding, that the major reason for reject was contamination in the weld zone. Okay.
- Q: How can we get a copy of that report of welds failures?
- A: What we talked about was that if you make a list, there's a man by the name of Joe Reeder, I believe that we can request the documentation from.
- Q: Do you know what that document is by name or number or anything?
- A: Off the top of my head I don't, Darryl Lamberd was the author of it.
- Q: In what time frame?
- A: It would have been the '82 time frame that it would have been written.
- Q: Written something like the history of the weld?
- A: Welding process history, something like that. It also talks about upgrades that we made to the program.
- Q: I don't remember reading such a report.
- Q: I don't think we have. It's not in our, the file that we have gotten so far. Would Gordy know about that?
- A: Gordy would know about it also but, see Darryl was the engineer that I had working the welding operation. Gordy was in our service organization that was in our welding development shop. Now he worked, Gordy was actually a support person to our welding engineer, we had various welding engineers over the years, Darryl use to maintain for me our failure rate of capsules with time.
- Q: So you used a statistical quality control scheme?
- A: We didn't take it to our statistics people, but it was done in house, yes.
- Q: Capsules are sent to the field, were they made in from during the time that all these changes and failures and stuff like that or did you wait until he had to process down and running good and ship those capsules?
- A: Okay. The initial capsules were manufactured only for use in other facilities for any reason. Garth, who I believe is on after me, can talk to the fact that there was a lot of discussion on that, especially with strontium capsules, to use them, but Battelle proceeded in trying to get our capsules to qualify as a special form or whatever the term used to be. Materials so they could be shipped. They pursued drop testing and all the studies that need to be done so that the capsules could be shipped. But that was never the intent in the start-up our program.

- Q: When you said early capsules were never intended for use for irradiation sources and so forth. What's the time line you could characterize as early and later? Like '76, '77, '78, and '79. Where in there?
- A: Well, our initial documentation for the building did not, specifically address shipments, so I would say someplace between the '74 time frame and the first capsule shipment which was very early. My guess, it was '75.
- Q: Okay. You're basically saying things before '74 were not intended, but after '75 were there was full confidences that they very well end up as radiation sources somewhere.
- A: I don't know if as much sources or that the material would be utilized by somebody to, in other words, the capsule section and then the material was moved and then that material was utilized in another form.
- A: Okay.
- A: I think it was some time later, but I can't tell you the specific time and I think Garth can shed more light on that as to when they were first used as radiation sources.
- Q: Did I hear somebody say this morning you have 700 and something capsules stored up?
- A: Uh...
- Q: We only saw 4.
- Q: Oh, in the transfer file?
- A: Yeah.
- A: Okay. The numbers that I recall, the reason I recall these cause I went back to Headquarters here about a month ago, was that we had 15, that we manufactured 1,576 at WESF. I believe that in the four commercial facilities we have 765. In my guess we've got about 500 on the order of 500 I don't have the exact number stored at WESF at the current time. The remainder have been sectioned for, cesium material. There's also, I believe there's few isolated capsules. I believe PNL has one, for instance, that are...
- A: Rockwell has some.
- A: I believe Rockwell has a few.
- Q: Was there any particular reason say these 500 or whatever out there weren't shipped out? Did they represent the first runs? Were you were questionable or what was the basis of choosing one to ship and the ones to keep?
- A: I can't answer your questions specifically because I wasn't there when they shipped them to the four facilities but, in reviewing the capsules, I have a month ago I was requested to go over an aide the organization of the B Plant people to, respond to the RSI concern. And since that time, I have had some of the engineers take a look at the capsules at RSI and they appear to be taking them randomly from all the years at WESF.
- Q: From 9/74 on?
- A: That's true. And interestingly enough, in that, since they were taken randomly, in our recent information that we have from the work that's been done down there, indicates that there is a

much higher failure rate in one RSI rack than in another rack. We have run that by our statistics people and they believe that there is a strong indication, very strong indication, that there is a difference between rack 4 and rack 1 at RSI.

Q: Difference in the rack itself or the capsules?

A: No, if you're drawing from a population randomly.

Q: Um.

A: And then you are putting in the capsules in the racks at RSI randomly as they appear to be and we have looked at it in a number of different ways. And your failure rate in one rack is, you know, on the order of 20 plus percent. I shouldn't say failure...

Q: Suspect.

A: Suspect is a more appropriate word, I'm sorry.

Q: Okay.

A: And, on the order of five percent in the other rack, statistically that would indicate to you that there are difference in either the design or the operational use of the two racks.

Q: Curtis, from your perspective, as you look back from the end of the manufacturing of cesium back towards the beginning. How would you characterize the Quality Control or Quality Assurance of the process when you compare to what you call today's standards for Quality Assurance/Quality Control records keeping configuration management. Did you go from most recent to as far back as you know anything about it or as far back as you understand? Could you characterize for us the evolution, if you will, of just what's your feeling for the whole thing?

A: Okay. Our records today would not meet NQA-1 standards. All right. The welding processes were performed by our operators and not performed by trained welding engineers or the like. My belief is that our operators did a very excellent job of what they did, but by today's standards one would question that operation. I believe our record keeping would also be questioned. It was set up by engineers, approved by operations, and put into service. By today's standards, I believe that there would be added checks and balances employed. I think our records, once they were finalized and placed into our storage, also did not get the scrutiny that today's standards would employ. So, I think you will, as you take a look at some of these run books, you are going to see crossed out numbers and new numbers added in where, in today's standards, you would require initials and documentation of changes and the like. But, for the most part, the people of WESF took a strong, a very strong approach to making sure there was quality in their work. Might also say when I'm talking about that, that there was kinda two era's at WESF.

Q: Yeah, that's what we...

A: There was an era...

Q: This is a current...

A: Between start up and '78 which was a very tough time for the plants since it didn't operate very well. And then there was the time frame from mid '79 through the completion and even up to the day at which our production rates went out of sight, went up tremendously, and morale and the like went way up, and it was basically a function of having the right tools and to do the job, in defense of the first people there.

- Q: You mentioned something about the welding operators and I got the impression this was basically an automatic welding machine. Was there much skill involved with using an automatic like this?
- A: Well you had to, I guess my answer to that question is "yes," because you have to be able to position the capsules and the equipment and you have to make sure the weld zone is clean, then you have to tack the capsule, you know, to tack weld the capsule, granted essentially there was two welding cards, one used for strontium capsules and one for cesium capsules, which was in a great effort.
- Q: A welding card is actually the pre-program steps that the welder must go through?
- A: Yes.
- Q: Then you just plugged it into the welding machine, is that how they worked?
- A: Right.
- Q: Okay.
- A: But we did, there were a number of questions during the years as to the qualifications for using operators, to do the welding operation or to do, to run the inspection equipment, the C-scanner, or later years the XY scanner. I always felt very confident that they were the best people to do the job.
- Q: Where's the dirt getting into the weld zone from?
- A: In that type of an operation and in our strontium cells, there was an air chiseling operation in our strontium cells in which we had boats that were fired in a furnace. They were moved out, and the initial material was so hard because it had excess quantities of sodium in it, they were chiseled out, using essentially a chisel and, with a manipulator going boom, boom, boom, strontium just flies everywhere. When it flies everywhere, any movement in the cell which includes air because you got very high velocities of air going from your least contaminated to your most contaminated zone, you get a lot of material swirling around in the cells.
- Q: Airborne contamination?
- A: Airborne contamination a lot worse in the strontium cells than in the cesium cells, but still a real problem.
- Q: I'm curious, I'm curious about the leak detection technique. You purge the inner cylinder with helium with the...
- A: The sintered disk in there.
- Q: With the sintered disk in there, then you put the cap on the hot cap on and weld it up, and then you do the basic mass spectrometer detection of the helium leak which you put a cap over the end, pump on that, I've been told, 15 to 30 minutes. I don't know if that's an accurate number, but that was I think.
- A: (mumbling)
- Q: And then after you've pumped on that for that time, then you drop that little jewel into a pot of water.

- A: A bubble tester.
- Q: Yeah, why have you not pumped the interior of that capsule to a vacuum and when you drop into the water, which is almost done immediately after the mass spectrometer checked, why don't you suck water back into that capsule? Why did you expect that thing to form bubbles?
- A: Well, we believe the capsule was hot. We believe that any air in there would want to exchange with water on the outside and it would see bubbles coming up.
- Q: But if you had pumped on it for 15 to 30 minutes before you dropped it in there, why would you not expect a partial vacuum to exist? And it's maybe sucking air in, but you're moving it over and you dropped it to this water tank and then it would tend to suck water in rather than exhaust air out?
- A: And I guess, I don't, I know if we took that same capsule placed in an outer and welded, our outer weld would have blew out, because any water in there would've vaporized. We also would not have been able to decon the capsule.
- Q: But what I think we are getting at is what is the purpose of the bubble test? Because to me it would be hotter...
- A: We did see some bubbles.
- Q: I know, that's amazing, it should be hotter when you are doing the vacuum test in air, I presume, and then when you put it in water it should cool off. In addition to having a vacuum in it, you're cooling off whatever's in there by putting in water.
- A: I hear you.
- Q: How does it bubble?
- A: I just always assumed that it was exchange of water and air but maybe I'm...
- Q: Well, you see our problem.
- A: Yeah.
- Q: It just looks like everything is working against bubbling and if you saw bubbling, I don't understand how you saw it.
- A: Massive crack, maybe that a lot of air got inside there in that short transfer time.
- Q: But if that had a massive crack then that should have been...
- A: No, it would have been picked with our visual, it would have been picked up...
- Q: In the visual check or should have been picked up in the helium leak check. Because those are very accurate techniques at least the helium check is a very accurate technique.
- A: If you have a big crack (tape broke).
- Q: But remember if the helium is trapped in that sintered disk and you create a vacuum around it, helium should come out and should be detected.
- A: We had a time requirement too, it seems to me like 30 to 45 minutes we had to weld the cap on.

Q: Yes.

A: After we purged it with helium, so it was, there were some pretty tight standards and those were monitored very closely, each run recorded that information. I can't specifically answer your question, to me, I thought it was exchange, but I understand your point.

Q: Well, I'm sure we'll have a lot of questions to come up, somewhere you deferred a lot of them like to the welding engineer and the QA guy and I'm giving you the benefit of that.

A: I think that the welding process and I really don't know, Gordy knows a lot about it, but we had a number of welding engineers over there that were really knew that process and then, of course Darryl Lamberd, who was my welding engineer.

Q: Is there somewhere where we could get a list showing the capsule numbers and I understand plus a minus 5 and when they were welded final...

A: And when they were...

Q: Dates that when there were the welds were made on them, not the bottom welds but the hot welds. Say like capsule 721, when was it fabricated? And 1542 when was it fabricated? Is there a list to show when each of them by number was fabricated? I understand that you say you went through with the data and it seemed to be random that we have all those numbers and these were the suspects.

A: Okay, each run book has in it the date, the time in which the operations were performed.

Q: But you don't have any around handy to show that...

A: I have in our data base, we have...

A: ...Date of the inner and outer capsules from...

Q: But his question, specifically I believe, was do we have the data accessible for when the capsules were welded?

A: Right.

Q: That's not in the log book?

A: He said (everyone talking)...

A: He didn't have a hand...

A: Oh, okay.

A: He said you could ---- it.

Q: Okay.

A: If I heard him right.

Q: Are the numbers on the capsules? Is there, can you tell us any logic about the numbers on the capsules?

A: They're in order when they were first...

A: First one.

Q: Was the first capsule made 100 or 001?

A: Actually there was, my recollection on this is that first capsules made were contained very small quantities of cesium to check out the process and there were about four of those, I believe, and then there were, I believe there were some hundred number capsules.

Q: The first number I see on here from RSI is 100?

A: That's on Rack 4.

Q: I guess.

A: Yeah, I think that's where it is Rack 4, yeah.

Q: And the highest number I see is 1600.

A: No, there should be like a 17, I think they went almost up to 1800 like 1790.

A: 1690-68.

A: That doesn't say he has the last one.

Q: Are you saying RSI passed with only 17?

A: I was thinking like the capsules went up to like 1800, I thought when I looked at that I saw a capsule like 1790 or something like that.

Q: Okay, that would be more capsules than...

A: And if you start at a 100 you could take 100...

A: But they were rejects.

Q: So the rejects were numbered and that number was then out of the system that was just a rejected capsule?

A: The capsule was deposed and a new capsule sent in.

Q: Okay, when we say that there's 1576 capsules, there's 1576 good ones and there could have been up to 1700 capsules made?

A: There was more than that because not only that (tape starts playing blurry), but any time it fails in the shops or at WESF, it would go out of the system.

Q: What part contains the number? Is it the inner capsule or the outer capsule?

A: They are both individually numbered; so there's a number on the inner capsule, you're just looking at the outer numbers here.

A: Yeah, okay.

Q: The inner capsule is different number than the outer capsule.

- A: Yes.
- Q: That's right, because I've seen some you've cut up.
- A: The run books show all that information.
- Q: The configuration control process that you've gone through, changes were suggested and were incorporated. Tell me the process by which somebody decided, "Yes, this indeed" thing that we wanted to include in future capsules?
- A: I get thoughts like changing wall thickness in the capsules. Is that what you're...
- Q: That would be a good example. Who would suggest it and who would judge that that would be a proper thing to do?
- A: The suggestion could come from a number of locations. It could come from operations engineering or however. Normally with design changes there is a drawing that must go through a change control process. The drawing is updated and goes through a review process in which all the organizations get a chance to comment on the change.
- Q: Would their comments be included in some sorta file then with that suggested change?
- A: Their comments would be incorporated in, we've gone through about three evolutions of contractors, so there's different systems for each contractor, but the answer to your question is yes.
- Q: And suppose somebody had no comments except to say yes. Would those affirmative kind of things be recorded in a configuration change file for that particular change?
- A: Depends on the vintage of the change, but generally speaking the answer is yes.
- Q: And what were the things taken into account safety...?
- A: It depended on the implications of the change.
- Q: Well, let's say the wall thickness?
- A: Then you would have all organizations involved in the change.
- Q: And who ultimately puts his name down on the bottom of that form that says, "Yes, indeed we shall make all future capsules that way"?
- A: The Operations Manager of the facility.
- Q: And this is Mr. Reep?
- A: No, it depends on what time frame you are talking about. During my time frame it was Lars Edualson and later on John Fulton.
- Q: But he's the manufacturing, he was the manufacturing person?
- A: That's true. All the other organizations had to approve it and if he could not get their approval, authorities he had to raise the issue up to a higher level of management for resolution.
- Q: Okay, and who was that?



