

ORIGINAL
UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of:

PHILADELPHIA ELECTRIC COMPANY

(Limerick Generating Station,
Units 1 & 2)

Docket No. 50-352
50-353

Location: Philadelphia, Pa.

Pages: 11,432-11,611

Date: Thursday, May 24, 1984

*Please return original + 2 copies to Jack
Whitaker, E/W 439 - Distribution: TR 01
0/1*

TAYLOR ASSOCIATES

Court Reporters
525 I Street, N.W. Suite 1006
Washington, D.C. 20006
(202) 293-7990

B405310204 B40524
PDR ADOCK 05000352
T PDR

1b1

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

----- x
:
In the Matter of: :
:
PHILADELPHIA ELECTRIC COMPANY : Docket Nos. 50-352
: 50-353
(Limerick Generating Station :
Units 1 and 2.) :
----- x

U.S. Customs House
Old Customs Courtroom No. 300
Second and Chestnut Streets
Philadelphia, Pennsylvania 19106

Thursday, May 24, 1984

The hearing in the above-entitled matter reconvened
at 9:00 a.m., pursuant to recess.

BEFORE:

LAWRENCE BRENNER, ESQ., Chairman
Atomic Safety and Licensing Board

RICHARD F. COLE, Member
Atomic Safety and Licensing Board

PETER A. MORRIS, Member
Atomic Safety and Licensing Board

1 APPEARANCES:

2 On behalf of the Applicant:

3 MARK J. WETTERHAHN, ESQ.
4 NILS NICHOLS, ESQ.
5 Conner and Wetterhahn, P.C.
6 1747 Pennsylvania Avenue, N.W., Suite 1050

7 On behalf of the NRC Staff:

8 BENJAMIN VOGLER, ESQ.
9 ANN HODGDON, ESQ.
10 JOSEPH RUTBERG, ESQ.
11 Office of the Executive Legal Director
12 U.S. Nuclear Regulatory Commission
13 Washington, D.C. 2055514 On behalf of the Commonwealth of Pennsylvania,
15 Governor's Energy Council:16 ZORI FERKIN, ESQ.
17 Governor's Energy Council
18 P.O. Box 8010
19 1625 N. Front Street
20 Harrisburg, Pennsylvania 17105

21 On behalf of the City of Philadelphia:

22 MARTHA W. BUSH, ESQ.
23 Deputy City Solicitor
24 1500 Municipal Service Building
25 Philadelphia, Pennsylvania 19102

On behalf of Limerick Ecology Action:

CHARLES W. ELLIOTT, ESQ.
1101 Building, 11th and Northampton Streets
Easton, Pennsylvania 18042

C O N T E N T S

	<u>Witness:</u>	<u>Dir.</u>	<u>Cross</u>	<u>Redir.</u>	<u>Recr.</u>	<u>Board</u>
1						
2						
3	G. Daebeler)					
4	S. Levine)					
	E. Schmidt)					
5	G. Kaiser)					
	L. Hulman)					
6	S. Acharya)					
	B. Richter)					
7	W. Pratt)					
8	By Mr. Wetterhahn		11435			
	By Ms. Hodgdon			11447		
9	By the Board					11452
	By Mr. Elliott				11473	
10	By Ms. Bush				11477	
	By Mr. Wetterhahn			11488		
11	By Ms. Hodgdon				11489	
12	G. Daebeler)					
	S. Levine)					
13	E. Schmidt)					
	G. Kaiser)					
14	L. Hulman)					
	S. Acharya)					
15						
	By Ms. Hodgdon	11494				
16	By Mr. Elliott		11502			
	By Ms. Ferkin		11513			
17	By Mr. Wetterhahn		11514			
	By the Board					11528
18						
	G. Daebeler)					
19	S. Levine)					
	E. Schmidt)					
20	G. Kaiser)					
	L. Hulman)					
21	S. Acharya)					
22						
	By Ms. Hodgdon	11540				
	By Mr. Elliott		11544			
23	By Mr. Wetterhahn		11558			
	By the Board					11560
24	By Mr. Elliott			11564		
	By Ms. Ferkin			11566		
25						

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

L A Y - I N S

Testimony and Professional Qualifications
of Messrs. Hulman and Acharya on DES-1 and 2. . . . 11543

Morning Recess. 11491
Noon Recess 11526
Afternoon Recess. 11570
Afternoon Recess. 11597

P R O C E E D I N G S

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

JUDGE BRENNER: Good morning.

When we recessed yesterday, we were ready to go to the Applicant for its combination examination of the Staff witnesses and redirect of its own witnesses. This would be on DES-4.

MR. WETTERHAHN: Yes, the remainder of the specific sections and any follow up on the general hearing that we started the hearing with.

Whereupon,

G. DAEBELER

S. LEVINE

E. SCHMIDT

G. KAISER

L. HULMAN

S. ACHARYA

B. RICHTER

W. PRATT

resumed the stand and, having been previously duly sworn, were examined and testified further as follows:

CROSS EXAMINATION

BY MR. WETTERHAHN:

Q Mr. Hulman, and other members of the Staff panel, you were on the stand when you heard the testimony of Dr. Pratt, with regard to the changes in 5-11(c) and the lack of

1 necessity for changing the other table that was discussed,
2 were you not?

3 A (Witness Hulman) Yes.

Q Has the Staff now had an opportunity to review the
5 changes that Dr. Pratt suggested should be made and to
6 determine whether it agrees with the conclusions of Dr. Pratt,
7 as yet?

8 A Yes.

9 Q What were the results of your deliberations
10 regarding the effect of these changes? Do you agree with
11 these changes?

12 A Mr. Wetterhahn, you asked two questions. Which
13 one would you like me to address first?

14 Q The first. Do you agree with the changes?

15 A In general, we agree that the changes appear
16 appropriate. We've reviewed their bases, the magnitudes
17 of the numbers. They appear appropriate.

18 Q Do you agree that they do not change any of the
19 conclusions in the Final Environmental Statement, in any way?

20 A We agree that they do not.

21 Q Staff, I'd like to turn your attention to page
22 11, Figure 6, 11-1, simplified interdiction model, which is
23 appended to your testimony. This is intended only to mean
24 a simplified pictorial, correct?

25 A (Witness Acharya) That's correct.

1 Q It doesn't purport to show the relative areas
2 of Area 1, 2, 3, or 4, isn't that correct?

3 A That's correct. It doesn't show the relative sizes
4 of the areas.

5 JUDGE BRENNER: I'm sorry. I didn't hear that
6 at all. We've got a noise problem outside, but I don't want
7 to close the windows unless we absolutely have to, so I
8 want everybody to practically shout so that we can leave
9 the windows open.

10 WITNESS ACHARYA: Okay, the question was whether
11 the relative sizes of the different areas shown in the figure
12 -- they really depict the relative sizes of the areas. The
13 answer is no. Here what is shown -- in the figure, what is
14 shown is for illustration purpose only.

15 BY MR. WETTERHAHN:

16 Q For the Applicant's panel, CRAC 2 uses a similar
17 interdiction model as CRAC, does it not?

18 A (Witness Kaiser) Yes.

19 Q I'd like to inquire into the meaning of the area
20 that you determined for, let's say, for example milk inter-
21 diction area. Is that area the area on which there are cows
22 grazing? Is that what area, for the milk interdiction area,
23 means?

24 A As determined in CRAC 2, the area presented is not
25 for milk interdiction. It's the area within which the various

1 dose criteria, given in our Table 4, are exceeded. It takes
2 no account of whether those areas, in fact, cover farmland
3 or not. For example, there could be areas of water or urban
4 waters contained within the CRAC 2 results, so that the
5 actual area of farmland or dairy farmland that would be
6 affected would be smaller than the areas given as our results.

7 Q And the same could be said of crop impoundment
8 areas, too?

9 A Yes, it could.

10 Q Such as listing the areas does not give a true, or
11 even a very good depiction of what the actual milk areas that
12 have to be interdicted -- or crop areas interdicted -- isn't
13 that correct?

14 A It overestimates the actual areas, by quite a
15 large amount.

16 Q Could you tell the Board how this information is
17 processed in the economic model, in order to get dollar
18 results, as far as the values of the milk impoundment area?
19 And does that take into account the fact that not all land
20 is farmland -- is pasture land?

21 endl
22
23
24
25

2pbl

1 A When the cost of interdicting these areas is
2 calculated, all of these factors are taken into account.
3 The fraction of actual farmland within the interdicted area,
4 and in the case of milk interdiction, the fraction
5 which is devoted to dairy farming. Things like urban
6 areas and areas of water are also taken into account.

7 Q So the economic model doesn't say -- have the
8 same shortcomings as just stating the land area in which
9 milk or crops would be interdicted; isn't that correct?

10 A That's correct.

11 Q Let's go back to a question that I think we were
12 interrupted with, Dr. Kaiser, last time. Were you a member
13 of the international benchmark committee?

14 A I was.

15 Q Could you state the full title of that committee?

16 A It's very long. It was the Committee on the
17 International Comparison Study on Reactor Accident
18 Consequence Modeling, sponsored by the Committee on the
19 Safety of Nuclear Installations, which is part of the
20 Nuclear Energy Agency.

21 Q This looked at consequence codes?

22 A It did, yes.

23 Q From how many different countries were consequence
24 codes examined?

25 A Fourteen countries who are members of the Nuclear

2pb2

1 Energy Agency.

2 Q How many independent codes were examined?

3 A Eighteen independent codes were examined.

4 Q When you say independent, are you lumping all
5 the CRAC and CRAC-derivative codes together?

6 A Yes, all the codes which were derived from CRAC
7 were counted as one code.

8 Q What were the results as far as the CCDFs produced
9 by each of these independent models as a result of your
10 benchmark test?

11 A Those independent models which were capable of
12 performing that analysis -- and not all of them were, but
13 those that were capable were, I should say, surprisingly
14 close in their predictions of CCDFs.

15 Q How do you define surprisingly close?

16 A For example, calculating the CCDF for early
17 fatalities they were, with the exception of one code, within
18 a factor of about three of each other. That one code was
19 a German code which for various detailed reasons was
20 considerably lower than the others.

21 Q Thank you. In the Applicant's testimony, Table
22 4 -- would you turn to Table 4? The dose criteria used in
23 CRAC and CRAC 2 to define interdiction requirements. Given
24 these values, does the codes that you used, the CRAC 2 code,
25 still calculate health consequences for doses both above

2pb3

1 and below these values?

2 A Yes, yes.

3 Q So that the manrem contribution, even though these
4 criteria were not met would have been summed up by the code.

5 A That's correct, yes.

6 Q And therefore used in the various predictive
7 health effect models.

8 A That's right. The CRAC 2 code, and indeed the
9 CRAC code take into account the chronic pathways, such as
10 irradiation by -- gamma rays, by deposited fission products,
11 consumption of various food products, that is factored into
12 the calculation of population dose.

13

14

15

16

17

18

19

20

21

22

23

24

25

1 Q Mr. Levine, there was considerable testimony with
2 regard to significance, and what constitutes significance,
3 as far as the results of these consequence analyses. Could
4 you comment on what you consider a measure of significance?

5 A (Witness Levine) Well, let me first try to
6 characterize the area we're talking about. In WASH-1400, we
7 not only predicted the results of the consequences to the
8 public, and the economic consequences of public -- of
9 accidental -- accident risks in reactors, we compared them
10 with other risks that exist in society, to which the public
11 is already exposed. And there is a long list of the kinds
12 of accidents, and the causes of cancer, and the like, in
13 WASH-1400.

14 For instance, there's a curve -- there are CCDF
15 curves of early fatalities from a number of causes, such as
16 dam failures, airplane crashes, and the like. And there is
17 a curve of reactor accident risks for the 100 reactor industry
18 in this country. And that curve shows that the reactor
19 accident risks are for all values of consequences shown five
20 orders of magnitude less than the total of all risks, all
21 accident risks.

22 And that didn't even include automobiles. If
23 automobiles were included, it would even be higher. The
24 difference would be greater.

25 The other point about those curves is that the

1 peak consequences shown for reactor accident risks down to
2 probabilities of 10^{-9} , which are essentially vanishingly
3 small already, were not higher and in many cases lower than
4 other accident risks -- other accident consequences.

5 Another way of looking at that is to make some
6 approximate comparisons of risks predicted for Limerick with
7 risks predicted in the same general area. And we have generated
8 some numbers that I would call approximate numbers, just to
9 use for illustrative purposes. And here we use median values
10 of predicted risks for Limerick against measured values in
11 society, a ratio to the various population areas around the
12 Limerick Station.

13 Now, for instance, within a 10 mile radius of the
14 Limerick Station, the predicted early fatality risks are
15 a factor of a million less than the risks of early fatalities
16 from all other causes. The individual risk at one mile from
17 the reactor, for early fatalities, is 1/100,000th of those
18 that already exist from other causes. And at 10 miles, it's
19 1/10 millionth. So the point of that is that as you move
20 away from the reactor, the risks drop -- the early fatality
21 risks drop dramatically. They drop very quickly and become
22 vanishingly small very soon.

23 For cancer fatality risks within 50 miles of the
24 reactor, the ratio of those predicted from Limerick to those
25 which exist within 50 miles to the general population from all

1 causes, is again a factor of a million less for Limerick
2 than for all other causes.

3 For economic cost, the ratio is 1/100,000th less
4 for Limerick than for other cost that society already bears
5 in connection with accident risks. That is counting just
6 offsite consequences. If you look at the loss of plant, the
7 ratio is one or two in 10,000, so that even that is a small
8 value, compared to other risks that society bears.

9 So my point is, irrespective of all the questions
10 that have been asked about what is risk significant, the point
11 to be made is in these analyses the risks are, in fact,
12 vanishingly small compared to other risks, and are trivial.

13 Q We've heard various -- I address the Applicant's
14 panel -- much testimony about the upper and lower ranges
15 of various parameters and we've talked about what is the
16 worst possible state for each of the parameters. Is there
17 any basis for taking the worst possible parameter or
18 condition in each of the various choices that you have, under
19 the code, and combining this and get a very, very worse
20 possible case as a measure of the disclosure of risk to the
21 population?

22 A That's an irrational procedure, in my estimation.
23 The chance of all these parameters, be they weather, be they
24 reactor accident scenarios, whatever -- all happening, in the
25 very worst way, at the same time are essentially -- that's an

31b4

1 irrational combination. The probabilities of such things
2 happening are even smaller than these vanishingly small
3 probabilities I've already discussed.

4 Now we have made estimates of the uncertainties
5 in our values, and they can go up by a factor -- up or down
6 by a factor of 10 or so. And even if you raise ours by
7 a factor of 10 -- which would be our 95th percentile -- they
8 don't change. They're still insignificant and pushing for
9 inclusion of small factors that might affect one of these
10 values by 10, 20, 30, 50 percent or a factor of 2 or 3, is
11 not going to change anything.

end3

12
13
14
15
16
17
18
19
20
21
22
23
24
25

4pbl

1 Q So in your professional opinion, is it then
2 better to do a probabilistic risk assessment as a disclosure
3 document in a realistic basis or a conservative basis?

