

853

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

IN THE MATTER OF:

RELATED CORRESPONDENCE

DOCKETED  
USNRC

GEORGIA POWER COMPANY,  
et al, (Vogtle Electric  
Generating Plant Units  
1 and 2)

DOCKET NOS. 50-4240L  
85-MAY-6 A10:47  
50-4250L

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

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Deposition of WILLIAM LAWLESS, taken  
on behalf of the Applicants, pursuant to  
Notice, before Mary J. Brewster, Certified  
Court Reporter and Notary Public, at 1400  
Candler Building, Atlanta, Georgia, on the  
26th day of March, 1985, commencing at the  
hour of 10:15 a.m.

- - -

STUART S. HUSEBY & ASSOCIATES, INC.

CERTIFIED SHORTHAND COURT REPORTERS

Suite 400 One Park Place  
1900 Emory Street, N.W.  
Atlanta, Georgia 30318  
(404) 351-0300



P. O. Box 719  
Gainesville, Georgia 30503  
(404) 536-7028

8505060445 8500126  
PDR ADDCK 05000424  
T PDR

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1 APPEARANCES OF COUNSEL:

2 On behalf of the Applicant: HUGH M. DAVENPORT, Esq.  
JAMES E. JOINER, Esq.

3 On behalf of the Intervener: LAURIE FOWLER, Esq.

4 On behalf of the Deponent: GARY FLACK, Esq.

5 Also present: Tim Johnson  
6 Tom Crosby

7 - - -

8 MR. DAVENPORT: Let me state for the  
9 record this is the deposition of William Davless, taken  
10 pursuant to Notice, with the time and place agreed upon  
11 between the parties. This deposition is being taken in  
12 accordance with the Nuclear Regulatory Commission's  
13 rules of practice for domestic licensing proceedings.

14 Mr. Flack, my understanding is that as  
15 yesterday you requested you would be allowed to tape  
16 record this deposition?

17 MR. FLACK: That is correct.

18 MR. DAVENPORT: And you are I believe  
19 willing to stipulate that the transcript prepared by the  
20 court reporter is the official transcript and the tape  
21 recording will not be used to challenge the accuracy of  
22 the transcript?

23 MR. FLACK: That's correct.

24 MR. DAVENPORT: We would state for the  
25 record by allowing you to tape record this deposition we

1 are not agreeing to the taking of the deposition by  
2 nonstenographic means nor are we stipulating that the  
3 tape recording is an accurate recording of the  
4 deposition.

5 MR. FLACK: That's my understanding. Let  
6 me state for the record that we've turned the tape  
7 recorder on and presumably everything else that  
8 transpires, what the court reporter takes down would be  
9 recorded with everybody's permission in the room.

10 MR. DAVENPORT: Mr. Flack, once again  
11 would you identify yourself and indicate who you  
12 represent today.

13 MR. FLACK: My name is Gary Flack. I  
14 represent the witness, Bill Lawless.

15 MR. DAVENPORT: Do you represent either  
16 of the Intervenor's in this action?

17 MR. FLACK: No, sir.

18 WILLIAM F. LAWLESS,  
19 having been first duly sworn, was examined and  
20 testified as follows:

21 CROSS-EXAMINATION

22 BY MR. DAVENPORT:

23 Q. Mr. Lawless, is Mr. Flack your attorney?

24 A. Yes.

25 Q. Have you ever met Mr. Flack before today?

1 A. No.

2 Q. Are you paying him to represent you?

3 A. No.

4 Q. Who is paying Mr. Flack to represent you?

5 A. I don't believe he's being paid.

6 Q. Did you approach Mr. Flack about representing  
7 you?

8 MR. FLACK: I object to any  
9 communications between my client and myself on the basis  
10 of the attorney-client privilege.

11 Q. (By Mr. Davenport) Mr. Lawless, I'm not  
12 asking you to divulge the substance of any  
13 communications between you and Mr. Flack; I'm just  
14 asking whether you contacted him or he contacted you or  
15 someone else contacted you about him representing you?

16 A. It was suggested that I might want to have an  
17 attorney and a name was suggested and I readily agreed.

18 Q. Was that suggestion made by the Intervenor?

19 A. Yes.

20 Q. Would you state your full name for the  
21 record, please.

22 A. William F. Lawless, L-A-W-L-E-S-S.

23 Q. What is your current address?

24 A. Post Office Box 12172 Augusta, Georgia 30904.

25 Q. Do you have a residential address?



1 A. Yes, I do.

2 Q. What is that?

3 A. 3203 Morris Court.

4 Q. Do you have a business address?

5 A. Yes, I do.

6 Q. What is that?

7 A. Faine College, the Math Department, 1235 15th  
8 Street in Augusta 30910.

9 Q. Have you ever had your deposition taken  
10 before, Mr. Lawless?

11 A. Once.

12 Q. When was that?

13 A. I don't recall exactly. It was maybe the  
14 early 70s, and involved some business dealings.

15 Q. Business dealings in which you were involved?

16 A. Yes.

17 Q. During the course of that deposition, was  
18 there any discussion of subjects relevant to the issues  
19 raised by the admitted contentions in this proceeding?

20 A. No.

21 Q. What sort of suit was that deposition taken  
22 in relation to?

23 A. It was a real estate suit.

24 Q. Do you know what a deposition is?

25 A. I have read some material on it and I have

1       been involved in one; I have a general idea.

2           Q.       Have you talked to your attorney or to the  
3       attorney for the Interveners about the deposition?

4           A.       I talked to my attorney.

5           Q.       You know that you are responding to my  
6       questions under oath and that your responses are being  
7       transcribed --

8           A.       Yes.

9           Q.       -- by the court reporter just as if you were  
10      testifying at a hearing before the Atomic Safety and  
11      Licensing Board?

12          A.       Yes.

13          Q.       Let me explain my purpose in asking you  
14      questions today. I'm trying to get information about  
15      your background, about the subjects about which you're  
16      knowledgeable about, the basis for some of the  
17      contentions made by the Interveners in this proceeding.  
18      I'm not trying to trick or confuse you. If I ask you a  
19      question you think is confusing or you don't understand,  
20      please stop me and ask me to restate it and I will.

21      Have you done anything to prepare for this deposition?

22          A.       I have. I have reviewed a copy of documents.  
23      I reviewed rather quickly some of our interrogatories.  
24      Let's see. I received, however, copies of the  
25      information only this morning. Some of the information

1 I briefed myself on it, but it's been very quick. I  
2 have not studied it.

3 Q. You did review some of the interrogatory  
4 responses made by the parties in this proceeding?

5 A. Yes.

6 Q. Have you reviewed anything other than  
7 interrogatory responses?

8 A. I looked at a couple of documents that I have  
9 written, DES comments and also a draft document that I  
10 have written.

11 Q. Is that the draft document entitled 'Savannah  
12 River Plant Offsite Radioactive Releases'?

13 A. Yes, that's correct.

14 Q. Anything else other than those documents that  
15 you have mentioned already?

16 A. No, I have not.

17 Q. Are you married, Mr. Lawless?

18 MR. FLACK: I object to that question on  
19 the grounds that it's irrelevant to this proceeding.

20 MR. DAVENPORT: Are you --

21 MR. FLACK: I instruct the witness not to  
22 answer.

23 MR. DAVENPORT: Can we take your  
24 instruction to the witness not to answer as a refusal to  
25 answer on his part?

1           MR. FLACK: Why don't you ask him if he's  
2 going to follow my instructions.

3           MR. DAVENPORT: Are you refusing to  
4 answer my question, Mr. Lawless?

5           THE WITNESS: I'll follow the  
6 instructions of my attorney.

7           MR. DAVENPORT: Whenever you make that  
8 statement can we take that as a refusal not to answer on  
9 your part to speed things up?

10          MR. FLACK: Are you going to follow my  
11 instructions?

12          THE WITNESS: Yes, I'll follow his  
13 instructions.

14          MR. DAVENPORT: That way I won't have to  
15 continually ask you if you refuse to answer.

16                I assume your instruction would be -- your  
17 objection would be the same about questions about Mr.  
18 Mr. Lawless having been divorced or separated?

19          MR. FLACK: That's correct.

20          Q.       (By Mr. Davenport) Mr. Lawless, would you  
21 describe for me your education since high school?

22          A.       I went to Auburn University for about six  
23 months, dropped out of Auburn University and went back  
24 to school at Louisiana State University in 1977,  
25 completed a Bachelor's in Mechanical Engineering and a

1 Masters in Mechanical Engineering, completed the  
2 Bachelors in 1970 and the Masters in 1977.

3 I have taken advance courses working up  
4 towards a Ph.D. in Physics from the University of South  
5 Carolina, and I have also taken advance courses in  
6 psychology from Augusta College in Augusta, Georgia,  
7 mostly statistical analysis, those sorts of things.

8 I also have had technical training in the  
9 Marine Corps, went to a flight school, became a pilot.  
10 I have been to a fair number of technical schools in the  
11 military. I don't know how much detail did you want on  
12 that, but that's a quick overview of it.

13 Q. When did you first arrive at Auburn?

14 A. 1960, in the fall of 1960.

15 Q. You left approximately six months thereafter?

16 A. About, yes.

17 Q. Were you passing at the time you left?

18 A. Barely.

19 Q. You indicated that you arrived at LSU was it  
20 in 1967?

21 A. 1966 -- I'm not quite certain. It's either  
22 '66 -- I think it was '66, the fall of 1966.

23 Q. Did you attend LSU continually between 1970  
24 and 1977 when you received a Masters degree?

25 A. No. I stayed at LSU from 1966 through 1971,

1 and left in '71 and returned in '77 to complete my  
2 Masters degree.

3 Q. Both of your degrees from LSU are in  
4 mechanical engineering?

5 A. Yes, that's correct.

6 Q. How many hours of courses have you taken at  
7 the University of South Carolina toward a Ph.D. in  
8 Physics?

9 A. Ten.

10 Q. How many hours are required for a Ph.D. in  
11 Physics?

12 A. 33.

13 Q. How long would it take you going full-time to  
14 complete the hours requirement?

15 A. I think that's fairly hard to assess.  
16 Probably a year and a half to two and a half years.

17 Q. Have you in the last year made any effort to  
18 obtain additional hours at the University of South  
19 Carolina towards a Ph.D.?

20 A. Not in physics. I have taken additional  
21 courses in statistics at Augusta College and other  
22 courses. I have got personal reasons that have kept me  
23 in the Augusta area and I have not been able to leave to  
24 complete work on a Ph.D.

25 Q. The courses at Augusta College, are those

1 courses part of a degree program?

2 A. They could be. I'm not part of a degree  
3 program, however.

4 Q. You're not currently enrolled in the degree  
5 program?

6 A. That's correct.

7 Q. Are they graduate level courses?

8 A. Yes, that's correct.

9 Q. Does Augusta College offer a graduate degree  
10 in statistics or would it be a degree in psychology?

11 A. Psychology. I'm sure that they have one in  
12 statistics, but I'm not certain.

13 Q. Within the general area of mechanical  
14 engineering, did your studies focus on any particular  
15 smaller area under that large area?

16 A. I probably could have minored in metallurgy.  
17 I have a fair strength in mathematics also. And then  
18 extensive background in aeronautical background and heat  
19 transfer.

20 Q. I'm sorry, I missed the last one.

21 A. Heat transfer, and a fair practice training  
22 in nuclear engineering and waste management.

23 Q. And the training that you've had in nuclear  
24 energy and waste management occurred during the period  
25 you were employed at the Savannah River Plant?

1           A.     I think engineering, it was mechanical  
2 engineering, that's part of the mechanical engineering  
3 field, or at least it was when I went to school.

4           Q.     So you did take some courses in nuclear  
5 engineering at LSU?

6           A.     Not specifically, but the heat transfer  
7 courses and metallurgical courses also touched on the  
8 subject. Most of the nuclear engineering training that  
9 I've picked up, however, has been since I've been at the  
10 Savannah River Plant.

11          Q.     For your Masters degree did you have to write  
12 a dissertation?

13          A.     No; a thesis.

14          Q.     What was the subject of your thesis?

15          A.     Solar dehumidification.

16          Q.     Solar dehumidification?

17          Q.     Can you explain very briefly what that means?

18          A.     Comparing mechanical engineering systems for  
19 air conditioning. One of the things that you can use  
20 solar heat is to help dehumidify an environment and  
21 thereby cool it. So as a means to look at the  
22 possibility of air conditioning with dehumidification.

23          Q.     What were you doing in the period between  
24 1971 and 1977 when you were out of school?

25          A.     I was in business for myself.



1 Q. What sort of business?

2 A. Insurance, real estate investments. Those  
3 sorts of things.

4 Q. Mr. Lawless, you have indicated that you  
5 served in the military?

6 A. Yes, that's correct.

7 Q. In the Marines?

8 A. That's correct.

9 Q. How long were you in the service?

10 A. I was in the military active duty for five  
11 and a half years. I was in the Reserves also.

12 Q. What did you do in the military?

13 A. I was a pilot.

14 Q. The you indicated that you received various  
15 types of technical training in the military?

16 A. That's correct.

17 Q. Can you tell me what subjects you received  
18 technical training on?

19 A. Well, flight school, electronics.

20 Q. Any subjects that related to nuclear  
21 engineering?

22 A. None per say; nuclear weapons, yes.

23 Q. What was your rank at discharge?

24 A. Lieutenant Colonel.

25 Q. Had you ever had a higher rank while you were

1 in the military?

2 A. No.

3 Q. Did you receive an honorable discharge?

4 A. Yes.

5 Q. Have you ever been charged with a crime, Mr.  
6 Lawless, other than minor traffic offenses?

7 A. No.

8 Q. By whom are you currently employed?

9 A. Paine College.

10 Q. What position do you hold with Paine College?

11 A. Assistant professor of mathematics.

12 Q. Have you ever held any other position with  
13 Paine College?

14 A. Yes. I was director of institutional  
15 research for one year.

16 Q. Institutional research, that simply mean  
17 research about Paine College?

18 A. Yes, and all the ins and outs of reports for  
19 the institution, statistical studies that were needed by  
20 a particular professor, helping someone out in a  
21 particular research venture, that sort of stuff.

22 Q. Were you actually involved in research on  
23 scientific issues?

24 RE. FLACK: You mean during that period  
25 of time as director of institutional research?

1 MR. DAVENPORT: Yes.

2 THE WITNESS: As the director of  
3 institutional research, I assisted a couple of other  
4 professors in their research in sociology and I was  
5 involved in nuclear waste research on my own.

6 Q. (By Mr. Davenport) Why do you no longer hold  
7 the position of director of the institutional research?

8 A. I did not enjoy the job.

9 Q. Someone else now holds that position at Paine  
10 College?

11 A. They're not trying to hire someone.

12 Q. How long have you been an assistant professor  
13 of mathematics at Paine College?

14 A. This is completing the second year.

15 Q. What are your duties in that position?

16 A. To teach.

17 Q. What courses do you teach?

18 A. I teach calculus, pre-calculus, algebra,  
19 trigonometry. I will be teaching advanced calculus and  
20 other courses.

21 Q. Are you teaching physics or any nuclear  
22 related courses?

23 A. Yes, I am teaching physics as well. I'm  
24 teaching a calculus based physics course.

25 Q. Do you have tenure?

1 A. No.

2 Q. Who did you report to in your position as  
3 assistant professor of mathematics?

4 MR. FLACK: I object to that question on  
5 the basis of relevancy and I instruct the witness not to  
6 answer.

7 Q. (By Mr. Davenport) Do you supervise anyone  
8 in your position as assistant professor of mathematics?

9 A. No.

10 MR. FLACK: Excuse me. I make the same  
11 objection and the same instruction.

12 Q. (By Mr. Davenport) Is Faine College a public  
13 or private school?

14 A. It's a private school.

15 Q. What is its enrollment?

16 A. I'm not certain any more. It was in the 750  
17 to 800 range.

18 Q. It was approximately a year ago when you knew  
19 it to be in that range?

20 A. (Witness nods head affirmatively.)

21 MR. FLACK: The witness was nodding his  
22 head affirmatively. You need to answer for the court  
23 reporter.

24 Q. (By Mr. Davenport) By whom were you employed  
25 prior to becoming employed by Faine College?

1 Q. Savannah River Facility, by the Department of  
2 Energy.

3 Q. You indicated that since you left your  
4 employment with the Department of Energy that you have  
5 been engaged in nuclear waste research?

6 A. That's correct.

7 Q. Can you describe that research for me?

8 A. I have been studying the various environments  
9 that radionuclides are released into, the air, ground  
10 and groundwater and surface.

11 Q. When you say you're studying, what  
12 specifically are you doing?

13 A. I am looking at the releases that are being  
14 released at the Savannah River Facility and trying to  
15 integrate all the information and make it  
16 understandable. I am also asking questions in areas  
17 that don't make sense and trying to make studies and  
18 comparisons of the data that is available.

19 Q. Have you published anything on that subject  
20 as of yet?

21 A. Yes, I have.

22 Q. What? Can you give me the titles?

23 A. Not offhand. I've -- Let's see. I've got  
24 two letters that are published, probably five articles  
25 that have been completed and others, various other

1 articles and papers that are in varying stages of being  
2 completed.

3 Q. The two letters that you indicated have been  
4 published, where were they published?

5 A. Published by the Bulletin and one is to be  
6 published by Science 25.

7 Q. What is the Bulletin?

8 A. A bulletin of the atomic scientists.

9 Q. What did that letter concern?

10 MR. FLACK: Hugh, wouldn't the letter  
11 itself be the best evidence of that?

12 MR. DAVENPORT: I'm asking him what he  
13 recalls about it.

14 THE WITNESS: It was on high level wastes  
15 being disposed in the environment and it was a  
16 commentary on another article -- I do not remember the  
17 author's name -- written by a geologist, and I'm trying  
18 to point out some of the things that the person was not  
19 aware of.

20 Q. (By Mr. Davenport) Did it deal with any  
21 specific facility?

22 A. It dealt with the Savannah River Plant and  
23 also it tried to make a generic statement.

24 Q. Did it concern high level waste from defense  
25 facilities or from commercial nuclear plants?

1 A. Defense primarily.

2 Q. When you say primarily, did it discuss at all  
3 high level waste from commercial plants?

4 A. There are a lot of similarities; there are a  
5 lot of dissimilarities and where it applies you can  
6 generalize the information.

7 Q. Do you recall the approximate time frame that  
8 that letter appeared in the Bulletin?

9 A. It was approximately September of last year.

10 Q. The letter in Science 85, what did that  
11 concern?

12 A. That concerned an article that was written in  
13 March on the Savannah River Facility, and the article  
14 was on the ecological studies that the Savannah River  
15 Ecology Laboratory has performed. And the title of the  
16 article was Radiation in Paradise. And I took exception  
17 to many of the comments made and I discussed groundwater  
18 contamination, contaminated animals and the contaminated  
19 environment and other things, the contamination of the  
20 aquifer and such other things.

21 Q. What aquifer are you referring to?

22 A. Tuscaloosa Aquifer.

23 Q. Mr. Lawless, you indicated that five articles  
24 have been completed by you?

25 A. Yes.

1 Q. Have any of those five articles been  
2 published?

3 A. Two of the articles were while I was working  
4 at the Savannah River Plant; one was the Appraisal of  
5 the Burial Ground Savannah River Plant and another was  
6 an Appraisal of the Burial Ground -- was never  
7 finalized; it has stayed in draft. The tank form  
8 appraisal was completed and has been finalized and was  
9 finalized while I was there. I have completed a report  
10 for Congressman Dingle. Another one of the reports is  
11 the DES Comments --

12 RE. FLACK: Just for the record, those  
13 were identified earlier here this morning.

14 THE WITNESS: Yes, right, that's correct.  
15 And I can't recall the fifth one at this time.

16 Q. (By Mr. Davenport) Would the fifth article  
17 be your draft article on the appraisal --

18 A. No. That one has not been completed yet.

19 Q. I didn't mean to interrupt you.

20 A. In addition there have been testimonies that  
21 I've given as part of the technical work that I've  
22 completed.