- A: Again, it's going to greatly vary with time; we've gone through a number of managers above that B Plants gone through, I guess in this time frame, it would have been Les Brecke, Ken Pascoe.
- Q: To your memory, did any changes ever go that high?
- A: Oh, yes. Yes, there were issues. More, I think, that there were a number of discussions with quality control involvement and to some of our processes. I'm on a little bit different tangent than the welding or the wall thickness of the capsule, but I'm talking about quality involvement in whether or not operators should be used or quality people should be used to do various tasks within WESF. That went up to some very high levels of management.
- Q: You mentioned one level passed the gentleman by the name of Mr. Fulton. Would it go even further than one level past him?
- A: Oh, yes.
- Q: Who is the ultimate authority?
- A: Well some issues go to DOE.
- Q: They would come to DOE?
- A: Some issues would come to DOE depending on the magnitude of the situation. A lot of funding issues like upgrades to our pool cell area.
- Q: But that's not a config...
- A: Sure. Let's take the upgrades to, you know, even in the initial WESF [Unclear] there are a number of upgrades for dealing with a leaky capsule. Those upgrades were, in every year that I was there, we submitted budget requests for those and a lot of cases, those went through RLO back to Headquarters. And things like being able to deal with [Unclear] of dropping a cover block on the capsules which is physically possible in WESF, it horrendous. The potential there is fantastic, the odds of it occurring are low.
- Q: By cover block do you mean those four foot square concrete blocks that sit on top of the pool?
- A: They can be physically crushed if they are dropped at an angle, go in, and crush the capsules, yes.
- Q: Okay.
- A: And there has been upgrades since on that issue since the early 70's.
- Q: So the change took the format of a budget request to DOE?
- A: Well, in that case it depends on the case, you know, in that design case we needed to get funding before we could proceed. On other issues that didn't require funding such as getting QA involved in our process that we a little bit different loop.
- Q: Let me give you a hypothetical illustration. Let's suppose for a moment, that it was during Rockwell time, which was basically the bulk of the manufacturing time.
- A: Yeah.

- Q: Or the time that the bulk of them are manufactured. Supposing that somebody in Process Engineering was on one side of an issue, a change issue, and somebody in Operations was polarized at the other side of the issue. At what point, ultimately, was where you got that result, where you would potentially get that result? Engineering over here and Operations over here. It's not to say it ever happened, but if it ever did.
- A: No, there were issues that we had and generally they were kicked up to the top levels of the company. By top levels, I mean all the way to at that time our Vice Presidents, which would have been Don Cockevan and Paul Lereuzi. I mean, they were kicked up that high. Management was involved. Now the ultimate decision rested up the Operational chain to the top of the company. I don't know if I'm answering your question.
- Q: Is it written down. Was the configuration control process written down?
- A: Oh, yes.
- Q: And Mr. Reeder would also be able to give us a copy of that configuration control process?
- A: Well, I think that, I don't want to put him on the spot, but what you're asking for is configuration process, I think your question is at various eras, ok. I know that he could hand you the one we got right now. I assume that he had a way of going back and explaining to you what it was in years previous. I can't, that's another question.
- Q: Okay.
- A: We're going through a evolution right now in which we're changing all of the Rockwell documentation to Westinghouse documentation, so all of our procedures are going through changes as to how we release documents, make changes and the like.
- Q: Okay. Go ahead.
- A: Okay. The, first of all, capsules that are shipped from us that are put into use in facilities such as RSI and the like, they must, in my opinion, they must meet certain criteria in their use. And they are aside configuration where we've got six capsules sitting right next to each other in major array. You know, where's the evaluation been done both from a stress standpoint, like where's it been documented that our capsules can withstand that array? In the RSI configuration here, even at WESF in our pool cell, we're very concerned that there's a potential for failure. We have HEPA filtration, we have radiation control work practices. In the RSI pool cell and alike, they do not employ, they don't have, those type of physical barriers between their pool area and the outside. From my perspective, I don't think that's acceptable. But I realize that they do meet the standards from what I understand.
- Q: Whose standards?
- A: In other words, they meet special form of requirements for shipping, and I believe there's a, what is it, an ANSI standard on testing and the like, that identifies weekly testing, monthly testing, array and the like, for gamma sources. I found out interesting, I don't know if you've read that one or not, but the, in the end of that standard it talks about failed capsules, failed sources, I should say, it's about 12 pages of all the checks and balances that you should go through. For that one little section, it says if you have a defective source, proceed immediately and contact responsible individual.
- Q: That's the way they ended up.
- A: Which is not the way we could do otherwise, though.

- Q: Curtia, who should be responsible for transmitting to the user, like RSI, all of the parameters in which, how you operate this, recommended parameters?
- Q: Before we get that, could we just go ahead elaborate on the items that we need to, that you saw, the things that bothered you down there, could you go ahead and elaborate on them?
- A: Looking in their pool cells when we put down in the stainless table from the pictures, and I assume that you've seen the pictures of, you've been in there, in the area. I was looking in the pool cell, all of their so called, 300 series stainless steel, looks rusty. And to me, I have difficulty understanding that. Again, I'm looking at photographs, and I haven't been in there, but I have talked to our people that have come back and that doesn't make sense. Their water circulation rate is much less than what WESF's is. I believe they recirculate through their cooling loop at about 6 gallons per minute. Ours is much, much higher than that. Their sampling of the pool cell and our sampling are night and day. We take weekly samples and we composite on a monthly basis and we analyze the pool essentially any activity, chloride, you know, we're looking for problems in the pool cell on a routine basis. From the information that we received back, on, and both their configuration control of the building and their operational parameters, they don't have those types of controls. I think that there's something, as I mentioned, there's something different, between rack four and rack one, I think that that's something that needs to be investigated before evidence is further removed down there. I realize that there's, the Oak Ridge evaluation of the capsule is a key element in determining why the capsule failed, but it's only a part, a part, and a key part is looking at what are the, what is the design, what's there and how is it used, cause that's gonna be...
- Q: Are you talking about the racks?
- A: I'm talking about the general configuration of the racks, of their history, on the time out of the pool, of how the water's recirculated as to, there's a lot of solids on the bottom of the pool, getting those sampled, getting samples off the racks themselves to see you know, what they are like, there's tools that they've used in there to move the capsules. I noticed looking at the tools that, I was looking at the bolts in the tools, they looked all rusted out. So they have, nothing in our pool cells went in our pool cells, unless it was stainless steel. And from my opinion, just looking at what I've seen visually and talking with people, I don't believe that was the case at RSI. And I don't think, and maybe I'm all wet, but our discussions with our contact at the facility, I don't think that data is being gathered, and maybe I'm wrong. That's my belief.
- Q: These letters that you wrote on the usage criteria, what were some of the dates on these letters? I mean, in '79 before the program got started in terms of shipping or...
- A: My recollection is like, the 80, the early 80's.
- Q: Who do they go to, meaning organizations?
- A: Upper management. Here.
- Q: Richland or Westinghouse.
- A: Would have been Rockwell at the time.
- A: In fact it was discussed...
- A: Whether they made it through... (Everybody talking)...
- A: We need to make copies of those letters.

- A: ...Rockwell to DOE, who knows.
- A: But those letters made it through our system, in fact there's an excellent report Ron Orme on all the leaky capsule recovery.
- Q: This is a recovery proposed system as opposed, I think you said the operating...
- A: Usage criteria.
- Q: ...usage criteria...
- A: I believe my letter's referenced in that one, (I'm just saying there's a whole attachment of all the letters in the back), that letter upgrades plants, upgrade strategies, numerous presentations were made to DOE on those subjects and those letters are in the files.
- Q: Can you tell me what the pool criteria is at WESF?
- A: You know, my memory is a little bit, I'm not great on that one, but I think it's like one part per million, less than one part per million, chloride...
- A: Reports say ten.
- Q: I thought it was one? I could stand corrected.
- A: That's the only one I can find unambiguously in the reports, the other ones tend to say that this is what we have and then there's some [Unclear] limit.
- A: Okay, there's a specification, there is an operating specification for WESF.
- A: Okay. That's probably in the SAR with the OSR's in it.
- Q: No. The hierarchy of documentation, maybe that's the problem, you could be looking at the SAR, the OSR's...
- A: We haven't seen those yet.
- A: ...Okay, there's an operating specification that's written and what it does in provide another level of control above the OSR's and then our procedures provide another level of control above that.
- Q: We don't have either of those do we?
- A: We have some that have looked at snapshots and said what they are but not necessarily what their supposed to be or what the limits are.
- A: Okay, that's available.
- A: Okay.
- A: [Unclear] control document.
- A: Okay.
- Q: I want to come back to one more question pertaining to the Georgia thing. If in fact, we've seen based upon, subsequent to the June 6 date when the problem became known to us down there, a lot of things that seems to bother the folks at Westinghouse. Was there ever any

discussion either within Westinghouse or between Westinghouse and Richland or between Westinghouse and Headquarters at that time it would have been Rockwell, concerning setting some standards and criteria for this stuff whenever it was furnished to the contractor? Was there any concerns expressed, any meetings, any discussions held.

- A: Oh, yes. Yes, that's the letters that I'm talking about on criteria. Yes. In fact,...
- Q: You mentioned that inside Westinghouse, did that go to DOE to DOE Headquarters?
- A: Yes, and I believe that, you know that I'm out of that loop, but I believe that there were a number of discussions with Oak Ridge in that line.
- Q: Could we have copies of those letters, or do we have them? I haven't seen them?
- A: That's what we just went through.
- Q: Okay.
- A: We've kind of looped around that one!
- Q: Yes. How's the best way to approach this. There have been several things that we've mentioned today that we need copies of and I don't think we established who's going to provide them to us.
- Q: No and we won't get copies of those letters by asking Reeder.
- A: Okay, what they wanted to do with Reeder, they wanted to make sure that on the copies that were provided to you, that you didn't get back that she...
- Q: Any calculations that you got, letters that were signed off and approved. And what I'm talking about here are letters that were signed off and approved. So if we just make a list, we can get with Reeder and he can get back with us and we can get you those, any letters that...
- Q: How would we characterize these, what do we call them. I mean, how we gonna know, what are we gonna write down so we know we get the right stuff.
- A: Okay, you want have the process specifications for WESF, you want to have usage criteria letters that we're mentioning, you want to have the Ron Orme report.
- Q: We got a great, big thick Ron Orme report Part II of something or another.
- A: Now on the back of that are some of those memos. Then there was a long range study for recycle of the capsules, use of WESF that went all the way back to Headquarters. It's called a long range WESF logic diagram or something like that, report that also addressed a number of those issues, we talked about the Welding history report earlier.
- A: The SAR, of course.
- A: The SAR, now there's a couple of versions of that. I believe the original one still exists if you're interested in that. In fact, the original spec document was, I believe it's ARH 1800, and I think the SAR was like 1293.
- Q: Let me make a suggestion. Based on the discussion in here around the questions, do you think it would be, a good way to do it is to go down and take a look at if we can find some of those key documents and you help me or somebody else pick out which of those document

would aid or [Unclear] (rattling paper) here, and maybe that's the quickest way to make a list that we can follow up with Reeder.

A: That's fine.

Q: Would you be willing to do that? I think that would work good, I think we probably have a key document or two that has a whole bibliography that contains a lot of what we're looking for, and then you may be able to recall other documents that we could add to. Let's do that kind of outside of your.

A: Okay.

Q: Curtis, I was going to ask you. Do you remember ever showing Dr. Chin or somebody from around the facility here?

A: I've never met Dr. Chin.

A: Okay. He was...

A: But I know some of our people have.

Q: And again I get back to my question. How did we, meaning DOE, and it's contractors communicate to the user what the parameters should be and the use handling the operation of these capsules. Did we do anything like that or should we have done something like that?

A: Again, a little of this is after my time. My belief is that once they were produced, Battelle went out and qualified them a special form of material, that since they were special form of material they could go to Oak Ridge for beneficial use and then from Oak Ridge, they could go out to the various users that were qualified by the state, the NRC. And I think that control of this, our concern was that the capsules were generated at WESF and that they needed to be tracked from WESF and that we needed to have some sort of process to periodically evaluate these capsules both in their location and on a destructive frequency. Now the destructive frequency was, you know, Garth can talk to that because that was really employed but the periodic screen process was never.

Q: Are you familiar with the destructive program?

A: Garth can go into that in great detail, but the answer is yes. In the early years I worked extensively with a man by the name of Hal Fullam and he was, I think it's appropriate to say he was the brains, because he was, he was the guy that put together the documents that set up tests and the like, he was, I had a lot of respect for him. He's retired now.

Q: Okay. Obviously you had some concern about the use of these capsules and the manner in which they would be used because of the quick letters you've referenced. Could you speculate as to why apparently there have been discussion within Westinghouse, Rockwell at the time, within Richland and presumably Headquarters and even Oak Ridge, why, if in fact we had all those conversations, why no one within DOE and the contractors communicated that to the customers.

A: I'm, I don't think that I can speak to that truly. I find it very hard to believe that there weren't discussions along those lines. You know your talking about discussions that are probably in another form most likely between, I would guess, Oak Ridge and the various customers, but I can't answer that.

A: We've talked to the Oak Ridge people and those things did not occur.

- Q: It seems like there must have been a lot of informal discussions with RSI personnel in Hanford, but...
- A: Again, that's after my time, I really can't, I think that our constant theme in that regard is that we had concerns; not that our capsules wouldn't withstand a lot, it's just that did the, do the array that they're going to be used in, the methods marry up with what we believe that they can meet.
- Q: Let me ask first, you know, the RSI contractual business transpired after you had direct involvement. Who could we talk that might have insight into what discussions might have taken place or might not have taken place, whether they did or didn't.
- A: Well, I think...
- Q: Who would be?
- A: Well, I think that Blaine Barton is a key contact.
- Q: Okay.
- A: I think that Gene Reep is a key contact, in fact, Gene had, he's been the program representative and so he had the interfaces with the other DOE sites and the DOE and the like.
- Q: Gene would probably be the best source for that kind of...
- A: Gene is gonna provide you probably the best history, and Bautor would be able to provide you the technical considerations.
- Q: Recent. Since your time there.
- A: Actually, Mark Stevenson took over for me, but his experience level at that time was low.
- Q: Yeah.
- Q: Okay. Assuming all the monitoring that you're doing for your capsules that are still here, if something shows up that there's a problem, what would you all do to try to identify where the problem is?
- A: We have the same concern. For years we've tried to secure funds to secure, I shouldn't say secure, but to fabricate and design systems to identify which capsule would be leaking in a basin. And we were unable to secure funding. We did put in a water exchange system that would allow us to pump out the pool cells back to be tank farms. And we figured that if we made ten volume changes of a pool cell, that we could dilute it to a level that would be alright. But we had one luxury that an RSI doesn't have and that is the ability to move capsules back into our cells directly and see, they don't, into a hot cell area, which they don't have. So we would end up with the same initial problem trying to hunt for the capsule, but we are in need of upgrading our facilities.
- Q: Is this a proposed line item or just a quit in funding?
- A: I believe it was a line item.
- Q: Do you remember from what year it was...?
- A: In the report, I was going guess it was like '82...