4 A Well, you almost have no choice in doing a PRA.
5 And I'd like to dwell on that for a minute. In order to do
6 a PRA, when you talk about the systems analysis part, the
7 event trees and fault trees, you generate descriptions of
8 hundreds to thousands of accident sequences, and then you
9 differentiate among them to find out which are the ones
10 that are going to contribute most to risk.

11 And you then eliminate the rest from consideration
12 because they don't matter. Now the only way you can make
13 such a differentiation validly is to compare them on about
14 the same basis. And you try to do that realistically, because
15 if you do it with conservatism, you never know whether this
16 sequence is 100 times more conservative than the next one,
17 and so forth. And this differentiation process cannot be
18 done well.

19 So you must start realistically in order to do
20 a PRA. I think the other part of the PRA is that it's not
21 really involved in the safety decision making of a reactor.
22 That is, a specific PRA on a specific plant, it's really
23 a characterization for the public of the environmental risks
24 that are potentially possible from this reactor or any
25 reactor. And you owe the public a realistic answer in that

4pb2

1 event, as opposed to a conservative answer.

2 MR. WETTERHAHN: Thank you panels. I have no
3 further questions.

4 JUDGE BRENNER: Staff.

5 MS. HODGDON: May I have a moment please?

6 (Counsel conferring.)

7 REDIRECT EXAMINATION

8 BY MS. HODGDON:

9 Q Mr. Levine just explained WASH-1400.

10 (Discussion off the record.)

11 BY MS. HODGDON:

12 Q Mr. Levine -- you've heard Mr. Levine's testimony
13 which was just given regarding WASH-1400 and the results and
14 economic consequences that were calculated there.

15 JUDGE BRENNER: Ms. Hodgdon, I apologize for the
16 interruption but I think you may have made an error. Who
17 are you directing the question to?

18 MS. HODGDON: I'm directing the question to Staff,
19 am I not?

20 JUDGE BRENNER: Don't worry about it. You've
21 clarified it now.

22 MS. HODGDON: Oh, excuse me. I meant to direct
23 the question to Staff. I think maybe the part that you
24 didn't hear, I had identified Staff. I'm asking the question
25 of Staff regarding Mr. Levine's testimony that was just

4pb3
1 given concerning WASH-1400 and the results calculated, and
2 the comparisons that Mr. Levine made between the risk of
3 nuclear power plant operation and risk of other origins to
4 which the public is exposed.

5 BY MS. HODGDON:

6 Q I would like to ask Dr. Acharya or anybody on
7 the Staff panel whether they can provide a comparison of
8 their estimates of the risk of early fatality associated
9 with the operation of the unit at the Limerick plant with
10 other such risks to which the population -- population which
11 is subjected to those risks is exposed.

12 A (Witness Acharya) Well, we have provided the
13 comparison of the risk of early fatality and latent cancer
14 fatality that result from the Limerick reactor accidents
15 with the risks of a prompt fatality from causes other than
16 reactor accidents at Limerick. These estimates can be
17 found at such pages in the FES, let me identify those pages.

18 Beginning the page 5-98 --

19 JUDGE BRENNER: Excuse me, Dr. Acharya, I'm
20 confused. Ms. Hodgdon, maybe you can help me out.

21 question asked for a comparison of the risks from early
22 fatalities?

23 MS. HODGDON: My question was not so particularized,
24 but I think that Dr. Acharya has chosen to break it down and
25 I have no objection to his answer.

4pb4

1 JUDGE BRENNER: I thought I heard that in your
2 question. Well, be that as it may, my confusion is as
3 follows. I don't understand that to be part of the contention.
4 Maybe you can help me out. We had finished with the health
5 effects part, I thought, although Mr. Elliott came back with
6 some general cross questions at the end, and I understand
7 your followup is related to that now.

8 But the health effects contention, (a) one talks
9 about latent health effects other than fatalities. And
10 the other parts speak for themselves. So I'm not sure how
11 the question, if it goes to a comparison of early fatalities
12 is relative to our findings necessary to deciding the issue
13 in controversy.

14 MS. HODGDON: My question was related to Mr.
15 Levine's answer concerning risks of the -- and I was trying
16 to get to a useful comparison of Mr. Levine's testimony --
17 with the Applicant's testimony regarding that matter with
18 the Staff's because I think that they're on a different
19 basis and different terms. Mr. Levine said --

20 JUDGE BRENNER: Let's not repeat all his testimony.
21 I'll give you a chance to tell me in a moment if you still
22 want to. But either the way you ask the question, or the
23 way Dr. Acharya was beginning to answer it, I had a concern
24 that we were going to get a lot of stuff on the comparison
25 I just mentioned, and very little that will help us with

4pb5

1 judging significance, which is what I now understand you
2 want to probe.

3 MS. HODGDON: The question put to Mr. Levine was
4 about significance. My question is also about significance,
5 and that is in terms of the FES, what is, or can you say
6 what the risk of Limerick is as compared with other risks
7 to which society has imposed preferably with regard to --
8 as compared with Mr. Levine's statement.

9 JUDGE BRENNER: Okay, we'll allow it in that
10 context. And maybe the witnesses can keep that context in
11 mind in their answer also.

12 WITNESS ACHARYA: Okay, as I started saying, the
13 comparison of the fatalities, both early fatality as well
14 as the cancer fatality -- they are provided in the FES,
15 pages 5-98 through 5-100. I would not like to repeat the
16 statement of the comparison as it is calculated there. But
17 that is also a comparison in FES page 5-92, that the
18 population exposure that would result from -- that may result
19 from the Limerick reactor accidents, we didn't -- at the
20 site, that's provided in one of our tables, which is about
21 700 personrems per each year of operation of the Limerick
22 reactor.

23 On the other hand, the population within 50 miles
24 of the site receives about 800,000 personrem per year from
25 natural background radiation. Now there are a number of

4pb6

1 health effects that we have estimated and provided in response
2 to the contentions, like the nonfatal cancer genetic effects,
3 and the spontaneous abortions. The basis for those
4 computations are the personrems.

5 Now, on the basis of 700 personrems from the
6 Limerick reactor accidents per reactor year, whatever
7 estimates that we have provided, they may be compared to the
8 similar effects, the nonfatal cancers and the genetic effects
9 and that would be stemming from 800,000 personrems from
10 the natural background radiation. So their proportion would
11 stand like this: 700 to 800,000. So this is small.

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 BY MS. HODGDON:

2 Q Dr. Acharya, did you have any further comment on
3 Mr. Levine's statement regarding the risk of Limerick?

4 Is -- I said any further comment. Or Mr. Hulman?

5 The SARA, as compared with the FES?

6 A (Witness Acharya) Well, I would not like to make
7 any detailed statement about whatever differences that might
8 be there in the assessment of Levine with ours, relating
9 the comparison of the reactor accident risk relating to that
10 of other causes. But however, I would agree with the general
11 conclusion that was stated by Mr. Levine.

12 Q Thank you.

13 MS. HODGDON: I have no further questions at this
14 time.

15 BOARD EXAMINATION

16 BY JUDGE MORRIS:

17 Q Dr. Kaiser, I'd like to learn a little bit more
18 about the benchmarking process that was carried out by
19 the CSNI. For example, was a specific set of inputs described,
20 which was then used by the practitioners of the art in their
21 own computer programs?

22 A (Witness Kaiser) Yes. For some of the problems
23 that were carried out, in the comparative exercise, to the
24 extent possible we tried to define the same input parameters.

25 Q Could you describe some of those parameters, the

1 important ones?

2 A Yes. For example, when we were looking at the
3 meteorological models contained in the various codes, some
4 of the comparisons were carried out with similar wash-out
5 coefficients for modeling the rainfall and the same deposition
6 velocities for modeling the effect of dry deposition onto the
7 ground.

8 Q What were used as source terms?

9 A Three artificial source terms were used. They
10 contained approximately 30 percent of the inventory of volatile
11 fission products in a large commercial light-water reactor.
12 They were fairly quick accident sequences in that the times of
13 release, and so on, were quite short, on the order of an hour.
14 In other words, it was meant to be a representative severe
15 accident sequence.

16 Q By representative severe, do you mean one which
17 would be high on the list of dose, which dominated the
18 public risk?

19 A Yes, that's correct.

20 Q Would it be fair to summarize by saying that
21 the same source terms were used, the same transport mechanisms
22 were used, the same dispersion methodology was used, and
23 the same health effects models were used?

24 A Could you clarify that? Are you asking me whether
25 the same methods and input parameters were used by all parties,

1 at all stages of the calculations?

2 Q Well, to what extent were they?

3 A As far as input parameters were concerned, there
4 was an attempt made to make those conform. But as far as the
5 material that is hard-wired into the code is concerned -- such
6 as, for example, parameterizations of the standard deviations
7 in the Gaussian model, those were left much as the
8 participants had put them into the codes in the first place.

9 So there was never any stage of the calculations
10 where the calculations done by the various participants were
11 identical in all respects.

12 Q I'm trying to get a feeling as to what extent the
13 comparison of the results was valid.

14 A As far as the final risk calculations are concerned,
15 the CCDFs, by the time we got to that stage, the participants
16 were modeling the results pretty much as they would have done
17 if they had been working independently. They were using
18 their own models and their own input --

19 (Panel conferring.)

20 A (Witness Kaiser) Yes, my colleagues suggest that
21 maybe you're asking whether the participants used the same
22 meteorological and the same health effects model, and so forth.
23 And the answer is no, they did not.

24 Q To what extent were the methodologies derived from
25 CRAC, as developed in WASH-1400? Another way of asking the

1 question, were some of the codes developed independently?

2 A Yes, some of the codes were developed quite
3 independently of CRAC. For example, when I was in the U.K.,
4 I was responsible for a code called TIRION and the
5 meteorological modeling in that code and the health effects
6 modeling was based on U.K. expert opinion and not on U.S.
7 expert opinion. Some of the other countries were very
8 -- I was going to say idiosyncratic, but they certainly
9 pursued their own views to a very independent extent
10 on meteorological modeling and health effects.

11 Q And does this -- are these differences, which
12 did in fact exist in the development of these various codes,
13 is that the basis? And would you say it was surprising that
14 the final results were so close?

15 A Yes, some of the intermediate results were further
16 apart than the final CCDFs.

17 Q Previous testimony this morning was discussing
18 the comparison of risk. And I guess, Mr. Levine, you were
19 talking about that, comparing the risks from severe accidents
20 from reactors with those risks which the public is already
21 exposed to. Focusing on the non-nuclear risks, are those
22 reported in a realistic way or in a conservative way?

23 A (Witness Levine) They are basically from
24 statistical data, which is very realistic.

25 Q So, in your opinion, would it make any sense to

51b5

1 compare the conservative reactor risk with the realistic
2 non-reactor risks?

3 A Not at all.

4 Q And is that the reason that -- or is that one of
5 the principal reasons -- that nuclear risk is done realistically?

6 A Well, it was not done with that in mind, but that's
7 another good reason for doing it realistically. If you
8 are, in fact, interested in making comparisons, you should
9 compare things on a like basis. And if you're comparing with
10 reality, you should try to predict reality.

11 Q Well, I guess in our context today, we're thinking
12 about the NEPA-type comparison?

13 A That should be done realistically.

end5

14

15

16

17

18

19

20

21

22

23

24

25

6pb1

1 Q Is it correct that the sequence with which the
2 work was done by the Staff and the Applicant was that SARA
3 was done before the FES was done?

4 A Yes, that's true.

5 Q Before the DES also.

6 A Yes.

7 Q And the Staff, was the DES and FES largely
8 based on work done by the Applicant?

9 A (Witness Pratt) In the context of the calculations
10 that we did at Brookhaven related to the fission product
11 release, this was done over a number of years. Initially
12 we did the calculations relating to the internal events,
13 long before we saw the SARA document, which is dealing with
14 the external events. /

15 We did these calculations completely independent
16 of the calculations performed by the Applicant. When SARA
17 came along we looked at the accident classifications, the
18 additional accident classifications that were generated by
19 the external events and did our own calculations to calculate
20 fission product release for accidents, again, independently
21 of them.

22 A (Witness Hulman) In terms of calculating
23 consequences and what we characterize as the back-hand risk,
24 the Staff used some of the information provided by the
25 Applicant and SARA, but did its own independent assessment

6pb2

1 and drew its own conclusions from its own computations.

2 Q As a result of that Staff work, was it your
3 opinion that the Applicant's PRA and SARA results were not
4 sufficiently conservative? To put it another way, did you
5 agree or disagree?

6 A We agreed with the conclusion in terms of the
7 relative conservatism between the two assessments, we did
8 not approach that question. We agreed with the conclusion
9 and we came -- the bottom line conclusion of the Applicant.
10 We came to our own conclusions on relative risk.

11 Q Well, there were, I seem to recall, some comments,
12 critique by Brookhaven and/or the Staff of the PRA and SARA;
13 is that correct?

14 A There is an appendix in the FES that provides
15 a critique of our comments on SARA. But in terms of my
16 understanding of the question, Dr. Morris, we did not, as
17 I remember come to an overall conclusion of the relative
18 conservatism of the Applicant's assessment versus ours.

19 Q Were there differences in the numerical results?
20 For example, frequency of core melt.

21 A Yes.

22 Q Were those significant?

23 A In terms of the overall conclusion, no.

24 Individually they could have been, but we didn't look at
25 individual accident sequences for that kind of finding. We

bu 2

6pb3
1 were interested in relative risk.

2 Q Does that imply that any differences were well
3 within the error bands?

4 A Yes.

5 Q In the Applicant's review of the Staff and
6 Brookhaven's comments, did you generally agree or disagree?

7 A (Witness Levine) It's our view that some of the
8 Applicant's approaches represented what we would call
9 conservative as opposed to realistic. But these could be
10 honest differences of opinion. It's hard to know.

11 But the import of our comments was, that they were
12 probably more conservative than we thought they should be.

13 Q Was it also true that the differences were not
14 significant in terms of the error bands of the results?

15 A I think that's right. I think their mean values
16 lie near our upper bound values, and so there is some overlap.

17 Q Is it correct that the overall conclusion of both
18 the Applicant and its consultants is essentially the same
19 as that of the Staff and its consultants?

20 A Yes. I should add, I think, that it's -- you
21 know, when you do a PRA, if you're not striving very hard
22 for reality, it's easier to get higher numbers than real
23 numbers. And the way in which one does calculations, one
24 starts by putting in estimated values and you then try to
25 find out what's important, and you then relook at those

6pb4

1 important matters to try to make them more realistic. And
2 you do this on an iterative process with many iterations.