23 Q. The report for Congressman Dingle, what did  
24 it concern?

25 A. It was a result of a series of complaints



1 that I filed with the Inspector General in 1983.  
2 Savannah River Plant has put together a series of  
3 responses and part of those responses dealt with some 32  
4 or 33 environmental issues or concerns that I had  
5 raised. And this is termed a technical report. And I  
6 was asked by one of the staff of Congressman Dingle's to  
7 respond to that technical report and I did and that  
8 formed the basis of this report to him.

9 Q. So your report basically responded to the  
10 findings by the technical report?

11 A. Yes, that's correct. And that technical  
12 report is just one of a number of other reports that the  
13 Savannah River Plant did in response to the complaints  
14 that I had filed.

15 Q. Then you mentioned the comments on the draft  
16 environmental statement. That was the draft  
17 environmental statement for Plant Vogtle?

18 A. Yes, that's correct.

19 Q. Have you submitted any comments with respect  
20 to the L-Reactor?

21 A. Yes, that was part -- that was one of the  
22 testimonies that I gave. That was in November of 1983.  
23 I've not included that one as a technical document, but  
24 there was a position paper that I wrote and that was  
25 included in the record.

1           The other technical report was on the health  
2 effects at the Savannah River Plant. There was a public  
3 comment period that ended in January of this year.  
4 There was a reviewing, a panel study of the possible  
5 health consequences of operating the Savannah River  
6 Plant over the past 30 years, and I made a technical  
7 response to the panel's findings and supporting  
8 literature that was a part of this public review period.

9           Q.     Your background and training is not in the  
10 area of the health effects of radiation, is it?

11          A.     As an engineer and as part of my  
12 responsibility it was important to know what effects we  
13 were causing in the environment and only insofar as what  
14 we had to do to make or improve to make those effects go  
15 away or to improve upon the operations. I'm not a  
16 health physicist.

17          Q.     When you say health effect on the  
18 environment, are you talking about just dose rates that  
19 can be measured as opposed to the effect on man or  
20 animals with those dose rates?

21          A.     For instance, if turtles are found on the  
22 plant and off the plant contaminated with gross amounts  
23 of strontium-90, and the turtles can be taken as a bell  
24 weather, a measurement of what humans themselves could  
25 pick up, then one of the things you want to do is take

1 measures to prevent those turtles from being  
2 contaminated or to use that information as a way of  
3 confronting seepage basins, or whatever is causing the  
4 contamination.

5 Q. Again, your expertise is not in the area of  
6 determining the effect on the turtles; it's on the  
7 effect of radiation on man?

8 A. The health effects of the turtle, no.

9 Q. So the fifth article that you have referred  
10 to previously was this article about health effects of  
11 the SRP or comments that you made to the panel study?

12 A. That is right, the title of the report was  
13 The Savannah River Plant -- may not be quite accurate  
14 what the title -- as I recall it, was The Savannah River  
15 Plant Radioactive and Hazardous.

16 Q. With the exception of the comments on the  
17 draft environmental statement for the Plant Vogtle, did  
18 any of these articles refer to or deal in any way with  
19 Plant Vogtle?

20 A. It is possible. I don't particularly  
21 remember, including or excluding Vogtle. It's part of  
22 the territory. It's part of the area where  
23 radionuclides will fall down, settle out from airborne  
24 releases where other forms of contamination might reach,  
25 so I did not -- I don't remember singling out the Vogtle

1 facility. But I talked about many sites that surrounded  
2 the Vogtle facility.

3 Q. Any discussion of the Vogtle facility in  
4 these papers other than the comments on the Draft  
5 environmental statement would have been in the context  
6 of discussing the amount of radiation at the plant site  
7 from the Savannah River Plant; is that accurate?

8 A. That's somewhat accurate. I would have used  
9 the Vogtle facility as part of the environment that is  
10 impacted by the Savannah River Plant.

11 Q. But in these articles you did not study in  
12 any way or comment on releases from Plant Vogtle itself?

13 A. That is correct.

14 Q. You indicated that you had given testimony on  
15 different occasions as part of your technical work, and  
16 on one occasion was the testimony on the L-Reactor in  
17 November 1983, in which you indicated you had wrote a  
18 position paper; is that correct?

19 A. That is correct.

20 Q. Did you actually testify live before some  
21 agency?

22 A. That is correct.

23 Q. What agency did you testify before?

24 A. The Department of Energy. It was at the  
25 Draft L-Reactor environmental impact statement hearing.

1 Q. What was the subject matter of your  
2 testimony?

3 A. It dealt with the draft environmental impact  
4 statement, the levels of groundwater contamination from  
5 various sources. It also dealt with corrosion pitting  
6 on the high level waste tanks. It dealt with  
7 predictions made by the Savannah River Plant and how  
8 those predictions had failed to come to pass. That's  
9 kind of a quick overview.

10 Q. What predictions by the Savannah River Plant  
11 did you testify about?

12 MR. FLACK: Hugh, again, I have no  
13 objection to you're asking these questions, but it would  
14 seem like the documents themselves would be the best  
15 evidence of this.

16 Q. (By Mr. Davenport) Was your testimony  
17 transcribed, Mr. Lawless?

18 A. Yes, it was.

19 Q. Can you tell me which predictions you  
20 testified about?

21 A. Offhand, I cannot. But it would have dealt  
22 with whether or not the Tuscaloosa aquifer could have  
23 been contaminated or not. It may have dealt with  
24 groundwater travel time. I don't recall exactly.

25 Q. On what other occasions have you given

1 testimony as part of your technical work?

2 A. On the health effects paper I gave public  
3 testimony in December '83 -- '84.

4 Q. Who did you testify before?

5 A. Before the CDC panel.

6 Q. Is that the Center for Disease Control?

7 A. Yes. In Akin, South Carolina. And DOE  
8 individuals at the same time.

9 Q. What was the basic subject matter of that  
10 testimony?

11 A. It dealt with -- well, again, I would like to  
12 fall back on what my attorney just said. I can't recall  
13 everything. It dealt with a lot of predictions that  
14 were made by the Savannah River Plant and how many of  
15 them -- in fact, all of the predictions I dealt with had  
16 failed to come to pass. It dealt with groundwater  
17 contamination; just dealt with a lot of subjects.

18 Q. Was that testimony transcribed?

19 A. Yes, it was.

20 Q. Have you testified on any other occasions?

21 A. I was in court in January of '84, and  
22 testified as an expert witness on various thing at the  
23 Savannah River Plant, ground contamination, airborne  
24 releases, discrepancies between internal and external  
25 reports, pilot waste tank, tank corrosion.

1 Q. Did you also testify about --

2 A. And so forth.

3 Q. -- the predictions that you previously  
4 mentioned? --

5 A. Yes, I testified about that.

6 Q. What did that proceeding concern?

7 A. It dealt with -- I'm not sure that I can say.  
8 I dealt with individuals that had --

9 Q. Was it a criminal proceeding?

10 A. I don't really remember the nature of the  
11 charges that were filed against certain individuals, but  
12 it had to do with traffic, let's say demonstrators  
13 against the Savannah River Plant, something like that.

14 Q. Were you actually admitted by the Court as an  
15 expert witness or did the Court simply just present your  
16 testimony?

17 MR. PLACK: I object to the extent it  
18 calls for a legal conclusion on the part of the witness.

19 Q. (By Mr. Davenport) To the best of your  
20 recollection, Mr. Lawless, do you remember whether the  
21 Court admitted you as an expert witness or not?

22 A. I remember there was a lot of discussion over  
23 it, and I'm not really certain how it was resolved. But  
24 the way I remember it was that the Judge said that if my  
25 testimony could be taken as an expert witness, depending

1 upon the interpretations of the people that were  
2 listening to the information.

3 Q. So basically left it up to the jury?

4 A. I don't know.

5 Q. How long were you employed by the Department  
6 of Energy?

7 A. Six years.

8 Q. Let me go back for a minute. You mentioned  
9 that you have several articles in a draft stage at this  
10 point?

11 A. Yes.

12 Q. Can you describe those articles for me?

13 A. The offsite releases article that you got  
14 there. I'm working on a draft article for the Bulletin  
15 on radioactive waste management within the Department of  
16 Energy. I'm working on a draft article for Nature along  
17 the same thing.

18 It will be from two different perspectives.  
19 The Bulletin will probably concentrate on groundwater  
20 contamination. Nature will probably concentrate on a  
21 high level waste tank and soil contamination,  
22 radionuclide hazardous soil contamination.

23 I'm working on another article for  
24 Congressman Dingle's committee which will respond to an  
25 IC report that was written last year, the charges that I



1 had made the previous summer.

2 Q. I'm sorry, I didn't understand what the  
3 report was made by?

4 A. The Department of Energy, Inspector General,  
5 I'm sorry. I'll write an article on contaminated  
6 turtles at the Savannah River Plant and that will just  
7 be submitted to various journals. And there are  
8 probably about four or five other articles that are just  
9 getting started, groundwater contamination, one on  
10 strontium-90, contamination in the milk around the  
11 facility. And I can't recall the others offhand. Does  
12 that suffice?

13 Q. Yes. All of these articles basically relate  
14 to the operation of the Savannah River Plant?

15 A. At this time, yes. The offsite releases  
16 document however does not. It will relate to both  
17 Vogtle and the Savannah River Plant.

18 Q. Do any of these, either these drafts or the  
19 articles that you have published, reflect original data  
20 that you yourself derived or do they simply analyze data  
21 gathered at the Savannah River Plant by other people?

22 A. I'm not doing any experimental work myself,  
23 but I am analyzing the data that is being provided by  
24 others and I'm requesting that data be generated and  
25 that is being done.

1 Q. You yourself are not generating any data?

2 A. No.

3 Q. You indicated that the article about offsite  
4 releases would discuss Plant Vogtle. Will it discuss  
5 releases at Plant Vogtle?

6 MR. FLACK: I don't believe the article  
7 has been written yet.

8 MR. DAVENPORT: Why don't you let your  
9 witness answer.

10 MR. FLACK: Make it clear what it is  
11 we're talking about.

12 THE WITNESS: It's a draft document and I  
13 have not finished it, probably will be substantially  
14 changed before I complete it.

15 Q. (By Mr. Davenport) In its current stage,  
16 does it discuss releases from Plant Vogtle?

17 A. Yes.

18 Q. What sort of discussion does it have about  
19 releases from Plant Vogtle?

20 A. It gives quotes that the Savannah River  
21 L-Reactor LAIRD made or concluded about releases from  
22 the Plant Vogtle.

23 Q. It simply quotes material that appeared in  
24 the environmental impact statement for the L-Reactor  
25 indicating the nature of the releases from Plant Vogtle?

1           A.     It gave a summary of the release doses. It  
2     did not go into the character of the releases.

3           Q.     What positions did you hold with Department  
4     of Energy?

5           A.     Quite a few different positions. The last  
6     one was as a senior project engineer in nuclear waste  
7     management.

8           Q.     What position did you hold prior to becoming  
9     senior project engineer?

10          A.     I was responsible for -- it's a very  
11     difficult question to answer because there were quite a  
12     few different positions. I guess my overall position  
13     was as a project engineer the entire six years that I  
14     was at the Savannah River Facility, which entailed  
15     different responsibilities at different times. Maybe  
16     that's the best way to answer your question.

17          Q.     Did your job title change during that  
18     six-year period?

19          A.     Yes, it did. I don't recall all of the  
20     titles, but the general title was as a project engineer.  
21     Most of the work was as a project engineer. It may  
22     amplify or help you by explaining some of the various  
23     jobs that I did hold.

24          Q.     I'll ask you that in just a minute. Did you  
25     ever hold a position called senior research engineer?

1           A.     I was a senior project engineer. As part of  
2     that I oversaw the research in low level waste, low  
3     level radioactive waste -- excuse me -- airborne  
4     radioactive waste, high level radioactive waste,  
5     transuranic waste and other positions.

6           Q.     What were your duties at the time you left  
7     the Savannah River Plant? Immediately prior to your  
8     leaving, what were your duties?

9           A.     Those were my duties as senior project  
10    engineer. You want the specific responsibilities that I  
11    had?

12          Q.     Yes. Why don't you give those to me.

13          A.     Well, in the last six months before I left I  
14    had experienced a major change. And at the time that I  
15    left, I was responsible for overseeing the construction  
16    in radioactive waste management. I was no longer  
17    responsible for the longterm research work. But since  
18    no one else understood it, I was often called in to work  
19    on special problems.

20          Q.     What again were the areas that you had been  
21    involved in longterm research about?

22          A.     High level waste, that's radioactive high  
23    level waste, low level waste, transuranic, which is  
24    radioactive, and airborne radioactive waste. In  
25    addition, our hazardous waste which at that time was not

1 an official category to be concerned about within the  
2 Department of Energy; it's more of a de facto.

3 Q. Hazardous waste refers to nonradioactive  
4 waste?

5 A. That's correct.

6 Q. During the last six months did you have any  
7 duties other than overseeing construction in the  
8 radioactive waste management program?

9 A. Yes, I did. But I can't really remember  
10 them. During the last six months that I was with the  
11 government I did less and less work. Most of the duties  
12 that I had were removed from me and I had -- during the  
13 last three or four months, for instance, the  
14 construction work was fairly well removed from me also.

15 Q. Prior to this change that occurred six months  
16 before you left -- let me ask you first when did you  
17 leave?

18 A. I left in August of 1983.

19 Q. Prior to the winter of 1983, what were your  
20 duties?

21 Q. In other words, prior to this change that  
22 occurred?

23 MR. FLACK: Just so we're clear, say in  
24 December of '82?

25 MR. DAVENPORT: That would be fine.

1 THE WITNESS: I was a senior project  
2 engineer in nuclear waste management responsible for all  
3 of the longterm research.

4 Q. (By Mr. Davenport) Which you just described?

5 A. Right. Also responsible for auditing the  
6 Savannah River Plant, low level waste burial ground and  
7 the high level waste tank farm. Also responsible for --  
8 Let's see, how can I describe it. I was one of the task  
9 force members for the Emory seepage basin contamination  
10 studies that was ongoing at that time. And at varying  
11 times I either had responsibility for the low level  
12 waste burial ground or the high level waste tank farm.  
13 I was also responsible for technical reporting at  
14 various times. I think they were a couple of other  
15 duties, but I don't recall at this time.

16 Q. Your position as senior project engineer,  
17 that is not a management level position?

18 A. No, it's not.

19 Q. At the Savannah River Plant?

20 A. No, it is not. I was at the top of the  
21 technical ladder.

22 Q. When you indicated that you were responsible  
23 for longterm research, you yourself did not actually  
24 direct or were not engaged in any research, were you?

25 A. I wasn't engaged in it, but I directed it.

1 Q. Wasn't there research being performed by  
2 DuPont?

3 A. That is correct.

4 Q. You did not actually direct the DuPont  
5 research as to what they could research and what they  
6 couldn't?

7 A. Yes, I did at times or disagreed with what  
8 they were going to research or not.

9 Q. Did you simply review the action of DuPont  
10 and make comments to your supervisor about the  
11 appropriateness of the research?

12 A. That's correct. Also pass on directions to  
13 my superiors on what they should or should not research.  
14 In my position it was important for me to be able to  
15 decide what research should be done, to advise my  
16 superiors on that, to help formulate a decision and to  
17 pass that decision back to the contractor.

18 Q. But you yourself were not the one that made  
19 that decision, that was made by your superiors based  
20 sometimes on your advice and I assume other times not on  
21 your advice; is that correct?

22 A. That's correct.

23 Q. What specific areas in terms of geographic  
24 areas at the Savannah River Plant that you were involved  
25 at?

1 A. Anything that dealt with radioactive waste.

2 Q. Did you have a security clearance while you  
3 were at the Savannah River Plant?

4 A. Yes, I did.

5 Q. Who did you report to on the Savannah River  
6 Plant?

7 MR. FLACK: I object on the basis that I  
8 did earlier and make the same instruction. I guess  
9 earlier we were talking about his current position.

10 MR. DAVENPORT: You're objecting to  
11 questions that I ask about his relationship with his  
12 superiors at the Savannah River Plant which apparently  
13 is the basis for his claim of expertise in this  
14 proceeding?

15 MR. FLACK: While I don't agree with your  
16 characterization, I withdraw the objection.

17 Q. (By Mr. Davenport) Who did you report to at  
18 the Savannah River Plant?

19 A. Directly, Harold Sosher.

20 Q. What was his position?

21 A. He was the branch chief, and I don't remember  
22 the title, but it was in radioactive wastes management  
23 branch.

24 Q. Was he actually the one responsible for  
25 managing the radioactive waste program?



1           A.     No more than I.

2           Q.     Who actually had the responsibility for  
3 directing the operation of the radioactive waste  
4 program?

5           A.     Well, essentially I did. What I would do, I  
6 would try to focus the decisions that needed to be made,  
7 come to the conclusions that needed to be drawn and get  
8 approval from my management and then go out and try to  
9 effect those decisions.

10           As you pointed out, you were not always  
11 successful in getting the decisions that you wanted  
12 effected or accepted by your own management.

13           Q.     You left the Savannah River, your employment --  
14 Let me start over. You left your employment with the  
15 Department of Energy voluntarily, did you not?

16           A.     That's correct.

17           Q.     Why did you leave?

18           MR. FLACK: Excuse me for one moment. I  
19 would like to confer with my client.

20           MR. DAVENPORT: Let the record reflect  
21 that they are conferring.

22           Q.     (Ey Mr. Davenport) Mr. Lawless, I believe  
23 the question was why you left your employment with the  
24 Department of Energy?

25           A.     There were quite a few reasons centering on

1 the particular problem I had filed complaints with the  
2 Inspector General, the Department of Energy, for  
3 generally -- starting in I believe it was May, sometime  
4 in May, and I filed a series of five complaints. I  
5 believe four of them were completed before I left and  
6 the fifth one was completed after I left, although the  
7 Inspector General knew of all five complaints before I  
8 had left.

9 Because I had no work to do with the  
10 government and I did not enjoy the environment anymore,  
11 it was very stressful, because I felt that I could stay  
12 on the one hand with the government and work through  
13 whatever I needed to but because I wanted to remain in  
14 the Augusta area because of personal reasons, I felt it  
15 was best to leave if I could find employment in the  
16 Augusta area.

17 If I could not find employment in the Augusta  
18 area, I would have stayed with the government and more  
19 than likely have been shipped to some other location.

20 Q. These five complaints that you mentioned,  
21 they were all filed after this change in your  
22 responsibilities occurred?

23 A. That's correct.

24 Q. One of these complaints related to  
25 construction activities, did it not?

1 A. That's correct.

2 Q. One of them related to the -- what was at  
3 that time a new draft Department of Energy regulation  
4 concerning waste management?

5 A. That's correct.

6 Q. Another related to the transport of PU 232  
7 waste to the WIF facility?

8 A. W-I-P-P facility.

9 Q. W-I-P-P?

10 A. That's correct.

11 Q. One related to the burial ground appraisal  
12 report that you prepared?

13 A. That's correct.

14 Q. I guess that complaint related to the fact  
15 that that report was held up and not released as a final  
16 report?

17 A. That's correct.

18 Q. The final concern related to the corrosion  
19 pitting problem?

20 A. That's correct.

21 Q. On the burial of the liquid -- excuse me,  
22 high level waste tanks?

23 A. High level radioactive waste tanks, yes.

24 Q. Who did you work for prior to coming to work  
25 for the Department of Energy, Savannah River Plant?

1 A. The State of Louisiana.

2 Q. What was your position with the State of  
3 Louisiana?

4 A. I was a project engineer there also. I don't  
5 know the title, but I was a project engineer.

6 Q. What period of time were you employed by the  
7 State of Louisiana?

8 A. I believe March of '76 to August of '77.

9 Q. So this would have been while you were  
10 obtaining your Masters degree?

11 A. I went back to work for the State of -- I  
12 went to work for the State of Louisiana and then went  
13 back to complete my Masters degree. I went back in the  
14 spring of '77 to complete my Masters degree.