- A: '81 or '82. I guess a documents a document so [Unclear] (Everybody talking).
- Q: How far through the process did it go? Do you remember?
- A: I think it went back to Headquarters. I could be wrong.
- Q: Was it supported in the DOE budget and then got killed by either OMB or Congress, or was it dropped out?
- A: Reep would be able to help us more on that than anybody.
- A: Okay.
- A: I don't think it ever was supported at Headquarters, is my belief.
- Q: Other questions?

# END OF TAPE

It's July 22nd. 10:00. Mr. Curtis Stroup is back with us and the committee this morning consists of Roger, Ed, Mike and myself Ron Hultgren. Go ahead Curtis.

- A: Okay. We're looking at a document published in July, 1980, RHOC1045, report on welding improvement program at WESF, written by D.L. Lamberd. In attachment one is a, an artist's concept of the welds on two outer cesium capsules. In both cases the penetration of the weld is a full penetration, one hundred percent penetration. But the weld is out of alignment with the, where the cap meets the capsule wall. The misalignment is noted on the chart and the penetration is actually the, or penetration requirement is, is the penetration from the outer surface of the capsule in. And our requirement in the early days was seventy-five percent penetration in that zone and in later years, fifty-five percent penetration, when we went with the thicker walled capsule. The seventy-five percent was based on the burst strength, making the weld as strong as the capsule wall. The, when we went to the larger capsule, they also did burst tests and found that the capsule would, that the percent penetration that was equal to the burst strength of the new capsule was sixty percent. But that was a higher burst pressure. So to have a similar burst pressure to the original seventy-five percent would correlate to something on the order of fifty percent weld penetration. So our standard, we chose, selected a standard of fifty-five percent penetration for our later generation capsules.
- Q: (Wright): Somewhere in my memory bank there's a data point that says when you went to the heavier wall you machined it back to the same thickness in the weld zone as the original one was and the reason you went to the heavier wall is so you could clean up all around. But it really didn't increase the wall thickness. Is that correct or not? And you went from like a quarter inch to three quarters of an inch of machining.
- Q: (Hultgren): Yeah. That information was offered by Gordy Funnell.
- Q: (Wright): Yeah, but isn't it your understanding that the...
- Q: (Hultgren): Yeah, right.
- Q: (Wright): ...wall portion that counts was still the same even with the heavier wall?



- A: (Hultgren): Right.
- Q: (Jensen): And I, I think that the part that was interesting to me on that, let, let just, I know there's a cut back...
- A: Yeah.
- Q: (Jensen): ...and that confused us or caused us some kind of a, of a concern and I think that the answer that you gave here where, where the fifty-five percent was correlated to the burst pressure of the capsule...
- A: Actual.
- Q: ...actual, and it was based on new tests with the machine wall, things, is the thing that explains their rationale for coming up with that fifty-five percent penetration. That's the way I got it.
- A: We actually took the new wall, wall capsules and took them down and had Battelle you know, pressurize them and found out where they burst it. And they burst at much higher pressures...
- Q: Yeah.
- A: ...than the original capsules.
- Q: See, that was the confusing part about the seventy-five percent versus the sixty percent versus the fifty-five percent versus the machining or lack thereof and so on and so forth. And it was hard, it was hard to sort that out.
- A: Okay, I would have to check, check on the actual I think, machining on the cap. My recollection was that that machining did not cut it back to the old wall thickness of the original capsules.
- Q: (Wright): My recollection is that somebody told us it did.
- A: Okay. That's fine and that could be checked. (Pause) In fact that's an easy one. A phone call, I could have that answer for us.
- Q: There was another thing that was kind of interesting to me. One of the, one of the things that, that, that we as a group I don't think did that might be worth our while, and that's to go through this original plan of what we were going to talk about and see how much, how many of the things that we, that we have covered and haven't covered. But I know that one of the areas that we intended to cover and didn't was the, was the design basis for the capsule, for the capsule. And in that same conversation that you and I had the other day, you basically surprised me with your, with what you told me about what the design basis was for the purpose of the inner capsule versus the purpose of the outer capsule, so on and so forth. And I don't know that that necessarily means, you know, what that means to us as a, as a investigating group on this whole thing, but I think it's worth while to go through that. I, I thought it was very interesting and I think that, that the rest of the board will find it...
- A: Okay. The original, the capsules had different purposes as they were originally designed. The inner capsule was designed to be a corrosion barrier. The outer capsule's purpose was to be pressure vessel.
- Q: Okay.

- A: And that's what our original reports...
- Q: So the inner capsule, then is the only purpose of that is to keep the cesium away from the crucial welds?
- A: I think the way it's stated is that, that the function, those are the functions as the original reports stated.
- Q: And that was a subtlety that I had not picked up in anything that I knew or that we had reviewed or anything.
- Q: (Jensen): There has not been extensive work, development work on corrosion from the outside in. It was believed that these capsules would not be subjected to an environment that would, that would facilitate corrosion from the outside in. The, the theory has always been that the corrosion would occur from the inside out. And so the idea of the inner capsule being the, the barrier and that says if you've got to have a good barrier there, then you don't have a corrosion media on the outer capsule and you don't worry about it. That's what I, this interpretation...
- A: I don't know if we don't worry about it. It's just that from a testing standpoint that was how we, we related to our outer wall penetration of the, that's how we came up with that one and that's how well there really wasn't any good way to do it, a UT scan, even if we wanted to on the inner ones in the cell. But if there had've been a pressure criteria on them, the helium leak check would not have supported that, okay, that claim. Alright, so in the, the whole development was, was based on the inner capsule wasn't a pressure vessel. I'd like to point out that if the UT equipment is, piece of equipment that you have to get in, you have to have a manned entry cell to be able to get into, to periodically service that equipment and the inner capsules in our other cells, there was no way that we could ever put ultrasonic equipment in those cells.
- Q: I have another question that's a kind of related question and I'm ignorant enough about the whole subject that I may not even ask an intelligent question. But my question deals with sealed sources and the definition of sealed sources. And, and I'm wondering if, if the criteria for and design base for and testing requirements of sealed sources as defined by the ANSI standards in, in place at the time that the cesium program were implemented were in any way to your knowledge taken into account in terms of the design basis for, for the WESF capsules? Do, do you know?
- A: Okay. I, I know from the reports that I have read that the original purpose for our capsules were to remove the cesium and strontium from, from the Hanford generated waste and to store, safely store the cesium and strontium in capsules so that they could be stored at Hanford in a pool cell. There were early investigative work by Battelle on strontium heat sources. But the primary goal, primary function of our capsules and the reason they were designed was to meet the Hanford goal.
- Q: Well, in, in our review of the background material, that, that's pretty obvious. But it's, also there's a thread through, like you indicated from the very beginning of an interest in a potential use for these capsules as either heating source or gamma, gamma sources. And, and that's the reason that I ask. Even though the primary source was you know, what, what you stated, was there to your knowledge, at least cognizance of or an attempt to as best you could or in any way, kind of make these things also fit the sealed source criteria as, you know, as they were developed? That's, I'm just trying to get your feel for if you...
- A: Okay. Here, here's my feeling based on what I've read, is that it's been known for years that irradiation of foods and substances for years and years that those things, were that sealed sources could have a real impact on that, on the radiation industry. And that the development

of these programs, the funding was to meet the Hanford goal. I think that there were attempts, and for good reason, to try and extrapolate data from our programs to the beneficial uses of these materials. But they were, it was never a main focus or a main stream focus of where the dollars were utilized. Okay? And in that light, it was, it was secondary, secondary usage of the data. Does that answer your...?

- Q: Yeah. I just, I just kind of wanted to get, you know, your perspective, having been involved with it, you know, at a fairly early time and in a continuous basis and in a responsible engineering job, how you viewed that whole thing. That answers my question.
- Q: (Jugan): Did these ever get qualified as sealed sources?
- A: Well, what they did as I understand it, is there is an NRC reg guide, or NRC reg, I can't give you the exact number, that for transportation of, of sealed sources. And Battelle did qualification testing to and they concluded that the capsules met the NRC requirements for transportation.
- Q: (Jensen): For transportation of sealed sources. There's another, and I was lucky enough to find, based on finding it as a reference in the ANSI standard on panoramic wet source storage gamma irradiators, category four. I was able to find a reference in there which talks about the ANSI standard criteria for sealed sources to be used in, in those. And while the reference is slightly wrong, we were able to track down, there is apparently is a standard here and we have a copy of it, but I have not read it. It essentially says what it takes to be a sealed source and I presume that this is not, is not restricted to just a sealed source from the standpoint of transporting one, but also a sealed source from the standpoint of using one, although I don't know that, because I, and I don't know that there is any difference in them either because I haven't read the thing. But we do have it here and, and I am going to read it.
- Q: The transportation aspect, seems that they call it special form. Where as, sealed source is a different term. They may be very similar.
- A: Oh, I understand, okay. Okay. I meant, you're right. When I said special form, I see, I see what you're saying. I can't really answer the sealed source question. Your point, your point's right.
- Q: (Jensen): Well, that's all, that's all I wanted to test on, to touch on, on as far as that's concerned. I'm, anybody else have any questions along the same line?
- Q: (Hultgren): No. Are you, it sounds like you're set to go to another subject.
- Q: No, no. What I, what I thought I'd do here, and I have not done it, is to kind of go down through our original, somewhat more detailed, outline to see if there were any other areas that we haven't covered that Curtis might, might elaborate a little on.
- Q: Let me first give Curtis the opportunity. I have the feeling that you came here to say more than tell us about the weld penetration depth. And if you do have other subjects that you wish to talk about, please don't wait until we ask questions about them. I think this would be an opportune time for you to launch into an essay on your own, if you, if you have such subjects.
- A: I have one data point for you that I talked about the other day that there, on the differences between rack four and rack one. Statistically, the probability of those two racks being, coming from the same family of capsules and experiencing the differences that we've seen between rack four and rack one, probability of occurrences is less than .0005.
- Q: What does this mean? What is the significance?

- A: Okay, the significant of, the significance of this is that, that the, what we are viewing on rack four is, via rack one is, must have occurred due to some difference in the design use, or the operational use of the capsules in rack four over rack one.
- Q: What I gather out of that, the probability is that they have essentially the same mix in both racks as far as the capsules being made and stuff like that.
- A: Right.
- Q: So what ever happened, he says is due to the difference in the rack, not the capsules? That's what I got out of it.
- A: That's right.
- Q: What did we see in rack four versus rack one, I guess?
- A: Okay, we've changed our numbers slightly but essentially the two hundred and forty-two capsules that are at RSI, alright, there's a hundred and twenty-six in each rack and it appears to purely random in which capsules are placed there.
- Q: Okay.
- A: And I'm going to give you our initial results because that's what my calculations are based on.
- Q: Okay.
- A: We've downgraded those very, very slightly. But there's twenty-six questionable in rack four via six questionable in rack one. There is two UT's that showed water of the twenty, of the twenty-six, okay. And generally rack four is in worse shape than rack one.
- Q: By worse shape you mean it's more discolored?
- A: There is a lot more etching on the capsules and in what they saw on these given capsules, they were generally worse than the capsules in rack one.
- Q: You mean worse even though they may or may have met the criteria that they are called suspect?
- A: The observed pitting was more of a greater magnitude. Okay? Now taking a look at that data, and saying that if I had a hundred and twenty-six capsules in each rack and I find twenty-six in one via six in another, is that statistically significant to indicate that there is a difference in those two racks. And the answer is, in all likelihood, it is.
- Q: Well, to .000 something.
- A: .0005 right. Now it still shows that both cases are suspect capsules but I think the impor, the fact is an important one. And it does, in my, in my opinion, it does indicate that we have some design or operational use down there that we need to investigate. Either that we can currently see at the facility by configurational reviews of the facility or by sampling some means of testing what we've got there. Or by a historical review of how they did their, their operation, process upsets, those types of things.
- Q: We, the board, has investigated all of those, not all, but many of those aspects. And I what you're saying I guess to me, is that, is that the board should be, in your opinion, your recommendation, is the board should do a thorough investigation of, of that, of the operating conditions...

- A: Well, either the, I'm not, I'm not saying that the, that the board, I think that the board needs the information from someone, to, to draw appropriate conclusion as to, means of failure. I think that the Oak Ridge destructive examination will show and provide some light as to why it occurred, but the exact cause may never be found unless we know more about the operation.
- Q: Okay.
- A: Like my opinion.
- Q: (Jugan): Did, two comments I guess. One was, we, we did go through all the records, nothing shows, nothing has been record, the only thing they record is when they drop the thing into the pool, the racks into the pool. And nothing in those records show any difference between rack one and rack four.
- Q: (Wright): They both are pulled out at the same time and lowered and the same time?
- Q: (Jugan): Yeah, nothing noted that only one rack fell or it was damaged or unusual occurrences to one rack. We asked them about unusual occurrences that had to be reported to the state of Georgia and I believe they said there were none.
- Q: (Wright): Was one rack closer to the make-up water point than the other?
- Q: (Jugan): Yeah, that's something we've got to check, where the air flow...
- A: How the packages were oriented with them.
- Q: Or, I, or if Hanford could tell us which was rack four by chance loaded with hotter capsules.
- A: We have in looking at what we've seen to date, we haven't found no common thread with the capsules in either of those racks. They appear to be purely at random and I don't see any, any areas that are hotter or you know, a different vintage, those things. We're still looking for correlations but we haven't seen anything to date.
- Q: (Jensen): Let, let me make a suggestion to the board and let me preface that first. We've really concentrated on our test, on our test planning on the capsule examination, I think appropriately so. I mean, you know, there is a lot that hopefully we're going to find out about that. And we have folks working on that and reviewing it and so on. Is it appropriate for somebody to take the time to come up with a test plan for the operating conditions? Would it be appropriate to ask somebody like Curtis to put together something that says, "What do you think should be tested down there for the board, so the board could consider that?"
- Q: (Jugan): You mean down at RSI?
- Q: (Jensen): Yeah.
- Q: (Jugan): What measurements should we do down there...
- Q: (Jensen): Yeah. If there, if there's concern of the operating environment and certainly that's a part of the whole system and we know, for example, from reading the ANSI standard, from reading the license, that the licensing requirement and monitoring requirements on the operating conditions are pretty minimal, they really are. And also, from the standpoint that we're going basically well beyond what the licensing and/or the specific requirements for all parts of this system or for some parts of this system, to find out should they have been better, should they have been more extensive. Does it make sense to the board to take a look at that and say, "Okay, what can we find out about it such that we can come up with some

recommendations that said, that say that the operating condition monitoring or the operating, actual operating conditions maybe should be somewhat more restrictive or somewhat more, more close in line? I just kind of throw that open for a comment.