3 And if you stop iterating too soon, you don't
4 get as close to reality as you might otherwise get. So it's
5 hard for someone, in looking at another's published work
6 to understand how hard they were striving for reality. It's
7 not apparent in the written work.

8 Q There's one other topic that I'd like to talk
9 about a little bit. In some of the testimony, both oral
10 and prefiled, semantics sometimes I believe are a little
11 fuzzy. Reference has been made to acceptable levels of
12 contamination, for example. And this may -- this kind of
13 usage may vary from one country to another.

14 Is there such a thing as an acceptable level of
15 contamination, or dose or dose rate?

16 A (Witness Hulman) Who are you addressing the
17 question to, Dr. Morris? Anybody on the panel?

18 Q Both the Staff and the Applicant.

19 A My opinion is that there is no such level following
20 accidents. It's a dose level -- except in one case. The
21 one case is whether regulatory criteria are met, and then
22 it's not an acceptable dose, it's whether an acceptable
23 showing of dose under 10 CFR Part 100 and parts of Part 50
24 have been met, with respect to a real reactor accident,
25 rather than the kinds of accidents that we analyze to show

6pb5

1 compliance with the regulations.

2 My view is that there is no such thing as an
3 acceptable dose or an acceptable level of contamination.
4 It's the -- the level of contamination is, in my view,
5 never acceptable.

6 Q Well, is it just your view, or it that -- to
7 begin with a Commission, NRC understanding of the use.

8 A In terms of the Commission, I can't speak for the
9 Commission.

10 Q Well, you can speak in terms of its rules and
11 regulations.

12 A There are, to my knowledge, none of its rules
13 and regulations that speak to the acceptability of any level
14 of dose or contamination resulting from accidents, other
15 than those that are contained within 10 CFR Parts 50, 20
16 and 100. Those statements on dose levels contained in
17 Parts 50, 100 and 20 are not couched in terms of acceptable
18 levels of contamination or doses. They are couched in
19 terms of the showing of consequences from specific kinds of
20 accidents, but not in terms of acceptability of doses.

21 I can't remember a statement anywhere in the
22 regulations that speaks explicitly to the acceptability of
23 an accident dose or a level of contamination following an
24 accident.

25 Q Mr. Levine, before you start, let me refer you to
your paragraph 48, the first sentence.

1 A (Witness Levine) That statement, which does use
2 the words "acceptable levels", means it meets the criteria
3 specified in Table 4, and that's the meaning of that sentence.

4 I'd like to comment more broadly, however. I
5 think our whole society is struggling in many areas, not just
6 the field of radioactivity, but especially EPA is struggling
7 very hard now with toxic chemicals and they are, in fact,
8 in the broadest sense of the word, trying to define acceptable
9 levels of risk. People have been trying, and the government
10 for years trying to avoid dealing with that concept, at least
11 in the United States government.

12 It has now reached the point where, as thought
13 processes evolve, it's becoming apparent that one must come
14 to such conclusions. In fact, the NRCs proposed safety goals
15 are a step in that direction. Again, they do not define
16 acceptable levels, but they are really intellectually trying
17 to define acceptable levels. So there, in fact, if you look
18 across society with what man has learned in the last five
19 decades, that with life expectancy increasing by 50 percent,
20 we are seeing new things. We are seeing second order effects
21 from pollution that affect that life expectancy and we're
22 trying to struggle with that.

23 It's an unknown area. You read alarming stories
24 by a lot of people about this matter. But the plain fact of
25 the matter is that life expectancy, in the past five decades,

1 has increased by 50 percent, from about 50 years to about
2 75 years. And that we are learning a great many new things
3 about this. And it's becoming more apparent to me that the
4 government will have to deal explicitly with the concept
5 of what is acceptable. And people are talking about that all
6 the time.

7 While you don't see much of it in regulations,
8 that's the coming thing.

9 Q I really didn't want to get too philosophical. I
10 just wanted to be sure that I understood the meaning that you
11 attached to the word acceptable. And really, if I understand
12 correctly -- and let me try -- it's not so much that it's
13 acceptable, but it's a numerical guide to when some particular
14 action might be advised.

15 A That's correct.

16 Q Thank you.

17 BY JUDGE COLE:

18 Q Just a couple of questions, gentlemen, on the
19 Applicant's testimony on page 37, last part of Item 49. I
20 believe yesterday one of the witnesses testified that they
21 used the actual farmland percentages in the vicinity of
22 Limerick for their computer runs. Do you know what the
23 fraction of farmland, within the 10 mile radius of Limerick,
24 is? Or where is it, in the documents that are before us?

25 A (Witness Kaiser) I haven't carried out that

1 calculation, no. I have only given you the county by county
2 breakdowns. And I didn't do the necessary average to work out
3 what it actually is within 50 miles.

4 A (Witness Schmidt) The county numbers are in
5 Table 10-11 of SARA. And I believe that -- is that into
6 evidence?

7 MR. WETTERHAHN: Yes.

8 WITNESS SCHMIDT: The plan is, I believe, in
9 Montgomery and Chester counties.

10 JUDGE COLE: Okay, thank you.

11 BY JUDGE COLE:

12 Q Table 1, page 57 in the Applicant's testimony.
13 I want to make sure I understand what the numbers mean. You
14 provide some guidance to that, on pages 7 and 8, the bottom
15 of 7 and the top of 8 of your testimony. In Table 1 you
16 show results, in the first item, for Case 1, 4.52×10^{-5} .
17 And back in page 7 and 8, you indicate -- Judge Brenner has
18 pointed out to me that this pertains more to 3.

19 Under the results in Table 1, you show the area
20 under the CCDF curves. And my question is, how do you
21 interpret those numbers and what is the significance with
22 respect to the effects of the different relocation and
23 sheltering assumptions?

24 A (Witness Kaiser) We interpret these results in
25 the same way, I think, as we have been interpreting similar

71b4

1 results throughout this period of questioning. The figures
2 given in Table 1 represent an average number of a year of
3 fatalities in the region around Limerick due to accidents at
4 the plant, predicted average number. The intent of the table
5 is to show that if you make some variations in the way
6 in which emergency responses might be carried out, beyond 10
7 miles, you can make quite a large variation in that response
8 without affecting the magnitude of the answers very greatly.

9 Q Well, I expect we will get some more detail on that
10 when we talk about that particular contention. But I couldn't
11 find very much in the testimony where you directly stated those
12 conclusions, sir. We'll get to that.

13 Table 3, page 59. I would like someone on the
14 panel to tell me how I might use this number, this dollar value
15 of total economic risk, and does it have any significance
16 with respect to financial planning or insurance rates, or
17 anything like that?

18 This is Table 3 in the Applicant's testimony, but
19 either Staff or Applicant can respond to that.

20 A We are not experts in economics. Let me say that.
21 My -- I guess, rather simple-minded interpretation of this
22 number would be basically what you might have to pay in
23 insurance in order to cover these accidents. I might add that
24 the purpose of the table is to show that some of the -- or
25 the effects called out in the contention, such as areas of

1 crop interdiction and milk interdiction, are small contributors
2 to the total cost of an accident.

3 Q All right.

4 A (Witness Richter) I agree with the response that
5 it does reflect roughly what an insurance premium would be
6 over the lifetime operating of the plant.

7 Q Less profit for the insurance company? Okay.
8 Thank you.

9 (Laughter.)

10 Table 2 of the Staff testimony, probability
11 distributions of interdicted land areas. We have five columns
12 on that page and I need some help in interpreting what's in
13 the table and what I should be looking at, how I interpret
14 it -- how I should interpret it.

15 A (Witness Acharya) The five columns in Table 2,
16 the first column -- which is the magnitude, as I had occasion
17 to explain yesterday -- the magnitude column should be
18 multiplied by 1,000. That number being underneath the
19 columns 1, 2, 3, 4. So the magnitude should be read in
20 terms of thousands of square meters.

21 Under column 1 we have the probability distribution
22 where the corresponding various magnitudes, which would be
23 equaled or exceeded per reactor year.

24 Q It doesn't say that anywhere on this page, though,
25 does it?

A That is not anywhere.

8pbl

1 Q What are the units for each column?

2 A For the first column --

3 Q The first column is the one identified as
4 magnitude or the one under the letter one, the number one?

5 A The first column is identified as the magnitude.

6 Q Okay, what does that mean?

7 A So that means the number of thousands of square
8 meters of farmland.

9 Q Okay, since the first entry in that is 1×10^0 ?

10 A That's right. The first entry is that, but that
11 has to be multiplied by 10^3 .

12 Q Okay, so that's magnitude in thousands of square
13 meters.

14 A That's correct.

15 Q And this is the amount of land interdicted, so
16 the first one is 1,000 square meters.

17 A That's right.

18 Q Okay, the next one.

19 A The next one on the column --

20 Q No, on the column right under magnitude, that's
21 2,000, right, and so on down the column?

22 A That's right.

23 Q Okay, thank you. Now go to the next one.

24 A The next one is the probability per reactor year
25 that the land would be interdicted for more than 30 years of

8pb2
1 size, 1,000 square meters. The next one in the same column,
2 it corresponds with probability for magnitude 2,000 square
3 meters. And the last one in the same column would mean that
4 a probability per reactor year is 7.52×2^{-9} . That the
5 7×10 is for 5,000 square meters would be interdicted for
6 more than 30 years.

7 Q Would you repeat that? I'm trying to follow you
8 here.

9 A (Witness Hulman) Judge Cole, the titles are
10 not labeled, as we often see them. Let me see if I can take
11 the last number in the second column which has a value of
12 $7.52E^{-9}$.

13 Q Fine.

14 A The interdiction of land for more than 30 years
15 has a probability of 7.52×10^{-9} of 7.00×10^8 square meters,
16 or 7.00×10^5 thousand square meters.

17 Q All right, sir. Now the column headings of the
18 second, third, fourth, and fifth columns that are identified
19 by the numbers 1, 2, 3, and 4. Is that the type of area
20 identified in Table 1 on the previous page? Is that what
21 those numbers refer to?

22 A (Witness Acharya) That's correct.

23 Q Okay, so column 4, which is the last column on
24 Table 2 on the right-hand side pertains to the land area for
25 milk interdiction in the first year; is that correct?

8pb3

1 A That's correct.

2 Q Okay, thank you.

3 A But the numbers in Table 1 are derived from the
4 combinations of the numbers in Table 2 and Table 3.

5 Q All right, sir, thank you. I can now interpret
6 the tables.

7 BY JUDGE BRENNER:

8 Q In the Applicant's testimony on page 40 in the
9 middle of that paragraph 55, which encompasses that page
10 there is a parenthetical phrase after the discussion of the
11 economic risk when factoring in risk economic expression of
12 health effects, risk to the extent noted therein. And the
13 phrase is, "Note that these results would not change
14 significantly if they were recalculated using the revisions
15 described in SARA Supplement 3."

16 What did you have particular reference to in those
17 revisions?

18 A (Witness Kaiser) The revisions carried out in
19 SARA Supplement 3 were carried in order to take account of
20 the fact that our previous calculations had inadvertently,
21 incorrectly fed in some of the meteorological data. And
22 I think you were made aware of all that.

23 Q Yes, do you have any particular changes there
24 that would be most material to these -- to the testimony
25 on page 40, even though I understand your conclusion, they

8pb4

1 wouldn't change significantly. But I'm wondering which
2 portion of the revisions would have had the potential to
3 affect this much materially, or it would have to all be put
4 together?

5 A When that revision was incorporated, the changes
6 in latent results and economic caused tended to be in the
7 range 25 to 50 percent in the upward direction. If you
8 modified the figures given on page 40 of \$1900 per reactor
9 year and \$6,000 per reactor year by about those --

10 Q I'm sorry, I didn't hear you.

11 A By those factors of 25 to 50 percent, my conclusion
12 basically that the -- incorporating the cost of health
13 effects is not really going to affect your conclusions about
14 the importance of cost of reactor accidents is not altered.

15 Q All right, while we're on the subject of factors
16 on page 9, which contains paragraph 13, you talk about the
17 uncertainties and reference the Staff's range and then you
18 state, "Typically the area under the upper estimate CCDFs
19 and SARA are on the order of a factor of 100 greater than
20 the area under the lower estimate CCDFs."

21 Did you mean on the order technically, or were
22 you just using it for prose? Could that be 10 or 1,000?

23 A (Witness Schmidt) The number varies depending
24 on the consequence you're considering. Some of them, the
25 range is a factor of 60. Others, the range is a factor of

8pb5

1 say, 180. The 100 was meant to be an indication of that
2 range.

3 Q On page 7 and continuing over to page 8, which
4 are parts of paragraph 11, you discuss that an alternate
5 way of looking at a CCDF, and you say, "One simpler depiction
6 of risk would be to take the area under the CCDF" -- well,
7 you use the example of early fatalities. And what I would
8 like to do is see if you could give me an example of the
9 description of another way of looking at the CCDF by looking
10 at one CCDF, so that we can get it expressly in the record.

11 And one possibility -- and again, only to
12 understand the expression here, not for purposes of the
13 substance of the CCDF -- we maybe could take a figure from
14 the FES, which is on page 5-87 of the FES, since it is one
15 of the early fatalities CCDFs. It's Figure 5.44(e),
16 probability of distribution of early fatalities.

17 Could you, using that CCDF give me a numerical
18 example of your description here of taking -- showing that
19 the inverse is the average predicted interval between the
20 occurrences of a early fatality in the population, and so
21 on, as you've discussed in your text?

22 A (Witness Kaiser) Yes, what I would do here,
23 the first step if look, say at the case with supportive
24 medical treatment at the lower of the two codes, I would
25 first of all integrate under that code. That would give me

8pb6

1 expected value.

2 Q I'm sorry. I didn't hear you.

3 A That would give me what I call the expected
4 value in the part of our testimony that you've just referred
5 to. I believe that area is then tabulated somewhere else
6 in the FES, 5-99, page 5-99.

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

91b1

1 Table 5-11(h), the first row in that table. That
2 area is 5×10^{-3} . That gives the average number of fatalities
3 per year, from accidents at the Limerick reactor.

4 Q Per reactor year?

5 A Yes, per reactor year. So that would mean, on
6 average, one fatality occurring in a number of years, which
7 you get by taking the inverse of that 5×10^{-3} . And that
8 is .005. It's about 200 years, I think.

9 Q And we could apply that to any CCDF which may be
10 of interest, given the testimony here before us, and that
11 would hold true?

12 A Yes, you could do that, for example, with the latent
13 results also.

14 JUDGE BRENNER: All right. That's all I have.
15 Thank you.

16 Q Any follow up questions, Mr. Elliott?

17 RE CROSS EXAMINATION

18 BY MR. ELLIOTT:

19 Q Question to Mr. Kaiser. Would it be possible
20 to determine the square meters of actual farmland to be
21 interdicted if one multiplies the area computed by CRAC or
22 CRAC 2 times the fraction of farmland within the 50 mile
23 radius? Is that correct?