15 Q. But you continued to work for the state  
16 through August of 1977?

17 A. Yes, that's correct.

18 Q. What were your duties or what sort of  
19 activities were you engaged in as a project engineer for  
20 the State of Louisiana?

21 A. I worked in the industrial energy  
22 conservation and in solar engineering. I had other  
23 positions with them or other duties, but these were the  
24 last ones when I left.

25 Q. Before when we discussed your duties at the

1 Savannah River Plant, did we cover all of the duties  
2 that you were involved with from the time you arrived at  
3 the river plant up to the time you left or was there  
4 some period that we still need to talk about?

5 A. There -- well, we've talked about all the  
6 positions, that is to say, as project engineer, but  
7 we've not talked about all of the duties. I had worked  
8 in the field site project office for about a year and a  
9 half at the Savannah River Facility looking at various  
10 means of closing the back end of the nuclear fuel site.

11 I've had various special projects that I've  
12 worked on. One, for instance, looked at the restart of  
13 allied general nuclear services. It had been started up  
14 by the Department of Energy and operated by DuPont.  
15 There were quite a few different special projects. I  
16 looked at the spent fuel project for three or four  
17 months, and so forth and on.

18 I guess the thread through all of the work  
19 that I have done has usually been in either research or  
20 in environmental research or both, even when I was with  
21 the fuel cycle project office. For instance, one of the  
22 areas that I worked in there was in airborne radioactive  
23 releases. And I had started a particular project,  
24 directed DuPont to begin monitoring the krypton-86  
25 releases. One of the first things I found out when I

1 was at the Savannah River Plant in 1977, early '78 was  
2 that the krypton-86 gases were not being monitored; they  
3 were simply calculated and estimated.

4 So we began a project in '78 of obtaining  
5 on-line monitors to install in the F & H canyon stacks  
6 to monitor those gases. Statement that we began working  
7 on, a research project with the Air Force and NOA,  
8 that's Natural Oceanic and Atmospheric Administration. So we  
9 had begun a research there that actually continued all  
10 the way through until the time I left.

11 Q. That research was basically related to  
12 documenting the --

13 A. Airborne releases.

14 Q. Airborne releases and essentially comparing  
15 those to model predictions?

16 A. That's correct.

17 Q. Which of your activities at the Savannah  
18 River Plant concerned groundwater contamination?

19 A. Most of my activities. The low level  
20 radioactive burial ground impacted the groundwater and  
21 so does the high level waste tank fuel, so do airborne  
22 releases, so do the transuranic wastes.

23 Q. What are transuranic wastes?

24 A. It's kind of hard to say. It depends on your  
25 interpretation of the regulations. Basically they are

1 transuranics above uranium, but also included is uranium  
2 226 and excluded are some radionuclides above uranium,  
3 plutonium 238, plutonium 239, basically plutonium and so  
4 forth.

5 Q. Mr. Lawless, what is your relationship with  
6 Campaign for a Prosperous Georgia?

7 A. I know them.

8 Q. Are you a member?

9 A. No.

10 Q. Are you employed in any way by them?

11 A. No.

12 Q. Are you an officer of it?

13 A. No.

14 Q. Are you on the board of directors?

15 A. No, I am not.

16 Q. Do you have any relationship with Georgians  
17 Against Nuclear Energy?

18 A. I know them.

19 Q. Are you a member or employee or officer or on  
20 the board of directors of that organization?

21 A. No, I am not.

22 Q. Do you have any relationship with Educational  
23 Campaign for a Prosperous Georgia?

24 A. No, I do not. I don't know them unless it's  
25 the same as the first one you mentioned. Campaign for a

1 Prosperous Georgia is the one that I'm familiar with.

2 Q. Mr. Lawless, have you served on any advisory  
3 panels or committees that have addressed issues  
4 concerning Nuclear facilities?

5 A. Yes, though in a limited way. There were  
6 panels set up for the Department of Energy regulation  
7 58.2; they were DOE panels. I can't recall the title of  
8 them.

9 Q. Can you repeat that?

10 A. DOE 58.2 radioactive waste management.

11 Q. Those panels were set up to discuss the  
12 changes that would be implemented if that regulation  
13 were adopted?

14 A. Yes, that's correct. Also panels set up to  
15 look at the post implementation.

16 Q. Other than the instances that you already  
17 testified about where you gave testimony, have you ever  
18 appeared as a witness before a court or administrative  
19 agency?

20 A. Well, I have been -- I've been before quasi  
21 panels or what have you that were official to review  
22 various positions, technical positions on the  
23 regulations and stuff like that. That was a normal  
24 course of my work at the Savannah River Plant.

25 Q. Did any of those proceedings concern



1 specifically groundwater contamination at the Savannah  
2 River Plant?

3 A. Yes and no. I mean groundwater is just part  
4 of the environment.

5 Q. What I'm asking really is whether any of  
6 those proceedings were intended to look directly at the  
7 groundwater contamination that had occurred at the  
8 Savannah River Plant?

9 MR. FLACK: Could you clarify intended by  
10 whom?

11 MR. DAVENPORT: By whoever was holding  
12 the proceeding.

13 THE WITNESS: I have been involved in  
14 quite a few discussions, formal discussions on various  
15 regulations, and you would always be concerned, for  
16 instance, what the impact of the groundwater might be,  
17 what such and such a change, what impact it might have  
18 on the biota, so forth and so. So I can't recall  
19 directly, but that would have been a part of it.

20 Q. (By Mr. Davenport) My question is a little  
21 more specific in the sense what I'm getting at is  
22 whether you have been involved in any proceedings that  
23 were set up to address existing contamination rather  
24 than to look at the effect of.

25 A. Sort of a remedial action?

1 Q. Yes.

2 A. That was part of my responsibility. I  
3 oversaw remedial work, too. That's -- Thank you. I  
4 forgot that one of my responsibilities was in the  
5 decontamination and decontamination research.

6 Q. Again, that was research that was being  
7 performed actually by DuPont that you were reviewing?

8 A. It was not only DuPont that I -- DuPont was  
9 my direct responsibility day to day. But as part of the  
10 job I also had to make trips around the country to find  
11 out what other sites were doing and to interact with  
12 those sites and to interact with panels to help  
13 establish standards and to understand what was going on  
14 in the environment not only at the Savannah River Plant,  
15 but throughout the Department of Energy.

16 Q. Did you ever actually participate in any  
17 proceedings before a court or administrative agency or  
18 panel established by an administrative agency concerning  
19 the contamination that existed in the groundwater at the  
20 Savannah River Plant?

21 A. Well, we've discussed some of the proceedings  
22 that I was involved in that -- do you have something --  
23 maybe if you could give me an example or do you have --

24 Q. Well, I believe that you testified that the  
25 testimony you gave concerning the L-Reactor?

1 A. Yes.

2 Q. You did discuss groundwater --

3 A. Yes.

4 Q. -- contamination in that proceeding?

5 A. We certainly did, and the health effects  
6 discussion also.

7 Q. Any --

8 A. We did last summer in the Plant Vogtle  
9 hearing, we discussed groundwater at this time. We  
10 discussed airborne releases at this time. But as a  
11 normal course of affairs on my job I was involved in  
12 many technical discussions about proceedings, NRC  
13 proceedings in Washington, D. C. and so forth and on in  
14 1982.

15 Q. What NRC proceedings are you referring to?

16 A. This is on DOE -- excuse me -- WINSA 4 part  
17 61, the low level waste, radioactive waste regulations  
18 for the NRC and the commercial community.

19 Q. Did you actually testify?

20 A. Well, it wasn't testifying so much as it was  
21 an open technical forum. And I went to technical  
22 meetings like that where the proceedings were kept and  
23 official records were kept maybe on the average of once  
24 every three months or so. Sometimes once a month.

25 Q. Did you ever testify in any proceeding before

1 an Atomic Safety and Licensing Board?

2 A. Only last summer.

3 MS. FOWLER: Special prehearing  
4 conference.

5 Q. (By Mr. Davenport) Have you ever appeared as  
6 a witness before a state public service commission or  
7 any other body regulating utilities?

8 A. Once, as part of my job we went to the State  
9 of Florida. I can't recall all of the ins and outs of  
10 that trip; it was a long time ago.

11 Q. What was the general purpose of the trip?

12 A. I don't remember.

13 Q. You don't remember what you testified about?

14 A. No. It wasn't -- there was not testimony  
15 given by myself. It was a technical discussion.

16 Q. Have you ever provided any person, any group  
17 or any organization an affidavit for use in a proceeding  
18 relating to a nuclear facility other than this  
19 proceeding?

20 A. Not that I am aware of.

21 Q. You indicated that you have submitted written  
22 comments on the draft environmental statement to the  
23 Nuclear Regulatory Commission in this proceeding. Have  
24 you ever submitted written comments to the Nuclear  
25 Regulatory Commission on any other occasion?

1           A.       As part of my job working within the  
2       Department of Energy we often commented on various NRC  
3       regulations and DOE regulations.

4 Q. These would be comments submitted on behalf  
5 of the Department of Energy?

6           A.       Within the Department of Energy, the behalf  
7       part would have come much later as one official  
8       representative from Washington.

9 Q. Essentially what you were doing was going and  
10 providing input in the process of drafting those  
11 comments?

12           A.       That's correct.

13 Q. Have you ever individually submitted comments  
14 to the Department of Energy on any facility?

15           A.     You might construe the complaints I filed in  
16     '83 as comments.

17            O.    Other than those complaints?

20 C. Have you ever provided any assistance to any  
21 party to any type of proceeding involving a nuclear  
22 facility other than this proceeding?

23 MR. FLACK: You mean other than to the  
24 DOE also?

1 your job duties with the DOE.

2 THE WITNESS: No.

3 Q. (By Mr. Davenport) Are you a member of any  
4 professional organizations?

5 A. I'm a professional engineer.

6 Q. Is that a professional organization?

7 A. Well, I pay dues each year.

8 Q. Who do you pay dues to?

9 A. State of Louisiana.

10 Q. Is that dues or a license fee?

11 A. I think it's probably both, but I'm not sure.

12 Q. It's not Louisiana Association of  
13 Professional Engineers?

14 A. No; it's as a professional engineer.

15 Q. Any other professional organizations?

16 A. Not that I recall.

17 Q. Are you a member of any nonprofessional  
18 organizations?

19 MR. FLACK: I object on the grounds of  
20 relevancy and I instruct the witness not to answer.

21 Q. (By Mr. Davenport) Are you a member of any  
22 nonprofessional organizations that are involved in  
23 environmental or utilities issues?

24 MR. FLACK: I object on the same basis  
25 and the same instruction.

1 Q. (By Mr. Davenport) Are you involved in any  
2 non professional organizations that are involved in  
3 activities related to nuclear facilities?

4 A. Can you repeat the question.

5 MR. FLACK: I object on the same basis  
6 and the same instruction.

7 Q. (By Mr. Davenport) Mr. Lawless, have you  
8 received assistance from any individuals or  
9 organizations other than the Intervenor in this  
10 proceeding?

11 MR. FLACK: Would you explain what you  
12 mean by assistance?

13 Q. (By Mr. Davenport) Have you received  
14 information from any individuals or organizations other  
15 than the Intervenor that you used in this proceeding?

16 A. Well, nothing that no other technical person  
17 would not be privy to. I mean, I receive technical  
18 reports all the time. I don't receive -- I don't know  
19 how else to characterize that. I'm in the business of  
20 pursuing whatever technical information I can gather to  
21 understand what's going on in the radioactive and  
22 hazardous waste environment.

23 Q. Have you contacted anyone like Union of  
24 Concerned Scientists for information?

25 A. No, I have not.

1 Q. Have you been paid by either of the  
2 Intervenor, Campaign for a Prosperous Georgia or  
3 Georgians Against Nuclear Energy, to participate in the  
4 Plant Vogtle licensing proceedings?

5 A. No, I have not.

6 Q. Have you previously appeared as a witness on  
7 behalf of either of those organizations in any other  
8 proceeding?

9 A. The hearing last summer; last summer.

10 Q. That was the pretrial, pre-hearing conference  
11 in this proceeding?

12 A. Right.

13 Q. No other proceedings other than the Plant  
14 Vogtle licensing proceeding?

15 A. Not that I am aware of.

16 Q. Did you help draft any of the contentions  
17 submitted by the Intervenor in the proceeding?

18 A. Yes, on the ground work and I assisted on  
19 some of the airborne releases.

20 Q. Did you provide any information, any of the  
21 information used by the Intervenor in supplying the  
22 bases for any of the contentions admitted by the Atomic  
23 Safety and Licensing Board in this proceeding?

24 A. I'm sorry I got lost on that one.

25 Q. Let me repeat it. I'm asking whether you



1 provided any of the information that the Intervenor  
2 used in providing a basis for one of the contentions  
3 that has been admitted by the Licensing Board of --

4 MR. FLACK: Hugh, excuse me. You want to  
5 explain the difference? I don't know if Bill  
6 understands the difference between contention and basis.

7 Q. (By Mr. Davenport) There were several  
8 contentions proposed by the Intervenor, some of which  
9 was accepted by the Licensing Board. When I refer to  
10 the basis for the contention, I'm talking about the  
11 information provided by the Intervenor to the Licensing  
12 Board to support the contention.

13 A. I'm not really concerned -- I mean, if  
14 someone asked a technical question, I gave the best  
15 response I could to it.

16 Q. Have you provided any information to the  
17 Intervenor for their use in responding to any  
18 interrogatories from the Applicants?

19 MS. FOWLER: Let me explain to you, I'm  
20 not sure he also understands, the same thing with  
21 Howard, the difference between everything that's filed  
22 and the contentions, the basis and the interrogatories.

23 Q. (By Mr. Davenport) Do you understand the  
24 difference between an interrogatory and the contentions  
25 when I use these terms?

1           A.     I thought they were the same thing. Whenever  
2           somebody has had a technical question, I have reviewed  
3           it and responded to the best that I could.

4           Q.     Have you seen written questions that were  
5           received by the Intervenor from the Applicants in this  
6           proceeding?

7           A.     Yes, I have.

8           Q.     Did you prepare the responses to any of those  
9           written questions?

10          A.     I gave comments on -- I've seen the Vogtle  
11          responses and some of the Vogtle questions and I gave  
12          responses to those.

13          Q.     What subject matters were encompassed within  
14          the questions that you either commented on or saw?

15          A.     Ground water, airborne releases, cooling  
16          tower releases, that I recall.

17          Q.     Mr. Lawless, what subject matters do you  
18          consider yourself to be an expert about based upon your  
19          background and training?

20                 MR. FLACK: Besides what he's talked  
21          about this morning?

22                 MR. DAVENPORT: I'm asking in general.

23                 THE WITNESS: Groundwater contamination,  
24          low level radioactive and hazardous waste, transuranic  
25          waste, high level wastes in some areas, in some areas B

1 a D, decontamination and decommissioning, in some areas  
2 audits and appraisals of low level radioactive waste  
3 burial ground operations and high level waste tank  
4 operations, in some areas environmental considerations  
5 as they're impacted by releases into the environments.

6 Q. But, again --

7 A. Pretty much the areas we have talked about  
8 today.

9 Q. You're not a health physicist?

10 A. I am not a health physicist, but I work with  
11 the technical problems that are -- that may be uncovered  
12 by health physicists or maybe even help assist point  
13 problems to health physicists.

14 Q. With respect to groundwater contamination,  
15 what is your educational background on that subject?

16 A. As an engineer, I have had some training, and  
17 as a nuclear waste management engineer, I've had  
18 extensive training.

19 Q. Have you ever studied hydrogeology or  
20 geology?

21 A. Hydrology is studied, geology, no.

22 Q. When did you study hydrology?

23 A. As an engineer.

24 Q. At LSU?

25 A. Yes.

1 Q. How many courses did you take in hydrology?

2 A. I don't recall.

3 Q. More than one?

4 A. It was part of another course.

5 Q. So it was less than a full course?

6 A. Yes; not a specific course on it.

7 Q. What specific training have you had that in  
8 your opinion qualifies you to be an expert on  
9 groundwater contamination?

10 A. I have studied numerous reports and I  
11 interacted with research scientists within the  
12 Department of Energy and the commercial environment for  
13 a number of years and have traveled and seen many  
14 different operations and facilities and so forth as part  
15 of my job with the Department of Energy.

16 Q. Have you yourself ever done any research on  
17 groundwater movement, for example?

18 A. Could you explain what you mean by have you  
19 ever done any research? What do you mean?

20 Q. It's fairly apparent.

21 MR. FLACK: You mean empirical research?

22 MR. DAVENPORT: What other types of  
23 research are there?

24 MR. FLACK: I believe there are other  
25 types.

1 THE WITNESS: Yes, they are.

2 Q. (By Mr. Davenport) Have you ever done any  
3 empirical research?

4 A. I have done no laboratory work.

5 Q. Have you ever done any research of different  
6 treatises or things like that on groundwater movement?

7 A. It was part of the reports that I've written.  
8 It's a part of every report I believe that I've written.  
9 I have looked at groundwater travel times, I did, and  
10 tried to make the various pieces fit together.

11 Q. When you say you looked at groundwater travel  
12 times, have you ever done any more than simply look at  
13 reported findings of groundwater travel time?

14 A. No; I have done more than that. I put forth  
15 the questions, I challenged the experts and brought  
16 evidence to bear and made changes.

17 Q. Do you know how to calculate a groundwater  
18 travel time?

19 A. Groundwater travel time is computed to be 200  
20 years between the entry of a nuclide and the exit at an  
21 outcrop, and it's already occurred within 25 years, it  
22 sometimes takes very little computation.

23 Q. Again, all you're doing is making statements  
24 about information that's reported. Have you ever  
25 calculated it?

1           A.     Making statements, challenging the experts,  
2     redirecting research, telling them what to look for.  
3     It's rather difficult sometimes dealing with some  
4     contractors and because of their own bureaucratic  
5     problems, so you try to direct the research.

6           Q.     Have you ever done any --

7                   MR. FLACK:   Could we have just one  
8     moment?

9                   (Whereupon, a discussion was held  
10    off the record.)

11          Q.     (By Mr. Davenport)   Mr. Lawless, have you  
12    actually done any direct field work in groundwater  
13    hydrology or have you simply been involved --

14          A.     I have done field work in the sense I've  
15    gotten and made appraisals to check what is going on, to  
16    see what data is being generated and to observe how  
17    they're generating the data.

18          Q.     You, for example, reviewed well reports, that  
19    type of thing?

20          A.     I have done that.

21          Q.     What other sort of data review did you do?

22          A.     Well in line with that, I have just gone in  
23    and looked at the research that was being done, made  
24    suggestions on changes that should be effected and  
25    questioned why things were done the way they were, that

1 sort of thing.

2 Q. If you were retained to make an estimate of  
3 groundwater travel time, could you do it?

4 A. I don't know that I would want to do it.

5 Q. I'm asking if you have the capability to do  
6 it?

7 A. Let me answer this way. The Savannah River  
8 Plant had predicted that the groundwater travel time  
9 would be 200 years.

10 Q. Mr. Lawless, that was not my question. My  
11 question can be answered yes or no. If you want, you  
12 can explain yourself. Can you yourself calculate a  
13 groundwater travel time? I'm asking if you were just  
14 given a specific regulation and asked to calculate a  
15 groundwater travel time for a specific distance, could  
16 you do it?

17 A. If it involved what?

18 Q. Just asking, for example, could you calculate  
19 a groundwater travel time from the power block at Plant  
20 Vogtle to Mathes Pond?

21 A. Yes, I could.

22 Q. How would you do it?

23 A. I would do it with comparative calculations.  
24 I would look at the calculations that were made.

25 Q. I'm asking you if there were no calculations

1 that were previously made, could you calculate a  
2 groundwater travel time?

3 A. That presupposes that there is no science  
4 that's gone on before and that, of course, seems to make  
5 no sense at all. Each scientist or engineer knows what  
6 has been done before and takes that into consideration.  
7 You must, for instance, know where the groundwater  
8 direction is traveling. And if that part of the  
9 research has already been done, you don't need to do it.