Q: (Wright): I think we would be remiss if we didn't have somebody at Westinghouse to be looking at all the information that people have, that Westinghouse had been down there plus their normal intelligence of what's there to give the board suggestions or directions on what, what to investigate. You'd probably get to the bottom of it. I think we'd be remiss if we didn't do that.

Q: Okay. Curtis could you, could you kind of put together a, or, or find, identify somebody who could do that? Who could put together...

A: What all...

Q: ...a recommendation of what you think should be, should be done that we haven't done in terms of investigating the operating conditions and your suggestions about what the observations that you and others that have been at RSI have, have told you or what you have inferred from that, so that we could consider that, so we could use that in our, in our evaluation?

A: Okay, what I'll do, is I'll take that recommendation back to our Westinghouse management and tell them that that's the request. And I think, I think it's a good recommendation. I think it needs to be done, and request that, that we perform that task.

Q: Okay.

A: And then I will get back with you if that task is not to be, you know, if they have a problem. Otherwise, we will do that.

Q: Okay.

Q: Well, you have, meaning Westinghouse, have more people who have spent more time hands-on and up close than this committee certainly ever could spend.

A: That's, that's my opinion too. I, I must, I must note that Blaine Barton, the last week down there, did, did try to get me to down to the site, take a look at it the last week down there via some of this information when we were coming up with it. But early in the game we were trying to get more definitive analyses at the site and were unsuccessful in our attempts. So it's not like it's new, I just wanted you to be aware of that.

Q: What were you trying to get more definitive analysis on?

A: A couple of things. One, I didn't understand why the ion exchange readings weren't coming down in the pool. The ion exchanger was supposedly good to  $10^{-5}$ . And that, that pool cell hung at  $10^{-3}$  for a long time. Now to me, that indicated one of a number of different things. Either the inlet and discharge lines from the ion exchanger and the pool cell were too close together, and we were getting short circuiting in the water or we were seeing something off the solids and equilibrium with the pool cell water and we just weren't able to get it to any lower. Three, that the ion exchanger wasn't being effective and they needed to change it out. Four, it wasn't on line enough of the time, which I find a little bit hard to believe. I know that they said it was but, and I know that they were only running it during day shift rather than running it around the clock, which I also had some difficulties with and they did, they did go to full time operation on that ion exchanger. Or five, that's the actual leak rate that we were seeing from the capsule. So you know, just a review of the data and then the corrective action data can lead one to some, you know, observations of what, what's happening.

- Q: Well you know, and I think that's very appropriate and, and I, you know, and that certainly should be a part, but I, I would also like to see a recommendation if anybody thinks or whoever thinks is appropriate, for example, the, if, if we should go down and get some of that muck off the rack and have it analyzed. Somebody, you know...
- A: They tried to get in with a TV camera, the last few days, to get in close to those racks and take a look at them with, with the capsules there, but they were only able to get to like two, two and a half feet and their cameras started to fuzz on them. But we did try to get in and take a look, a better look at the material.
- Q: The cameras began to fuzz on them?
- Q: Due to gamma or what?
- A: I'm assuming due to the gamma.
- Q: Could they shield it or...?
- A: They didn't try to at that point. I mean we were down to our last couple of days here, of operation and they didn't try. I'm not saying that we can't do that again or remove some of the capsules from an area and go after that area again.
- Q: What, what I'd like to see, that's a specific example of what I'd like to see, this proposed you know, what happened and what are we to do about it. There is something that you observed which suggests perhaps some data gathering. In other words, you know, you can say we'll gather all the data in the world and that would be nice and nobody will do it. But if there is something that leads you to believe, something that happened, where you can say, this happened, therefore we recommend that this data, further data should be got, I would make it much, much better for everybody and much, much, you know, if you're going to do it that way...
- A: I'd like, you know, everything that's in the pool and I don't know what their design drawings are, but they should have, I would imagine they've got drawings of these racks. And you know, and what are the material call-outs on those and you know, what were the you know, the basis question is everything in there now stainless steel and if it is what is it.
- Q: I wouldn't expect you to do that here and now, but I mean as you, as you look at that thing or whoever it is that does it...
- A: Yes.
- Q: ...I would hope that you would for our assistance base the request for information on observations or you know, other than just you know on some... This lead me to do that. I mean it will make it a heck of a lot better for us, if it could be done that way.
- (Mumbling)
- Q: Ron, any comments?
- Q: No, no that's fine. We'll, we'll look for that and if you need some sort of special request from us in order to...
- A: You know I really think on this, this, I think a request would be appropriate and anyway because we're talking about a, it is an additional work scope.

Q: I understand and I know that there...

Q: We shall, we shall carry that out. We shall provide a request. I think that's appropriate.

A: Okay.

Q: You guys have spent so much money down in Georgia you could do that without even anybody noticing it. I'm just kidding with you.

Q: Yeah.

Q: Okay. Any other questions?

Q: Oh, I've got lots of questions for him but...

(Laughter)

Q: You're looking through these records, I ran across a bunch of things that I didn't really understand and one of them is, you have a melt temperature up at the upper, middle and lower and the one that's the worst, or one of the one's that had water in it had a melt temperature, it was higher by fifty or so degrees centigrade than any of the others. Some of the numbers didn't make sense. Like it was too cold to even pour and so I decided I didn't understand what I was looking at. So I wanted you...

A: Do you know which one?

Q: They all have melt temperatures.

A: No, but which one had the high one...

Q: The one that, that had the high temperature is number 1507.

Q: This one here?

Q: You've got 1507? It's in this book here evidently.

Q: Now, it'll be up near the front. Now here's the page I'm looking at and I don't understand. It says the inner melter temperature lower, is 740, inner melter temperature is 740, inner melter temperature upper is 450. And the susceptor temperatures, a lot of them have it, but this one doesn't. And I wonder what all that means?

Q: Well, there's another one, maybe it's the 43, well any rate, that one is different.

**END OF TAPE**



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**Virgil Blanchard**  
**Westinghouse Hanford Company**

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**VIRGIL BLANCHARD**

- A: (Virgil Blanchard) To remember dates and everything, I'm very poor at. So what I can come up with is that approximately '82 or '83 I became Level 3 and about a year after that I became Level 3 for the capsule program and UT program. 'Cause at the same time, same year that I became Level 3 there was also another Level 3 that was involved in the program, and we became more or less almost like associates. And then when he took over, left the program, then I took the full responsibility of Level 3.
- Q: To jog your memory, did you take over before the cesiums were finished? Cesium capsules?
- A: I can't remember that to be honest with you.
- Q: I think they were finished when, December '83?
- A: Yeah, October of '83.
- Q: Were they the ones in the hastelite capsules?
- A: No. They were the strontium.
- Q: Strontium in the hastelite?
- A: No, no.
- A: Okay, because I did not do any hastelite. I was doing strictly stainless steel.
- Q: Okay. Then those were the cesium. I don't remember the time period for the strontium.
- A: 'Cause there was quite a bit of difference in the velocities of the strontium and cesium so they were, you had to use different settings on your instruments.
- Q: Well my concern with the UT of the capsules. Chuck has records of the four that we're apparently going to send back to Tennessee to examine. They will give you typical X-Y recordings of a standard for penetration. The capsule being tested and the standard for defect. And most of the charts, this ten mil standard for defect, you really can't resolve it that well on the traces in there. You can see it, but, it is really not as distinct as you'd like it to be. And my other concern is that they were, say that this is the end cap and the weld is here. And the standards apparently for the defects were drilled from the bottom up and they were ten say twenty, thirty, forty mil holes, flat bottom holes. And the weld being here, any pinhole in that weld would not present itself to the ultrasonic beam like the standard would or any crack would just show a cracked edge, and I'm concerned about the sensitivity of that test to a pinhole type defect or crack. And I'm also concerned that you show, say seventy-five percent penetration on the X-Y plot, and I understand that almost every case when they cut them off, open, they had a hundred percent penetration or thereabouts. Can you explain for me, those concerns?
- A: Okay, when I became Level 3, we did a program as, that was an ongoing program of trying to update, increase the actual resolution of the problems of UT'ing. If you'll look at that actual configuration of the cap with the square shoulder, the tubing that comes in that pad, that comes up there and butts up against it, that is not what you would call a real inductive configuration for ultrasonic inspection anyway. The ultrasonic transducer,

throughout the program had been changed when it was first started, back in, I think it was around 1974, or maybe before then, under preliminary studies of that program and running of it, they had a fifteen megahertz transducer.

- Q: Was it a zirc titenate or what was the transducer material?
- A: I don't know what it was when it was first started, but towards the end it was zirconium titenate materials.
- Q: First you have fifteen megahertz?
- A: First it was the fifteen megahertz. That was before I even came on board. What I'll do is try to give you a history and some of the progression of it as far as I know. That may answer some of your questions and how to clarify some of the situations.
- Q: Okay.
- A: And in doing that, fifteen megahertz gave real good resolution sensitivity of the materials. There was at that time, to my recollection of the program, they had about two transducers that did that. Due to radiation, the transducers are good for a certain length of time, and then they have to be changed out because they get, they lose their ability for receiving...
- Q: One second. When you got a transducer did you calibrate it, say put a ball there and zip it back and forth and plot its hot spots and its resolving powers, or how did you calibrate a transducer?
- A: To calibrate it? It was basically calibrated off the flat bottom hole.
- Q: Okay.
- A: We received its band wave, and its plotting was part of the requirement when the transducer was sent to us, that the company that sent it to us, sent us that information.
- Q: Okay, they sent a standard. Did we buy it from somebody in Boulder, Colorado or...?
- A: No, they, it was bought from, at that time it was Nortec...
- Q: Oh, yeah.
- A: ...here in Richland, and they had their own lab and they did their own frequency band on it.
- Q: Nortec, I remember was a spin-off from this kind of...
- A: I think it was a spin-off from Battelle. Battelle at that time had two concerns. They had its private, private industries and then it had its Hanford industries. And then Nortec spun off from that, was that private industry.
- Q: I remember when they did that.
- A: A spin-off, then they finally bought it and then they, now they have been bought out by, at one time, an English concern, an English company, and I don't know if they were...
- Q: Okay, so...

- A: Okay then so, they had two transducers that was able to give good sensitivity resolution. After those transducers more or less wore out or lost their capabilities, they were hard pressed to come up with a transducer that would match the first two transducers that they had. Then they had the fifteen megahertz on stainless steel, stainless steel being extremely grainy, gave you a lot of grain noise. So it was concluded that the fifteen megahertz was too high a frequency for that type of material, so they reduced it from fifteen to 10 megahertz.
- Q: The stainless steel was harder to read with UT than with hastalloy?
- A: No, no. I'm talking grainy.
- Q: In the cask nugget, you get a very large grain in stainless. That's what we were talking about the other day.
- A: Well, even in sheet metal, any stainless steel is a lot more noisy than carbon steel. You can take sheet metal or casts or just about any type of configuration you can think of, but stainless steel is a grainier material than carbon steel for ultrasonics, so you get more hash on your scope, more \_\_\_\_\_.
- Q: Would hastalloy and...?
- A: Hastalloy is a lot more quieter because of the density. The density of hastalloy, even in welding, hastalloy is quite a trick because it is a cold weld. You have to just about get, it's very sluggish and you have to push it. It doesn't flow the same as the stainless.
- Q: I'm not a materials expert by a long shot. I just noticed that they correlated some UT scans with the hastalloy welds. They didn't do it with the three sixteenths, that's why I was asking in one of the welding study documents. I'm, they, they would...
- A: I'm not...
- Q: ...they did some tests on hastalloy where they made ninety percent penetration, fifty percent penetration, and seventy-five percent penetration. And you know, they, they had an inspector evaluate what the penetration was without telling him, then they cut it up and determined what it actually was. But I didn't see those tests done with 316 ss.
- A: It was done with 316 ss.
- Q: Okay. It wasn't in the report, and I wondered why?
- A: We were working on that. That was done about two or three times when I was working on that report when the program ended 'cause I had some ideas and some things that I was trying to show. But, yeah, there is a tremendous difference in UT between hastalloy and stainless. Hastalloy is quieter, that's a denser material for sound wave and everything else. If you would, if you would calibrate off of a stainless steel and do a hastalloy or do a vice versa, you would have, I would consider an improper calibration of the equipment.
- Q: Velocity of sound?
- A: Velocity of the sound is quite a bit different. I shouldn't say calibration because you determine calibration, and ultrasonic is usually related to something different. You usually calibrate your machine about once or twice a year, and you standardize your machine on every weld and then depending on how long, or on every scan, or depending on how long your scan lasts you take and calibrate, or you standardize it every half hour or hour if

you're doing a continuous scan on a large project.

Q: So, you burned out your two good fifteen megahertz, transducers and you went to ten megahertz?

A: Well, they continued on with the fifteen megahertz, and they weren't receiving the same results. The transducers couldn't duplicate themselves with the same results. They could, there was nothing in any of the reports I read or talked to the people that were involved in that. There was no way of explaining it; they just couldn't explain why they couldn't produce other transducers that had the same capabilities as the first two.

Q: Is the, let me ask a question here if I could. Is it unusual to have to tailor the frequency to a transducer in order to get good results? In other words, would you, are they, it sounds like they're kind of custom made jobs.

A: Well, transducers have personalities just like people.

Q: That's what, and yeah, you might get a production run or a couple of that you figure, find out that they work at this frequency and you try and make another production run and you might not be surprised to find out that they wouldn't run at that same frequency, but that they might run at another frequency.

A: Well...

Q: I, I'm just trying to pursue the reason for that.

A: When you take a transducer, it's out of a piece of material that, the actual crystal that you're using is an individual piece of material. And you won't get two transducers no matter how you, what step, what way you manufacture them, you will never get two transducers that will give you the same curve on your frequency...

Q: Okay.

A: ...or your frequency band.

Q: And every operator has his own pet transducers.

A: Uh-huh.

A: Yeah. It', it's just the fact that the...

Q: But unfortunately the gamma energy has destroyed their usefulness apparently over a period of time.

A: Yes, anytime, on any of those transducers at that type of radiation levels, they loose their ability to receive. You can actually take them out and sit them aside for a while, and I don't know how it does it, but it seems to recuperate itself, and you can use it for just a short time after that.

Q: Sounds like a battery.

A: Yeah, it loses it's charge again, and then you have to pitch it. So there, the life expectancy of the transducers is an X period of time on high radiation.

Q: Okay. Let's go to what we did after those burned out.