24 A (Witness Kaiser) Yes, I think that's correct.

25 A (Witness Levine) I would like to modify what

1 Mr. Kaiser said slightly. His answer yes is correct for
2 the CRAC model. In this area, the CRAC model does not depict
3 reality completely. In an actual accident, there could be
4 varying wind directions in which this same land could
5 be crossed twice by the plume, for instance. And the area
6 of interdiction could be less than that shown.

7 Q The CRAC model assumes an invariant wind direction?

8 A That's correct. And what happens in a real accident
9 would be different, in some degree, from what's predicted in
10 CRAC.

11 Q Another question to Dr. Kaiser, You mentioned,
12 in the international benchmark test of the comparisons between
13 the codes for early fatalities were all within a factor of
14 3? Do I have that understanding correct?

15 A (Witness Kaiser) Yes, except for one code,
16 which I mentioned.

17 Q Okay, could you tell me how close the predictions
18 were for the other consequence categories considered by the
19 codes?

20 A For other categories, such as latent cancer
21 fatalities and early injuries, there were larger variations.
22 In the case of early injuries, for example, these variations
23 were explicable in terms of the fact that the participants
24 used different definitions for what they meant by an early
25 injury. That's, for example, the British participant used a

1 definition for early injury which was based on damage to the
2 lung. Whereas some of the other participants used a criterion
3 which was based on the appearance of certain symptoms, such
4 as vomiting. So that the larger differences there could
5 generally be attributed to some specific assumption of that
6 nature.

7 Similarly, in the latent cancer case, some
8 applicants -- not applicants -- some participants used the
9 so-called central estimate, while others used a linear dose
10 relationship and so, for those kinds of reasons, we tended to
11 get a larger spread than the factor of three that I mentioned.

12 Q Could you give me a number associated with those
13 larger variations for latent cancers and for early injuries?

14 A The total range on latent cancer plot is about a
15 factor of 10. If you look at the early injury plot, if
16 one excludes the U.K. result, which is based on a totally
17 different interpretation, of what early injuries mean, then
18 the range there is about a factor of 7.

19 Q Question to Dr. Levine. It is easy to wax
20 philosophical when we're in the area of discussion of risk.
21 I'd just like to ask one question in that area. You mentioned
22 risk acceptability in a philosophical way. Would you agree
23 with me that risk acceptability is related to the benefit
24 to the population incurring the risk?

25 A (Witness Levine) Yes.

1 Q And one final question, to Dr. Richter. With
2 respect to your response on Dr. Cole's question about
3 Applicant's Table 3, economic risk, you interpreted -- you
4 indicated that one way of interpreting that table is in
5 terms of an annual insurance premium?

6 A (Witness Richter) That's correct.

7 Q You do not know of any insurance company in the
8 world that provides risk coverage to the general public from
9 nuclear reactor risks --

10 A Under Price Anderson?

11 Q At any price, do you?

12 A To whom?

13 Q To the general public?

14 A Yes, even in Pennsylvania, I believe there is
15 some policies offered by private firms. The insurance -- I
16 recall meeting with -- in the home owner's there are
17 three firms, I believe. Two offer it a a rider, I believe,
18 and one has started -- one has included it as a general
19 coverage feature. I don't know the names of the firms. I
20 recall having a conversation with someone from the Pennsylvania
21 Insurance Department, or something like this, sometime back.

22 Q You don't know the names of the companies?

23 A They were relatively small companies. I have the
24 card of the person I spoke with.

25 Q I think you're on thin ground.

1 MR. WETTERHAHN: Objection, objection. That's
2 argumentative.

3 JUDGE BRENNER: All right. It's sustained.

4 WITNESS HULMAN: The Staff will --

5 JUDGE BRENNER: Wait a minute.

6 MR. WETTERMAHN: I object to that answer, too,
7 and I move that it be stricken.

8 JUDGE BRENNER: What answer?

9 MR. WETTERHAHN: The gratuitous comments of the
10 witness here.

11 JUDGE BRENNER: I didn't even hear them, if you
12 meant Mr. Hulman's, but there is no question outstanding.

13 MR. ELLIOTT: I apologize for the comment.

14 JUDGE BRENNER: Any follow up by the City?

15 MS. BUSH: Yes.

16 RE CROSS EXAMINATION

17 BY MS. BUSH:

18 Q I'd like to direct some follow up questions to the
19 Staff, either to Mr. Hulman or Mr. Acharya. With regard to
20 page 5-98 and the information you gave in that regard.

21 JUDGE BRENNER: 5-98?

22 MS. BUSH: Yes, 5-98.

23 BY MS. BUSH:

24 Q I would like to focus on one of the specific
25 numbers that you discussed, in general terms, and that is that

1 last paragraph on that page 5-98. The latent cancer
2 fatality risk number, and take for example the 5×10^{-2}
3 persons per reactor year within 50 miles. Now would it be
4 correct to adjust that number to get a value for the risk
5 associated with both units and with the 40 year life of the
6 facility by multiplying 5×10^{-2} times 80?

end9

7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

1 A (Witness Acharya) That would be appropriate provided
2 the two reactors do not have much mutual interaction between
3 the two.

4 Q So would the resulting site lifetime risk value
5 then be -- would that multiplication give you four?

6 A Whatever would be the result of multiplication.

7 Q Would you accept, subject to check, then that
8 $80 \times 5 \times 10^{-2}$ is 4? Would you accept that, subject to check?

9 A (Witness Hulman) Except for one condition. It
10 assumes that both reactors operate independently. And as
11 we pointed out in testimony yesterday, there can be some
12 dependence in terms of accidents. So as a maximum, your
13 computation would be reasonable. But in reality, it could
14 be less.

15 Q Now further, if we wanted to get the cancer
16 fatalities, latent cancer fatalities, from other causes over
17 the same period of time, would be multiply then the number
18 that you have on 5-99 -- that is 10,000 -- times the same
19 period of time we're examining, 40 years?

20 A (Witness Acharya) That's right.

21 Q So that would be 400,000 cancers over that period
22 of time.

23 A Uh-huh.

24 Q Now if we -- the number that we derived a few
25 moments ago for the latent cancers associated with the --

1 not the latent cancers, but the risk associated with both
2 facilities over their lifetime of four, that number is not a number
3 that is the -- it's not a magnitude of consequence number, is
4 it?

5 A That's the probability weighted consequence. And
6 so, also, is that number, 10,000 number background, is a
7 probability weighted number.

8 Q It has a probability of one, is that correct?

9 A That's right.

10 Q Now if we wanted to take the probability out of
11 the four risk number, the probability weighted consequence number,
12 would it be correct to divide the four by the total probabilities
13 -- the total probabilities for the accident, which is a number
14 that adds all of the probabilities of the various kinds of
15 accidents studied?

16 A I was asked the same question yesterday, in
17 reference to the genetic effect. My answer then was not
18 indeed for -- that's not totally correct. If you take the
19 risk per reactor year, which is the probability weighted with
20 respect to all the release categories, and divide that by the
21 sum of the probabilities of all the release categories, you
22 would get a conditional value -- you would get a mean value
23 which is not a conditional mean value for any specific
24 accident sequence we have in the analysis.

25 You would get a number which is difficult to

101b3

1 interpret. And it may be associated with some hybridized
2 or synthetic accident or release category which can be
3 compared out of all the release categories we have used in the
4 analysis.

5 Q What was the last thing?

6 A That we have used in our analysis.

7 JUDGE BRENNER: Ms. Bush, I've lost the context.
8 What is this following up on, in the context of the subparts
9 of the contention that we're now supposed to have before us.

10 MS. BUSH: There has been general discussion on
11 direct -- redirect, excuse me -- about the comparison of the
12 risk and/or consequences associated with an accident at
13 Limerick with other social risks. And I feel an obligation
14 to have the record clear on that matter, since it has been
15 brought up. And so this is related to what has been
16 previously stated, to put into context the numbers that have
17 previously been used, as what the risk here is.

18 JUDGE BRENNER: Well, I agree with what I infer
19 you're saying, that some of the questions -- or at least the
20 answers -- got kind of wide ranging. But what you just said
21 I put under the label of those questions on how do you judge
22 significance. And when we do that, we're going to do it in
23 terms of that which is in contention. And some of what you're
24 asking about now, I don't see in contention, although maybe
25 we can apply some of it to other things.

1 It might be more efficient, if you have a lot more,
2 to apply it yourself in the questions to matters that are
3 important to the contention.

4 MS. BUSH: Well, the numbers that were discussed --

5 JUDGE BRENNER: I don't want to debate it. I just
6 made my statement.

7 MS. BUSH: I think what I'm doing will be useful
8 for the panel to understand how to interpret the number that
9 is being given on the record. That discussion today has not
10 been directed at any thing other than what I'm asking now.

11 JUDGE BRENNER: Speaking for myself, as an
12 individual up here, it's more helpful for me when I can
13 apply it to that which we actually have to look at, although
14 sometimes you have to start with the general -- I think, in
15 choosing your examples, you should keep that in mind. But
16 I don't know how much more you have, so maybe I've taken more
17 than you would have had.

18 MS. BUSH: Mr. Levine used a lot of numbers that
19 I don't know the derivation of, or the base of. So I
20 thought I would focus with Mr. Acharya on something that is
21 in the record. And he did talk about these pages, too.

22 JUDGE BRENNER: I said a few comments ago, let's
23 not debate it.

24 BY MS. BUSH:

25 Q The consequence number that we are talking about,

1 within this four is a mean value, is that correct?

2 A (Witness Acharya) You asked me which one?

3 Q 5×10^{-2} , when we adjust it for the number of
4 reactors that four is a -- includes a mean consequence value.
5 Is that correct?

6 A A mean consequence value for each of the release
7 categories? Yes.

8 Q Each of the what?

9 A Each of the release categories.

10 Q So that all of the consequences, separately stated
11 for each release category, were added and then divided by the
12 number of cases you examined. Is that correct?

13 A As much as I understand your question, on the basis
14 of that, my answer is no.

15 Q Could you explain how the mean value was derived,
16 for the consequence?

17 A Okay, I'll try to do that. I took the Appendix
18 K, Table 1, Table K.1 for each of the release categories that
19 were individually analyzed, we have listed a large number
20 of different kinds of the conditional mean values of the
21 consequences. Now take, for instance, any given value or
22 given kind of consequence for early fatality. For each given
23 release category, it was assumed that the release could take
24 place at a different start time of the year, and 91 different
25 sequences were pulled from all the meteorological data.

1 Now for each meteorological sequence, for each
2 direction of wind blowing, you would get one estimate for the
3 early fatality. Thus, for 91 weather samples, you had
4 91 x 16 estimates of early fatality of varying magnitudes.
5 Then for each of the 91 samples, weather samples, the 16
6 different regions that were obtained, they were multiplied by
7 the probability of the wind blowing to the respective directions
8 This way you got 91 samples.

9 Then add the 91 sums, divided by 91, you'd get
10 the conditional mean value for that kind of consequence
11 in the early fatality that is entered in that table.

12 Q Now how did you go from that table, if you did
13 go from that table or those calculations, to the consequence
14 value that is within the 5×10^{-2} ?

15 A Okay, the next step is to take the release
16 category probabilities from the Table 5.11(d) and then
17 multiply the respective conditional mean values in Appendix
18 Table K.1 and then add the sum together for all the release
19 categories. One set of release categories are evaluated
20 under evacuation assumptions.

21 And the other set of release categories is evaluated
22 under a latent cancer assumption. So one has to add the
23 probability weighted sums of the conditional mean of both these
24 categories to arrive at the number in Table 5.11(h).

25

11pbl

1 Q What would you advise as the appropriate way if
2 we wanted to look at the magnitude of the consequences in
3 isolation from the probability of the accident, particularly
4 in relation to this number 5×10^{-2} ? What would you advise
5 would be the best way for the Board to do that?

6 MR. WETTERHAHN: Objection. This is much too
7 general to be recross. There's no reason it couldn't have
8 been brought up in the first round of examination. And it's
9 straight from the Board's questions and the redirect by
10 both Applicant's and Staff counsel.

11 MS. BUSH: May I respond?

12 JUDGE BRENNER: Yes.

13 MS. BUSH: I'm trying to get to my original
14 question, which is to get a comparable consequence of the
15 accident to compare to the background cancer fatalities
16 which Mr. Wetterhahn brought up in his redirect examination
17 of Mr. Levine. And then the Staff brought up in regard
18 to Mr. Acharya. And I believe it will be helpful for the
19 public and for the Board to have a number to compare with
20 the background cancers that does not have a probability
21 in it.

22 I thought Mr. Acharya stated it would be improper
23 to take the total probability of the accident out and --
24 I'm asking him if he has an alternative --

25 JUDGE BRENNER: I've got a number of problems with

11pb2

1 what you're doing, Ms. Bush. First of all, for a party that
2 had no cross plan and no initial followup, suddenly we're
3 delving very deeply into a subject that while having had
4 been touched on is far from being central. Your last
5 immediate question asked him to start with the consequences
6 and then do something with it.

7 We discussed some of that in terms of the
8 admissibility of the contentions and you got some of your
9 contentions denied, which were close to that. Another one
10 which is arguably related to that involves the dose/distance
11 relationships, and that one is in.

12 But it's not going to help us make any findings
13 to assume an accident occurring and then doing something
14 with the consequences. It's just that simple. So it's just
15 not material to any of our findings, and for that reason, I
16 guess we will on our sustain an objection to the question on
17 grounds other than Mr. Wetterhahn's. But his objection has
18 some force also.

19 You may have some argument to tie it to something,
20 but it becomes a matter of degree. And now we're in the
21 final round and we're not going to have to go back and go
22 round and round again.

23 MS. BUSH: Not to argue with your --

24 JUDGE BRENNER: I've sustained our own objection
25 to the question, because it's not going to help us decide

11pb3

1 Contention DES-4 on the merits.

2 MS. BUSH: I would, for the record, take exception
3 to your ruling.

4 JUDGE BRENNER: Fine. Well, you've got that all
5 the time.

6 MS. BUSH: If the question of how to measure or
7 evaluate the risk of the accident context of other risks
8 cannot be the subject of cross-examination, I have no further
9 cross-examination.

10 JUDGE BRENNER: You can make your statement, but
11 I think you've mischaracterized our ruling. All right.

12 Any followup by the Commonwealth?

13 MS. BUSH: Your Honor, I would --

14 JUDGE BRENNER: Ms. Bush.

15 MS. BUSH: I would request that the respondent's
16 questions -- responses to answers raised by the company
17 and the Staff with regard to putting the risk numbers in
18 context be stricken from the record.

19 JUDGE BRENNER: Putting the risk numbers in
20 context is acceptable as applied to the contentions before
21 us. And you'll have your chance at proposed findings and
22 so will the other parties. I'm not going to back up now
23 over an hour and a half of testimony and try to figure out
24 which questions and answers we need or not.