10 Q. We'll assume you know the direction.

11 A. You might know the average speed, if you know  
12 the average groundwater speed, then you simply take the  
13 distance and can make --

14 Q. How would you --

15 A. -- a calculation.

16 Q. How would you calculate the groundwater  
17 speed?

18 A. There's various ways to calculate it. You  
19 can calculate it as a straight line function. You can  
20 look at it as a nonlinear function. If you got the  
21 equations, all you to do is generate the data. There's  
22 nothing to calculating. Anyone can calculate. In fact,  
23 it does not take an expert to make calculations; it  
24 takes an expert to make a judgment on whether the  
25 calculations are good or not.



1 Q. Do you know what formula is used generally to  
2 calculate groundwater travel time?

3 A. I'm familiar with some of the formulas. I do  
4 not recall them offhand.

5 Q. Do you recall the name of any formula?

6 A. If I recall the name of any formula, would  
7 that make a difference if I did or didn't?

8 Q. Yes, it would. I'm asking you whether you do  
9 or don't.

10 A. I don't think recalling a formula means that  
11 you're a groundwater expert or not. I recall various  
12 parts.

13 Q. Mr. Lawless, I'm entitled to ask you the  
14 questions.

15 MR. FLACK: Let me confer with him, maybe  
16 we can speed it up a bit.

17 Q. Mr. Davenport) Now that you have conferred  
18 with your attorney, can you answer my question whether  
19 you can recall the name of any formula used to calculate  
20 groundwater travel time?

21 A. No, I do not recall to the best of my  
22 ability, but I do not think that that is important.

23 Q. Fine. Do you consider yourself an opponent  
24 of nuclear power, Mr. Lawless?

25 MR. FLACK: You mean safe nuclear power?

1                   MR. DAVENPORT: Nuclear power.

2                   THE WITNESS: I don't think of myself  
3 that way, no.

4           Q.       (By Mr. Davenport) You yourself are not  
5 opposed to the use of nuclear generating plants?

6           A.       I don't -- what I'm opposed to are improper  
7 operational procedures, engineering shortcuts, poor  
8 methodology in the field, poor conclusions and lack of  
9 technical insight.

10          Q.       I don't think anyone would argue with you on  
11 that. Do you oppose nuclear plants as such?

12          A.       I have not made any statement to that effect.

13          Q.       Do you feel that Plant Vogtle should not been  
14 granted an operating license by the Nuclear Regulating  
15 Commission?

16          A.       I've not made my conclusion on that.

17          Q.       Mr. Lawless, you have been identified by the  
18 joint Intervenor in the proceeding as someone who may  
19 testify as a witness on their behalf in hearings before  
20 the Atomic Safety and Licensing Board. Have you been  
21 asked to appear as a witness before that board on behalf  
22 of the Intervenor?

23          A.       I think so.

24          Q.       Have you agreed to appear as a witness?

25          A.       Yes.

1 Q. Are you familiar with the contentions  
2 admitted by the Atomic Safety and Licensing Board in  
3 this proceeding?

4 MR. FLACK: Let me state for the record I  
5 think he's familiar with everything. I think that he's  
6 familiar with the contentions that were submitted. I'm  
7 not sure that he's able to -- he has the familiarity with  
8 what you have.

9 Q. (By Mr. Davenport) Mr. Lawless, do you  
10 intend to testify about any issues raised by Contention  
11 7 concerning groundwater contamination?

12 A. I expect to, yes.

13 Q. Do you intend to testify about any issues  
14 raised by Contention 10.1, concerning the dose rate  
15 effect?

16 A. I don't think so.

17 Q. Concerning Contention 10.3, the  
18 multiconductor effect?

19 A. I don't think so. I have never heard of it.

20 Q. 10.5, ASCO solenoid valves?

21 A. No.

22 Q. Concerning Contention 10.7, hydrogen  
23 recombiners?

24 A. No.

25 Q. Contention 11, steam generator tube failures?

1 A. No.

2 Q. Concerning Contention 12, salt and chlorine  
3 emitted as part of the cooling tower drift?

4 A. Possibly.

5 Q. Contention 14, the TDI emergency diesel  
6 generators?

7 A. No.

8 Q. What aspect of your education background,  
9 training or experience qualifies you to testify about  
10 issues raised by Contention 12 concerning salt chlorine  
11 emitted as part of the cooling tower drift?

12 A. I have an expertise in the airborne releases  
13 and consequent groundwater contaminations.

14 Q. Do you have any expertise with respect to  
15 cooling tower drift as such?

16 A. None.

17 Q. Do you have any expertise with respect to the  
18 makeup of cooling tower drift when dissolved solids  
19 might be in a cooling tower drift?

20 A. None.

21 Q. Mr. Lowless, do you consider yourself an  
22 expert in the area of geology or hydrogeology?

23 A. That is hard to say.

24 Q. Why is it hard to say?

25 A. I'm not a trained geologist nor hydrologist,

1 but I've a fair amount of experience with both.

2 Q. So you consider yourself knowledgeable about  
3 geology and hydrology or hydrogeology?

4 A. In certain areas as it relates to radioactive  
5 and hazardous wastes.

6 Q. Mr. Lawless, do you agree with the  
7 Intervenor's contention in this proceeding that the  
8 Applicants have not adequately addressed the value of  
9 groundwater below the Plant Vogtle site?

10 A. Yes.

11 Q. What is the basis for that opinion?

12 A. Reading the information that I have had  
13 presented to me, the ESAR and DES and the responses to  
14 some of the questions that have been raised.

15 Q. How have the Applicants failed to adequately  
16 address the value of groundwater below the Plant Vogtle  
17 site?

18 A. That's a very broad question. It seems that  
19 there's a lot of holes in their presentation. It seems  
20 that some of their responses have been inadequate and  
21 unenlightened.

22 Q. What holes are you referring to?

23 A. Again, it's very broad. You asked a broad  
24 question, I tried to give as good an answer as I could.  
25 If you could be more specific, I could be more specific

1 in turn.

2 Q. I'm asking you, Mr. Lawless, to give me some  
3 specifics to support your contention that the Applicants  
4 have failed to adequately address the value of  
5 groundwater beneath the Plant Vogtle site?

6 MR. FLACK: Let me suggest it might be  
7 easier and speed up the process if you could show him  
8 the specific things that included that he referenced.

9 MR. DAVENPORT: Mr. Flack, I'm asking him  
10 now for the basis of his testimony today.

11 MR. FLACK: I think he's answered your  
12 question. I'm trying to speed it up.

13 MR. DAVENPORT: I'm asking what he  
14 recalls without looking at documents.

15 THE WITNESS: Well, it's a very broad  
16 answer. I could give you a specific, for instance.

17 Q. (By Mr. Davenport) Did you say you could?

18 A. I could.

19 Q. Please do.

20 A. For instance, the Plant Vogtle or Georgia  
21 Power or whatever, I will describe them as just Plant  
22 Vogtle, has stated that certain wells have been  
23 destroyed or covered up through the construction  
24 process. And I think that is a concern it's a possible  
25 serious oversight, possible area that contamination

1 could enter into the groundwater or into the aquifer.

2 Q. Do you have any knowledge concerning the  
3 manner in which those wells were sealed or abandoned?

4 A. No, I do not.

5 Q. Do you know that they were not sealed?

6 A. I take that back. I do have some information  
7 based on the responses that I have just read this  
8 morning, and I've not studied them, so I only have an  
9 idea.

10 Q. Are you aware of any well on the Plant Vogtle  
11 site that is no longer in use that has not been sealed?

12 A. No, nor am I aware of any well that's been  
13 sealed properly or improperly.

14 Q. You basically have no knowledge about that  
15 subject?

16 A. At this point.

17 Q. Can you give me any other specifics as to how  
18 the Applicants failed to address -- Let me ask you  
19 first. What do you mean by the value of groundwater?

20 A. I don't really know. What do you mean by  
21 that?

22 Q. I'm using the phrase that appears in the  
23 Intervenor's materials; not my materials. It appears in  
24 Contention 7, the statement of Contention 7.

25 MR. FLACK: Why don't you let him see a

1 copy of it.

2 MR. DAVENPORT: I can read it to him.  
3 Contention 7 states that the Applicant has not  
4 adequately addressed the value of the groundwater below  
5 the plant site and fails to provide adequate assurance  
6 that the groundwater will not be contaminated as  
7 required by 10 C.F.R. (a)(b) and 10 C.F.R.s 50.34(a)(1)  
8 and C.F.R.s 100.10(c)(3). The language that I'm using  
9 about the value of the groundwater comes from the  
10 language of the contentions submitted by Intervenor.

11 THE WITNESS: Okay. I guess I'm not that  
12 familiar with that particular question. Value can mean  
13 many different things. Is it acceptable for process  
14 water, is it acceptable for drinking water, is it  
15 acceptable for irrigation, so the end use will determine  
16 the value of the water but maybe not exclusively.

17 Q. (By Mr. Davenport) When you responded  
18 earlier to my question about how the Applicants have  
19 failed to adequately address the value of groundwater,  
20 how were you using the term?

21 A. I did not write the questions; I only  
22 supplied comments to the questions.

23 Q. I'm asking you now earlier in this deposition  
24 when you responded positively to my question about  
25 whether you agreed that the Applicants have not



1 adequately addressed the value of groundwater, what were  
2 you thinking of in the terms of the word value?

3 A. There's many different things that I must  
4 look at and study, but from what I have seen to date I  
5 do not feel that they have adequately addressed the  
6 groundwater contamination possibilities, and that I've  
7 given you one specific; there are many others that are  
8 possible to give. I don't know that I can specify them  
9 all here.

10 Q. Which ones can you specify today?

11 A. Abandoned wells, which can also encompass  
12 borings into the earth for other purposes. I think the  
13 well has been improperly or inadequately or both  
14 characterized.

15 Q. Any other specifics that you can recall at  
16 this time?

17 A. Groundwater migration time, the character and  
18 the relationship of consultants, groundwater consultants  
19 to Plant Vogtle.

20 Q. Anything else?

21 A. There are a lot of other things, but this is  
22 the best sample that I could come up with.

23 Q. You can't think of any other specifics at  
24 this time?

25 A. Not at this time. If you ask a question,

1 I'll try to respond to it.

2 Q. Sure. Is it also your contention that the  
3 Applicants have failed to provide adequate assurance  
4 that the groundwater beneath the Plant Vogtle site will  
5 not be contaminated?

6 A. Yes.

7 Q. What is the basis for that opinion?

8 A. Similar reasons. If you got a specific  
9 question, that's just too broad as it is. I'm not  
10 prepared to list it out. Can you be a little bit more  
11 specific?

12 Q. I'm asking you how the Applicants failed to  
13 assure that the groundwater will not be contaminated?

14 A. By not completely protecting the public to  
15 me.

16 Q. Are you referring to normal or accident  
17 conditions?

18 A. Either, both.

19 Q. What more should the Applicants do that they  
20 have not already done?

21 A. They should respond to all of the  
22 interrogatories that have been asked of them on  
23 groundwater contamination and releases from the cooling  
24 towers as best that I can ascertain.

25 Q. Anything other than answer your

1 interrogatories?

2 A. Not at this time, I can't state.

3 Q. Are you familiar with the provisions of 10  
4 C.F.R. part 51, Mr. Lawless?

5 A. No.

6 Q. So I assume you cannot tell me how the  
7 Applicants have failed to comply with 10 C.F.R. section  
8 51.20?

9 A. No.

10 Q. Are you familiar with the provisions of 10  
11 C.F.R. part 50?

12 A. No.

13 Q. I assume that you can not tell me how the  
14 Applicants have failed to comply with Section 50.54?

15 A. That's correct.

16 Q. Are you familiar with the provisions of 10  
17 C.F.R. part 100?

18 A. I don't think so.

19 Q. So, again, you cannot tell me how the  
20 Applicants have failed to comply with 10 C.F.R. Section  
21 100.10; is that correct?

22 A. That's correct.

23 Q. Have you reviewed the Applicants' assessment  
24 of possible accidental releases in Section 15.7 of the  
25 final safety analysis report in Section 7.1 and 7A of

1 the operation licensing and environmental report?

2 A. I don't remember. I don't recall  
3 specifically. I read a lot of material. I'm not sure  
4 where it comes from.

5 Q. Is it your contention that any inadequacies  
6 exist in the Applicants' assessment of possible  
7 accidental releases since they have not characterized  
8 the environment adequately?

9 A. Yes.

10 Q. How have the Applicants failed to  
11 characterize the environment adequately?

12 A. As we have mentioned, I don't think they have  
13 taken care of the concerns that have been raised on  
14 abandoned wells, for instance, destroyed wells,  
15 abandoned borings and so forth and on.

16 Q. Anything other than abandoned wells and  
17 abandoned borings?

18 A. Yes, but I can't specify at this time.

19 Q. So you don't have a list prepared?

20 A. I don't have.

21 Q. At this time you can't tell me anything  
22 specifically other than abandoned wells and abandoned  
23 borings and the interrogatories that have been asked?

24 A. Yes.

25 Q. Our failure to respond to some of your

1 interrogatories?

2 A. Right, that's correct.

3 Q. Mr. Lawless, have you reviewed the  
4 Applicants' assessment of different accidental spillages  
5 in the operating stage environmental report at Section  
6 7A.4?

7 A. It doesn't -- I'm not certain.

8 Q. Do you contend that any inadequacies exist in  
9 the Applicants' assessment of different accidental  
10 spillages?

11 A. Only from what I've read to date. Since I  
12 feel that the environment has been inadequately  
13 characterized for normal releases that it would be  
14 definitely inadequately characterized for different  
15 accidental releases.

16 Q. And you described previously just a short  
17 while ago how it's been inaccurately characterized?

18 A. I've not done a very good job of describing  
19 that, but I have attempted to.

20 Q. Liquid waste management section, Section  
21 11.2?

22 A. I'm not certain. I'm not certain. I don't  
23 recall the titles. I read a lot of material. I just  
24 can't pin it to a particular chapter or --

25 MR. FLACK: Hugh, this question, as with

1 others, if you can show him the document, I think he  
2 might be able to tell you if he has seen it.

3 Q. (By Mr. Davenport) Do you contend that any  
4 inadequacies exist in the Applicants' liquid waste  
5 management system?

6 A. Well, I can recall the DRS somewhat, some of  
7 the concerns I had about the DRS, for instance, were  
8 that the numbers, the employee rates in one part of the  
9 system did not add up and balance with employee rates in  
10 another part of the system and they should have.

11 Q. Other than the comments that you submitted on  
12 the draft environmental statements and any inadequacies  
13 you might have pointed out in those comments, are you  
14 aware of any other inadequacies in the Applicants liquid  
15 waste management system?

16 A. Other than the inadequacies that I pointed  
17 out and raised through the interrogatories and written  
18 in the draft report that I've written, no, I am not.

19 Q. What inadequacies are you referring to now?

20 A. Well, I am -- I have raised all of the issues  
21 that I could that I'm aware of. If I was aware of  
22 others, I would have raised them.

23 Q. I'm asking you specifically what inadequacies  
24 you contend exist in the liquid waste management system?

25 A. I've not prepared a list of them but I think

1 there's a fair number of them and they are substantial  
2 and they have been raised through the interrogatories  
3 and the comments that I've made on the DFS and the  
4 comments that are in this draft document.

5 Q. Can you identify for me some of these  
6 substantial inadequacies that you referred to?

7 A. The possibility of contaminating the aquifer,  
8 the confined aquifer underneath Plant Vogtle. The  
9 possibility of contaminating the groundwater itself  
10 directly underneath Vogtle.

11 Q. When you refer to groundwater, what do you  
12 mean?

13 A. The confined groundwater above the marl and  
14 beneath the surface. The possibility of communication  
15 through the marl, the possibility of surfacial  
16 contamination from cooling tower releases and consequent  
17 contamination of the groundwater. These are the things  
18 that have been raised. This is just a sample of the  
19 things that have been raised.

20 Q. Anything else that you can recall at this  
21 time?

22 A. Yes, but that I cannot recall at this time.

23 Q. Nothing that you can recall at this time?

24 A. There are others that I can recall, but I  
25 cannot recall at this time.

1 Q. You mentioned the possibility of the  
2 contamination confined aquifer and the possibility of  
3 contamination of the cooling towers. Do any of these  
4 things point out inadequacies in the liquid waste  
5 management system?

6 A. Liquid waste management system? I'm sorry, I  
7 misunderstand the question. I thought you were  
8 addressing inadequacies as throughout the Vogtle system.  
9 I did not know you were referring specifically to liquid  
10 waste management.

11 Q. Your response was directed to the entire  
12 Vogtle system?

13 A. Yes.

14 Q. And not specifically to the liquid waste  
15 management system?

16 A. Specific to the liquid waste management  
17 system, I can't recall the issues that I have raised. I  
18 just have not refreshed myself. And they are concerns,  
19 but I don't remember whether it is even defined by the  
20 system where the boundaries, what separates one part of  
21 the system from the next. I'm sorry. I just don't have  
22 that clear in my mind.

23 Q. So at this time you do not recall any of the  
24 concerns that you might have raised about the liquid  
25 management system?



1 A. That's correct.

2 Q. Specifically?

3 A. That's correct.

4 Q. Have you reviewed the description of the  
5 Applicants' rad waste program in the operating stage  
6 environmental report?

7 A. Yes.

8 Q. Is it your contention that the Applicants rad  
9 waste program is inadequate?

10 A. I have raised some issues there, yes.

11 Q. In what respects do you contend that the  
12 Applicants rad waste program is inadequate?

13 A. Again, I don't have a clear list, but I can  
14 give an example. If I remember, there was a concern  
15 about our releases into the river and there were  
16 concerns about a holdup tank storage of liquid  
17 radioactive wastes, but past that I can't remember.

18 Q. Is it your contention that the rad waste  
19 program will result in releases into the Savannah River?

20 A. I don't recall. I was concerned about  
21 releases into the river and I remember being concerned  
22 about some hazardous nuclides. I do not remember the  
23 levels of radioactive waste nuclides going into the  
24 Savannah River.

25 Q. Were you concerned about accidental releases

1 or normal releases?

2 A. If you are concerned about normal releases  
3 and the concerns have to do with releases into the  
4 environment then you would be also be concerned about  
5 accidental releases and past that so, yes; but past that  
6 there are opportunities for accidental releases that  
7 when there are no normal releases in this particular  
8 area -- I have reference to the -- I am referring to the  
9 holdup tank, but I don't want to tie it down just to  
10 normal release. For instance, at the Savannah River  
11 Plant through normal operations the E area basin has  
12 contaminated the groundwater and also the Tuscaloosa  
13 aquifer, but the highest level of contamination is  
14 directly underneath a holdup tank or a storage tank that  
15 has been in normal operation for 25 years.

16 Q. Going back to Plant Vogtle, do you recall at  
17 this time whether your concern was about, with respect  
18 to the rad waste program, was about accidental releases  
19 or normal releases or both?

20 A. I don't remember discriminating between the  
21 two of the then. I only remember discriminating on  
22 accidental releases on the holdup tank.

23 Q. Is it your contention, Mr. Lawless, that any  
24 design or construction deficiencies exist with respect  
25 to the Plant Vogtle that might result in the

1 contaminants being released into the groundwater?

2 A. Yes.

3 Q. Can you define that design or construction?

4 A. I cannot define all of it, I can give you an  
5 example. The best example would be the construction  
6 atop abandoned wells.

7 Q. Again, you don't have any knowledge  
8 concerning the circumstances of the sealing or  
9 disclosure of these wells?

10 A. Other than the information that was provided  
11 in the responses that I reviewed this morning. I have  
12 limited information on how they plan to close them or  
13 have closed them. In some instances it seemed like the  
14 information is conflicting, but I have not taken it past  
15 that.

16 Q. Have you any design or construction  
17 deficiencies that you can identify for me at this time?

18 A. Not at this time.

19 Q. How would you go about determining the  
20 sequence of the hydrologic unit in geologic formations  
21 underlining a particular location?