A: Well, then, then they finally went to a ten megahertz transducer, when finding out that they were receiving too much metal noise. And the ten megahertz reduced the metal noise to an acceptable level to where they could scan it without any problems. At that time the ten megahertz transducers were able to give the good resolution and sensitivity of the materials. So it wasn't that they were, it was a situation in which they were not sacrificing anything in fact you could have probably reduced with, using the focal transducer it's quite possible that you could have went down to a five megahertz and still received it.

Q: Um-hm.

A: So there was no sacrifice as far as sensitivity and resolution. They were actually getting a better picture per scan with less noise.

Q: So there probably was, there was a band in there I guess that, there were a period of time where they burned out the two transducers and before they went to the ten megahertz where they had some less than optimal UT scans.

A: You can't say that. It was just a little, what it is, is that they were getting more metal noise and in doing so they had, I would say they had more grass on their screens, so they could have possibly came up with metal noise on their scan. And then anytime you are doing UT, you always work around to a point where you involve extraneous indications. So it's like when you do a PT or an MT, you don't want to have to take and try to read through the extraneous or false indications. (Pause) And that was back in the seventies.

Q: Oh, the switch from fifteen to, that was before your time really.

A: Yeah. What I'm doing is giving you a case history of the...

Q: No, that's fine. I was just, didn't realize that you were talking about something before you were there.

Q: You going ahead on the case history now?

A: Okay and so they did come into the time and era where they went into the ten megahertz transducer, which gave sensitivity and resolution as showing in the fact that there was no loss in the reducing. They kept with that particular transducer throughout the rest of the program. It's one and a half inch focal transducer.

(Pause)

Q: Okay. Anything else on the background and history?

A: That's about it. They did, they did some studies on, like he said, they cut the, cut the metal open and looked at it.

Q: Why would it show penetrations on the UT that were considerably less than the actual? Do you know?

A: Less than actual?

Q: Right.

A: That's what we working on at the end and we were, the interesting point on that is that in stainless steel when you're welding it, you're putting in, like in any other piece of material, you're putting in stress. And after a certain period of time and heat, you can

stress relieve that material. Stress on a material, if you can, if ultrasonic a piece of material that has been work-hardened or stressed, it changes the velocity of the material.

Q: Or the sound in the, in the material.

A: And so you could actually be in a period where you were receiving back from that a sound in the area that has not been stress relieved.

Q: Well, I agree. You can put in thermal stresses during welding and the chilling of the weld, but the, all the materials were solution annealed prior to welding.

A: Um-hm.

Q: And the thermal stresses near the inside, I don't really see why they should be that much greater than near the outside. And my question is why, if it is a hundred percent penetration, why does it only show sixty percent penetration?

A: Well...

Q: They later lowered the standards from seventy-five to fifty or fifty-five, which was it?

A: Let, let me interrupt for just a second.

Okay.

A: I had that explained to me yesterday.

Q: (Wright) Did you now?

Q: (Jensen) I did have that explained to me and the guy that explained that to me was Curtis Stroup. You know I was just as baffled as everybody, what the heck this meant. And he explained to me what that means. Now what it means, and it would be better for, you know, he's coming in next, to have him explain it, but let me just tell you what it means. When they say a hundred percent penetration. They're talking about, when they say everything that they checked, no matter what it read, they found a hundred percent penetration. That meant that the depth of the weld itself into the end cap. But when they're talking about fifty-five or seventy-five, that's the, the fractional distance that that weld nugget goes into the, into the capsule wall.

Q: (Wright) Okay.

Q: (Jensen) So if there's a misalignment, the weld depth goes a hundred percent, but it's up enough so that it only picks up fifty-five percent of the capsule wall. That's the confusion.

Q: (Wright) Well, looks to me like to ultrasonic would show the part of the weld into, into the wall.

Q: (Jensen) What they think that they were picking up and what the, the intent of that, is at least as I understand it, was that they were picking up the fraction of that weld over on the crack, between the top, you know...

Q: (Jensen) And the wall.

Q: (Wright) Yeah.

- Q: And if it said seventy-five, that's what they were measuring. And then when they say, "Well, in all cases when we sectioned them, we found a hundred percent penetration," what they meant was that, that the weld didn't just go in seventy-five percent. The weld went in as far as a hundred percent of where it was supposed to go.
- Q: (Wright) uh.
- Q: (Jugan) As much as there was material to weld to.
- Q: (Jensen) Well, no. As, as much as the penetration, as much as the heat as you expected to go to, you know.
- Q: (Wright) It penetrated into the end cap, but unfortunately that wasn't what they were trying to weld. Now that's...
- Q: (Jensen) That's what he told me.
- Q: (Wright) We'll, we'll talk to him.
- Q: (Jensen) Yeah. Let's talk to him about it.
- Q: (Wright) I'm not interested in how deep the nugget went into the end cap.
- Q: (Jensen) Exactly. And this hundred, this always a hundred percent is just a confusion factor.
- Q: (Wright) Yeah. I'm interested in what percent of the wall was welded into the end cap.
- Q: (Jensen) Exactly.
- Q: (Wright) I'm not interested in how deep they went into the cap.
- Q: (Jensen) Exactly, exactly.
- Q: (Wright) Okay. But if that's it, I would see why the ultrasonic would show quote, the actual penetration of the wall or fusion of the wall to the end cap. And the other one shows how deep the nugget went in.
- Q: (Jensen) Yeah.
- A: There's another thing that's of interest too, is that we, we UT'd some of the capsules that had been in there for many years, I shouldn't say many years, but for a considerable length of time. Those same capsules that showed that same noise that I was talking about that I was referring to as stress in there from the welding, we UT'd those, compared those to the UT that was done on them previously, and those came out clean. Absolutely showing a hundred percent penetration of the weld.
- Q: Well, how do you explain that?
- A: I still would like, I still believe that you are getting a certain amount of stress of some sort built up in there and when you do the weld, and that's what you're seeing. And it takes a length of time, plus they are in the heat. When they are in there they're still hot, when they're, even in the pool. And I still believe that that is allowing it to relieve that stress that's in that weld. Because you're dealing with, considering you're dealing with a one and a half inch focal length transducer. So you...



- Q: What was the diameter of the spot on that transducer? A sixteenth or something like that?
- A: I, I don't remember on that. It's been a long time since I...
- Q: Did you have a spot focus and not a line focus?
- A: That's right. You've got a, you've got a spot focus there. So you're getting a lot of energy in there and you're getting a lot of, at that short of a focal length, cause it's one and a half inch water, so when you're actually doing the test, you're off the cap only about a half inch, from three eighths to a half inch. Dependent upon the transducer and everything else. So, you take that short a distance, and you're going to get a lot of energy in there that we were working on raising the water length and the actual scan to about two inches, which would have been a more ideal scanning distance for energy and for scanning results.
- Q: I guess Ed had the one question that why would, why would this lack of penetration or stress be just on the inner part of the weld as opposed to the circumference or any other...?
- A: Well, your inner part actually stays hotter longer and builds up stress more.
- Q: (Wright) I have to think about that. Looks to me like the part that has the widest weld bead would have received the most heat input and that's the part on the surface.
- A: Yeah, but you also in doing that, you have more surface area and you are able to dissipate the heat more. In the, in the back part of the weld, see, these are autogenous welds.
- Q: I understand that.
- A: And being an autogenous weld, you're pouring the heat in there and it's staying in there, cause it has nowhere to go because the back part of that weld is also, the back part of that is also producing heat. As it is coming out, you are only getting a single heat force. You're also receiving more heat dispersement area.
- Q: Yeah, but if you want to stress relieve a weld, what you want to do to keep it at heat and (mumbling) the inner part would retain it's heat longer and have a better chance of stress relieving than maybe the outer part.
- A: Like I say, I can't explain it.
- Q: But at any rate...
- A: I can't explain it but that, it is interesting, the way we use the same parameters, identical parameters, when we took and UT'd the one that had had a chance to be in the pool with a certain amount of heat for a long period of time, cooling for a long period of time and it came out and it, it UT'd slick as a baby's...
- Q: Interesting.
- Q: Can't remember who, but someone that was here didn't trust the UT very much at all. They trusted the helium leak test better and...
- A: Well, we used to have a joke going on between Hopman, Jim Hopman, the welding engineer and I. We used to, he used to always tease me about my black box of magic. I have complete confidence in ultrasonics. I have, the only question I would ever bring up is, your ultrasonics will show you what's there, it depends upon how you set it up and

how, and your parameters.

Q: If the defect is oriented correctly it will pick it up. I agree with the ultrasonics scan.

A: But I once told a story about we shipped, we were going to ship a tube, a zirc tube about that big around with a hole about big as my finger to England. And it was tested to a defect level of less than one percent of the wall in depth and maybe a sixteenth inch long both longitude and transverse. And I go ready to sign off the certification records and I said, "Where's the hydrotest certification?" and it was already in the box and the guy said, "Oh, God, we'd passed a super-duper ultrasonic test." I said, "Take it out of the box and hydro it." And there were like five tubes and one of them sent a spray of water completely to the ceiling. It had a forty-five degree shear crack through the tube wall, and the ultrasonic trace we put it back through and it absolutely showed not more than a ripple. So if the defect is oriented right and is set-up right, I agree with the ultrasonic. It's fine.

A: Same thing with X-ray and any of these other NDE methods. You've always got a possibility of a defect of being there that is unable to be picked up by...

Q: That's presenting, that's the reason I asked you if were scanning from the top and your standard was a hole drilled under the bottom and you had a nice flat, bottom hole. But if the crack or pore is coming through from this angle...

A: We did some, we did some tests with side drilled holes in the weld. You can discern them, but they're very, very difficult to discern.

Q: Right. And if we have a defect in this weld, I think it's going to be a hole or a pore.

A: If it's a, it would be hard to discern.

Q: ...or a crack that is even harder to see ultrasonically because all you're seeing is the edge of that crack.

A: They would be hard to discern.

Q: Right. Well I don't, I've run out of questions.

Q: Let, let me ask a question. What, we're, well, let me just say something before I ask it. Obviously one of the things that we're really looking hard at here is some of this, is the whole manufacturing process and our ability to determine the quality of the product. I mean, in particular, the zeroing in on, on the testing method, ultrasonic testing as well as helium leak testing for the inner. And, and we've heard all kind of various discussions about it, people's impressions, people's gut feel about how good it is or, or it's shortcomings and so on and so forth. And I'm not a metallurgist and I know not much about testing, non-destructive testing or, or testing in general any more than the average engineer would. I'd say. But I do have a question. For this kind of any application, for this kind of a product, what other non-destructive testing techniques might be considered? And I guess I'm saying, and I'm asking myself and I'm asking you, if there's question about UT being a good, reliable method, what are the other alternatives?

A: Well, I think, I think you'll find, and in my experience in the, in the NDE industry other than out here I think you will find that any industry that has a high integrity type of situation like that, you always have more than one NDE possibility, and you should always test with more than one NDE possibility. Like on the cold runs where, the ones that we could possibly do on the cold runs and not only UT'd them, but we PT'd them. When you're, when you do that type of situation, I would say you would have closer to a 99 point

nine percent factor of, you know, shoving out all the problems of having the defect there. Your weld holes like you're talking about could also happen, this is just off the cuff, but you could have a lamination in the cap in which, owe it to the fact in which you have sudden fluctuations in temperature cause the lamination which would work into the, being in the heat effective zone, it would have a chance, have a higher probability of you know, delaminating and causing the crack, working down then into your weld. And as you know weld is nothing more than a cast which has a coarser grain material and it would take and tend to fracture and yield faster.

Q: (Jensen) Was there, is there some other NDE technique that, that it's reasonable to think that could have been used either in place of or in conjunction with ultrasonic on these, on these hot capsules? You know, and I don't know what the answer is, I'm just kind of asking.

Q: (Wright) They could have done a helium leak test on the entire capsule in addition to ultrasonic, and my check in there could have been done but it's, it's more difficult. But it could have been done in the hot cell. We're going to do it at Oak Ridge to find the hole.

Q: Is there any other, other than the helium leak test and a, and a dye penetrant?

A: Radiography is not...I wouldn't trust radiography on that configuration.

Yeah, well your cesium, your cesium...

**Garth Tingey  
Pacific Northwest  
Laboratory, Richland**

## GARTH TINGEY

We have the pleasure of Mr. Garth Tingey visiting with us. The committee is here: Willis Davis, Mike Jugan, Ed Wright, Judy Penry, and myself, Ron Hultgren. Uh, Roger Jensen will be joining us probably in 15 or 20 minutes.

- Q: Garth, you've been billed to us as the person whose done the design bases, tested these things and knows these capsules better than anybody else. I think the thing were interested in, at least to start with, is the, your testing program is indicated that we've thermally cycled these capsules about 3,000 times, they've been subjected to various drop tests and all that sort of thing. But yet when we went down to RSI, we saw a facility in which capsules were lifted out of the water and were kept of the water for as long as 8 days and for short as 5 minutes. They were cycled in and out of the water over 7,000 times in the 2 years and 2 months that they operated. And I'm curious as to your comments and thoughts about the similarity of your testing techniques and all the information that you have gathered about the capsules in relation to the actual use that RSI was putting their capsules through. I would like to make this an open ended answer for you, and please feel free to carry it on just wherever you feel it should go.
- A: Most of the special form testing that you referred to was done long before I got involved in the program, and so the earlier drop tests and pressure testing and things, and even compatibility testing was done earlier. These were not my work, but were reviewed in a document published in 1974 with John Lytle and Earl Wheelright. In that assessment, we determined that for use in the irradiator, especially a wet-dry irradiator, there were a couple of areas that deserved a little more consideration. One was the thermal cycling test that you referred to. And so we designed a thermal cycling test that was meant to evaluate crack propagation due to a temperature profile generated when you quench the capsules or when you remove them from the water pool. The latter is a much less severe condition because the temperature changes much more slowly in that case. And so we cycled the capsules much more rapidly in an attempt to get some data in an accelerated test. We determined from analytical work that in about an hour in air, they would come pretty close to the maximum temperature they would achieve. So we held them an hour out of the pool and put them back into the pool, and my recollection is that it was 90 seconds in the pool. The document would clarify that. So they were held 90 seconds in water by cycling cool water into a bath. Then the water was dropped out quickly to let the capsules come up to temperature. The experiment was designed specifically for the irradiator application. Capsules held more than an hour in air would not change temperature significantly over what they reached in our test. More than 90 seconds in the water would also not lower temperature significantly.
- Q: What were those temperatures that you can remember?
- A: Temperatures in our test were designed to pretty much simulate the irradiator. The temperature was somewhat higher in air because the capsules were shielded from thermal convection in the bath. When we dropped the water out, the temperature would come up to about 175° centigrade maximum surface temperature.
- Q: The outer surface side or the inner?
- A: The outer surface.
- Q: The inside would be...