25 Suffice it to say I think there is some in there

11pb4
1 that we don't need. If that's the thrust of your remarks,
2 but I'm not going to give you a general ruling now. You
3 argue in your findings. We can't take that kind of motion
4 this far removed from the question and answer.

5 MS. BUSH: Well, the witnesses --

6 JUDGE BRENNER: Ms. Bush, we've discussed it
7 enough.

8 MR. WETTERHAHN: I have one question.

9 REDIRECT EXAMINATION

10 BY MR. WETTERHAHN:

11 Q There's a question to the Staff with regard to
12 the risk over a reactor's lifetime, say 40 years. Mr. Levine,
13 is it fair to just multiply the per reactor risk by the
14 total number of years that a reactor would operate to get
15 the total risk --

16 JUDGE BRENNER: Wasn't that asked and answered
17 two days ago?

18 MR. WETTERHAHN: I don't believe so.

19 JUDGE BRENNER: I think it was. I'm going to
20 sustain it on my own. Anything else, Mr. Wetterhahn?

21 MR. WETTERHAHN: That's all I had.

22 JUDGE BRENNER: Staff?

23 MS. HODGDON: I had one brief question.
24
25

11pb5

1 RECROSS EXAMINATION

2 BY MS. HODGDON:

3 Q It relates to a question asked by Judge Brenner
4 at the bottom of page 7 of the Applicant's testimony. It's
5 for the Applicant's testimony. I think it may be a
6 grammatical question, but I have trouble with several concepts
7 in the sentence.

8 Page 7, last sentence on the page going over onto
9 page 8 where it reads, "The area under the CCDF has a
10 relatively simple interpretation. For example, for early
11 fatalities, it's inverse is the average predicted interval
12 between the occurrence of an early fatality, et cetera."

13 It doesn't say between what and what. So would
14 somebody just finish that sentence for me, or improve it so
15 that it makes -- so that it's clear. So that the meaning
16 is clear.

17 Should it read --

18 JUDGE BRENNER: All right, let them answer it.
19 You've got to stop your question at some point.

20 MS. HODGDON: Yes, I stopped my question. I'm
21 not sure they understood it. Did someone understand it?

22 WITNESS KAISER: I think the example that I went
23 over with Judge Brenner made it clear what that means.

24 BY MS. HODGDON:

25 Q You didn't explain it in terms of the sentence.

11pb6

1 My question is, how should the sentence read between what
2 and what, between what two events that interval is used in
3 that sense?

4 A (Witness Levine) The word interval refers to the
5 time between the occurrence of one early fatality and the
6 occurrence of another early fatality in a separate effect.

7 MS. HODGDON: Thank you. That's the answer I
8 was -- thank you. I have no further questions.

9 JUDGE BRENNER: Seeing nobody leaping for the
10 microphone to followup on that question, we can say that
11 we've completed the questions on DES-4. We're going to take
12 a break and we'll come back with the combined panel of
13 whatever witnesses the parties think are appropriate on
14 DES-3. I want to get a specification as I've said before of
15 which portions of the FES related to that contention in the
16 Staff's view. And I want to do that for each one, because
17 the Staff has moved in a large portion of the FES into
18 evidence.

19 I don't have any problem with that, but I do want
20 to get a better specification of what we have before us.
21 In addition, I told the parties some time this week if
22 anybody believes other portions of the FES should be moved
23 in, tell us while we're here. Mr. Elliott, you said you
24 thought there were. Have you discussed this with the
25 other parties?

11pb7
1 MR. ELLIOTT: I have. My understanding is, I
2 gave those numbers to both Applicant and Staff.

3 JUDGE BRENNER: Ms. Bush, I'm sorry, I have trouble
4 hearing. Why don't you take the microphone, Mr. Elliott?

5 MR. ELLIOTT: The page numbers were given to
6 both Applicant and Staff counsel. Page numbers in addition
7 to those which Applicant and Staff had indicated they
8 wanted to move in, upon which both Ms. Bush and I agree, I
9 believe. My understanding is that Applicant's counsel --

10 JUDGE BRENNER: Let's stop it right there. After
11 the break, come back and tell us what the situation is. I
12 don't want to get too far afield before we know what's in
13 evidence in the FES.

14 MR. ELLIOTT: Okay.

15 JUDGE BRENNER: I guess my last comment was
16 directed to the Staff, as the proponent of the portions of
17 the FES that may be material. And remember, when we come
18 to the other contentions in future weeks, I want to get
19 something in writing in advance so all the parties know
20 before the first time we sit down in the hearing as to
21 which portions are relevant, even if they are already in
22 evidence.

23 Given the way the items were moved in, I assume
24 they will be somewhere in that batch. Let's come back at
25 10:35.

(Recess.)

1 JUDGE BRENNER: We're on the subject of DES-3 now.
2 Remember, Mr. Elliot, we'll be recessing at 11:30 today
3 to accomodate the meetings. And then hopefully, early
4 this afternoon, we can find out from the City what the
5 situation is. And then at the same time we will discuss
6 when to adjourn this week and when to start next week.

7 I can tell you I'm very leery of starting later
8 than we already scheduled next week, as you know, particularly
9 if we have not finished all of LEA's contentions this week.

10 MR. ELLIOTT: Judge Brenner, as a brief
11 preliminary matter, I believe that Mr. Richter has a
12 clarifying statement to make, with respect to his observations
13 on the availability of insurance coverage in Pennsylvania.

14 MR. WETTERHAHN: I object to that. It's totally
15 irrelevant to any of the contentions. It was merely given
16 as a hypothetical, as far as what it could conceptually mean,
17 not that any insurance company may or is available.

18 JUDGE BRENNER: I don't know what he's going to
19 say. I don't think the whole area is material for what
20 it means in terms of insurance. However, since he gave an
21 answer on the record, and it was not stricken, if he has
22 a correction I don't want to leave something incorrect on the
23 record, even if my present preliminary judgment that it's not
24 material in any of our findings later proves correct.

25 So let's get the correction, but we're not going

121b2

1 to continue with it, that's sure.

2 And after that, there's a preliminary matter for
3 DES-3, I understand from Staff counsel that Staff is ready to
4 identify the portions of the DES. So we'll get Mr. Richter's
5 clarification and then go right to you for that, Ms. Hodgdon.
6 And then to Mr. Elliott for his cross examination.

7 Mr. Richter?

8 WITNESS RICHTER: I checked with the Office of
9 State Programs during the break, and the most recent data they
10 found was two to three years old. Lebanon Mutual and Manor
11 Mutual offer evacuation insurance related to nuclear power
12 plant accidents, just to clarify it.

13 JUDGE BRENNER: So you retract what you said,
14 over and above that?

15 WITNESS RICHTER: Until I can do some more research
16 on it.

17 JUDGE BRENNER: It's not that important.

18 WITNESS RICHTER: I'll leave it at that, then.

19 JUDGE BRENNER: Let's get, for the record, what
20 you're doing now. Mr. Richter is not part of this panel, on
21 DES-3?

22 MS. HODGDON: Mr. Richter has been excused.

23 JUDGE BRENNER: At this time, all these witnesses
24 have been previously sworn, and the reporter can note which
25 witnesses make up the combined Applicant and Staff panel.

1 Whereupon,

2 G. DAEBELER

3 S. LEVINE

4 E. SCHMIDT

5 G. KAISER

6 L. HULMAN

7 S. ACHARYA

8 resumed the stand and, having been previously duly sworn,
9 were examined and testified as follows:

10 DIRECT EXAMINATION

11 BY MS. HODGDON:

12 Q Dr. Acharya will identify the sections of the FES
13 which relate to Contention DES-3.

14 A (Witness Acharya) It's Section 5.9.4, beginning
15 at page 5-72, running through 5-126. Then APS pages
16 beginning at 9-31 through 9-55. Then APS Appendix A, part
17 2, and APS Appendices H, I, J, K, L, M and N.

18 JUDGE BRENNER: Well, I think besides the fact
19 that just about everything previously identified has been
20 put in, I think we've got some new parts that are not in
21 evidence. I'd have to check.

22 Everything in the FES, on severe accidents, is
23 pertinent to DES-3 and you've relied on it for your conclusions?

24 WITNESS HULMAN: We attempted to narrow the DES
25 section on severe accidents. And I think the only thing that

121b4

1 is different is FES pages 9-32 to 9-55. Let me double check.

2 JUDGE BRENNER: Well, I don't remember Appendix A
3 being in evidence.

4 WITNESS HULMAN: I haven't finished. Appendix A
5 was not previously offered.

6 MR. WETTERHAHN: I think Applicant has an objection,
7 if no one else has.

8 JUDGE BRENNER: Wait, let me just identify it.
9 Well, this so-called narrowing was starting at page 5-72
10 is not very much of a narrowing, considering much of that
11 is tables which were not in evidence anyway. It's all the
12 same appendices. Now you want to add 9-31 to 9-55. Do you
13 want to tell us why?

14 WITNESS ACHARYA: Because these pages contain the
15 response to comments made on the DES and several comments
16 were related to the emergency response.

17 JUDGE BRENNER: Yes, but not all of them. I want
18 to get a specification, not a global conclusion. That's the
19 whole reason for the specification. You haven't done any fine
20 tuning here, you've given me the whole mess again.

21 WITNESS ACHARYA: In DES -- in the Staff's written
22 testimony on DES-3, has specific references to only a few pages
23 in the APS. So in lieu of what we just provided, the ones that
24 are called out may be the specific ones.

25 JUDGE BRENNER: All right, but the reason I asked

1 my question is I didn't know if you just wanted to stay with
2 those specific references for DES-3. You'd be satisfied to
3 stay with those?

4 The problem is counsel should know we've had this
5 in different context over the course of this long proceeding
6 that when we have large documents, I want to get a better
7 handle for the purposes of all the parties and the Board of
8 what's before us. It does not mean that sometime later there
9 might not be some piece of evidence which is in for another
10 purpose, that may be helpful to relate to -- and it's not
11 meant to limit the cross examiner in the first instance. But
12 it should help give us a better focus.

13 Let's stop sandbagging in findings later that
14 certainly 15 pages of detail in the FES, that nobody focused
15 on, is deemed to be the crux of somebody's case in a contention
16 and you haven't helped me at all, in that regard.

17 Based on Dr. Acharya's comment now, in terms of what
18 would generally be in evidence for all the contentions, does
19 the Staff now want to include those portions of Chapter 9?
20 Because you did not identify those before?

21 MS. HODGDON: Yes, I believe it may be a bit
22 over-inclusive and we could narrow the portions of Chapter 9
23 somewhat. But there are portions of Chapter 9 that explain
24 changes that were made because of comments and that the Staff
25 would rely on.

1 JUDGE BRENNER: What about Appendix A, part 2,
2 which I guess are just the comments, right? You're not going
3 to put those into evidence?

4 I'm talking to counsel, now, Dr. Acharya.

5 MS. HODGDON: Those wouldn't be offered in evidence.
6 I believe the Staff merely identified them as related to
7 the Chapter 9. And so, I think that they understood this
8 to be as a convenience for the cross examiners, that they
9 should see what --

10 JUDGE BRENNER: That's what I want to ask.

11 MS. HODGDON: We may have over identified,
12 particularly with Chapter 9. I'll work on it and try to
13 narrow it down.

14 JUDGE BRENNER: We're not putting the comments
15 in evidence, unless you show us a particular one that
16 should be in evidence, in terms of identification purposes.
17 If you have an answer in Chapter 9 that will take care of the
18 subject matter, and the parties have available the full
19 contents, so they have no complaint as to disclosure.

20

21

22

23

24

25

13pbl

1 What about the general comment before the break
2 that there may be other parts of the FES that should be
3 moved in? Is it these comments in Chapter 9 that Mr. Elliott
4 had in mind, or are there other parts?

5 MR. WETTERHAHN: There are other parts. There are
6 only three pages or so. It's VIII, and specifically paragraph
7 S, which purports to be a summary of severe accident
8 consequences, that's appearing at the beginning of the
9 volume.

10 And the other are pages 1-3 and 1-4 under Section
11 1.3, Commission policies and positions on the post-TMI
12 treatment of severe accident consequences and environmental
13 impact statements.

14 Applicant does object to the moving of those
15 three pages, or portions of those pages into evidence.

16 JUDGE BRENNER: Why?

17 MR. WETTERHAHN: Initially, just for the reason
18 that you stated that there was no examination whatsoever
19 with regard to either the summary or the two other pages
20 the title of which I read. A summary is just that, and I
21 don't see how it has any relationship to a specific -- the
22 treatment of specific issues in detail.

23 With regard to 1.3, it's my reading of that
24 statement that that is at most a canned legal interpretation
25 on what the Commission's duties are under NEPA. And as far

13pb2

1 as this Board's finding, there is absolutely no probative
2 value or materiality. I'm sure this Board will determine if
3 there are legal questions raised as to the scope of the
4 treatment of severe accidents under NEPA. It will make its
5 own decision based upon the law and not what some summary
6 of it is, or some condensation by one of the parties.

7 JUDGE BRENNER: My inclination, Mr. Elliott, is
8 to agree with Mr. Wetterhahn for essentially those reasons.
9 Maybe I'll state it somewhat differently.

10 The summary on VIII, paragraph S which I have
11 just now reread is at best cumulative and at worst, if it's
12 not accurate it presents problems. We've got the pertinent
13 sections themselves and we can deal with those and not the
14 summary.

15 I might tell you that from time to time, at least
16 in other cases we allow witnesses to summarize the supplemental
17 testimony for various purposes, but not for evidentiary
18 purposes. And for that reason, we would not include the
19 summary. It's either unnecessary or harmful. But in any
20 event, it's not helpful.

21 In terms of page 1-3 and 1-4, it seems to be --
22 it doesn't seem to be factual, evidentiary material or
23 expert technical material. It does seem to be the Staff's
24 legal context discussion, and you can put that in findings.
25 The Staff can put that in findings, too. It's not necessary

13pb3

1 to admit it into evidence, and doesn't seem to qualify as
2 evidence. It's no testimony by these witnesses.

3 MR. ELLIOTT: They represent Staff's position with
4 respect to the manner in which the document is to be
5 interpreted, particularly in reference to page 1-4. The
6 analysis of severe accident consequences as presented in
7 this document must be interpreted with the above purposes
8 and caveats in mind.

9 While I agree that legal conclusions will be
10 based upon the policy statement adopted by the Commission,
11 this page represents Staff's position with respect to that
12 matter, and for that reason it's relevant.

13 JUDGE BRENNER: All right. I don't think it would
14 be evidence for any cross-examination. These witnesses are
15 not here to talk about that type of thing. You can argue
16 it in findings.

17 MR. ELLIOTT: If I'm permitted to make findings
18 on it, that's fine. I have no interest in cross-examining
19 witnesses on it.