22 A. I would not.

23 Q. You would not do that?

24 A. No.

25 Q. Have you ever done that?

1 A. No, I have not.

2 Q. So you've looked at no materials; you never  
3 made any efforts to determine the sequence of hydrologic  
4 units underneath Plant Vogtle?

5 A. No, I have not. I have studied what Plant  
6 Vogtle has put out in their technical reports and also  
7 the Savannah River Plant in our technical reports.

8 Q. But you have made no special independent  
9 effort to --

10 A. No, I have not.

11 Q. -- to determine what hydrologic units exists  
12 underneath Plant Vogtle.

13 Q. Have you looked at geophysical well log data?

14 A. I'm sorry?

15 Q. Have you looked at the geophysical well log  
16 data provided in the preliminary safety analysis report  
17 relating to Plant Vogtle?

18 A. I recall having looked at some of that. I  
19 don't remember -- I believe I might have, but I don't  
20 recall. I don't recall.

21 Q. So any knowledge that you have about the  
22 sequence of the hydrologic unit that exists beneath  
23 Plant Vogtle comes from the materials prepared by the  
24 Applicants?

25 A. That's correct, and also the Savannah River

1 Plant. There are other reports in the technical  
2 literature, just the technical literature.

3 Q. Concerning Plant Vogtle?

4 A. Concerning the area as I referenced often and  
5 usually by Plant Vogtle and or the Savannah River Plant.

6 Q. You have looked at those reports?

7 A. I have looked at some of the technical  
8 literature.

9 Q. Have you looked at the report prepared by  
10 Sophil?

11 MR. FLACK: Can you identify that any  
12 better?

13 MR. DAVENPORT: I think he knows what I'm  
14 talking about.

15 THE WITNESS: Yes, I did. I have looked  
16 at parts of the report. I do not recall whether I  
17 looked at the actual report itself or not. I have  
18 looked at data that was a part of that report.

19 Q. (By Mr. Davenport) Do you have any knowledge  
20 concerning the pattern of groundwater movement beneath  
21 the Plant Vogtle site?

22 A. I have some knowledge, yes.

23 Q. What is the pattern of water movement in the  
24 water table aquifer beneath the Plant Vogtle site?

25 A. I don't recall exactly, but it seems to be

1 generally it's directional. I do not recall the exact  
2 direction. I think it's somewhat to the northeast and  
3 that is a groundwater movement.

4 Q. I'm talking now about movement in the water  
5 table aquifer.

6 A. Yes.

7 Q. Do you know anything about the direction of  
8 movement of water in the tertiary aquifer beneath Plant  
9 Vogtle?

10 A. Somewhat, qualified in the same way.

11 Q. What do you know?

12 A. The general movement seems to be toward the  
13 Savannah River and parallel to the Savannah River north  
14 of the Savannah River in the Vogtle area and the  
15 movement seems to be uncertain south of the Savannah  
16 River in the Vogtle area. There seemed to be  
17 indications of both toward and parallel to the Savannah  
18 River. But I have not refreshed myself on the  
19 particulars. That's just a general recall.

20 Q. What if anything is your knowledge of  
21 groundwater movement beneath the Plant Vogtle site based  
22 upon?

23 A. Studying the literature.

24 Q. So it's more than the materials provided by  
25 the Applicants?

1           A.     It is, yes, that is correct.

2           Q.     What literature specifically are you  
3 referring to?

4           A.     The technical literature on groundwater  
5 movement and geology and hydrology in the area. I've  
6 not studied at all but I have looked at a fair amount of  
7 it.

8           Q.     Can you identify any particular report?

9           A.     No, I can't. Much of the literature is  
10 referenced however by both Vogtle and the Savannah River  
11 Plant.

12          Q.     Do you have any basis on which to dispute the  
13 Applicants' characterization of the geologic formations  
14 on hydrologic units that exist under the Plant Vogtle  
15 site?

16          A.     The general characterization I think possibly  
17 not meaning many of the conclusions, yes.

18          Q.     What specific conclusions are you referring  
19 to?

20          A.     That is an equivocation --excuse me -- that is  
21 the marl underneath the Vogtle facility, that Vogtle is  
22 isolated in an interfluvial high. That all of the  
23 contaminants will enter into the Savannah River, and  
24 these are a sample of some of the things that I would be  
25 concerned about.

1 Q. Anything else specifically that you can  
2 recall at this time?

3 A. Not at this time.

4 Q. Mr. Lawless, do you dispute the existence of  
5 the Blue Bluff marl beneath the Plant Vogtle site?

6 A. I don't.

7 Q. Do you dispute the Applicants'  
8 characterization of that marl layer as a calcareous  
9 clay?

10 A. I don't.

11 Q. But you do dispute that that marl constitutes  
12 an effectively impermeable layer?

13 A. I have raised questions on it.

14 Q. On what basis do you dispute the marl can act  
15 as an impermeable layer?

16 A. Inadequate characterization of the marl by  
17 Plant Vogtle.

18 Q. How is that characterization inadequate?

19 A. It seems incomplete. They have not answered  
20 interrogatories completely and some of the questions  
21 don't make technical sense. And I guess that says it.

22 Q. What more should the Applicants do in the way  
23 of analysis of it that they have not done to date?

24 A. I'm not certain. As a start they should  
25 complete the interrogatories and answer them fully and



1 completely.

2 Q. Anything other than that?

3 A. Not at this time.

4 Q. Are you aware of any specific point beneath  
5 the Plant Vogtle site where Blue Bluff marl is permeable  
6 or not resistant to groundwater flow?

7 A. Not at this time, but then, again, I might  
8 want to change that somewhat. Could you be a little bit  
9 more specific?

10 Q. Yes. I'm asking whether you have any  
11 knowledge of any specific point beneath the Plant Vogtle  
12 site where the marl is permeable or not resistant to  
13 groundwater flow?

14 A. I have no knowledge but I have raised  
15 questions on it.

16 Q. So you cannot identify any particular point  
17 where you contend it's permeable or not resistant to  
18 groundwater?

19 A. I have raised questions around well neck 42,  
20 and well neck 42 seems to indicate there's a possibility  
21 that water can flow from one end to the next.

22 Q. How does well neck 42 indicate that?

23 A. Because wells in the middle of the aquiclude  
24 have water in them.

25 Q. Are you saying that they have water flow?

1 A. No.

2 Q. They have water in them?

3 A. They have water in them. That's what I said,  
4 yes.

5 Q. In other words, there are water levels  
6 measured in the wells?

7 A. There is water in the wells.

8 Q. What does the level of water in a well  
9 indicate?

10 A. That there is a level of water in the well.

11 Q. What physical forces result in water rising  
12 in a well?

13 A. Depends on where you are.

14 Q. What is the height of the water in a well a  
15 measurement of?

16 A. I would imagine many things.

17 Q. Can you define for me what is meant by  
18 hydrostatic power pressure?

19 A. That is exactly what I'm referring to. The  
20 wells, the two wells in the acquiclude did record a  
21 certain hydrostatic power pressure and the intimation  
22 was that there was a possibility that water has been  
23 flowing and that's what I've tried to resolve.

24 Q. Mr. Lawless, do you know whether you can get  
25 a hydrostatic power pressure reading in a well that's

1       drilled into rock?

2           A.       No, I do not.

3           Q.       Do you know what hydrostatic power pressure  
4 means, what it's a measurement of?

5           A.       I have a sense of it, but I do not know what  
6 it means.

7           Q.       Are you aware, Mr. Lawless, of any specific  
8 point beneath the Plant Vogtle site where the marl layer  
9 is intermittent?

10          A.       Might I return to that question for just a  
11 minute there. I would like to abridge the comment to  
12 say that the hydrostatic power pressure was just  
13 mentioned in these comments and I have not had a chance  
14 to look at them and to study them, and that is the best  
15 that I can do at this time.

16          Q.       Fine. But based upon your prior training and  
17 experience you don't know what that term means, correct?

18          A.       I have run across it before, but I do not  
19 recall at this time what it means.

20          Q.       Are you aware of any specific point beneath  
21 the Plant Vogtle site where the marl layer is  
22 intermittent or does not exist?

23          A.       I'm not aware of any specific instances.

24          Q.       Are you aware of any specific point where  
25 fractures or permeable sections exist in the marl?

1 A. Not to the best of my knowledge.

2 Q. No?

3 A. No.

4 Q. Do you contend Blue Bluff marl changes to  
5 limestone anywhere in the vicinity of the plant site?

6 A. I have not made that contention.

7 Q. I believe you indicated that you do dispute  
8 the statement made the Applicants that the water table  
9 aquifer beneath the plant site is hydraulically isolated  
10 on an interfluvial high?

11 A. I have asked why Plant Vogtle has made that  
12 statement and how they made that conclusion and the  
13 response has just arrived and I have not had a chance to  
14 adequately study their response.

15 Q. So you basically yourself have no basis for  
16 or no information available to you that would indicate  
17 one way or the other whether it's isolated under an  
18 interfluvial high?

19 A. I have only what I reviewed in the Vogtle  
20 responses and information in their documents.

21 Q. Can you identify any location at which water  
22 in the water table aquifer underneath the plant site  
23 travels off of the plant site?

24 A. Have I made such an identification?

25 Q. Can you?

1                   MR. FLACK: You mean here today?

2                   MR. DAVENPORT: Yes.

3                   THE WITNESS: Can you repeat that.

4           Q.       (Ey Mr. Davenport) I'm asking you whether  
5 you can identify for me any location at which water in  
6 the water table aquifer travels off of the plant site.

7           A.       I cannot recall any information at this time.

8           Q.       Do you dispute that water in the water table  
9 aquifer underneath the plant site moves in a direction  
10 of and discharges into stream channels around Plant  
11 Vogtle that have cut down into or close to the marl  
12 area?

13          A.       I have raised that question.

14          Q.       On what basis do you dispute that statement?

15          A.       Because it seemed that Plant Vogtle did not  
16 characterize that part of their environment completely,  
17 so I asked on what basis did they make their statement.

18          Q.       What aspect of the environment did they fail  
19 to characterize completely?

20          A.       They just said it was on an interfluvial high  
21 cut by stream channels on all sides.

22          Q.       So am I correct in stating that you have no  
23 specific basis for disputing that contention, but you're  
24 just not sure it's correct based on the information  
25 provided?

1           A.     Based on the information provided that  
2 statement seems erroneous.

3           Q.     Which information do you rely on to say it's  
4 erroneous?

5           A.     The information that Plant Vogtle has  
6 provided, the plans, the surface maps. I don't recall  
7 at this time, but it seemed that it was -- it seemed  
8 that it may not be isolated, so I asked the question to  
9 find out on what basis they had made that statement.

10          Q.     But the only information that you have is the  
11 information that's been provided by the Applicants?

12          A.     That's correct.

13          Q.     Do you dispute that immediately beneath the  
14 power block water in the water table aquifer moves in  
15 the direction of Mathes Pond?

16          A.     I have raised the question as to whether -- I  
17 have raised the question how Vogtle is concerned that's  
18 it's moving in only that direction.

19          Q.     On what basis do you dispute the Applicants'  
20 characterization of water movement in the water table  
21 aquifer in that area?

22          A.     It seems that the information that they  
23 provided was not in detail. They only stated that the  
24 thing -- they stated the information in such a way that  
25 led me to believe that they felt this groundwater was

1 traveling in that direction, and so I asked for more  
2 information to understand how they drew these  
3 conclusions.

4 Q. So your problem is basically with a lack of  
5 information, not with contrary information?

6 A. It seems that I would agree with you in part  
7 that is lack of information, but at this time I'm  
8 uncertain as to whether or not it's contrary  
9 information.

10 Q. Mr. Lawless, what data would you need to  
11 determine the direction of groundwater flow?

12 A. The groundwater flow map of Vogtle surface.

13 Q. Such a map has been provided in the final  
14 safety analysis, was it not?

15 A. It did not seem detailed.

16 Q. What specific data would be provided by such  
17 a map that you would use in determining the direction of  
18 flow?

19 A. You would want to know heights of sample  
20 measurements and directions of groundwater flow. You  
21 would want to validate --

22 Q. I'm asking you how you would determine  
23 direction of groundwater flow?

24 A. How would I do it? I would not do it.

25 Q. You would not determine?



1 A. No, I would not.

2 Q. Do you know how the direction of groundwater  
3 flow is normally determined?

4 A. I would not determine it.

5 Q. Do you know how it would be determined by  
6 someone who is in the business of determining it?

7 A. I have read the reports of Savannah River  
8 Plant how it was determined but at this time I do not  
9 recall how it was done.

10 Q. If you cannot determine yourself the  
11 direction of groundwater flow, how do you determine if  
12 someone else's prediction is erroneous?

13 A. Since we're talking about many subjects, very  
14 complex subjects, I try to refrain from remembering  
15 formulas and specific citations and specific instances.  
16 It's just too much to remember. So when I'm dealing  
17 with a particular instance, then I will pick up all the  
18 information that's available at this time and go and  
19 research the subjects and try to close the loop on the  
20 information that's available and what is not available.  
21 Then I'll call that particular expert in the field, call  
22 up authors who have written certain documents and try to  
23 cover the material as best I can. That's the way I  
24 would attempt to tackle it.

25 Q. So you yourself would not attempt to



1 determine direction of groundwater flow?

2 A. Would not physically, would not get out in  
3 the field and attempt to determine groundwater flow.

4 Q. I'm asking from data provided to you.

5 A. I might question it, but I would not attempt  
6 to determine it. I would do as I have done, I would  
7 raise the questions that have been raised in response to  
8 the information Plant Vogtle has provided or in response  
9 to questions that have been asked.

10 (Whereupon, a luncheon recess was taken.)

11 Q. (By Mr. Davenport) Mr. Lawless, is it your  
12 contention that contamination found at the Plant Vogtle  
13 in the vicinity of the power block would move in the  
14 direction other than the direction of Mathes Pond?

15 A. I'm not certain. There are -- I believe  
16 that's part of an interrogatory that was raised, but at  
17 this time I don't recall.

18 Q. Mr. Lawless, do you have any knowledge  
19 concerning the well users that draw water from wells are  
20 from the water aquifer beneath the plant site?

21 A. Only the information that's been provided by  
22 the Applicants. Is that Vogtle?

23 Q. Yes.

24 A. Okay.

25 Q. So it's information that's provided by the

1 Applicants?

2 A. Yes, that's correct. Although I think there  
3 was some information in the interrogatories, too.

4 Q. Again, information provided by the  
5 Applicants?

6 A. Yes.

7 Q. Is it your contention that the Applicants  
8 estimate of the time it would take any contamination  
9 reaching the water table aquifer at the plant site to  
10 travel to Mathes Pond is erroneous?

11 A. Yes.

12 Q. On what basis?

13 A. On the extensive experience that I've had.

14 Q. What aspect of that calculation is erroneous?

15 A. The travel time.

16 Q. Do you dispute the correctness of the formula  
17 used by the Applicants?

18 A. I don't recall the formula.

19 Q. Do you dispute the permeability figures used  
20 by the Applicants?

21 A. I don't recall those.

22 Q. Do you know whether the Intervenor in this  
23 action are challenging the correctness of those figures?

24 A. I do not know. The Intervenor, that's the --  
25 let me rephrase that. I'd say it's not Plant Vogtle.

1 Q. Ed. I am talking about Plant Vogtle.

2 MR. FLACK: I think the Interveners are  
3 CPG and GANE.

4 THE WITNESS: That's why I was beginning  
5 to backtrack. I think there have been some questions  
6 raised about groundwater travel time, yes.

7 Q. (By Mr. Davenport) Do you have any basis to  
8 dispute the permeability figures used by the Applicants?

9 A. The only thing is disputed groundwater travel  
10 time.

11 Q. What is the basis again on which you dispute  
12 it?

13 A. The extensive experience that I've had and  
14 the literature, although I do not recall the literature  
15 completely.

16 Q. What in your experience provides you  
17 information that's suggests to you that the estimate at  
18 Plant Vogtle is incorrect?

19 A. I believe the Plant Vogtle calculation and  
20 the HRC calculation, which are calculations of a similar  
21 nature, that the river plant has made those sorts of  
22 calculations.

23 Q. What with respect to those calculations  
24 causes you to conclude that the Plant Vogtle calculation  
25 is incorrect?

1 MR. FLACK: Do you mean other than what  
2 has already been provided in the materials?

3 MR. DAVENPORT: No. I'm asking here  
4 today as far as he's told me that different calculations  
5 to him mean that the Plant Vogtle calculation is  
6 incorrect. Really what I'm asking is how those  
7 calculations suggest to you that the Plant Vogtle  
8 calculation is incorrect?

9 A. The Savannah River Plant made predictions  
10 that it would take 200 years and then they revised that  
11 number downward to 107 years for groundwater travel  
12 time, and the groundwater travel time was actually found  
13 out to be less than 25 years.

14 Q. Is that the only data on which you rely to  
15 dispute the travel time estimated by the Applicants?

16 A. At this time that's all I can recall.

17 Q. That prediction made by the Savannah River  
18 Plant, that was a prediction for the time it would take  
19 tritium in a burial ground to outcrop; is that correct?

20 A. That is correct, but there are other bits of  
21 data such as the strontium-90 travel time, other  
22 radionuclide travel time from other locations on the  
23 Savannah River Plant. It's the body of knowledge. It's  
24 the literature that was available to me in my capacity.

25 Q. You say the strontium-90?

1 A. Strontium-90.

2 Q. Is it strontium?

3 A. Strontium-90 travel time.

4 Q. What specifically are you referring to?

5 A. The travel time for strontium-90 to go into  
6 the surface and outcrop.

7 Q. Where?

8 A. At the Savannah River Plant.

9 Q. Where specifically at the plant?

10 A. In seepage basins.

11 Q. Which seepage basins?

12 A. F and H.

13 Q. When were those predictions made?

14 A. I don't recall these as predictions. These  
15 are actual travel times.

16 Q. Am I correct in assuming what you're saying  
17 because of the actual travel time in the case of  
18 strontium-90 you feel that Plant Vogtle travel time  
19 estimates may be erroneous?

20 A. Yes, also because the Plant Vogtle  
21 calculations were different from the EPC calculations.  
22 I cannot list all of the reasons. Part of those reasons  
23 have been spelled out in the interrogatories that have  
24 been written and part of them have been spelled out in  
25 the EPC comments.

1 Q. Do you know whether the NRC used the same  
2 permeability and porosity?

3 A. No, I do not recall at this time.

4 Q. Do you know whether the NRC made any  
5 assumptions that were different than the assumptions of  
6 the Applicants?

7 A. I believe they did.

8 Q. Do you know what the travel time estimate  
9 reached by the NRC was?

10 A. It was an order of magnitude less, but I  
11 don't recall what it was.

12 Q. What other travel time of the Savannah River  
13 Plant are you referring to other than the strontium-90  
14 travel time?

15 A. The tritium travel time, the travel time for  
16 strontium-90, for other radionuclides and other  
17 hazardous contaminants.

18 Q. Do you recall all of them? Can you give me  
19 specifics?

20 A. Strontium 90 is one, tritium is another. I  
21 don't recall any others, but there are substantial --  
22 there is a substantial body of information on other  
23 radionuclides as well.

24 Q. So the only two that you specifically recall  
25 at this time are the travel time for the tritium and for

1 the strontium-90?

2 A. That is right, but it's a little bit  
3 misleading. I don't recall the exact travel time for  
4 the strontium 90. I just recall approximately what some  
5 of the values were.

6 Q. Was the tritium release point in the same  
7 area as the strontium-90 release point?

8 A. Yes and no. It's not an easy question to  
9 answer because they are radionuclides that are released  
10 in the burial ground and in the burial ground there is  
11 strontium-90 and tritium and there's also tritium and  
12 strontium-90 released at the seepage basins.