- A: The inside surface temperature was projected by analytical work and also measured earlier by Hal Fullum. The difference between the outside temperature and the inside temperature is 50° to 60° so we're looking at something less than 250° centigrade at the interface between the salt and the inner capsule wall. For thermal cycling, the most critical area is the part of the capsule with the largest temperature change; for these capsules, the lower weld of the outer capsules has the greatest delta T and they are greatest stress in the lower endcap (meaning the end that was lower when it was filled). So that lower outer endcap has the highest delta T.
- Q: I was also looking for some idea of how hot the capsule got in the extended storage outside of the pool. I understand the lower endcap would receive the largest stress during thermal cycling.
- A: That's right.
- Q: Critical.
- A: And inside of the capsule would have come up to a somewhat higher temperature. Now the general feeling is that our temperatures were a little hotter than the temperatures achieved in the irradiator itself, though I think there is still some reason to question that feeling.
- Q: This morning someone out there said RSI had several of them stacked touching each other and left them out for up to 7 days, and what do you think about that if they are touching along the line and also touching a reflector in front of them, a heat reflector?
- A: Yes, I've thought quite a bit about that over the last year or two, and my belief is that gamma heating from adjacent capsules is small after you get 1 or 2 capsules away. More assessment really needs to be done on whether or not we have some area shielding from heat removal. My assessment is that probably that doesn't make too much difference. NRC required RSI at the Westerville, Ohio, irradiator to have a temperature monitoring, and to do this they (RSI) put what they called a dummy capsule in the rack. This was a capsule with the same geometry and probably about the same material but with no radioactive salt inside. This capsule had a thermocouple attached to it. I guess I can't remember the material even if I ever knew this, but I would say it was about the same material. They put that capsule in direct contact with the others, and measured the temperature. It was somewhat lower than we had projected. This may be expected because there is no internal heating in that capsule. Since it was in direct contact, I think it gives you an indication of the temperatures of the other capsules. This is discussed in a report not yet issued. In this report of the examination of the Westerville capsule, we reported the temperature measurements, but we assumed temperatures more nearly what we had calculated and measured in the hot cell. All these temperatures are well below those we projected to be of significant concern for capsule interior corrosion.
- Q: Would, from your understanding at least, the Decatur facility be similar enough to the Westerville facility to draw any conclusions?
- A: I have never visited the Decatur facility so I'm not sure. I have seen the Dallas facility, which I'm told is very similar. But I spent an hour there at an NRC meeting, and so I haven't looked into that in great detail, but I think that the rack configuration and the way the capsules are set in are probably not that much different.
- Q: This is a far out question from the line we've been talking about, but I'd like to ask you before I forget it. What would be an average time from the time you get a capsule into a hot cell to where you be finished with it, ready to write a report?

- A: That depends on how much priority.
- Q: Top priority.
- A: Top priority?
- Q: Yeah.
- A: Of course I am assuming that we are going to open the capsule at Oak Ridge and so you are talking to an outsider. I would think that we ought to be able, with top priority, to open the capsule within...You're talking about?...Leaky capsule.
- Q: This one right here.
- A: This one we have to look at very carefully and make sure that we don't open it in a place where we would sacrifice some of the data we're looking for, and so we've got to do some preliminary experimentation. I suggest that if we can't determine the point of the leak visually in the hot cell, then we might want to do a dye penetrant test, we might just want to do ultrasonics and maybe even other things if necessary, to make sure we don't cut it in the wrong place. But I would think if things go well, in a few days to a week we ought to be able to open and remove the capsule and take samples and do metallographic examination within 2 or 3 weeks. And I would hope that, with top priority and people giving us the facilities we need, that in 6 weeks time we ought to have a report out.
- Q: Good.
- A: Now, in shorter time, I would think we would have some information for you.
- Q: Well, this was a personal question for me, and I wanted to ask it of you before, and I was sure I would forget it, but right now I was thinking about it.
- A: Now at the same time I have to tell you that I pulled a Westerville capsule nearly two years ago, and I told you the report is just ready to be issued, but of course we weren't pushing for that. We knew what the data were several months ago, and we've gone through various cycles of review for the report and things, and so it's not unusual to spend a lot longer than that where you don't have pressure to complete it. Now the staff at Oak Ridge might feel differently, but we could do the metallographical work in about three weeks time.
- Q: I've been pressured to come up with a ballpark schedule, and again I apologize, that's away from what we are here for.
- Q: Yeah, getting back to the examination of the capsules themselves, what are the variables which will affect the weld after it has been made? What are the things that are going to lead to a leak? You've discounted the thermal cycling temperature differences because the capsules are in a rack and perhaps touching and perhaps out of the water for a very long period? What are some of the other variables which will contribute to a leaking capsule?
- A: You can well imagine that my previous assessments were such that I thought we weren't going to get a leak. And the welds seem to be good. Every weld we've looked at had, instead of the 55% penetration specified, we saw only 100% penetration. We haven't seen any problems with the welds. I thought, and I still feel, that the most likely problem is a defective weld. Perhaps a defective weld got through without detecting a problem. The other thing we've thought about is how significant is inter-granular stress corrosion cracking. I don't know what the pool chemistry was. Inter-granular stress corrosion cracking, from what our metallurgists tell us, might require chlorides, fluorides, some

sulfur compounds and particularly thiosulfate and other chemicals of that sort in the pool, and the temperature doesn't have to be very high in some of these materials. You must also have some stress. Under these conditions I can not see any internal stress on the capsules, but we have residual stress. These capsules were not stress relieved, and also you must have some sensitization of the weld. Sensitization means that you've got some unusual chemistry in the weld because of the heat affected zone being affected such as chromium moving to grain boundaries and things of that sort. So I think there is some chance that we could have stress corrosion cracking in that system.

- Q: And the variables of question, there are the water chemistry primarily, and you would also have to have some problem in the weld itself to start with.
- A: Weld sensitization is kind of an unusual characteristic, and 316L shouldn't be very sensitive. If, for instance, you've got a lot of material that was not as good as the specs call for. We ought to look, if we haven't already done so, at the metal composition. We ought to look at the vendors' analysis of the materials that were supplied, both for the endcap and the tubing.
- Q: But you all must of thought that there was a very remote chance of that happening, or you probably would have looked at that when you were doing this report whatever this reports safety analysis. Is that correct?
- A: Yes, in fact I would recommend that when we test the failed capsule, we do an analysis of the material of both the endcaps and the tubing.
- Q: (Hultgren) Well it's supposed to be on there?
- A: It might be in Oak Ridge's recommendation, but it wasn't in mine.
- Q: (Wright) He made that recommendation.
- Q: (Jugan) If there was a material problem, it should be fairly widespread throughout the capsules, is that not right? There were few procurements of the raw materials I believe.
- Q: (Hultgren) So it would be rampant through a numerical series of the capsules themselves?
- A: Could be, assuming the lot was homogenous.
- Q: (Hultgren) The capsules, of course, were picked randomly through the production sequence. Did you have anything to do with taking the capsules?
- A: No, that was done before I was involved in the program.
- Q: (Jugan) I think by the, I think what he meant by picking the capsules, meant by deciding which ones went to the different facilities.
- A: Oh, is that what you meant?
- Q: (Hultgren) Yes.
- A: I didn't have anything directly except maybe in establishing some of the philosophies that were used but in terms of going and looking at the numbers and saying, "Let's send this one to Atlanta, and this one to Westerville, and this one to Iotech." I didn't do that. The selection was based almost entirely on the specific activity of each capsule.



- Q: Okay, now we've talked about the water chemistry. Are there other factors that participate here?
- A: Sure, temperature. Both operating temperature and temperature outside of the pool could cause an effect.
- Q: Air temperature?
- A: Air temperature might have some effect, but the capsule temperature is the most important thing. Air temperature would have an effect in so far as it affects the capsule temperature.
- Q: But you all looked at that, right? Are you saying that in conjunction with spec of material in some of these other factors is that what saying the combination?
- A: Yes, or maybe something that we hadn't thought of before. If there is something occurring in the weld because of temperature and there's some evidence that the higher temperature welds might be more susceptible. And so temperature is something we've obviously got to be concerned about.
- Q: Okay, make sure, I'm the administrative person. But you all looked at temperature and when you ran the test, when you did your report, you felt the temperature level that you all looked at was so much higher than what would we could ever reasonably expect to achieve, that you definitely covered that and now you think we probably need to go back and look at it again.
- A: Well, the temperature that we were primarily concerned with was corrosion temperature and temperature during thermal cycling. Those two we looked at very thoroughly. Now if temperature is affecting some other mechanisms, like stress corrosion cracking or whether were getting internal corrosion cracking. Also the outer weld, we never really felt there was much concern for that.
- Q: How come?
- A: Our main concern was for thermal cycling. The outer weld doesn't contact the salt, so you don't have a very corrosive system to worry about. It operates at a lower temperature, and it was thoroughly examined during construction. I don't know that anyone really looked at the potential for stress corrosion cracking on these materials prior to the last month.
- Q: (Penry) Okay, I heard something about 12,000 cycles. Is the 12,000 correct?
- Q: (Jugan) For the life of the facility was one estimate we've got.
- Q: (Penry) Okay, and the fact that they have cycled theirs 7,000 times. How did we come up with 12,000?
- Q: (Hultgren) (Everybody talking) That's an Allan Chin estimate he said, "In the life time of this facility, I would expect to withdraw these capsules approximately 12,000 times." That was...
- Q: (Penry) Okay, then someone within DOE must have said, "Okay, that sounds fine."
- Q: (Hultgren) Yes.
- Q: (Penry) Okay, upon that, how did we make that evaluation?

- A: Is it appropriate now to describe the thermal cycling philosophy a little bit?
- Q: (Hultgren) Yes.
- A: When we put together this test, we were working very closely with NRC. I've been doing this because they were going to have to license the facility, and we were trying to supply them the information that they needed. In talking with the industry, they led us to believe that on the average the capsules would be cycled about once a day. And so in my documents, you'll notice that I assume one cycle a day when I try to relate the number of cycles to time. So we cycled them once an hour for six months and got about ten years worth of once-a-day cycles. But 3600 cycles is ten years worth if you're cycling once a day. And so we figured we had about ten years worth. Well, obviously that wasn't very satisfying in the long term, but it was a verification of the finite element analysis we had done. And we calculated on the order of  $10^{-6}$  inches per cycle for a crack propagation rate. That means that in 3600 cycles, we're not going to see anything. Well, we didn't see anything, so in sense that was a verification of the calculation. Now what I've said is that if our calculated number has any validity, we ought to be able to use the capsules for ninety years (three half lives) and still have just a small fraction of the weld penetrated by a crack. And so that's the reason for the ninety year number in the document. And that's based on one cycle a day. So you ought to be able to go much more than even 12,000 cycles and still, if our analysis is correct, ought to still have a good weld, at least free from cracks due to thermal-cycling.
- Q: Garth? Yeah, that's important. When you take it in conjunction with the overall program, that he's tested it for ten years and, a simulated ten years, and we expected to do another test at the end of, possibly in the second year or at the latest, in the third year, you can feel that you've covered yourself between testing periods.
- A: Yeah, we're monitoring the capsules. NRC and DOE have a letter of agreement or least NRC has written a letter that says that DOE agreed, to examine capsules out of a wet/dry facility after one year, three years, after six years, and nine years, and then we would evaluate how often we needed to do it beyond that. So we thought we could see any effect of thermal cycling in this monitoring program.
- Q: Do you have a copy of that letter of agreement?
- A: I do, but not with me.
- Q: Alright. I could not find a signed copy that, I've got it with the concurrences on the bottom, but never the final signature.
- A: The source of my copy was one I picked up in Washington, D.C. when we were back there shortly after the contamination in Decatur occurred.
- Q: Okay. Was your understanding that you and Hanford were going to be responsible for continuing this on-going surveillance program of the capsules in use at Westerville or whatever? Who had that responsibility for making sure these things continued throughout this ten year program?
- A: That's kind of a hard question for me to answer. I expected to be involved but there wasn't anything very formal about who would do the examination. DOE was responsible, and I'm not sure what would have happened when I retired or died or left the company or something like that. So I guess I would have to admit that there was an agreement between DOE and NRC, but perhaps it was not well organized and a procedure established.

- Q: Okay. You had been working for two years on testing the first one, right?
- A: Well, we pulled a capsule from the facility in about August and sent it to Oak Ridge for opening and metallographic examination. Since the ORNL hot cells weren't available, we shipped the metallographic samples to Battelle, for the metallography, and we had the results in a short time. Most of the remaining time was spent getting the document prepared.
- Q: (Jugan) I've got...I want to correct something of what he just said if we could. You said pulled in August, I've got 12-86, is that what, did you mean in the...?
- A: Alright, no.
- Q: (Jugan) Okay, I didn't know if you meant August of '87, August '86 or...
- A: December is probably right.
- Q: (Jugan) Okay.
- Q: (Penry) Okay, so, in December when the capsule was removed, what told you to do that, who authorized you all to do it then, to make whatever arrangements that needed to be made, whether we wanted to send it to Oak Ridge, the fact that they couldn't accept it, and for you all to make other arrangements to do all the stuff you needed to do. Was that direction from Richland, directions from Headquarters, did you have a tickler file that said, "Oops, looks like it's time for us to do this," let me go ahead and make the appropriate arrangements to do this, how does this work? When your doing the report has anyone called and said....
- A: We had that in our program plan for the By-Products Program to examine the capsule.
- Q: Okay.
- Q: (Wright) So you, PNL notified them to ship the capsule or did DOE notify them or what?
- A: Well, I interacted with the Oak Ridge people, you see, we were desirous of using the salt for Oak Ridge, and I was in contact with Oak Ridge Operations Office, Sylvia Wolfe.
- Q: You talked to Sylvia Wolfe?
- A: We talked to Sylvia Wolfe, and we agreed that Oak Ridge arrange for the shipment of the capsule and would, in fact, pay for it out of the isotope sales, and would cut the capsule, but I would be directing the work. So I wrote a procedure which they should use for sampling the capsule.
- Q: Was that done at Oak Ridge?
- A: Yes. The capsules were opened. The samples were cut from the capsule and were re-encapsulated in an empty capsule and sent in a cask to Richland where we did the metallography. The original plan was to do the metallography at Oak Ridge but it was later decided to do it at Hanford.
- Q: Okay, so you say this in your program plan, how often have you updated your program plan?
- A: Every year.

Q: Okay, and that's submitted to, is it Liz Bowers here, or who's the...

A: No, our program plan now is under NE, and Dick Gorenson is responsible.

Q: Is that a Richland person, I don't know that person?

A: That's a Richland person.

Q: When did that happen?

A: We were doing it under the auspices of the Nuclear By-products Efforts, that's how we are funding it, and so it was part of our program plan.

Q: Is there something in this year's program plan to pull another capsule?

A: It will happen in Fiscal '89, and there will be, yes, we've got it in our budget.