20 JUDGE BRENNER: You can argue in findings that
21 based on these pages of the FES the Staff has appeared to
22 have done whatever it is you want to argue they did. Staff
23 can argue in its findings what it thinks it has done.

24 MR. ELLIOTT: That's adequate for my purposes,
25 thank you.

13pb4

1 JUDGE BRENNER: All right. The Staff had better
2 give us an early specification of which portions, if any
3 of Chapter 9 it wants to move in at some quick point, and
4 you're already too late for anything relevant to DES-4
5 unless the parties have no objection. I'm not going to
6 reopen the examination on that subject.

7 And I think my request is pretty simple, and
8 I've said it again now this morning. I want to get those
9 specifications. You'd better just give it to us in writing
10 for each contention so we have it in front of us, as well as
11 the fact of getting it into the record. Don't just list
12 everything in there, unless truthfully that's the Staff's
13 judgment.

14 Now it might be. I understand there are
15 interrelationships, but let's not carry that concept further
16 than necessary. I've given you the reason why we want it.
17 For example, specification by subsection, if there's a
18 subsection in there that one party or the Board would not
19 expect to have there, that will cause us to direct our
20 attention to it now, which is when our attention should be
21 directed to it.

22 Right after lunch you'd better give us that
23 DES-3 specification and then be ready on 1 and 2. See if
24 you can get it written up and copied somewhere, so we can
25 have it in front of us.

13pb5

1 All right, Mr. Elliott, go ahead.

2 So we're not admitting Chapter 9 for now, any
3 part of it. The only thing in evidence is what we previously
4 admitted, and we don't know which portions of those are
5 pertinent to DES-3 yet. But you're free to use whatever you
6 think is pertinent.

7 Mr. Elliott, go ahead.

8 CROSS-EXAMINATION

9 BY MR. ELLIOTT:

10 Q Question to Applicant's panel. There is an
11 opinion expressed in paragraph 32 of Applicant's testimony.
12 That opinion is based upon the sensitivity analyses
13 described in the testimony; is that correct?

14 A (Witness Kaiser) Yes, it is.

15 Q Paragraph 33, the study referred to in Applicant's
16 reference A, Exhibit 144, relies upon in part, the response of
17 Cameron Parish to Hurricane Clara; is that correct?

18 A That's correct.

19 Q At page 33 of that study, that study concluded,
20 did it not, that it is difficult to imagine how a plan of
21 evacuation could be more publicized and more actively
22 prepared than that for this area. Nevertheless, a substantial
23 portion of the population remained unaware of it; is that
24 correct?

25 A That's what it says, yes.

13pb6

1 Q Table 2.17 of that study showed that in that
2 parish only 60.6 percent knew of the plan; isn't that correct?

3 A Yes.

4 Q The hazard from a hurricane is visible to the
5 people who are within eyesight of the environmental impact
6 of the winds; isn't that correct?

bu 4

7 A I would suppose so.

8 Q For persons to know of the existence of radiation
9 hazards, they must rely upon outside information; isn't
10 that correct?

11 A Yes, I would say so.

12 Q Jumping to paragraph 38 of your testimony. There
13 is reference made to a 6 percent nonparticipating fraction
14 of the population in the evacuation and relocation model.
15 Where in the spatial grid of CRAC 2 are these people assumed
16 to be?

17 A They were assumed to be 6 percent of the population
18 at each of the points on the spatial grid within 25 miles
19 of the plant.

20

21

22

23

24

25

1 In other words, they were not concentrated in
2 any one area. They were spread out uniformly among the
3 population in question.

4 Q Is that a random distribution, in some way?

5 A I wouldn't characterize it as random. I just said
6 that six percent of the people who were there did not
7 evacuate or obey sheltering instructions, or whatever.
8 Uniform is perhaps the word.

9 Q Pardon?

10 A Uniform, rather than random.

11 Q Thank you. The location of the people assumed
12 not to evacuate has an impact on the results, does it not?

13 A Yes, in the same way that location of the people
14 who do evacuate also has an impact on the results?

15 Q The model used in the sensitivity study still
16 assumed cooperation in evacuation, although it was delayed
17 for 24 hours, isn't that correct?

18 A As a calculational convenience, it stopped the
19 accumulation of radiation dose after a period of 24 hours.

20 Q Persons who, in fact, do not participate in
21 evacuation or relocation, in reality, would continue to
22 receive a dose after 24 hours, isn't that correct?

23 A If steps had not been taken, by the responsible
24 authorities, to ensure that such people had been evacuated
25 by that time, what you say is true.

1 Q Did Applicant carry out any studies in which some
2 portion of the population did not take protective action of
3 some sort?

4 A Would you repeat the question, please?

5 Q Did Applicant carry out any analyses in which
6 some portion of the population did not take any protective
7 action?

8 A Yes, we did. Those calculations are described
9 in the response to the contention, in Paragraph 38. And the
10 result is also presented in Paragraph 38, in terms of its
11 impact on risk. The assumption made was that six percent
12 of the population remained out in the open for 24 hours or
13 to make a rough equivalence, if they continued with their
14 normal activities -- which means more or less indoors -- they
15 would have been there for between two and three days.

16 Q So that the net effect of that assumption is that
17 nevertheless people stopped receiving a dose after two to
18 three days, isn't that correct?

19 A That's correct, yes.

20 Q So the net effect of that assumption is that people
21 took protective action after two to three days, isn't that
22 correct?

23 A Yes. If only to the extent that, by some means
24 or other, they were persuaded to leave the area.

25 Q There are areas in which dose projections are

1 estimated -- dose estimates from ground exposure -- are
2 estimated not to reach the lethal dose threshold level until
3 a period of seven days goes by. Is that not correct?

4 A Yes.

5 Q A question to the Staff witnesses. Testimony, at
6 Paragraph 10, in the second paragraph it is stated that
7 people within the 10 mile EPZ would be well sensitized; i.e.
8 informed; in advance of the need for evacuation. How would
9 that occur?

10 A (Witness Hulman) Under the provisions of NRC's
11 regulations, we believe that sufficient information will
12 be provided the public within the 10 mile EPZ, including the
13 warning systems and the other provisions required by the
14 regulations and -- as we understand -- proposed by the
15 Applicant, will provide that assurance.

16 Included are such things as sirens, public
17 information sessions, training exercises, and the like.

18 Q There will be no training for the general public,
19 correct?

20 A There will be training exercises. They have been
21 reported in the press and on television and the radio. We
22 think the public, within the 10 mile EPZ, will be sensitized
23 to the need to evacuate, if warranted.

24 Q There will be no training for the general public,
25 isn't that correct?

141b4

1 A In the strictest sense of the word training, no.

2 JUDGE COLE: Yes, there will be no training or --

3 WITNESS HULMAN: In the strictest sense of the
4 word training, the general public will not be trained.

5 BY MR. ELLIOTT:

6 Q You were not familiar with how familiar people
7 in the Limerick area are with the evacuation plan, are you?

8 MR. WETTERHAHN: Objection, that really has no
9 relevance of how familiar the people are at this point in
10 time. The plant is not going to be licensed for some time,
11 and it's really an emergency planning contention.

12 JUDGE BRENNER: Mr. Elliott, do you have a
13 response?

14 MR. ELLIOTT: Well, you can make a prediction now
15 about how sensitized people are going to be in the future,
16 without knowing what the actual arrangements are going to be,
17 can you?

18 WITNESS HULMAN: Judge Brenner, am I to answer?

19 JUDGE BRENNER: Yes, he's modified the question.

20 WITNESS HULMAN: I believe we can make a judgment.

21 BY MR. ELLIOTT:

22 Q That judgment must necessarily be based on various
23 assumptions, isn't that correct?

24 A (Witness Hulman) Yes.

25 Q And what assumptions are they?

1 A Basically the experience at other reactor sites,
2 the experience of Three Mile Island, and the provisions of
3 regulations 10 CFR Part 50, Appendix E, as I remember, the
4 Memorandum of Understanding between NRC and FEMA.

5 Q There was reference made to confirmation of
6 evacuation. How will that be carried out?

7 A Specifically where are you?

8 Q Last -- second to the last paragraph of Staff
9 testimony, paragraph 10, first sentence, top of page 5.

10 A Okay, would you repeat your question. I have
11 the sentence.

12 Q How will confirmation of evacuation be done?

13 A (Witness Acharya) Well, I won't be able to
14 describe how the confirmation process will be carried out,
15 but this is in the requirements in the emergency planning
16 document, NUREG-0654.

17 Q You do not know how it will be carried out, do you?

18 A I do not know, because I am not part of the
19 planning.

20 Q Does the relative significance of the number of
21 people who do not evacuate depend upon what accident sequence
22 or release category we're talking about?

23 A (Witness Hulman) It's influenced, yes.

24 Q Oh, let me go back to the previous question. Let
25 me pick up something. With respect to this confirmation of

1 evacuation, it's stated it's a process which is likely
2 to influence the small minority of individuals who may have
3 initially chosen not to -- I assume that means to evacuate --
4 to have second thoughts.

endl4

- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

15pbl

1 How was that process likely to influence some
2 portion of the population?

3 A (Witness Acharya) I believe -- though I do not
4 know the details, the confirmation process that is described
5 in the information on the confirmation procedure that is
6 requested of applicants of several nuclear power plants as
7 well as the licensees of the power plants -- I seem to
8 remember that that would be door-to-door knocking and trying
9 to verify whether people are still there or people have left
10 for the evacuation.

11 Now what is alluded here in this statement that
12 is that is likely to be -- in case the people in charge of
13 the confirmation would find people that have not evacuated
14 still, they would be treating the person that might be
15 worthwhile to evacuate. So the person maybe has a tendency
16 not to evacuate might change their mind and evacuate.

17 Q So this process assumes a door-to-door individual
18 contact with each household that may or may not evacuate,
19 and some conversation takes place with each person who
20 remains in the area in an effort to convince them to leave?

21 A That's my understanding.

22 Q You do not know whether the emergency plans for
23 Limerick contain such an arrangement, do you?

24 A (Witness Hulman) We do not know at this point.
25 We have however -- at least I have seen evidence of that kind

15pb2

1 of confirmation of evacuation in at least two emergency
2 situations. It's a process that I think the authorities
3 use to help assure that people are vacated.

4 Q With respect to testimony in paragraph 9, the
5 first full paragraph on page 9.

6 MR. WETTERHAHN: Nine?

7 MR. ELLIOTT: I'm sorry, page 4.

8 WITNESS HULMAN: Page 4.

9 BY MR. ELLIOTT:

10 Q First full paragraph. The alternative analysis
11 Staff used was the early re-look mode of emergency response;
12 is that correct?

13 A (Witness Acharya) That's correct.

14 Q In the early re-look model, persons are assumed
15 not to receive a dose after -- excuse me, 12 hours after
16 plume passage; isn't that correct?

17 A That's outside of the 10 miles.

18 Q Correct, outside the 10 miles. How about within
19 the 10 miles?

20 A Within 10 miles, the people are assumed to be
21 relocated from the contaminated areas six hours after the
22 passage of the plume.

23 Q Question for Applicant's panel. With respect to
24 the EPA evacuation study of Hans & Sells, the objective of
25 that study was to assess the risks involved to the public

15pb3

1 in evacuation; isn't that correct?

2 A (Witness Levine) Yes.

3 Q It was not one of the objectives of that study
4 to rigorously determine the nonparticipating fraction of
5 the population in emergency response, was it?

6 A (Witness Kaiser) The -- as we said, the
7 objective of the study was to determine the risk to the
8 population. The nonparticipating fraction would be an
9 important element in understanding that risk.

10 Q The estimate of the nonparticipating portion of
11 the population was not one of the study's final conclusions,
12 was it?

13 A If you look at our Attachment 1, which is the
14 very last page of our testimony, there is a paragraph
15 headed motivation to evacuate. The last sentence of that
16 paragraph indicates results of this study indicate that
17 approximately 6 percent of the total population refused to
18 evacuate. So it was a result of the study.

19 Q It was a result of the study, but it was not
20 one of the study's final conclusions that were set forth
21 in response to the objectives of the study; isn't that correct?

22 A I may misunderstand you, but it seems to me that
23 they have made a conclusion in the sentence that I just read.

24 MR. ELLIOTT: Thank you. I have nothing further
25 on DES-3.

15pb4

1 JUDGE BRENNER: Has the city any followup?

2 MS. BUSH: No.

3 JUDGE BRENNER: Commonwealth?

4 MS. FERKIN: I have just one question.

5 CROSS-EXAMINATION

6 BY MS. FERKIN:

7 Q For the Staff, paragraph 10 of your testimony,
8 that last statement concerning confirmation of evacuation,
9 would you -- I'm directing this to either Staff witness --
10 did either of you consult with any member of the NRC Staff
11 emergency planning section in coming up with the conclusion
12 that confirmation is likely to influence individuals to
13 evacuate if they haven't already done so?

14 A (Witness Acharya) No, I did not check. As to
15 that assumption, that assumption is my own, that the
16 conversation might persuade the people to change their minds.
17 But the conversation would be conducted, that's in the
18 regulation.

19 Q Mr. Hulman, you mentioned that you had seen the
20 confirmation process work in emergency situations. Could
21 you explain that, please?

22 A (Witness Hulman) I have either participated in
23 or observed a large number of evacuations from floods, from
24 hurricanes and from fires.

25 In many of those cases, the authorities went

15pb5

1 door-to-door after evacuation was announced through the
2 media and announced by loudspeakers and announced by the
3 National Guard personnel and knocked door-to-door to make
4 certain that people had left. The authorities found people
5 that had not evacuated.

6 The door-to-door confirmation persuaded most of
7 the people to evacuate when the environmental conditions
8 outside their homes were bad. When the environmental
9 conditions were not bad, still most of them left. There were
10 occasionally some hold-outs however, but the confirmation
11 process resulted in what I would consider to be a second
12 wave of evacuation.

13 MS. FERKIN: All right, thank you. I have no
14 further questions.

15 JUDGE BRENNER: Applicant?

16 CROSS-EXAMINATION

17 BY MR. WETTERHAHN:

18 Q Applicant's panel, you were asked questions with
19 regard to the Cameron Parish incident which is discussed
20 in reference 8 of your testimony. Assuming that a large
21 percentage of those people that did not evacuate -- assuming
22 that had been due to their lack of knowledge of plan or
23 lack of awareness that they had to evacuate, do you believe
24 that the period of time -- if those conditions were the
25 equivalent of what would occur at Limerick, do you believe

15pb6

1 that the period of time which is contained in your estimate,
2 that is 24 hours in the open, which is equivalent to two
3 or three days would give sufficient time to notify those
4 people and to give them information such that they could
5 make a reasoned decision?

- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

1 A (Witness Kaiser) Yes, I do, and the reason
2 for believing that is based in part on a reading of
3 the report of an evacuation that took place in the vicinity
4 of the Waterford nuclear power plant in December 1982.
5 Since that evacuation took place in the vicinity of a
6 nuclear power plant, the emergency response planning that
7 had been undertaken for the nuclear power plant was helpful,
8 even though the evacuation was initiated by an accident
9 in a chemical plant.

10 In that particular case, an area of some 60
11 square miles, with the reactor fairly close to the center,
12 was evacuated. The nonevacuating fraction was determined
13 to be only 0.2 percent. It was something like 50 people
14 out of 16,000.

15 The responsible authorities knew the names and
16 addresses of every single one of those people. They made
17 no attempt to forcibly evacuate them because they had not
18 been instructed to do so. They knew those names and
19 addresses within a period of a few hours.

20 It seems to me that that example with the
21 background that it was done in the context of the planning
22 that had been done for the nuclear power plant -- that
23 all that suggests that such an evacuation would be extremely
24 efficient, and that there would be ample time to deal with
25 those people who proved to be intransigent.

1 Q Is Staff panel aware of that evacuation?

2 A (Witness Hulman) Yes.

3 Q Are your conclusions with regard to that
4 experience the same as that stated by Dr. Kaiser?

5 A In general, yes.

6 Q Do you have any significant exceptions to what
7 Dr. Kaiser said?

8 A Without studying the record, I cannot respond.

9 Q But to the extent of your knowledge, you have
10 no differences?

11 A To the extent of my understanding, without
12 having the opportunity to consider at length the comments,
13 I have nothing.

14 Q Aside from -- I'm addressing this still to the
15 Staff panel -- aside from house confirmation of notification,
16 are there not other methods which are likely to inform
17 people with regard to the fact that an evacuation is called
18 for, if they were not otherwise notified, such as use of
19 helicopters and loudspeakers?

20 A I think I indicated the same in the response
21 to the State. Loudspeakers, helicopters, door-to-door
22 knocking; all kinds of ways to inform the public.

23 Q Do you distinguish in your mind two groups of
24 nonevacuees, those which were not notified and those who
25 refuse to evacuate after -- even though they are notified,

1 in terms of risk from a nuclear station or other event?

2 A I'm afraid I don't understand the question.
3 Could you restate it?

4 MR. WETTERHAHN: Okay, I'll withdraw the
5 question. No further questions.

6 JUDGE BRENNER: Why don't you restate it,
7 because otherwise I'll ask it, since I was going to.

8 BY MR. WETTERHAHN:

9 Q With regard to evaluating the risks from, let's
10 say, a nuclear power plant, do you evaluate the risk for
11 the threat of injury to people who have made a judgment,
12 even though they were notified that they could be killed or
13 injured, they decide to stay -- do you evaluate that
14 differently as far as risk from those who didn't know they
15 had to evacuate, but would have evacuated if they had been
16 informed of that need?

17 MR. WETTERHAHN: Perhaps I should withdraw the
18 question and let the Board ask it.

19 JUDGE BRENNER: I thought you were going some
20 place else. Let me try it, since we're on the subject.

21 MR. WETTERHAHN: I will withdraw the question.

22 JUDGE BRENNER: Okay, his question is withdrawn.

23 It seems that in reading the Staff's testimony
24 where they talked about the confirmation process, there
25 was no distinction drawn in terms of the risk to the members

1 of the public who evacuated after the delay caused by
2 the fact that it was not until the confirmation process
3 that they would evacuate. And part of my question is, I
4 see no breakdown, and would you have some basis for assuming
5 a certain percentage of the public not evacuating when
6 they are first advised to evacuate, and then a different
7 percentage after the confirmation process?

8 You have treated them all, it seems to me, as
9 if they all evacuated, although admittedly under the
10 assumptions of the FES.

11 WITNESS ACHARYA: It's true that we did not
12 provide the analysis to indicate the changes and the risks
13 that might result if a small percent or whatever -- small
14 percent or whatever percent of people refused to evacuate,
15 but instead we chose to provide an alternative that the
16 people would not evacuate, but rather after the area which
17 had been contaminated and identified in those areas, people
18 would leave upon advisement six hours after the ground
19 contamination would have occurred.

20

21

22

23

24

25

1 So we thought that the alternative analysis
2 would essentially bound or at least provide a reasonable
3 bound to certain small percents and the risk that could
4 have resulted by assuming a certain fraction of the people
5 not to evacuate.

6 JUDGE BRENNER: I didn't mean to get in ahead
7 of the Staff's questions. Mr. Wetterhahn, had you finished
8 with your questions?

9 MR. WETTERHAHN: Yes.

10 JUDGE BRENNER: As long as we are on this
11 point, in looking at the assumptions for the early re-look
12 mode, which you have just referred to, and also referred to
13 earlier in response to questions, and the fact that under
14 that assumption people would evacuate six hours after the
15 radioactive plume has passed over their area. You say that
16 provides a sensitivity or an alternative analysis in your
17 testimony on DES-3. Yet in the FES, on page 5-80, where
18 you describe the assumptions for the early re-look mode,
19 at the very bottom of that page, it states:

20 "This six-hour relocation time is similar to
21 the time for evacuation assumed in the first set, based
22 on two hours delay, and about 2.5 miles per hour evacuation
23 speed."

24 My question is, if they're similar, where is the
25 sensitivity provided?

1 WITNESS ACHARYA: Okay, there is a distinction
2 between evacuation within six hours and the relocation
3 after the plume passes over a period of six hours. That
4 is in case of evacuation the part of the total time which
5 according to our assumption is six hours, the part of the
6 total time for evacuation, the people may have succeeded
7 in evading the plume and the ground contamination. That
8 is to a certain percent of the people. But in case of the
9 early relocation, it assumes that nobody gets the benefit
10 of the plume, that everybody for sure gets the ground dose
11 for six hours, and the dose from the plume -- the
12 radioactive cloud, until the plume passes.

13 So, in other words, both received during the
14 six hours after the plume passes, is higher for most of
15 the people compared to the dose that would be received if
16 people are evacuating. You know, you have to look at
17 that assumption.

18 JUDGE BRENNER: What, then, did you mean in
19 the sentence I quoted from page 5-80 with respect to the
20 similarity?

21 WITNESS ACHARYA: Okay, the similarity is this:
22 When I was confronted with what kind of ground exposure,
23 with what kind of period that people would likely be
24 receiving after the plume passes, this thought crossed my
25 mind, that the site would have already an agency plan for

lb 16-7

1 evacuation, and it is only under certain disadvantageous
2 conditions that the evacuation may not be effected. But,
3 however, a site which is quite prepared in conducting the
4 evacuation, if it appeared to do -- to conduct an early
5 evacuation, the least that can be done is dose contaminated
6 areas, the people would be advised to leave their residences.
7 And even though evacuation time estimate is six hours, the
8 relocation process cannot be much longer than that six
9 hours.

10 JUDGE BRENNER: All right. Let me think about
11 all that and read the words again, and you might want to
12 read the words, too, because the word "similar" appears
13 to modify the word "time" in both instances in the sentence,
14 and presumably that is only important in terms of doses,
15 but we promised we'd break promptly at this time, and I
16 want to do that. When we come back, we will pick up with
17 Staff's questions. They can bring up anything on this
18 subject they want to, and we'll think about it, too.

19 Did you want to add to that very same question,
20 Mr. Hulman?

21 WITNESS HULMAN: Yes. Judge Brenner, I think
22 one clarifying remark, I think what Dr. Acharya was
23 referring to when he said similar to the time, he was
24 talking about the elapsed time, not the clock time, and I
25 think the English is correct. Although you may interpret it

1 as clock time, that was not the intent.

2 JUDGE BRENNER: I must be tired. I'm not
3 focusing on the difference between clock time and elapsed
4 time as you just used it.

5 WITNESS HULMAN: Delta time. Not related
6 to any clock. If you read that as the time since the
7 accident, that was not the intent.

8 JUDGE BRENNER: That may be a problem. I'll
9 think about that, too, and go back and read it. We'll break
10 now and we will come back at 1.30 -- 1:35, and see if we
11 can get any reports at that time or shortly thereafter.

12 In any event, the next order of business on
13 this contention will be to get the Staff's questions of
14 the combined panel.

15 Could you give us an estimate, Staff, of how much
16 you have?

17 MS. HODGDON: We have very little.

18 JUDGE BRENNER: What about DES 1 and 2, which we
19 will go to next?

20 MR. ELLIOTT: Relatively little; something on
21 the same order of magnitude as I had on 3.

22 JUDGE BRENNER: If we finish DES 1 and 2, and
23 everything else is favorable also, as we said, we are
24 considering in the first instance -- we haven't ruled on
25 Philadelphia's request to start at 9:00 a.m. on Wednesday,

lb 16-9

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

instead of Tuesday afternoon.

MS. BUSH: The request, your Honor, is Thursday.

1 JUDGE BRENNER: Thursday?

2 (Laughter.)

3 MS. BUSH: Yes.

4 JUDGE BRENNER: Forget it. I'll tell you that
5 right now. I'm not even going to consider it. We're not
6 going to start next Thursday.

7 MS. BUSH: I'm going to have to form a motion
8 when we get back.

9 MR. WETTERHAHN: I couldn't hear counsel.

10 JUDGE BRENNER: She wants to start Thursday. We
11 are not going to do that. We had that week scheduled long
12 in advance for Tuesday afternoon. We are willing to adjust
13 it somewhat if things move efficiently today, and we are
14 willing to go half a day tomorrow, unless somebody has an
15 objection, but we said any objection would be honored
16 because we were not scheduled to go tomorrow. So you talk
17 to all the parties. But we are not going to start Thursday
18 and hope to finish in a day and a half next week, unless
19 something different in terms of the issues before us is
20 given to us this afternoon.

21 MR. WETTERHAHN: Any consideration by the
22 Applicant to start even next Wednesday would --

23 JUDGE BRENNER: We're going to take this whole
24 thing up again.

25 MS. HODGDON: We too did not come prepared to

ay - In

May 16, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	
PHILADELPHIA ELECTRIC COMPANY)	Docket Nos. 50-352
(Limerick Generating Station,)	50-353
Units 1 and 2))	

NRC STAFF TESTIMONY OF LEWIS G. HULMAN AND
SARBESWAR ACHARYA RESPONDING TO LEA CONTENTIONS DES-1
AND DES-2 AND THE CITY OF PHILADELPHIA ISSUES 13 AND 14
RELATED TO THE LIMERICK DRAFT ENVIRONMENTAL STATEMENT 1/

Q1. Mr. Hulman, please state your name, address and position with the Nuclear Regulatory Commission.

A1. My name is Lewis G. Hulman. My business address in U.S. Nuclear Regulatory Commission, Washington, D.C., 20555. I am the Chief of the Accident Evaluation Branch, Division of Systems Integration within the Office of Nuclear Reactor Regulation of the Nuclear Regulatory Commission.

1/ The NRC staff's testimony of Lewis G. Hulman, Sarbeswar Acharya and Brian J. Richter addressing LEA's Contentions DES-3 and 4 was filed on May 11, 1984. Pursuant to a ruling from the bench granting Staff's request to file a portion of its testimony later than the May 11, 1984 date required by the Board's Order of April 20, 1984, for the filing of testimony, Tr. 11,068, the Staff is filing its testimony addressing DES 1 and 2 and the City's Issues 13 and 14 today.

- Q2. Have you prepared a statement of your professional qualifications?
- A2. Yes, a copy of my statement of professional qualifications was appended to the testimony filed on May 11, 1984. Another copy is appended to this testimony.
- Q3. Dr. Acharya, please state your name, address and position with the U.S. Nuclear Regulatory Commission.
- A3. My name is Sarbeswar Acharya. My business address is U.S. Nuclear Regulatory Commission, Washington, D.C., 20555. I am the Senior Radiological Engineer in the Radiological Analysis Section^A of the Accident Evaluation Branch, Division of Systems Integration¹ within the Office of Nuclear Reactor Regulation of the Nuclear Regulatory Commission.
- Q4. Have you prepared a statement of your professional qualifications?
- A4. Yes, a statement of my professional qualifications was appended to the testimony filed on May 11, 1984. Another copy is appended to this testimony.
- Q5. Please state the purpose of your testimony and identify your responsibilities therein.
- A5. The purpose of our testimony is to respond to Limerick Ecology Action's (LEA) admitted contentions DES-1 and DES-2 and to the City of Philadelphia's Issues 13 and 14. We are jointly responsible for all of the following testimony.

Q6. How are the contentions identified?

A6. Identification of the contentions in our testimony follows the same format as used by the Licensing Board in its Order of April 20, 1984. The contentions/issues are addressed in the following order: DES-1, DES-2, City 14(a), (b), (e), and City 13.

Q7. What is DES-1?

A7. DES-1 states:

21

The DES' severe accident consequence modeling assumes the relocation of the public from contaminated areas beyond the 10 mile plume exposure EPZ. (DES, Supp. 1, pp. 5-26 to 5-22). Such an assumption in Limerick's case is implausible and without foundation in fact.

Q8. What is your response?

A8. It is highly plausible that following a severe reactor accident involving large atmospheric release of radionuclides, the health physics teams of the licensee, local and state governments, FEMA and other federal agencies such as EPA, DOE (including National Laboratories), Department of Health and Human Services, etc., would perform environmental radiological monitoring and field measurements in areas extending beyond the 10 mile EPZ for identification of contaminated ground, including identification of highly contaminated areas (hot spots) and provide bases to formulate advisories to the affected persons for protective action. The foundation for this assumption is provided in the last sentence of the first full paragraph on p. 11, and item d on p. 12 of NUREG-0654, FEMA-REP-1,

Rev. 1 (1980), which should be read in conjunction with the descriptions of I. Federal Response on pp. 27-28 and C. Emergency Response Support and Resources, Evaluation Criteria 1 on p. 40 of the same document.

Q9. What reasons are there to believe that ad hoc relocation beyond the 10 mile EPZ would occur?

A9. The fact that so much public and private sector attention would be given to releases from a severe reactor accident, the planning efforts within the 10 mile EPZ, the availability of monitoring teams, public awareness, and historical precedents for response during disasters all provide bases for concluding that such a relocation would take place.

Q10. What are your estimates of the number of persons who may have to be relocated from the "hot spots" outside the 10 mi EPZ?

A10. Our basis is CRAC runs made to estimate the number of persons for whom the projected 7-day ground dose would be more than 200 rems to the total bone marrow. The DES/FES analysis assumes that these persons would be relocated. One of the CRAC runs included all of the release categories shown in FES Table 5.11c that are not initiated by severe earthquakes and their probabilities are shown in FES Table 5.11d. From this CRAC run, the complementary cumulative distribution function values for the number of people to be relocated is shown in the attached Table 1. From this table we see that for relocation from the hot spots outside the 10 mi EPZ the probability that 5000 or more persons would be affected is about 1×10^{-6} per

reactor-year, the probability that 50,000 or more persons would be affected is about 1×10^{-7} per reactor-year, and the probability that 300,000 or more persons would be affected is about 1×10^{-8} per reactor-year. Finally, the probability that 500,000 or more persons would be affected is about 2×10^{-11} per reactor-year. These estimates include the probabilities of the accidents, the probabilities of the weather sequences and the probabilities of wind blowing toward the various population sectors.