13 Q. What specific travel time were you referring  
14 to for the strontium-90?

15 A. For the seepage basin.

16 Q. Are these seepage basins in the same area?

17 A. In the same area.

18 Q. With respect to the tritium contamination,  
19 was the travel time distance reduced by erosion?

20 A. There were a series of reports that Savannah  
21 River Plant put out that discusses a shortened migration  
22 path due to erosion, which would have shortened the  
23 outcrop time.

24 Q. In fact those reports indicate that the  
25 migration path was shortened by approximately 50

1 percent, did it not?

2 A. I don't recall 50 percent. I recall more  
3 like 25 percent, but it was 25 percent that had to be  
4 calculated -- I do not recall offhand whether or not  
5 there was a specific number provided such as 50 percent.  
6 The reason why is because the outcrop point was about  
7 three-fourths of the way from the burial ground to  
8 Four-Mile Creek, but even that is a rather broad  
9 statement and not specific enough. The burial ground  
10 itself is a rather large area.

11 Q. That erosion also affected the gradient of  
12 the groundwater immediately below the surface, did it  
13 not?

14 MR. FLACK: Would you repeat the  
15 question.

16 Q. (By Mr. Davenport) The erosion of the  
17 outcrop area also affected the gradient of the upper  
18 aquifer in that vicinity, did it not?

19 A. It affected the groundwater. I do not recall  
20 how it affected it.

21 Q. When you refer to groundwater we're talking  
22 about the upper aquifer?

23 A. The groundwater or the water immediately  
24 underneath the surface.

25 Q. Were you involved at all in analyzing the



1 problems associated with the tritium outcrop in your  
2 duties at the Savannah River Plant?

3 A. That was one of my duties, yes.

4 Q. By what means do you contend radioactive  
5 contaminants would reach the water aquifer beneath the  
6 Plant Vogtle site?

7 A. I do not believe that Vogtle contends that  
8 they will not. I don't recall that.

9 Q. Do you contend that they will?

10 A. I don't think I've contended that. I've  
11 raised the question about what happens after they reach  
12 it.

13 Q. So you have not done any analysis or raised  
14 any questions about whether radioactive contaminants  
15 will reach the groundwater; your analysis has assumed  
16 there are contaminants in the groundwater?

17 A. I really don't recall. I think that is so,  
18 but I don't recall. I think that we've raised the issue  
19 only about what happens. Again, on reflection I guess  
20 that's not entirely correct because we've talked about  
21 the holdup tank which is a potential source of  
22 contaminants into the groundwater. So the answer to  
23 that would be yes and no.

24 Q. What is the function of the holdup tank at  
25 Plant Vogtle?

1           A.     I don't recall. I would have to brief myself  
2     on it again.

3           Q.     How might it be a source of contaminants?

4           A.     Through what path?

5           Q.     Yes.

6           A.     I guess I wasn't that concerned with the path  
7     so much as in recognizing the similarity between that  
8     situation and the situation at the Savannah River Plant.

9           Q.     Do you have any knowledge concerning the  
10    construction or fabrication of the holdup tank at Plant  
11    Vogtle?

12          A.     I don't think so.

13          Q.     What use will be made at Plant Vogtle of  
14    natural soil column?

15          A.     If I recall, there was some use. I don't  
16    remember.

17          Q.     Do you remember any of the details of how it  
18    would be used?

19          A.     No. It's been a while since I looked at the  
20    DES and even longer since I looked at the SPAR.

21          Q.     Do you know what use will be made at Plant  
22    Vogtle of the burial ground?

23          A.     I don't recall a burial ground at Plant  
24    Vogtle.

25          Q.     Do you know what use will be made at Plant

1 Vogtle of trenches?

2 A. I don't recall there being a trench at Plant  
3 Vogtle.

4 Q. Do you know what use will be made at Plant  
5 Vogtle of cooling ponds?

6 A. There are ponds, as I remember, at Plant  
7 Vogtle. I remember that generally speaking they fell  
8 into two categories, structural facilities and also I  
9 think some sort of a settling pond. I just don't  
10 recall.

11 Q. Do you know what use will be made at Plant  
12 Vogtle of settling ponds?

13 A. I don't recall.

14 Q. Do you know any of the details of the  
15 construction of those ponds?

16 A. I have read the literature on it, but I don't  
17 recall what it was.

18 Q. What do you mean by structural facilities?

19 A. Concrete facility, I believe there was a  
20 couple of blow down valves.

21 Q. Do you know what use will be made of blow  
22 down valves at Plant Vogtle?

23 A. I don't recall.

24 Q. Do you know how any blow down valves at Plant  
25 Vogtle are constructed?

1           A.     I have read the material on it, but I don't  
2 recall it at this time.

3           Q.     Do you know what use if any will be made of  
4 retention basins at Plant Vogtle?

5           A.     I don't recall at this time.

6           Q.     Do you know what use if any will be made of  
7 startup basins at Plant Vogtle?

8           A.     I remember a description of it in the DFS. I  
9 don't recall in the SFAR that is correct, but I don't  
10 remember that much about it.

11          Q.     Do you remember any of the details about the  
12 construction of any startup basins?

13          A.     No, I do not.

14          Q.     To your knowledge will any type of hazardous  
15 waste earthen impoundments be used at Plant Vogtle?

16          A.     I don't recall. I suppose it depends on -- I  
17 think it was part of the question, part of the  
18 interrogatories that have been asked and I just don't  
19 recall at this time.

20          Q.     So I assume you don't know what contaminants  
21 would be discharged into any of those types of  
22 facilities that I have just gone through?

23          A.     No. I remember reading the material and I  
24 remember writing responses, working on the  
25 interrogatories, but I don't recall the specifics.

1 Q. By what mechanisms do you contend  
2 contamination reaching the water table aquifer could  
3 reach the lower confined aquifers?

4 A. Well, I have not drawn my material and  
5 thoughts to a conclusion yet. We're still in a process  
6 of getting responses back from Vogtle. Some of them are  
7 in hand. And I've not studied all of the responses so I  
8 have not prepared.

9 Q. Can you answer that question at all today?

10 A. I could give you an example.

11 Q. Please do.

12 A. The contamination could enter through the  
13 surface into and through some mechanism or another, pass  
14 through the marl and enter into the confined aquifer.

15 Q. By what mechanism are you suggesting that it  
16 could pass through the marl?

17 A. I haven't decided yet.

18 Q. Do you have any suggestions?

19 A. At Savannah River Plant they passed through  
20 because of various reasons, as we've talked about  
21 earlier, through abandoned wells, might be an example,  
22 but I haven't decided the best way to respond to that.

23 Q. At the Savannah River Plant contamination has  
24 reached the lower confined aquifer only in the F and A  
25 areas; is that correct?

1           A.     That may or may not be correct. That may or  
2 may not be totally known.

3           Q.     Do you have any knowledge that suggestions  
4 that it is not correct?

5           A.     I have no knowledge to suggest that it is  
6 correct or that it's not.

7           Q.     Are you personally aware of any instance in  
8 which contamination has reached the lower confined  
9 aquifer at the Savannah River Plant outside of the H and  
10 A areas?

11                   MR. FLACK: I think he's answered that.

12                   THE WITNESS: It's possible. I'm just  
13 not aware of how we'll answer that at this time.

14           Q.     (By Mr. Davenport) Anything is possible, Mr.  
15 Lawless. I'm asking you whether you know or are aware  
16 of any information that indicates that it has happened  
17 anyplace outside of the H and A area?

18           A.     I'm not aware at this time.

19           Q.     In the H and A area there's no marl confining  
20 area, is there?

21           A.     It was suspected to be there and predicted to  
22 be there.

23           Q.     Who predicted it to be there?

24           A.     DuPont.

25           Q.     When?

1 A. In 1977.

2 Q. You're referring to the letter from Mr. Ice?

3 A. Yes. I don't believe that letter however was  
4 written in 1977. I was actually referring to the body  
5 of literature that was put out during that time, but  
6 there's an adequate representative of that literature.

7 Q. Are you aware of any and can you cite me to  
8 any other piece of literature that supports that  
9 statement?

10 A. The 1977 environmental impact statement. But  
11 there are others.

12 Q. Can you identify any others?

13 A. Not offhand.

14 Q. Your testimony is that in the 1977  
15 environmental impact statement that the Savannah River  
16 Plant indicated that the marl confining layer was  
17 present in the H and A area?

18 A. No, I did not say that.

19 Q. Please correct me then. What is your  
20 testimony?

21 A. The testimony is this, that the indications  
22 were, and I don't recall specific statements, the  
23 indications were that the predictions made in 1976 and  
24 1977 were that the test aquifer was confined and could  
25 not be breached by contamination.



1 Q. Do you know what specific area within the  
2 Savannah River Plant those predictions were made with  
3 respect to it?

4 A. I do not recall that they identified any  
5 specific areas apart from any other areas.

6 Q. So your testimony is that the statement was  
7 made that over the entire 300-square mile area of the  
8 Savannah River Plant that that Tuscaloosa Aquifer could  
9 not be breached because of a confining area?

10 A. My testimony is I do not remember them being  
11 any more specific than what I have said.

12 (Whereupon, the court  
13 reporter marked Applicants'  
14 Exhibit No. 10 for  
identification.)

15 Q. (By Mr. Davenport) Mr. Lawless, you've been  
16 handed what's been marked as Applicants Exhibit No. 10.  
17 Can you identify that document for me, please.

18 A. This is the Clark Ice to Mr. Stetson  
19 September 29, 1976, letter.

20 Q. Is this the letter you were referring to  
21 previously with the statement the Tuscaloosa Aquifer was  
22 not being breached?

23 A. This is the letter you referred to.

24 Q. Can you point me to the portion of the letter  
25 that refers to the Tuscaloosa Aquifer?



1 A. It's Item No. 72 on page 8.

2 Q. Do you know what prompted Mr. Ice to write  
3 this letter?

4 A. It was in response to a lawsuit.

5 Q. Isn't it true that the individually numbered  
6 items in the letter respond to specific paragraphs in  
7 the complaint in that lawsuit?

8 A. Yes -- I do not know that. I don't know  
9 that. That's -- I just do not know that.

10 Q. Mr. Ice indicates that in the second  
11 paragraph of the cover letter, does he not? Let me  
12 point you instead to the second page, the comment at the  
13 bottom of the page there. Mr. Ice indicates that the  
14 comments are numbered to correspond with the  
15 enumeration of the paragraphs in the complaint, does he  
16 not?

17 A. That is written down there, but I have no  
18 knowledge of that.

19 Q. Do you have any knowledge of what allegations  
20 were made in the complaint?

21 A. I have some knowledge, but at this time I do  
22 not recall any of the allegations in the complaint.

23 Q. So at this time you do not recall the  
24 specific allegation that Mr. Ice was responding to in  
25 paragraph No. 72?

1 A. No, I do not.

2 MR. FLACK: Could I see that for a  
3 moment?

4 Q. (By Mr. Davenport) Mr. Lawless, do you know  
5 what specific regulation of the Savannah River Plant Mr.  
6 Ice is referring to in Paragraph 72?

7 A. No, I do not.

8 Q. Mr. Lawless, do you contend that the  
9 hydraulic head of the water table aquifer underneath  
10 Plant Vogtle would affect the migration of contaminants?

11 A. I'm not contending that it would.

12 Q. Are you contending that it could?

13 A. I have raised questions about whether or not  
14 the aquifer is confined and how well that  
15 characterization has been made.

16 Q. Do you know what hydraulic head exists on the  
17 water table underneath Plant Vogtle?

18 A. I don't recall at this time.

19 Q. Are you aware of any location within the  
20 boundaries of the plant site where that hydraulic head  
21 doesn't exist?

22 A. I'm not aware of that.

23 Q. Doesn't the existence of the hydraulic head --

24 A. That's based on the assumption there are no  
25 head reversals. We raised the question as to how Vogtle

1 has determined that there are no head reversals.

2 Q. Are you aware of any head reversals  
3 underneath the plant site?

4 A. I'm not aware of any at this time.

5 Q. Is it your contention that the hydraulic head  
6 might act as a downward force?

7 A. I have not made a contention.

8 Q. Is it your contention that any contamination  
9 in the water table aquifer that reaches Kates Pond  
10 would in some manner then be able to migrate into the  
11 lower confined aquifers?

12 A. I have raised questions about whether or not  
13 that is possible.

14 Q. Do you have any information that would  
15 suggest that that's possible?

16 A. I do not recall any information at this time  
17 about the Plant Vogtle facility, but I have raised the  
18 question about whether or not that is possible.

19 Q. Do you know the basis on which you raised  
20 that question?

21 A. Based on the extensive experience that I've  
22 had at the Savannah River Plant.

23 Q. But you're not aware of any information  
24 related specifically to Plant Vogtle that would support  
25 the argument that contamination reaching Kates Pond

1 would be able to migrate to the lower aquifers?

2 A. I'm not aware of any information that says  
3 that it will reach the lower confined aquifer.

4 Q. Would you describe what is meant by a  
5 pressure differential between the water table aquifer  
6 and the lower confined aquifer?

7 A. What was that taken out of?

8 Q. I'm just asking whether you can tell us what  
9 is meant by pressure differential between the water table  
10 aquifer and lower confined aquifer?

11 A. Is that something I used?

12 Q. Do you understand the term? I'm not here to  
13 answer questions.

14 MR. FLACK: I think he's permitted to get  
15 his context in which this term is used in the answer.

16 MR. DAVENPORT: It's being used in the  
17 context of my question.

18 MR. FLACK: If he doesn't understand the  
19 question --

20 MR. DAVENPORT: Then he can say he  
21 doesn't.

22 Q. (By Mr. Davenport) Mr. Lawless, can you  
23 explain to me what is meant by a pressure differential  
24 between an upper aquifer and a lower aquifer?

25 A. I guess I would want to know the context from

1 which that question came and then maybe I could respond  
2 better.

3 Q. So just as I have asked the question you  
4 can't respond to it?

5 A. Pressure differential?

6 Q. A pressure differential, what is meant by  
7 that?

8 A. Means there's a pressure differential.

9 Q. What does it mean to say there's a pressure  
10 differential?

11 A. I guess I don't know how to respond to a  
12 question that's out of context, and I don't see the  
13 relevancy of the question at this time.

14 Q. What physical phenomenon is the term pressure  
15 differential used to refer to?

16 A. That there's a pressure differential between  
17 two points.

18 Q. What does it mean when there's a pressure  
19 differential between two points? Is the pressure higher  
20 at one point, lower at another point?

21 A. It may be; may not be.

22 Q. If the pressure --

23 A. May be lower at one point and higher at  
24 another.

25 Q. If the pressure is equal at both points,

1 there's no differential pressure?

2 A. There's still pressure differential. A  
3 pressure differential is a number. Just because the  
4 number is zero does not mean there's no differential  
5 pressure.

6 Q. What if there's a pressure differential of  
7 zero?

8 A. Depends on how many intervening layers there  
9 are. I don't know how to respond to your question.  
10 It's too general. It depends on lot of things.

11 Q. Is it your contention that the pressure  
12 differential existing between the water table aquifer  
13 and the lower aquifers at the Savannah River Plant has  
14 reversed in some locations?

15 A. There were head differentials that have been  
16 reported at the Savannah River plants.

17 Q. Have those -- have there been reported  
18 occurrences of reversals of head differentials at the  
19 Savannah River Plant between the upper and lower  
20 aquifer?

21 A. I have not reviewed the material but it seems  
22 to me that there have been some, but I do not recall at  
23 this time.

24 Q. Do you know at what locations?

25 A. No, I do not.

1 Q. Do you know what capacity wells were  
2 operating in the vicinity of those pressure  
3 differentials?

4 A. I do not.

5 Q. Do you know what aquifers were involved?

6 A. No, I do not. I do not recall at this time.

7 Q. Do you know what sequence of hydrolic units  
8 exist beneath the Savannah River Plant?

9 A. I do not recall them at this time. I have  
10 studied them.

11 Q. When you say you studied them, could you  
12 explain in a little more detail what you have done to  
13 study them?

14 A. I have read reports for six years.

15 Q. Those reports indicate what the hydrologic  
16 units are?

17 A. Some reports do and some don't.

18 Q. Do you know what hydrogeologic forces  
19 comprise them?

20 A. Again, I've studied those in the literature  
21 but I do not recall those.

22 Q. How large an area is covered by the Savannah  
23 River Plant?

24 A. 300 square miles.

25 Q. The plant is roughly circular with a diameter



1 of approximately 20 miles; is that correct?

2 A. Approximately.

3 Q. Have you ever sought to determine how the  
4 sequence of hydrologic units beneath the Savannah River  
5 Plant compared to the sequence of hydraulic units  
6 existing beneath Plant Vogtle?

7 A. I have read the comparison.

8 Q. What comparisons have you read?

9 A. The comparisons between the hydrolic and  
10 geologic strata beneath the Savannah River Plant and  
11 Plant Vogtle.

12 Q. Who prepared those comparisons?

13 A. The Savannah River Plant has made some  
14 comparisons and the Plant Vogtle facility has made some.

15 Q. What documents prepared by the Savannah River  
16 Plant have had comparisons of the hydrolic units beneath  
17 the Savannah River Plant and Plant Vogtle?

18 A. I do not recall at this time.

19 Q. Do you know what documents prepared at Plant  
20 Vogtle have such a comparison?

21 A. I do not recall at this time.

22 Q. Do you know whether the geologic formations  
23 underneath the Savannah River Plant are uniform over the  
24 whole area covered by the plant?

25 A. I don't think so.



1 Q. Do you know whether a geologic formation such  
2 as exists at Blue Bluff exists beneath the Savannah  
3 River Plant consisting of calcereous clay?

4 A. I'm aware of such a comparison that has been  
5 made, but I don't recall the comparison nor the source  
6 at this time.

7 Q. Do you know whether such a calcereous clay  
8 layer exists at the B and A area at the Savannah River  
9 Plant?

10 A. I don't recall.

11 Q. Do you know the name of the formation?

12 A. There are many formations under the Savannah  
13 plant and I do recall a formation has been identified  
14 with marl, but I don't remember who made the  
15 identification.

16 Q. You do not remember the specific name of the  
17 formation?

18 A. No, I do not.

19 Q. Do you know how thick that formation is under  
20 the Savannah River Plant?

21 A. No, I do not.

22 Q. What contamination has been found in the  
23 cretaceous aquifer at the Savannah River Plant? Let me  
24 ask you first, are you familiar with what I'm referring  
25 to by the term cretaceous aquifer?

1           A.     Somewhat familiar. I would like for you to  
2 define it.

3           Q.     By cretaceous aquifer, I'm referring to what  
4 I believe in some materials you've referred to as the  
5 Tuscaloosa Aquifer.

6           A.     That's what I've assumed. There have been  
7 levels of hydrocarbons that have been found,  
8 chlorohydrocarbons.

9           Q.     No radioactive contamination has been found  
10 in the cretaceous aquifer in the Savannah Plant, has it?

11          A.     Not that I am aware of.

12          Q.     You're not aware of any contamination being  
13 found in the cretaceous aquifer at the Savannah River  
14 Plant at any location other than the I and A area, is  
15 that correct?

16          A.     I don't recall at this time.

17          Q.     What contamination has been found in the  
18 water table aquifer at the Savannah River Plant?

19          A.     Radioactive and hazardous.

20          Q.     What areas of the Savannah River Plant has  
21 such contamination been found?

22          A.     I've not studied all of the areas of the  
23 Savannah River Plant.

24          Q.     Of the areas that you have studied, which  
25 ones have had radioactive or hazardous contamination of

1 the water table aquifer?

2 A. I don't think that I can recall all of them  
3 at this time, but the K area, F area seepage basins, H  
4 area -- excuse me -- the K area and A area, the F and H  
5 area, THE area, the burial ground itself.

6 Q. What specific burial ground are you referring  
7 to?

8 A. The radioactive waste burial grounds. And  
9 there have been some other areas, but I don't recall  
10 them at this time.

11 Q. That was for groundwater contamination. What  
12 were the sources of groundwater contamination at the  
13 Savannah River Plant?