Q: Okay, working with NRC to develop this testing program, which obviously, there was a lot of efforts several years ago, whoever would contact Richland, were they closely involved in this process? The same question pertains to Headquarters, or did you have most of your direct interaction on a one-on-one basis, say between you and NRC?

A: No, DOE was very closely involved.

Q: Richland and Headquarters?

A: Yes, I had a lot of very close association with NRC, particularly with some of the technical people in discussing their needs, but Headquarters and Richland were very much involved.

Q: Where does this come from? Ohio? Georgia?

A: Well, at that point, see that was before the lease agreement was really put together, I would say probably Oak Ridge was putting it together, but maybe not in those early stages.

Q: We just talked to Curtis, what was Curtis' last name?

A: Stroup.

Q: Stroup, and he made mention to some letters that he had written, concerning the criteria for the use of the capsules themselves and the application. Did you get that information, did you have an opportunity to review it? To try to address some, we have not seen these letters so we don't know exactly what they said, but the impression we got was, he had some concerns, and did ya'll have an opportunity to evaluate those concerns in some of the analysis that you did?

A: I'd have to see the letters to know what involvement I had. I did have quite a bit of involvement on temperature limits and things of that sort, because they often came to me for an opinion.

Q: Okay, but you don't specifically remem...

A: I've written a few memos to them and some things that I said that I felt was all right, some they denied and others they accepted. But without seeing the letters, I don't know whether I was involved.

- Q: (Penry) Okay, you've just pointed us in another direction, maybe we can get some copies of this correspondence to get a feel for the kind of negotiations and discussions that took place, obviously fed into the report that you developed, we need to maybe put that on our list.
- Q: (Jensen) Yeah, well, the list that we're, and as a matter of fact, I've written a note to Curtis requesting a whole series of documents and he's to get them for me, he has agreed to get them and provide them to us.
- Q: (Penry) Okay, we got another list.
- Q: (Jensen) But that doesn't have to throughout that same thing cause we're talking to Garth and he's PNL as opposed to Westinghouse, so we deal with him separately for documents....
- A: It is possible Curtis would have the memos that I wrote.
- Q: He may have been.
- A: So they may have been covered in that.
- A: Specifically there was a desire on the part of the lessee to ship five capsules at once, and we exceeded the temperature limits which Rockwell, at that time had set, 400°. I wrote a memo saying that I didn't see anything wrong with 450° for seven days, but not for an extended period. And they chose not to accept that recommendation, and I have a copy of that memo and there are probably others that were written as well, though I can't think of any specifically, but that one has come up recently, and I suspect Curtis will include that in the package that he supplies you.
- Q: (Jensen) It could well be. We were pursuing the line of questioning more on down the trail of actual operation conditions as opposed to shipping conditions, but you know, it's enough similar that it may very well be in the package.
- A: I don't recall being very much involved in that kind of discussion, I always took the position that NRC would control the operating conditions. I can see why Rockwell, or Westinghouse would be interested.
- Q: But didn't the document you prepared, wasn't that a key part in their determination in whether or not they wanted to license the use of the material?
- A: Sure, those documents were used by NRC to set the criteria.
- Q: (Penry) So...
- Q: (Hultgren) NRC set criteria for what?
- A: For operation of the licensee to operate an irradiator using cesium.
- Q: For the facility? Can I say that I don't think that ever happened? I don't believe the NRC set the criteria for the operation of the RSI facility, I believe the only thing that NRC did was license the capsules themselves and for RSI in Decatur, that facility was licensed by the State of Georgia.
- A: Oh, okay.

- Q: But were you talking about Westerville, perhaps?
- A: I was thinking Westerville, but I guess when I say NRC you ought to interpret that to mean NRC or an agreement state.
- Q: Was there any time in which you passed onto NRC during a licensing process of "Thou shalt keep the chloride levels in the water to thus and such." Westinghouse people seem to think that that was very important that the differences in their operating condition down there and here is real different, and they seem to think that it was important. Now what, the impression I got is that we made good capsules and we passed it on to PNL to license it, so we're trying to find out why the guy that ended up using it didn't know, wasn't as smart as Westinghouse was, or Rockwell at the time. And it doesn't look like anybody told them, and we don't know who was supposed to.
- A: I don't think I ever got involved in the water chemistry questions. I don't think PNL was given the responsibility to license the capsules. PNL was working with NRC as part of the By-Product Program to answer questions on the licensability of these capsules.
- Q: I understand.
- A: Now, NRC, in my opinion, never did certify these capsules as sealed sources. We had meetings with them (when I say we I'm talking about DOE with me being there as a technical contact) and encouraged them at one time to certify the capsules as sealed sources. NRC at that time took the position that these first facilities were demonstration tests, and they chose to license a facility on a case by case basis for the use of WESF capsules. And in the case of Westerville, it was an amendment to an already existing license to permit them to use WESF capsules. In the case of Atlanta, the initial petition was to include the use of WESF cesium capsules.
- Q: (Hultgren) Yea.
- Q: (Penry) Make sure I understand the distinction you were making between the DOE position of NRC should license these as a sealed source, I think that's the term you use, versus what NRC ultimately did was on a case by case. Okay, what's the difference in that? Are we saying, did DOE say that, "Hey we feel that these capsules, almost in any kind of situation, would be appropriate to be used; therefore, NRC would not have to look at the specifics of the particular operation?"
- A: Often NRC certifies various sources as sealed sources, and then it makes the licensing process more simple.
- Q: (Penry) What does that mean?
- Q: (Jugan) Garth, is that the same as special form that we're hearing?
- A: Special form usually refers to transportation of radioactive materials.
- Q: (Jugan) Okay. So there is a difference?
- Q: (Penry) What does sealed source mean?
- A: Well, that means that somebody looked at these and they're a sealed source, and the radioactivity is contained, and they meet certain criteria.
- Q: And under normal operating conditions, a prudent person, you couldn't do anything to this?

A: Yeah.

Q: Why did DOE, since it was their, our position, that "Hey, let's do it the sealed source," you know, on what did we base that conclusion. Okay, we've looked at the temperature issue, but you said that you all didn't look at water chemistry, do we know if anyone else looked at that?

A: Oh, I assume that people have looked at it, but I don't know how specific to these capsules.

Q: Good, you're starting to round the conversation back to where I was, and that's the different failure modes of the capsules. And again, talking about the variables which participate. And one thing I guess that I was curious about as I read through some of the reports, is the rate of corrosion, the stainless steel when effected by cesium chloride. I've seen one test report in which a person left the capsule or left the stainless steel in contact with cesium chloride, and it had a corrosion depth of up to ten mills. He was then unable to duplicate that test. And as a result, in the conclusion of his report, it was: "This is not a problem." What, have you any idea what would change the corrosion rate between a ten mil depth in three months and then run a follow up test and have no corrosion in the same period of time? What could possibly affect that?

A: If his temperature measurements weren't accurate, or something of that sort, the temperature has a very great effect. Impurities has an effect, if he had an unusual impurity. I suppose the material itself could have an effect. We based most of our corrosion data on that done to select the material by Hal Fullum (a Battelle employee, who's since retired). With very careful research, he did a lot of work on corrosion of stainless steel and other materials with cesium chloride, and he found that with pure cesium chloride, he had a very low corrosion rate. Later they had initiated a series of experiments to try and qualify these materials for remote storage in a repository, and someone calculated that they needed to be able to withstand an interface temperature of 450°. So most of my conclusions are based on the 450° test that have now been completed up to six years. Now the six year test was just opened, and they haven't completed the analysis. On the basis of that data, and of other data at other temperatures, we conclude that corrosion is very slow at temperatures below 350°C. On the other hand, it's clear to me 450° is too high for these capsules for a long term use.

Q: The corrosion, the resistance is a function of the impurities in the cesium chloride. I'm curious if the manufacturing process of the capsules admitted those impurities into the system. Let me restate the question.

A: There's a significant amount of impurity: ten, maybe up to twenty percent in some cases.

Q: So, all those impurities could be present in the cesium chloride, resulting from the manufacturing process that Westinghouse used?

A: In subsequent testing, we've done analysis of the salt to try and get a feel for the composition, and we've made comparisons of the corrosion.

Q: This is a bit of an unfair question...

A: Not a great deal of basic work has gone into that, however.

Q: ...do we know the chemical content of the cesium in each one of the, the cesium chloride in each one of the capsules that we have?

- A: No. There are some analyses on the batches that were made, but those analyses weren't that thoroughly done, and I have not relied very much on those in my work. I've done chemical analysis on the salts.
- Q: Garth, it was my impression from having read some of that background information, that there was admitted an extreme difficulty in doing analytical work on the cesium chloride. Extremely difficult to do, and the accuracy was claimed to be poor.
- A: I think we've got better data on the subsequent capsules with the more recent analytical techniques. But that is true, that is a difficulty.
- Q: But newer instruments have admitted greater accuracy into the measurements?
- A: I feel more confidence in the results that we've got on the analysis of several of the salts that we've extracted, but there's still a lot of variation and a lot of uncertainty, it's not a highly precise measurement.
- Q: Even if it were a highly precise measurement, is it not true that the batches themselves could vary significantly in impurity levels?
- A: Yes, I would say so. And some of the Rockwell (Westinghouse) people would be better ones to ask this question, but I think that they admit that there's variations from one batch to another.
- Q: How much of an advocacy role did DOE, you, whatever, get into in the licensing of the capsules or the attempt to license the capsules? I'm worried that there was such a drive to get these things out into industry, that perhaps we might have been a little bit tant in our advocacy and you know, "Hey NRC, this is no problem, let's get us a license and let's get on with this."
- A: No, I would say on the contrary, I think that particularly here at Richland there was not a strong drive to...
- A: I hear the anti-development say that the only reason...

#### SIDE B

- A: ...There were many who would have preferred not to have their cesium sent outside. They had control over it, and I think as a general rule that's the case. And so, in terms of getting rid of a problem, that's as far from the truth as it could be. In terms, now let me speak a little more for myself. I've been promoting the use of this, I don't think unduly so, of this and other by-products because I think we have a national resource here that has many applications which we scarcely use. No reason in the world, that I can see, to send Cobalt 60 to the Decatur facility instead of Cesium 137 if we've got Cesium 137. In spite of the problem we've got, I still hold that opinion. Well, maybe after I find out what the problem is, if I do, I'll want to do something different, but at the present time that's the case. So I don't think NRC felt any pressure from DOE. All we were saying was "Here's some material that can be used for an irradiator, and we've done these tests and we think they're safe. Now you take the data and make the determination of the safety for yourself."
- Q: What do you think prompted DOE to advocate to NRC not to do the case-by-case licensing as opposed to the sealed source concept?
- A: I don't think that that's the normal way of doing it; you certify a sealed source, NRC



would rather do it. That's kind of the normal way. NRC just chose to...

Q: (Penry) They chose not to do the normal way, but DOE chose to...

A: No, we weren't pressing them, we were happy, and when I say "we," I speak of DOE.

Q: (Jensen) It's fine with me.

A: As a group, no matter who we worked for at the time, we were not dissatisfied with NRC's decision. NRC took the position that we might only have three or four of these facilities, after all, there's not very much cesium available and at least for the first one, let's see how they work. So I never felt, and I don't think the NRC people felt, that we were pressuring for the source to be certified. When they said, "Oh, let's do it this way instead of the other way," we accepted that.

Q: There was a letter though from DOE Headquarters, at least, to NRC asking NRC to speed up the program, to cut short the year's demonstration time before a second facility came on line. Can you comment on that turn of events or the reasoning maybe?

A: I think if there was a reasoning, it was that we couldn't really see any reason not to. There was no technical reason why we shouldn't, after all we had done testing for longer periods of time. Who signed that letter? Remini, perhaps...

Q: (Penry) No, Jicha.

A: Jicha signed it, yeah. So I don't think that...

Q: Okay, this is a part of the By-Products Program. We didn't have really that much cesium, so even if this had been a success, I mean this wasn't gonna be, you know, a big mission, was the driver, the fact that the By-Products Program in general was a new kid on the block, and we were trying to get some acceptance, and we felt that the cesium application was further along than others, and so we wanted to get that in the market place. The fact that you only had, you know, very limited supply, and I don't know if we anticipated that we were going to increase that supply, in the near future, to have twenty facilities using this. Why was cesium selected, in other words?

A: We had cesium capsules here at Hanford, and at the same time we were using strontium for heat sources for the thermal-electric generator.

Q: Okay, but on the cesium there had to have been more of a motivator than economics since there was a limited supply. I just wonder if it was tied to the program itself, the By-Product Program.

A: I don't think so. Here was material that was available, it was useful, I guess the driver has to be, there was a keen demand at that time for irradiation sources. AECL (Atomic Energy of Canada Ltd.) had limited, or had allocated their limited amount of Cobalt 60 to their various users. And so there was really a quite a bit of interest on the part of many users at that time, to have another source available.

Q: But then that source would only be a short term solution, too, since it was again limited.

A: Well, there was a limited amount, but there was enough to at least satisfy the needs for several years.

Q: Although in the federal register there were some references to an allocation process, which implied that they didn't think that they would be able to meet the demand.

- A: No, there were more requests than there was cesium available. That's right. Not all have taken it. So I would say if there was a driver, then the need was the driver, but that didn't have a great impact on DOE. DOE, and ourselves, and the By-Product Program, speaking for me personally, had cesium, there was a need for it, it's a good by product, it ought to be used for as a radiation source, and so we made it available. I think that was the right decision.
- Q: Okay, I'm curious in the manufacturing process, there's a step in which the inner capsule is electro-polished...
- A: Yes.
- Q: ...And there's a limitation on that electro-polishing step, only forty minutes worth, no more than forty minutes, that's all you're allowed, and we take off a very few mils of material in forty minutes. How sensitive are these capsules to a few mils of wall thickness reduction by an electro-polishing step? And if it is sensitive, then how bad is corrosion in the effect of ten, twenty, thirty mils perhaps?
- A: I don't think it's sensitive to that. And I don't have any reason to believe that that does anything more than remove a little bit of the surface. I'm a chemist, I'm not a metallurgist by experience and training, but I don't think that the electro-polishing has a big impact on it. Now we have seen in a couple or three instances, some pitting on the outside of the inner capsule, which we attribute at the present time to the electro-polishing, probably arching at the contact points. And that pitting, of course, reduces the wall thickness by a larger amount. But I don't see why electro-polishing would sensitize the material to corrosion.
- Q: Would a loss of ten mils on the thickness of the capsule put it in great jeopardy?
- A: No. See, the earlier capsules were only 95 mils thick (.095 inches) thick. And the later ones are 0.136 inches and so the loss of a few mils makes little difference.
- Q: What's the reason for the increase in thickness, do you think?
- A: I've been told that the decision was made on the availability of material, tubing. So it's a procurement reason.
- Q: What do you think of ultrasonic checking of welds and stainless steel? Do you think that's a rational technique to evaluate a good weld in stainless steel?
- A: That's really outside my area of expertise, and the people who are more knowledgeable in that area have said so, and I accept it.
- Q: (Hultgren) Other questions?
- Q: (Davis) Back to the temperature just a minute. I'm also an administrative person trying to wade through and listen, to at least halfway try to understand, but you mentioned that you didn't think that, if I heard you correctly, that taking that material out of water for a seven day period, over an extended period, you know, one time was okay, but if that was going to be done for extensive periods of time that, you felt that would be a good practice. Did I hear you say that?
- A: You did. We were talking about shipping. And in the cask these capsules are much more restricted, and there's a big air gap as a dead air gap, and so they get quite a bit hotter, so during shipping these capsules run somewhat hotter than they do in actual use. And the question was, can we permit the outer surface temperature to go above the 400°?

Q: Was that 400° outer, you were saying?

A: That was outer.

Q: Okay, thank you.

A: That was outer. And so that's where I commented that I saw no significant total corrosion if you were to let them go to 450° for a period of seven days. Now, in the irradiator, my recommendation is that outer capsule limitation be 350°C, shouldn't exceed that, and that's the 100° to 200° higher than we think they normally would operate, so we're talking about a very much higher temperature there. I would not want to see these capsules used for a long time at 450°C, but at the temperatures that we think they're operating at, which is around 150° to 175° they could operate for ninety years or more.

Q: (Jensen) Well, Garth, how do we know what temperature we think they operate? On what basis do we think they're 100° to 150° or whatever that is?

A: Okay, there's several things that give us this kind of information. The first calculations, we've done a lot of calculation, and the results of these are in some of the documentation. We've also done a lot of measurements. Fullum measured temperatures that were simulated using electrical heaters, and temperatures were measured on both inner and outer capsules. On our thermal cycling experiment, we instrumented two capsules with thirteen thermocouples; twelve on one capsule and one on the second capsule, so we could measure the temperature in a variety of positions. Measurements were made in both air and water. There are also a couple of other measurements, in the Sandia irradiator, which was a dry irradiator, and it never did go in the pool except when they put them in and took them out, they filled the area with water so they could remove the capsules. In Sandia they used surface contact thermometer measurements and those temperatures were around 100° they were lower than the temperature we projected and measured in a hot cell. In the Westerville irradiator we had the dummy capsule. In summary, there are a number of determinations of the temperatures achieved.

Q: Did you say it was 350°C outer for the irradiators is what you were recommending?

A: I recommended that the capsules outer surface not exceed that.

Q: Okay.

A: And I'm not sure whether, I finally suggested 300° to 350°, or what the license might read, the NRC license and/or Georgia state license. I recommended a temperature that seemed to be well above that needed so the temperature wasn't really of any great concern to any of them.

Q: Would it shock you if we told you that the State of Georgia took the thermal couple off the system and did not specify any temperature at all?

A: I would have assumed that, they would specify temperature limits.

Q: There were no user conditions.

A: I would have thought they would specify those user conditions. I thought that NRC would work with them closely enough to see that they did.

Q: I believe there were user conditions specified for Ohio, wasn't there?

- A: In terms of monitoring the temperature, I don't see that the capsules would be much different than those in Ohio.
- Q: If you take them out of the water, and I think I also heard you say that it only takes about an hour, but then we get up to the normal temperature that they would stay at a constant, pretty well constant temperature. You're saying if they take them out with very little air flow in the small cell room then you still think the temperature would stay well within the safe operating conditions?
- A: Yeah, unless something was there to insulate them. (Everybody talking)
- Q: You still think the temperature would, over an extended period of time, with the thermocycling that they go through, where they would stay up maybe for three or four days at a time, that there would still be a safe condition for them in their air space with very little air flow.
- A: Well, if you've got a fairly open system, you've got thermal convection. The temperature would be dependent on the ambient temperature, and so if that temperature got to be very high, the capsules would be somewhat higher.
- Q: (Davis) Well I understand that the temperature in there, what 80°, 90°, 100°?
- Q: (Jensen) 100°F.
- Q: (Jensen) There's another condition there that I'm curious, if you simulated by calculation or measurement, and that is a wall to wall touching of the capsules, intimate contact through the length of the capsule from capsule to capsule. When you're doing calculation on what that might do to the surface temperature and your centerline temperature and/or the cesium chloride metal interface, and what the outside temperature on the non-touching side maybe should be as an operating limit in that kind of a configuration. Did you do any work like that?
- A: I haven't done any calculations with that kind of geometry, I don't expect it to change significantly. Again we're a long ways away from where we think corrosion is going to be a problem, and I don't expect, with a fairly heavy walled, metal cylinder with metallic conducting properties, that there will be a major effect upon the temperature from a minor change in configuration.
- Q: What would, what have expected the temperatures to be during the shipping container transport. You said five would have...
- A: 400°C.
- Q: Okay.
- A: That's a measured temperature.
- Q: Is a what?
- A: Measured temperature.
- Q: So they did one, they measured for them in there, and it was below 400° on the outer? Okay, I didn't realize that.
- A: And Curtis will probably supply you with that kind of documentation if he hasn't already.

Q: Okay.

A: They had an administrative limit that said that they, not on every cask, I don't think, but before they made a shipment in a specific cask they would set these out on the dock in the sunlight, and they had it instrumented with thermocouple on the capsule so that they had an administrative limit of 400°.

Q: So can we guess that this probably came close to 400° or within that ballpark?

A: With five capsules they exceeded 400°. So with 4 capsules, that probably approached 400°C.

Q: Can you give me an idea of what might have been the reaction when they then lowered those capsules into the pool or flushed the cask with this capsule, whatever they did after they got the RSI with 400° capsules?

A: You'd have a single cycle if they were 400°, and lowered the cask into the pool. I don't know how rapid it would quench, but that's something that one could worry about for a single cycle. I think that the fellow who did my finite element analysis would probably say, "That one cycle at 400° would not be a real shock to them."

Q: Is he available to talk to us if we want to talk to him?

A: I think so. His name is Ray Sheppell. He's one of the authors on the thermal cycling document. He's not quite as close to this program as I am, and he may not have thought about this for a couple of years, but given a few minutes to think about the problem, he can be a good resource.

Q: Would there have been, and I asked the question this morning, but somebody told me that somebody didn't know they seem to think there was any problem with it, would the movement of the inner capsule against the outer capsule, would there have been any possibility that the constant moving around of those capsules and possibly dropping them, down inside that pool, would that have done any possible damage to the weld?

A: I guess if you get enough vibration, you might get a little erosion, a little wearing between capsules, during transport, your thinking, huh?

Q: Well, no, not so much during transport as the movement of the capsules and handling them on the inside of the pool.

A: Raising them up and down?

Q: Yeah, they raise them up and down, we're dropping them, in just the general handling, especially...

A: I would think...

Q: (Everybody talking)...fairly rough, I don't how nice and easy that thing operates up and down when it takes them in and out of the pool.

A: I don't either, but...

Q: But would there be any kind of stress damage over a period of time, let's say seven, eight thousand if it was rough?

- A: I would think, normally they just lower it into the pool, it's not a drop, unless you broke a cable or something of that sort, but normally they just lower them into the pool. I don't envision any vibration or any long term wearing, and I think we're talking about long term wearing, in that case. On the other hand, you may get more wear from vibration during transport.
- Q: Obviously it would. If you had it over a period of time.
- A: But I really don't think that's a viable or a likely concern. But you can make that judgement as easy as I can, I think it's...
- Q: Well, I don't know anything about welding to speak of. I know if you weld a tractor part and take it out into the field, since I operate a tractor, and you put a lot of stress on it over a period of time, a lot of times those welds will break, and I was thinking a long the same line. That weld is, really don't have that much of that material around the edges where that weld was made, but if you had constant stress, and if you had constant stress then over a period of time there would be some damage.
- A: These capsules are not stressed, except for the residual thermal stress.
- Q: Ed, questions?
- A: No, I was checking our time.
- Q: Mike?
- Q: How many capsules were destructively analyzed, was there a total of two from Sandia and one from Westerville or there were more, WESF capsules?
- A: There were three from Sandia and one from Westerville. In addition, a number of capsules were opened and the salt was used here at Hanford. Opened out at WESF, a large number, I've forgotten the number, but quite a large number, and the salt was used for canisters for waste management studies. We didn't examine all of those, but visually inspected many of them. In addition to that, you've got, have you scheduled a talk with Gary Bryan? Then there was the work of Gary Bryan.
- Q: No, is he somebody we ought to talk to?
- A: Bryan has tested five capsules that were held at 450°C.
- Q: Oh, yeah, okay.
- A: So you've got about nine that were destructively analyzed and metallographed. But from use in an irradiator, I think we're talking about the four, three from Sandia, one after 27 months and then the second time we actually looked at two of them. Then one capsule from the RSI Westerville, Ohio irradiator.
- Q: (Jugan) Okay.
- Q: (Jensen) How about the thermal cycling test capsules. Were they metallography?
- A: One was destructively analyzed, so that's another one that you could consider. The second one was never analyzed, it was cycled for a total of about 12,000 cycles and is still in the hot cell but no longer being thermal cycled.
- Q: Yeah, where is that by the way?

- A: Out in 324 buildings, it's in the hot cell.
- Q: Still in the hot cells and sitting in air?
- A: Yes, in air.
- Q: (Jugan) Would anybody have a convenient list of the capsules that were taken out and destructively analyzed?
- Q: (Hultgren) The numbers?
- Q: (Jugan) The numbers and the dates.
- A: I think Westinghouse put that list together, since the Atlanta incident and they can tell you the numbers.
- A: I could get you the numbers. I haven't been involved in all of these, but I think that list is available. Do you have the list of where all of the capsules are? There were, what, 1575 made, and I think they've recently put together and of course, we were asked by DOE and NRC to notify anybody that has a capsule. And so I think that that list is available now from Westinghouse.
- Q: (Jensen) We're gonna talk to Bob Gelman of Westinghouse/QA tomorrow, and we keep hoping that one of these people that we talk to will be able to give us that list, and we're hoping that he is the guy that's the keeper of what they are, what the date on each one of them is, and where they are and so on.
- Q: Did you ask Curtis that question? Or have you talked to Gene Reep?
- A: Not yet. We haven't talked to Gene, yet. I can't remember if we asked Curtis that...
- A: Ask Gene for that. And if you want me to put together a list of the capsule numbers for those seven which were destructively examined, I could do that. Seven or eight, whatever the number is.
- Q: (Jugan) Yeah, I'd appreciate it, if you could.
- A: It may not be significant to the line of question, but it's reported in the same document as the thermal cycling, and that's the high temperature test that we did. Now we used a simulated salt for this, rather than the real salt, so we could handle it without having to deal with radioactivity. But we filled the capsule as full as we could get it, heated it to 870° for ninety minutes, and under these conditions the salt swells very markedly, you've got two phase changes that both have a significant volume expansion; one is a crystal-crystal phase change and the other is the solid-liquid phase change. Under those conditions, we expect the salt to swell the capsule, and we wanted to see what the consequences were. The salt expanded the capsule to the point where it fractured the upper weld because we had more salt volume than there was room for. So, either the material had to yield or it had to break and let some of the salt out, and it did both under those conditions. As a result of this test, we recommended that some of the most heavily loaded capsules not be used in an irradiator facility. In fact, they were to be shipped to Oak Ridge and opened for use of the cesium chloride. We also recommended that if the WESF capsules are ever subjected to high temperature because of a fire or some other condition, that they not be used further but be shipped back and reencapsulated or the salt disposed of.

- Q: (Hultgren) But in the manufacturing process that's used here, how could you get that much cesium chloride into the capsule? Because it's filled at about 450° and...
- A: Filled at 700°.
- Q: (Jensen) 700°.
- Q: Okay, 750°, when it's at it's least dense state, so...?
- A: And that's, in general, the case, but we know how many grams of salt there are in every capsule. We can estimate the volume based on the specification for the tubing and so we've estimated that there's some that were overfilled. The only way you can get that, is to refill a capsule a second time. Apparently this was done sometimes. You fill a capsule, and you don't have enough to totally fill it, so you leave that one on and fill it again with the next batch. In essence, they've got some of the salt that was cooled and contracted, and so you can get more salt in the capsule. And in our tests, we filled, cooled, filled again to top it off. Therefore, we filled the capsules as full of salt as possible.
- Q: Am I remembering correct, Garth, in that study said that you might expect up to 40 percent of the capsules to fail or the inner weld to fail during a fire or test?
- A: There was the potential for stressing the capsule wall in 40% of the capsules.
- Q: Okay.
- A: There was the potential. That is a very conservative statement based on the fact that if we had the minimum volume and the weighed amount of salt, we would get some stressing of the capsule.
- Q: Basically the number of 40 percent, I was remembering correctly on it?
- A: I think that's correct.
- Q: Thank you.
- Q: (Jensen) My recollection of that cycling report, the report where we reported the cycling results and the high temperature results, was that you estimated that there were probably no more than twenty out of the 1500 and some that were in danger of having been filled too full to be in that, those some twenty or so should be pulled out of the program? Is that correct?
- A: Yeah, I think that's right. And we set a limit on the loading in the capsule (the loading in grams per  $\text{Cm}^3$ ). But the statement that he said is also in there that up to 40 percent would have some stress of the inner capsule. Would have the potential of having some stress. And remember, what that meant is that we've got to have that loading in a capsule that had less than the nominal dimensions, but the minimum dimensions allowed by the specification tolerances.
- Q: Probably also you used the spec welding condition as opposed to actual 55 percent penetration?
- A: Well, we did not do a stress analysis. We said that any capsule where the volume of the salt exceeded the volume of the capsule, would have the potential of being fractured. So it was an extremely conservative statement.
- Q: In fact, the material's got to go someplace.



- A: Yes, that material has to go someplace.
- Q: And it will effectively generate  $\epsilon$ ...
- A: But if you read my first document, I said nothing's going to happen because even if we did have that, because at that temperature, the steel would yield enough that it would stretch, so you've still got that potential. I had to eat those words after we did our high temperature test.
- Q: Do you know if those twenty very highly loaded capsules ever went to ORNL and were there numbers on those capsules?
- A: You'd be better off to ask someone who has control of the capsules that question. I've been told that they were not sent to another vendor, and I think some of them, at least, have gone to Oak Ridge, although they may not have had that many capsules yet, so some of them might still be up here in the WESF pool.
- Q: Okay.
- A: Those capsule numbers would be documented and ought to be listed among the listing that you get.
- Q: We'll track that down then. Okay.
- Q: (Jensen) I don't have any more questions.

**END OF TAPE**

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