14 A. A large number of different species, many  
15 different species, both radioactive and hazardous,  
16 tritium, plutonium 238 and 239.

17 Q. Let me --

18 A. Uranium.

19 Q. Hasn't the primary source of contamination of  
20 the groundwater of the Savannah River Plant been either  
21 radioactive or hazardous waste buried in the ground?

22 A. No.

23 Q. Or stored in seepage basins?

24 A. No.

25 Q. What has been the primary source?

1           A.     Well, first off I don't think it's been  
2 characterized sufficiently to state which is the primary  
3 source of contamination. You can state with a fair  
4 amount of assurance that many different sources of  
5 contamination exists. But the sources of contamination  
6 have not been adequately characterized. The source  
7 terms themselves have been inadequately characterized at  
8 Savannah River Plant and the levels of contamination in  
9 the environment have been inadequately characterized.

10          Q.     Were the seepage basins of contamination?

11          A.     Yes.

12          Q.     Were the burial grounds a source of  
13 contamination?

14          A.     Yes.

15          Q.     Were the waste storage tanks a source of  
16 contamination?

17          A.     Yes. High level waste storage tanks, low  
18 level storage tanks and the nonradioactive storage  
19 tanks.

20          Q.     Were trenches a source of contamination?

21          A.     Yes.

22          Q.     What is the difference between a trench and a  
23 burial ground?

24          A.     I suppose it depends on semantics more than  
25 anything else. In the Savannah River Plant radioactive

1 waste burial ground trenches are the primary method of  
2 disposing of low level radioactive wastes. And  
3 transuranic waste has been disposed there in the past as  
4 well.

5 Q. What category does the tritium fall in?

6 A. Tritium is a low level waste, a low level  
7 radioactive waste.

8 Q. These different facilities that I've  
9 mentioned, the seepage basins, the burial grounds, the  
10 trenches, these were all used as part of the normal  
11 operation of the Savannah River Plant facility, were  
12 they not?

13 A. That is correct, part of radioactive waste  
14 management.

15 Q. By what routes or mechanisms did  
16 contamination reach the cretaceous aquifer at the  
17 Savannah River Plant?

18 A. I have knowledge of contamination that's  
19 reached the Tuscaloosa aquifer in the A and M area. In  
20 that area contamination has reached the aquifer via  
21 seepage basins -- a seepage basin, excuse me -- a  
22 seepage basin and a lake that became a spillover for the  
23 seepage basin. But I don't feel that that is the end of  
24 the question because the highest levels of contamination  
25 seemed to be underneath the one particular storage tank.

1 There are also high levels under other areas around the  
2 seepage basins. I think at this time it's safe to say  
3 the sources have not been completely characterized.  
4 It's very difficult to say.

5 Q. My question is little bit different, Mr.  
6 Lawless, I'm asking by what routes or mechanisms the  
7 contamination reached the cretaceous or Tuscaloosa  
8 Aquifer?

9 A. It has been postulated by the Savannah River  
10 Plant that the contamination reached the Tuscaloosa  
11 aquifer through damaged production well casings, well  
12 water casings.

13 Q. Do you have any expertise in the construction  
14 of wells?

15 A. I have not constructed a well, but the well  
16 monitoring program at the Savannah River Plant came  
17 under my purview, the well monitoring program primary  
18 for the radioactive waste burial ground.

19 Q. Do you consider yourself to have any  
20 expertise in the construction of wells?

21 A. No, I don't consider myself to have  
22 construction expertise but I do have engineering  
23 expertise in overseeing those wells.

24 Q. Do you consider yourself to have any  
25 expertise with respect to the methods of abandoning or

1 sealing wells?

2 A. Yes.

3 Q. On what basis?

4 A. Basis of my experience at the Savannah River  
5 Plant.

6 Q. Were you responsible for seeing that wells  
7 were properly sealed or --

8 A. No, I was not, but I was responsible for the  
9 job duties that we've already described, and part of  
10 those job duties entailed taking care of problems as  
11 they arose, and that's one of the problems that arose  
12 from time to time.

13 Q. Were you ever involved in the abandonment or  
14 sealing of a well at the Savannah River Plant?

15 A. Physically, no, but I was involved in the  
16 oversight of that.

17 Q. How were abandoned wells sealed at the  
18 Savannah River Plant?

19 A. Some were not.

20 Q. The ones that were, how were they sealed?

21 A. I don't recall the techniques at this time.

22 Q. So you have no expertise with respect to the  
23 techniques of sealing wells?

24 A. I have reviewed the methods. I do not recall  
25 the methods at this time.



1 Q. If I were to say there's a well in this  
2 particular location that needs to be sealed and I'm  
3 asking you to go seal it, could you do it?

4 A. I would not want to do it. If I had to do  
5 it, I would study the techniques that were available at  
6 this time.

7 Q. Based on your knowledge here today you would  
8 not have the technical knowledge to do it?

9 A. I may or may not. I would go and assess the  
10 literature and decide then whether or not I had the  
11 ability to do it or not. I have overseen this in the  
12 past and that's the way I would handle it in the future.

13 Q. What literature would you review?

14 A. I don't recall at this time.

15 Q. Is it your contention that the head  
16 differential between the Savannah River and the  
17 Tuscaloosa aquifer has reversed at any point in the  
18 vicinity of the Savannah River Plant or Plant Vogtle?

19 A. I don't recall that contention. I think I  
20 have raised some questions about that particular issue,  
21 but I don't believe I've made a contention. I may have.  
22 I just don't recall it at this time.

23 Q. Are you aware of any information today that  
24 would suggest that water from the Savannah River has  
25 flowed into the Tuscaloosa aquifer?



1 A. I'm not aware of any information on it, no.

2 Q. What additional preventive measures do you  
3 contend the Applicants should take to prevent  
4 contamination from reaching as has occurred at Savannah  
5 River Plant?

6 A. Once we do their responses, once we get all  
7 their responses, I think I will be better able to make a  
8 decision at this time.

9 Q. Based on the information that you have  
10 reviewed to this date, information in your possession,  
11 can you identify any additional preventative measures  
12 that the Applicants should take?

13 A. I have not made a determination at this time.

14 Q. You can't suggest possibilities?

15 A. I have not made a determination at this time.

16 Q. I take it the answer to my question is no?

17 A. Not the way you stated it. I prefer my  
18 answer better. I have not made a determination what  
19 preventive measures they should make. Part of the  
20 reason is because I have not been provided all the  
21 responses to the questions that have been asked of Plant  
22 Vogtle.

23 Q. Mr. Lawless, I'm asking you to respond yes or  
24 no, and if you wish to provide some explanation you may.  
25 Can you identify for me today any additional

1 preventative measures that you contend the Applicants  
2 should take to prevent contamination from reaching the  
3 lower confined aquifers at Plant Vogtle?

4 A. I have not made any at this time.

5 Q. Do you contend that any time table estimates  
6 prepared for the Savannah River Plant were erroneous  
7 other than the one for tritium?

8 A. As I recall, that is the only one that I have  
9 questioned.

10 Q. Is it your contention that the cretaceous or  
11 the Tuscaloosa Aquifer underlining the Savannah River  
12 Plant is in open communication with the cretaceous  
13 aquifer underlying Plant Vogtle?

14 A. I think that that contention has been raised  
15 as a question. I do not believe that Plant Vogtle has  
16 adequately responded to the questions that have been  
17 raised in that area.

18 Q. Are you, Mr. Lawless, today aware of any  
19 information that suggests that the cretaceous Tuscaloosa  
20 aquifer underlying the Savannah River Plant is in open  
21 communication with the same aquifer underlying Plant  
22 Vogtle?

23 A. I don't recall any at this time.

24 Q. Are you aware today of any information that  
25 suggests that the Applicants intend to turn the Vogtle

1 site over to the public after Plant Vogtle ceases to  
2 operate?

3 A. I'm not aware of any at this time.

4 Q. Going back to what's been marked as  
5 Applicants Exhibit No. 10, in paragraph 72 of that  
6 document, the statement made by Mr. Ice, that paragraph  
7 is accurate with respect to some areas of the Savannah  
8 River Plant; is it not?

9 A. I do not know that it's not accurate to other  
10 areas.

11 Q. I'm not sure I understand your response.

12 A. You seem to be limiting his responses to a  
13 particular area. I do not know that it was limited to a  
14 particular area.

15 Q. My question a little bit different. I'm  
16 asking whether or not it's true there are some areas of  
17 the Savannah River Plant where clearly his statement is  
18 correct?

19 A. It has been postulated that there are areas  
20 of the Savannah River Plant where his answer may be  
21 correct.

22 Q. You're not contending in this proceeding that  
23 Plant Vogtle will use waste disposal practices similar  
24 to those used at the Savannah River Plant, are you?

25 A. What do you mean by waste management

1 practices?

2 Q. When I refer to waste disposal practices, I  
3 mean the use of natural soil column, burial grounds.

4 A. As far as natural soil columns are concerned,  
5 questions have been raised and asked of Plant Vogtle to  
6 better define their liquid waste management system and  
7 radioactive waste system to try to understand a little  
8 bit better about what was going on. At this time I  
9 wouldn't make such a determination. I would like to  
10 wait until I get all responses in.

11 Q. Based on the information available to you at  
12 this time, are you aware of any intent on the part of  
13 the Applicants not to use natural soil columns for  
14 disposal of waste at Plant Vogtle?

15 A. I'm not aware of any at this time that I can  
16 recall.

17 Q. The Applicants' activities at Plant Vogtle  
18 are regulated by the Nuclear Regulatory Commission; is  
19 that correct?

20 A. I'm sorry. I was still thinking about the  
21 last question.

22 Q. My question now is the Applicants' activities  
23 at Plant Vogtle are regulated by the Nuclear Regulatory  
24 Commission; is that correct?

25 A. I would suppose so.

1 Q. Whereas DuPont's activities at the Savannah  
2 River Plant are regulated by the Department of Energy;  
3 are they not?

4 A. And the EPA.

5 Q. The Environmental Protection Agency?

6 A. Some of their activities are.

7 Q. But not with the NRC?

8 A. The NRC does not regulate the activities that  
9 I was familiar with.

10 Q. Let me narrow my question.

11 A. But the NRC's regulations impacted the  
12 Department of Energy regulations and influenced them.

13 Q. In the sense the Department of Energy saw  
14 what someone else was doing and said maybe we need to do  
15 the same thing?

16 A. In the sense that the Department of Energy  
17 was required or requested to comment on the NRC  
18 regulations and the opposite happened also.

19 Q. But NRC had no jurisdiction or control over  
20 the waste management practices at the Savannah River  
21 Plant, did they?

22 A. No, they did not.

23 Q. NRC regulations concerning waste disposal are  
24 much stricter than the Department of Energy, are they  
25 not?

1           A.     That is correct.

2           Q.     In particular, the NRC's regulations are very  
3 stringent with respect to the use of burial grounds; are  
4 they not?

5           A.     That is correct. But I would not say the NRC  
6 regulations are sufficient nor are they fully adequate.

7           Q.     The contamination problems that occurred at  
8 the Savannah River Plant as contamination of groundwater  
9 were largely the results of the practices for disposing  
10 of waste in the ground; were they not?

11          A.     No. We tried to talk about that before.  
12 That's not the only source of contamination. The burial  
13 ground is only one very small part of Savannah River  
14 Plant. The number of radionuclides that are disposed of  
15 in the burial ground are minuscule compared to the  
16 number of high level waste tank form. There are many  
17 sources of contamination at the Savannah River Plant,  
18 airborne, liquid releases, solid releases, et cetera.

19          Q.     Do you dispute that contaminants generally  
20 travel in the direction of groundwater flow,  
21 contaminants in the groundwater?

22          A.     I have raised questions about whether they  
23 only head in one direction.

24          Q.     But by what mechanisms or means would  
25 contaminants head in a direction different from the

1 direction of the flow of water?

2 A. It's possible that they may go in other  
3 directions. I have not tried to specify how they have  
4 gone in other directions. I have extensive experience  
5 reviewing the data of Savannah River Plant which  
6 indicates that they may go in other directions.

7 Q. When contaminants do go in a direction  
8 different from the flow of the groundwater in the  
9 hydrolic unit in which they're located is the rate of  
10 travel generally less in that direction when they're not  
11 in the direction of the water flow?

12 A. I don't recall if -- I don't know that I  
13 could agree or disagree with that. I think that it's --  
14 you may find circumstances where that is so and you may  
15 not.

16 Q. What kind of contaminants moved in a  
17 direction opposite to that of water at the Savannah  
18 River Plant?

19 A. I do not recall at this time.

20 Q. I believe your testimony was that you cannot  
21 identify the specific mechanism by which contaminants  
22 move in a direction other than the flow of the water?

23 A. Not at this time. I would much prefer to sit  
24 down and review the material before I made a statement  
25 on it.



1 Q. Mr. Lawless, have you ever studied or done  
2 any research on the effects upon polymer materials of  
3 radiation?

4 A. Polymer, it sounds vaguely familiar; may have  
5 done that in college.

6 Q. Have you ever had any training or educational  
7 background on subjects relevant to the environmental  
8 qualifications of the equipment in the nuclear  
9 facilities?

10 MS. FOWLER: Just to speed things up.  
11 I'm not sure you understand this, Dr. Lawless didn't  
12 help prepare any of the environmental qualifications and  
13 we're not going to call him as a witness.

14 MR. DAVENPORT: I want to establish his  
15 knowledge or lack of knowledge in these areas.

16 THE WITNESS: I have looked at equipment  
17 in the field, but I have not offhand thought about the  
18 subject that much.

19 Q. (By Mr. Davenport) Do you know what's meant  
20 by environmental qualification of equipment?

21 A. No, I do not.

22 Q. Have you, Mr. Lawless, ever studied or done  
23 any research on steam generator tube degradation?

24 A. No, I have not.

25 Q. Mr. Lawless, have you ever studied about or



1     done any research on the effects of cooling tower drift  
2     deposition?

3             A.     I have provided input on interrogatory  
4     questions, interrogatories for Plant Vogtle on cooling  
5     tower drift.

6             Q.     I'm asking do you have any knowledge about  
7     the mechanisms of cooling tower drift?

8             A.     For say, no.

9             Q.     Can you describe for me what is meant by  
10    cooling tower drift?

11            A.     I have only a vague sense of what it is. I  
12    have studied airborne release at the Savannah River  
13    Plant for a number of years around the country, and  
14    that's it.

15            Q.     Savannah River Plant does not have cooling  
16    towers, does it?

17            A.     No, it does not.

18            Q.     That's airborne releases from smoke stacks?

19            A.     They're airborne releases from many different  
20    sources.

21            Q.     None of those sources are cooling towers, are  
22    they?

23            A.     I think once the release from the cooling  
24    tower has left the cooling tower it no longer knows it  
25    was released by the cooling tower, then it's an airborne

1 release.

2 Q. Are you sure of that?

3 MR. FLACK: I think he said he thinks.

4 MR. DAVENPORT: I'm asking how confident  
5 he is.

6 THE WITNESS: It is something that could  
7 be described by physical chemical release models.

8 Q. (By Mr. Davenport) Have you ever attempted  
9 to do that?

10 A. I have worked with physical chemical release  
11 models, yes.

12 Q. Have you ever attempted to model cooling  
13 tower drift?

14 A. No, I have not.

15 Q. Have you ever yourself attempted to model  
16 releases, airborne releases?

17 A. I have attempted to duplicate the  
18 calculations that have been made by other individuals.

19 Q. But you have not designed any models?

20 A. I have not. Then, again, I have. Yes, I  
21 have.

22 Q. What models have you designed?

23 A. I have modeled releases from the Savannah  
24 River Plant.

25 Q. What you say you modeled releases, tell me

1 what you did specifically?

2 A. Just attempted to calculate the releases.

3 Q. Based upon the amount coming from the source  
4 term?

5 A. At the time I did not know what the source  
6 terms were. That information was not available, so I  
7 had to calculate a source term as well.

8 Q. What was your starting point for your  
9 calculations?

10 A. The starting point were the concentrations in  
11 the environment.

12 Q. From those concentrations in the environment  
13 you then extrapolated a source term?

14 A. A crude source term, yes.

15 Q. What other sort of extrapolation did you make  
16 from the concentrations in the environment?

17 A. Just the source terms.

18 MR. FLACK: Just a minute. Off the  
19 record.

20 (Whereupon, a discussion was held  
21 off the record.)

22 Q. (By Mr. Dav Nport) Mr. Lawless, have you had  
23 any communications with the Nuclear Regulatory  
24 Commission staff on the Vogtle application other than  
25 your comments on the draft environmental statement?

1 A. I have not.

2 Q. Mr. Lawless, have you ever studied about or  
3 done any research on water chlorination?

4 A. No, I have not.

5 Q. Have you reviewed the report prepared by MUC  
6 Corporation concerning drift deposition from the Plant  
7 Vogtle natural draft cooling towers?

8 A. No, I have not.

9 Q. Mr. Lawless, do you have any knowledge  
10 concerning the effect of various levels of salt drift  
11 deposition upon the surrounding environment?

12 A. I have read information on that. I do not  
13 recall what it is at this time.

14 Q. Do you have any knowledge whether a salt  
15 drift deposition of 17 pounds per acre per year would  
16 cause damage to vegetation?

17 A. I have read information on it. I do not  
18 recall at this time.

19 Q. You don't recall whether that rate of  
20 deposition might cause damage?

21 A. No, I do not.

22 Q. Do you have any basis for disagreeing with  
23 the cooling tower drift parameters used by the  
24 Applicants in predicting drift deposition rates?

25 A. Based on calculations that I've seen in the

1 past, predictions versus actual concentrations in the  
2 environment, I have raised questions of Plant Vogtle on  
3 how sure they are of their own calculations.

4 Q. The calculations that you've seen in the  
5 past, none of those dealt with cooling tower drift, did  
6 they?

7 A. That is correct.

8 Q. Have you made any effort to estimate a drift  
9 deposition rate for the Plant Vogtle cooling towers?

10 A. No, I have not.

11 Q. Mr. Lawless, do you have any knowledge about  
12 what rate of chloride deposition might cause damage to  
13 vegetation?

14 A. No, I do not.

15 Q. Mr. Lawless, do you have any knowledge  
16 concerning the emergency diesel generators manufactured  
17 by TransAmerica DeLaval, Inc. for Plant Vogtle?

18 A. No, I do not.

19 MR. DAVENPORT: I have no further  
20 questions.

21 (Deposition concluded.)  
22  
23  
24  
25

C E R T I F I C A T E  
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STATE OF GEORGIA:

COUNTY OF FULTON:

I hereby certify that the foregoing transcript was taken down, as stated in the caption, that the witness was first duly sworn, and the questions and answers thereto were reduced to typewriting under my direction; the foregoing pages 1 through 137 represent a true, correct, and complete transcript of the evidence given upon said hearing, and I further certify that I am not of kin or counsel to the parties in the case; am not in the regular employ of counsel for any of said parties; nor am I in anywise interested in the result of said case.

This, the 29th day of March, 1935.

*Mary J. Brewster*

MARY J. BREWSTER, CCP-B-723  
My commission expires the  
3rd day of December, 1935.



DU PONT DE NEMOURS & COMPANY  
INCORPORATED  
ATOMIC ENERGY DIVISION  
SAVANNAH RIVER LABORATORY  
AIKEN, SOUTH CAROLINA 29801  
TWL 810-771-2610, TEL 803-824-8331, WV AUGUSTA, GA. 7

*From Jackson*

FULMER

17

September 29, 1976

Mr. N. Stetson, Manager  
Savannah River Operations Office  
U. S. Energy Research and  
Development Administration  
Aiken, South Carolina 29801

Dear Mr. Stetson:

As requested in your teletype of September 17, 1976 to J. D. Ellett, we have prepared comments on the technical matters mentioned in the suit by NRDC et al against ERDA concerning the construction of additional waste storage tanks. In accordance with the direction of our attorneys in connection with the preparation of the defense of this law suit, we are submitting the information in the attachment.

The Introduction of the complaint contains broad allegations that are generally repeated with more specificity in later sections. We have replied primarily to these latter sections to minimize repetition. Some of the technical issues are common to Savannah River and Hanford, and the replies of both sites may require coordination. These particular paragraphs are noted in the attachment.

The draft environmental statement on waste management operations at the Savannah River Plant (ERDA-1537) addresses in detail most of the technical matters in the suit. When issued, ERDA-1537 could serve as an important document in responding to the suit. In addition, the "Integrated Radioactive Waste Management Plan for the Savannah River Plant" (SRO-TWM-76-1) provides extensive descriptions of the engineering and safety features of the waste tanks and the plans for long-term management of high-level waste.

Sincerely yours,

*C. H. Ice*  
C. H. Ice, Director



WCR:msg  
Attach.

COMMENTS ON TECHNICAL ISSUES IN NRDC SUIT

- 16.\* The storage of high-level radioactive waste in the tanks funded for FY 1976 and FY 1977 will not result in undue risk to the public from release of radioactive materials to the environment. All relevant and proven technology currently available is incorporated in the design of the new tanks to ensure high-integrity containment over their service life. Although the tanks will have safety features beyond those included in the design of the tanks built earlier at the Savannah River Plant, there is no undue risk to the public from present storage of waste. The radiation dose in 1975 to the population within 50 miles of SRP from storage of high-level waste was 3 man-rem (0.004 percent of the dose from natural radioactivity). This radiation exposure was not caused by leakage or accidental dispersal of radioactivity, but by normal processing of the high-level waste.
- 31b & 51. Project 76-8-a will provide six waste tanks, two evaporators, and additional waste tank farm facilities (pumps, concentrate transfer systems, etc.) The six new waste tanks will have a total capacity of 7.8 million gallons.
- 32b. Project 77-13-d will provide four waste tanks, a waste maintenance facility and a variety of tank farm improvements. The additional tanks will have a total storage capacity of 5.2 million gallons of waste.
36. Strontium-90 (half life of 28.9 years) has been assigned to the Medium-Toxicity (Upper Sub-Group A) category of radionuclides by the International Atomic Energy Agency. (Basic Toxicity Classification of Radionuclides, IAEA Technical Report Series 15, 1963).
37. Cesium-137 (half life of 30.1 years) has been assigned to the Medium-Toxicity (Upper Sub-Group A) category of radionuclides by the International Atomic Energy Agency. (Basic Toxicity Classification of Radionuclides, IAEA Technical Report Series 15, 1963).
52. The term "soft steel" may be misleading. The generic name applied to the steels used to fabricate SRP high-level waste tanks is "carbon steel". More precisely, the steels can be specified in terms of ASTM Standard designations. The tensile strengths of carbon steels used in SRP waste tanks (all are pressure-vessel quality steels) are similar to tensile strengths of austenitic stainless steels used in the waste storage tanks at the Idaho National Engineering Laboratory in INEL tanks as shown below.

<u>ASTM Designation</u>	<u>Tensile Strength, lbs. per sq. in.</u>
<u>Carbon Steels</u>	<u>Range or Minimum</u>
A 285-Grade B	50,000 - 70,000
A 516-70	70,000 - 90,000
A 537-Class 1 (normalized)	70,000 - 90,000

\* Comments are numbered to correspond with the numeration of the paragraphs in the complaint.



ASTM Designation  
Carbon Steels

Tensile Strength, lbs. per sq. in  
Range or Minimum

Austenitic Stainless Steels

A 479* Types 304L and 316L	70,000
Type 348	75,000

\* Current ASTM Standard for stainless steel plates for pressure vessels.

Selection of steel for waste tank construction has been studied extensively at the Savannah River Plant. Both carbon steels and austenitic stainless steels have been considered in recent years for tank fabrication. Based on technical and economic reasons carbon steel was selected as the material of construction for SRP tanks (see Items 68 and 69).

The steel used in the early SRP tanks was A 285-Grade B, and the fabricated tanks were not stress-relieved. These are the only tanks that have experienced nitrate stress corrosion cracking. Waste tanks constructed at SRP since 1967 were made of A 516-70 and were stress-relieved after erection. The steel for tanks funded in FY 1974 and FY 1975 is A 516-70 in the normalized condition. Normalizing is a heat treatment (analogous to annealing) that refines the grain size and improves the toughness of the steel plates. A 537-Class 1 steel is specified for the FY 1976 and 1977 tanks. This steel is supplied only in the normalized condition, and the chemical composition is very similar to A 516-70, except that the specifications on impurities are tighter to ensure more uniform properties among multiple batches of steel.

54. Eight of the sixteen original SRP waste tanks have experienced some leakage from the primary tank to the annular space inside the secondary container. All these eight tanks were built prior to 1960 of A 285 Grade B steel and not stress relieved after fabrication (see Item 52). The leaks occur through small hairline cracks, usually adjacent to welds. The rate of leakage was very slow ( $<0.05$  gal/min) except from Tank 16. In that tank minor leakage was detected in November 1959 from the primary tank to the annular space inside the secondary container (steel pan) and concrete vault. Subsequently, during September of 1960, a large number of very small leaks resulted in a leak rate reaching a maximum of about 4 gal/min. The level of waste in the annular space exceeded the 5-foot height of the steel pan for an estimated period of six hours while a transfer jet was being installed in the annulus to remove the leaked waste. Some waste overflowed into the space between the concrete vault and the steel pan. Leakage from the primary tank was stopped by reducing the liquid level inside the tank below the major leak sites.

A maximum of 700 gallons of alkaline waste rose above the top of the 5-foot-high steel pan liner of Tank 16. Intensive investigation and monitoring over the intervening years confirm that most of the 700 gallons was contained in the concrete vault and the quantity of waste leakage into the soil was limited to a few tens of gallons of waste containing about 7 Ci of radioactivity per gallon (primarily  $^{137}\text{Cs}$ ). Because the tank bottom is below the surface of the near-surface water table, the radioactivity that reached the soil also immediately reached the ground water. The soil contains clay with a significant ion exchange capacity, and consequently during the ensuing period the radioactivity has moved only a few additional feet. The limited migration has been confirmed by extensive sampling and testing with encased wells. The radioactivity level in the ground water 15 feet from the edge of the concrete pad under Tank 16 is about 10 times the normal background of 5 to 15 pCi/l (the Concentration Guide for  $^{137}\text{Cs}$  in drinking water is  $2 \times 10^4$  pCi/l) and between  $2 \times 10^{-4}$  and  $4 \times 10^{-4}$  Ci of radioactivity is estimated to have moved beyond this point. Continued use of Tank 16 was restricted to a reduced volume (below the worst cracks) until it was removed from liquid storage service in early 1972. Further details on leakage from Tank 16 are given in DP-1358.

To prevent possible future accumulation of liquid waste in the annular space, jets of 75 gal/min capacity are installed in the annular space of each high-level waste tank so that liquid waste may be rapidly returned to the storage tank. All tank annuli are purged with air to dehumidify the space and evaporate any leakage to dry, immobile salt.

56. SRP has demonstrated the capability to safely remove sludges and salt cake from SRP waste tanks. Salt cake in SRP tanks can be redissolved in water, and transfer of the resultant solution from one tank to another is a routine SRP operation. Sludge was first resuspended and pumped from a waste tank in 1966 by slurrying with water. Sludge has been also slurried from several other waste tanks since then. In addition, a more cost-effective technique for slurrying the sludge with supernate is being developed and a demonstration with actual waste is planned. Chemical techniques are being developed for final cleaning of retired waste tanks and a demonstration in a cracked waste tank is being planned.

Salt and sludge can also be removed safely from leaking waste tanks. As indicated in response to Item 54, leaks from SRP waste tanks have resulted from small hairline cracks in the primary tank. These small cracks would not interfere with salt or sludge removal. Should complete failure of the primary tank occur, the secondary tank will serve to contain the tank contents during salt or sludge removal.

A process is being developed for solidifying and packaging of SRP waste for long-term storage. The waste will be converted to a solid form that is highly resistant to dispersion to the environment. The

development program is described in the document, "Integrated Radioactive Waste Management Plan for the Savannah River Plant" (SR0-TWM-76-1). No technical obstacles have been identified that would prevent solidification and packaging of SRP high-level waste for long-term storage

58,59,76.

Although WASH-1528 (issued in April 1973) indicated that the waste may remain in SRP tanks through 1999, Savannah River is now planning to remove high-level waste from the tanks at an earlier date. Schedules for several of the options for long-term management of SRP waste show waste solidification to begin in 1987. During the solidification period, waste tanks will be emptied on a scheduled basis to limit high-level waste storage in tanks funded in FY 1976, FY 1977 or in future years to a period of less than 20 years. Other waste management options are also available to meet the schedule of removing the high-level waste from these tanks within 20 years. If a long-term repository is not available to receive the waste, the solidified encapsulated waste could be temporarily and retrievably stored in an environmentally safe facility until the long-term storage facility is completed.

60.

SRP waste tanks do not have domes. The Savannah River Plant Type III waste tank design, developed in 1965, and continually refined since then, includes a steel-reinforced concrete center column 6 feet in diameter that supports the 4-foot-thick reinforced concrete roof slab. The flat 1/2-inch-thick steel roof plates of the tank are pinned to the concrete roof slab to ensure the highest possible structural integrity. Collapse of the roof slab of SRP tanks has a very low probability of occurrence.

61. +

Salt cake is no more corrosive than the liquid high-level waste. This has been demonstrated through experience with waste tanks at SRP in which salt cake has been stored since 1960. Literature survey and laboratory studies substantiate this experience. Stress corrosion cracking can be caused by either strong  $\text{NO}_3^-$  or strong  $\text{OH}^-$  concentrations. Cracking by either anion is inhibited by the presence of small amounts of the other one.  $\text{NO}_2^-$  also acts as an inhibiting agent. ~~In the case of the waste tanks which are known to have cracked due to stress corrosion, the cause was a high concentration of  $\text{NO}_3^-$  and relatively low concentrations of  $\text{OH}^-$  and  $\text{NO}_2^-$  in fresh waste.~~ As the waste solutions age, radiolytic decomposition of the  $\text{NO}_3^-$  occurs, converting it to  $\text{NO}_2^-$  and rendering the waste solution less aggressive. During crystallization of waste, the interstitial liquor becomes more concentrated in  $\text{OH}^-$  as the  $\text{NO}_3^-$  and  $\text{NO}_2^-$  crystallize in the salt receiver tank. Samples of the "terminal liquor" have been analyzed to contain 9M  $\text{OH}^-$ , 2M  $\text{NO}_3^-$ , and 1M  $\text{NO}_2^-$ . Laboratory studies indicate that this liquid (with its high  $\text{OH}^-$  concentration) is stabilized by the  $\text{NO}_3^-$  and  $\text{NO}_2^-$  concentration and should not cause stress cracking of the waste tanks.

+ Reply may require coordination with Hanford.



Salt cake has a higher density than liquid waste. The amount of salt stored in a tank is limited so that its weight does not exceed the design specification of the tank.

62. Meltdown of SRP tanks resulting from a loss of coolant is incredible. The waste tanks are equipped with cooling coils in multiple headers to remove radiolytic heat. A failure of one or more coil headers will not affect the operation of other coils. Twice as many coils as are necessary to cool the waste are installed as a contingency against multiple failure. In addition three other safety provisions have been included in the tank design. These are 1) forced air cooling of the external surfaces of the primary tank, 2) access ports in the tank roof to allow insertion of supplementary cooling coil bundles, and 3) the condenser in the tank ventilation system which returns condensate to the tank. If all of the backup cooling systems were entirely lost for a tank containing the maximum heat content waste, four to ten days would be required before the contents of the waste would reach boiling. During this time the waste could be transferred to a tank with adequate cooling.

- 63-64. ~~There has been no evidence of stress corrosion cracking on the bottom of SRP tanks. Bottoms of new tanks are specified to be flat within 3 inches with no more than a 0.33-inch-per-foot slope on any distortion. Out-of-flatness experience for all recent primary tank bottoms has been less than half the specified maximum.~~ ✓

65. + a. Generalized corrosion is minimal in SRP waste tanks. Wall thickness measurements on ten tanks, and measurements of the bottom plate thickness on two tanks have shown no wall thinning due to general corrosion. ✓  
~~Test coupons exposed in synthetic and actual waste solution showed pitting-type corrosion to be insignificant (rates of less than  $2.5 \times 10^{-3}$  cm/year).~~  
 Examination of one of the cracked tanks showed that the stress-corrosion cracks originated on the internal surfaces and that corrosion on the external surface of the steel was minor. Based on these measurements corrosion is insignificant. The thickness of the steel, as determined from working stresses in the tank walls, is considered to be adequate.

- b. ~~As indicated in item 52, the carbon steel specification for waste tanks at SRP was changed when stress corrosion cracking was detected.~~ ✓  
 Fabrication techniques were also revised to minimize stress corrosion by a stress relieving heat treatment of the fabricated primary vessel. The steel specifications have been revised further so that the plates are supplied in the normalized condition.

- c. Cathodic protection for SRP waste tanks was considered in 1971 and 1972. A consulting firm concluded that cathodic protection was feasible contingent on the results of additional studies to

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- 1) determine effects of cathodic protection on tanks containing salt
- 2) develop anode material and design for a workable system
- 3) develop anode supports and seals

These additional studies relate to the engineering and maintenance considerations of ensuring proper electrical potential and current distribution.

Other problems were identified by SRP. These included

- 1) differences in electrical conductivity of waste supernate, salt cake, and sludge would prevent uniform distribution of current flow over the inner surface of a tank,
- 2) the integrity of the electrical insulation between the system anodes and the tank could not be ensured over a period of years,
- 3) stray electrical currents that might develop could actually accelerate localized corrosion in tanks.

The benefits of cathodic protection for waste tanks was judged by SRP to be small in comparison to the uncertainties and problems of installing such a system. As a result of the advances in tank construction - improved materials and construction technique (stress relief of finished tanks) - and better understanding and definition of the characteristics of SRP waste that caused corrosion problems, in waste tanks, development of the information necessary to implement cathodic protection was not judged to be necessary. Reliance was continued on use of the more resistant steels and improved tank designs for long-term protection. ✓

- d. As indicated in Items 63-64, design, construction and testing specifications for these waste tanks are developed through extensive analysis by specialists and consultants. These specifications are revised as necessary to ensure that SRP tanks incorporate all relevant and proven technology to ensure tank dependability.
66. a. The long-shafted pumps that can be used to remove liquid waste, re-dissolve salt, or slurry sludge from SRP waste tanks are designed to fit into any tank riser larger than two feet. The SRP Type III waste tanks contain numerous access risers larger than this two-foot diameter. Pumping of all these waste products has been demonstrated in existing SRP waste tanks as described in items 56, 67 and 73.
- b. Internal tank cooling coils are a standard part of waste tank design for removing radioactive decay heat from high-heat waste tanks at SRP.

67<sup>+</sup>, 75.<sup>+</sup>

SRP tanks funded for FY 1976 and FY 1977 incorporate in their design and construction all relevant and proven technology currently available to ensure tank integrity over many decades, although they are scheduled to be used for storage of high-level waste for less than 20 years. Tanks and associated equipment are designed with a large factor of safety. They will not be subjected to all the adverse conditions allowed for and should be serviceable for a much longer period than their design life. In the very unlikely event that a tank deteriorates to a point of questionable adequacy before its planned retirement, waste will be transferred from it to another tank (see item 56).

68<sup>+</sup>, 69.<sup>+</sup>

The life expectancy of waste storage tanks made either of stainless steel or carbon steel depends on operational and environmental factors and ability to control those factors. Carbon steel and stainless steel suitable for waste tank construction have similar strengths (see item 52). Austenitic stainless steel of the type used for waste storage is susceptible under specific conditions to the same forms of corrosion that can damage carbon steels. Austenitic stainless steels are susceptible to stress corrosion cracking by chlorides and by caustic; fluoride ions are also known to have caused cracking. Pitting and/or intergranular corrosion (especially in weld heat-affected zones) can occur due to chlorides, fluorides, nitrates, chromates, and other ionic chemical species. Therefore, the specific chemical nature of waste being stored and charges that occur for any reason during storage must be known and must be amenable to adjustment so that conditions corrosive to the steels are avoided. We have a high level of confidence in the longevity of the new carbon steel tank. A similar level of confidence could be obtained for stainless steel tanks only after extensive tests with SRP waste.

INEL is able to maintain tank temperatures at about 35°C because of the low levels of radioactivity in its wastes compared to SRP. This 35°C temperature prevents attack by fluorides that are present. An extraordinarily large cooling capacity would be required to maintain SRP high-level tanks at this low temperature.

Storage of SRP wastes as acid solutions in stainless steel tanks has been evaluated as an alternative to the present neutralized waste system. Safety, technical and economic considerations were included in these evaluations. Acidic waste from SRP processing would involve storing of solids; the amount of solids might be as high as 0.1% (by weight) of the fuel processed. It was concluded that storage of liquid waste in either mode was probably feasible. The risk of either system could be reduced to negligible levels by adequate design and engineered safeguards. The stress corrosion cracking observed previously in carbon steel tanks would not have occurred had they been stress relieved and protected by hydroxide and nitrite ion which are stress corrosion inhibitors. Although either system would provide adequate safety, the neutralized wastes possess certain inherent safety advantages for SRP; namely, the inclusion of the majority of radionuclides in an insoluble and relatively immobile sludge phase and negligible mobility of neutralized

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waste in SRP soil due to soil pluggage by hydroxide ion. Since there were no safety advantages for the stainless steel tanks at SRP, the decision between the two systems was made in favor of continued use of carbon steel tanks.

71. The Savannah River Plant waste tanks funded for FY 1976 and FY 1977 are adequately and properly designed to meet their objective of safe, short-term storage of waste. They will effectively contain the waste, and therefore, their use will not impose a risk to the public from the release of radionuclides. Design of the tanks represents the combined efforts of competent engineers, designers, and consultants. The tank fabricator is selected from among only the most capable industrial tank fabricators in the United States. (see also items 65 b, 67 and 75).
72. In the event that waste leaked from the tanks into the ground, it would not enter the Tuscaloosa aquifer. The near-surface ground water at the tank farms is isolated from the deeper Tuscaloosa aquifer. The near-surface ground water in the vicinity of the tanks is entirely contained on the site. The large Tuscaloosa aquifer is 300 feet deeper than the near-surface ground water, separated by several nearly impermeable clay barriers, and is at a higher artesian pressure than the ground water exposed to the waste tanks. Thus, flow of contaminated ground water could not reach the Tuscaloosa aquifer. Radionuclides that enter the near-surface ground water would decay to permissible levels before reaching the nearest creek because of low ground water velocity and ion exchange characteristics of the soil (see item 54).
- 73.<sup>+</sup> There is neither intention nor need to remove waste from SRP tanks by direct contact or mechanical mining methods; aqueous dissolution and hydraulic slurring techniques have been demonstrated as discussed in items 56 and 67. Worker exposure to radiation is minimized by adequate shielding, and will be maintained well within permissible guidelines. Access openings (risers) through the tank tops are provided to allow installation of waste removal equipment when needed. Installation of much of this equipment, particularly the submerged slurring pumps, before it is to be used is impractical because of potential plugging and other deterioration incurred during the time while the tanks are serving their intended function of safe waste storage. However, each SRP tank in liquid waste service is provided with the facilities required for prompt removal of the tank liquid should this become necessary for either routine or emergency reasons.
- 74.<sup>+</sup> Seismic analyses are an integral part of SRP waste tank design. Consultants recognized for their competence in earthquake phenomenon participated in the design of Type III waste tanks. Analyses have shown that the Type III waste tank, with a 4-foot-thick steel-reinforced concrete roof and a 6-foot diameter steel-reinforced

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<sup>+</sup> Reply may require coordination with Hanford.

concrete center column, will maintain functional integrity in an earthquake producing ground acceleration of 0.2 g. This design criterion is 4 times the acceleration estimated to have occurred at the SRP site in the 1886 earthquake at Charleston, South Carolina.

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