Q11. What is DES-2?

A11. DES-2 states:

The DES' severe accident consequence modeling uses an assumption of a uniform two-hour evacuation delay time in its emergency response model. (DES, Supp. 1, pp. 5-21 to 5-22). This assumption understates the likely delay time for a high population density site such as Limerick. This understatement of delay time results in an understatement of Limerick's risk, because accident consequence calculations are sensitive to evacuation delay time assumptions.

Q12. Are the risks at Limerick sensitive to evacuation time estimates?

A12. For some accidents, yes; for others, no.

Q13. Why do you differentiate?

A13. For some accidents there would be sufficient warning time to allow the public to evacuate before the plume could reach them even if the evacuation time were relatively long. For others, the warning time could be short and many persons in the EPZ could not evacuate before being overtaken by the plume (even if the

evacuation time were relatively short). As discussed below, the Limerick DES and FES contain an assessment that may be used to indicate the range of risk from our 2 hour delay time before evacuation to no evacuation at all. (See FES pp. 5-113, 5-114 for discussion of uncertainty stemming from Emergency Response Effectiveness).

Q14. What is the basis for your FES estimates of a 2 hour delay time?

A14. With a well-established emergency response plan in place, periodic testing of the notification systems and procedures, exercise and drills to maintain the emergency plan in readiness on a 24-hour basis during the entire period of plant operation, it is very unlikely that the mean delay time before evacuation would be significantly higher than the 2 hours assumed in the DES/FES analysis for the site conditions assumed for the "Evac-Reloc" mode of offsite emergency response described in FES p. 5-80. We have not presupposed one hundred percent accuracy in the delay time estimate of 2 hours, or in any other estimates of delay time. Similarly, estimates of other parameters used in risk analysis are also subject to a degree of uncertainty (see FES Section 5.9.4.5(7) for discussion of uncertainty).

There would likely be small variations in the delay time around the assumed value of 2 hours in either direction but, as explained in the FES (p. 5-80), the impact of these small variations on risk estimates would not be expected to be substantial.

In the Limerick DES/FES the staff also provided an analysis to reflect the hypothesis that planned evacuation may not take place

for several reasons, one of which may be long delay time due to possible adverse site conditions (FES p. 5-80) for which the staff used the "Early Reloc" mode of offsite emergency response. The principal reason for evaluating this alternative mode of response was to reasonably bound the effects of possible perturbations in the selected values of the evacuation parameters. It is our opinion that the evaluations of the two alternative modes of response constitute a reasonable approach to assuring that accident risks are not understated.

Values of the time-steps that sum to the 2 hour delay time are assumed to be as follows:

- ° 15 minutes (reckoned from the reactor operator's warning) for the authorities to interpret the plant data and decide to promptly notify the people to evacuate (see 10 CFR 50 APP.E, D.3)
- ° 15 minutes to notify most of the people in the 10-mi EPZ to evacuate (see 10 CFR 50, APP.E, D.3, and NUREG-0654, REP-1, Rev. 1, 1980, p. 3-3, item 2a).
- ° 90 minutes for ^{people's} preparation to evacuate and to get underway.

The 2 hour delay time is assumed to be appropriate for the site conditions that are normal to moderately adverse due to light snow, ice, moderately severe hurricane or earthquakes of low to moderate severity (less than Modified Mercalli Intensity Scale VI). The 2 hour value for the delay time chosen for the Limerick DES/FES analysis is the same as was used by the staff for risk analysis for

the Indian Point site (in Section III.C.A of the staff written testimony on Commission Question 1 Regarding Assessment of Consequences and Risks for the Indian Point hearing, 1982-83). The delay time of 2 hours for the Indian Point site was based on two evacuation time studies - one prepared by a contractor for the Indian Point licensees, and the other prepared by a contractor for FEMA. Both studies were reviewed in NUREG/CR-1856, "An Analysis of Evacuation Time Estimates Around 52 Nuclear Power Plant Sites," Vol. 1, May 1981. The delay time of 2 hours for the Indian Point site used by the Staff was characterized by the Indian Point ASLB as reasonable (see Indian Point ASLB Recommendations to the Commission, October 24, 1983, p. 96, second paragraph). Because the population within the Indian Point 10-mile EPZ (0.25 million people projected for the year 1990 as used in the Indian Point risk analysis) is larger than the population within the Limerick 10-mile EPZ (0.16 million people projected for the year 2000 as used in the Limerick DES/FES), the staff also considered the 2 hour delay time for Limerick as reasonable. Implicit also in the staff's value of the 2 hour delay time is that only for a small fraction of the year the site (Indian Point or Limerick) may have weather related adverse conditions that may affect evacuation. Further, for Limerick the estimated frequency of a severe reactor accident due to earthquakes of low to moderate severity is only one-hundredth of the frequency of a similar accident due to causes other than earthquakes (see FES Table H.2).

The document SAND78-0092 which is intervenor's reference cited in the basis of the contention DES-2 is also a staff reference to Limerick DES/FES, Appendix J. The values of 1 hr, 3 hrs, and 5 hrs for 15%, mean, and 85% likely delay times derived in the report were based on historical data on experience with unplanned or impromptu evacuation following transportation accidents in conjunction with the assumption of evacuation speeds of 10 mph, or higher. The delay times of 1, 3 and 5 hours with weighting factors of 0.3, 0.4 and 0.3, respectively, and an evacuation speed of 10 mph for all the three values of delay time, were also used by the applicant in the ER-OL analysis. However, the staff did not use the assumption of a radial evacuation speed of 10 mph in the ER-OL because the staff concluded that the effective (radial) evacuation speed should be determined by such considerations as the road network in the site region, and the expected traffic loading during evacuation. The NUS 1980 study includes the estimate of about 4 hours of travel time (implying a radial evacuation speed of 2.5 mph) and is roughly consistent with travel time of 6.7 hours (equivalent to a radial speed of 1.5 mph) for the Indian Point 10-mi EPZ. Therefore, the staff considered the evacuation speed of 2.5 mph as more appropriate and site-specific for Limerick than the 10 mph arbitrarily assumed in the Sandia report. Therefore, since the delay times of 1, 3 and 5 hours go together with the speed of 10 mph, the staff did not use the delay times of the Sandia report.

It should be noted that a 10 mph evacuation speed in conjunction with 1 hr, 3hrs and 5 hrs of delay time would imply 2, 4 and 6 hours respectively, for 15%, mean, and 85% total evacuation times in the Sandia report. On the other hand, the staff's assumptions of 2 hours delay and a 2.5 mph speed amount to 6 hrs of 100% total evacuation time, which is Sandia's maximum value for the total evacuation time. From this comparison it should be inferred that the staff's evacuation parameters have not resulted in understatement of Limerick risks.

As stated above, the risk evaluations for the two emergency response modes (Evac-Reloc and Early Reloc, FES p. 5-80 through p. 5-82 and Appendices L and M) are viewed as reasonably bounding the risk estimates.

See also the staff testimony in response to Contention City-14 part(a).

Q15. What is City 14 part (a)?

A15. City 14 says:

The DES does not accurately reflect either the median or upper estimates of the radiological effects which could result from an accident at Limerick because several key input assumptions associated with human activity after a severe accident are not realistic.

Part (a) states:

The base case average evacuation time of 2.5 mph is based on a 1980 study which is now inaccurate. See also Statement of Issues of the Commonwealth of Pennsylvania

with Respect to Offsite Emergency Planning, January 30, 1984.

Q16. What did the Commonwealth of Pennsylvania assert in the January 30, 1984 document with respect to this contention?

A16. In the referenced document, the Commonwealth asserted:

11. The applicant must prepare an updated evaluation (sic- evacuation) time estimate study for the Limerick station plume exposure pathway emergency planning zone (plume EPZ). The evacuation time study the applicant has submitted to the Nuclear Regulatory Commission for approval is outdated and based on inaccurate information. Deficiencies in the study include, but are not necessarily limited to, reliance on out-of-date and inconsistent census data (see pp. 1-6; 2-8; see also pp. 2-11 - 2-13 and 3-4 - 3-7); use of incorrect evacuation routes (see pp. 3-9 - 3-12; 3-14 - 3-17); use of a concept of "maximum evacuation time" that does not accurately reflect the size of the plume EPZ, (see p. 3-18); and failure to account for the notification system to be installed by the applicant. 10 C.F.R. 50.47(a)(1), (2), (b)(10); 10 C.F.R. Part 50, Appendix E, Section IV; NUREG-0654, Rev. 1, "Criteria for Preparedness in Support of Nuclear Power Plants, "(November 1980), Criterion J.8 and Appendix 4.

Q17. What were the bases for the staff's evacuation time estimates?

A17. Although the staff derived the mean effective radial speed of 2.5 mph using the NUS 1980 estimate of 4 hours of travel time to clear the 10-mile EPZ, the NUS 1980 study was not the only basis for using the 2.5 mph evacuation speed. The other basis was the estimated effective radial evacuation speed of 1.5 mph in the Indian Point risk analysis (in Section III.C.A of the staff written testimony on Commission Question 1 Regarding Assessment of Consequences and Risks at Indian Point hearing, 1982-83). The effective evacuation speed of 1.5 mph for the Indian Point site (which the staff had derived on the basis of a mean estimate of 6.7 hours of travel time to clear

the Indian Point 10-mi EPZ, based on the same two evacuation time studies which are referred to in our response to DES-2) was considered as reasonable by the Indian Point ASLB, and is equivalent to a slow walk (see Indian Point ASLB Recommendations to the Commission, October 24, 1983, p. 96, second paragraph).

Because the population within the Limerick 10-mile EPZ (0.16 million projected for the year 2000 as used in DES/FES analysis) is considerably less than the population within the Indian Point 10-mile EPZ (0.25 million projected for the year 1990 as used in the Indian Point risk analysis), it was the judgment of the staff that the effective evacuation speed of 2.5 mph (travel time of 4 hours) for Limerick is consistent with that of 1.5 mph (travel time of 6.7 hours) for Indian Point. There could be other factors besides the difference in the populations within the 10-mi EPZs of Limerick and Indian Point, such as terrain differences, difference in capacities of road networks to cope with traffic loadings during emergencies, etc., which may influence the effective evacuation speeds for the two sites. However, the speed of 2.5 mph chosen for Limerick DES/FES analysis is also equivalent to a moderately slow walk.

We have not presupposed one hundred percent accuracy in the evacuation speed estimate of 2.5 hours; nor any other estimates of evacuation speed or other parameters that were used in risk analysis

can claim such accuracy. (See FES section 5.9.4.5(7) for discussion of uncertainty). The staff's use of the "Early Reloc" mode in an alternative risk analysis provided in FES Appendix M is intended to provide a reasonable bounding of risk estimates due to minor perturbations in evacuation model parameters. The alternative analysis shows no substantially different risk perspective compared to the risk perspective provided by use of 2.5 mph for evacuation speed and 2 hours for delay time before evacuation. However, the two analyses using "Evac-Reloc" and "Early Reloc" modes of offsite emergency response, when viewed together, enlarge the perspective of risks from Limerick accidents.

It should be recalled from the FES analysis that the risks of early fatality are dominated by Limerick reactor accidents initiated by severe earthquakes for which evacuation is unlikely, and only the "Late Reloc" mode of emergency response would apply.

Q18. What is City 14(b)?

A18. CITY-14(b) asserts:

Not included in the base case is the known phenomenon that as evacuees approach the City outskirts, their speeds would reduce, backups would occur and consequences due to trapped evacuees would increase.

Q19. Do you agree with this assertion?

A19. Yes, but with several conditions, as stated below.

First, an accident must occur that releases a large amount of radioactivity to result in high radiological doses substantially

beyond 10 mi EPZ; situations which have been associated with some of the low probability events in the FES.

Second, the wind must blow toward Philadelphia to constitute a hazard to evacuees traveling in that direction. As described in the FES, the wind generally blows toward Philadelphia 27 percent of the time.

Third, given an accident with a release of substantial quantities of radioactivity, with the wind initially blowing toward Philadelphia and continuing to blow in that direction, the atmospheric diffusion conditions would have to be poor to allow sufficient concentrations of radioactivity to remain in the plume to constitute a significant hazard to evacuees approaching the outskirts of Philadelphia.

Fourth, given the advisory to the evacuees that at least after crossing the 10 mi EPZ boundary they should travel in the crosswind direction and avoid travelling in the downwind direction, the evacuees could either not heed the advisory, or inadvertently or willfully travel toward Philadelphia while the wind is also blowing toward Philadelphia.

Q20. What assumptions and analyses in the FES are relevant to this contention?

A20. The CRAC code used by the staff in estimating consequence and risk estimates for the FES contains a number of stylized or simplifying

1 stay tomorrow because we understood that --

2 JUDGE BRENNER: I understand you weren't
3 prepared, but earlier this week we mentioned that we might
4 be flexible if any of the parties were.

5 MS. HODGDON: The consideration was whether we
6 would go into Friday or not. Originally we --

7 JUDGE BRENNER: I know, Ms. Hodgdon, but I just
8 stated what I just said, and if you have an objection, we
9 will honor it. But let's see where we are.

10 MS. HODGDON: We object. We will object when
11 an objection becomes timely.

12 JUDGE BRENNER: You think about it and we will
13 talk about it later.

14 Okay, we will be back at -- let's make it 1:40
15 now.

16 (Whereupon, at 11:40 a.m., the hearing
17 was recessed, to reconvene at 1:40 p.m.,
18 this same day.)

19

20

21

22

23

24

25

- - - - -

AFTERNOON SESSION

(1:40 p.m.)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

JUDGE BRENNER: All right. We're back on the record.

What we'd like to do is finish the examination on DES-3 and then take up the other various matters we discussed, unless there is something pertinent that any party wants to do first, such as the DES references.

MS. HODGDON: I have no cross examination for the Applicant, nor redirect for the Staff.

JUDGE BRENNER: How about the other matter?

MS. HODGDON: Oh, the other matter.

We were engaged in the telephone conference call for over an hour, and we did not have time to check this out. We have the table. I'd like to look at it and be sure it's correct before I offer it, if we can defer that until after the recess.

JUDGE BRENNER: All right. You come back to us and tell us when you're ready.

MS. HODGDON: Thank you.

171b2

1 Whereupon,

2 G. DAEBELER

3 S. LEVINE

4 E. SCHMIDT

5 G. KAISER

6 L. HULMAN

7 S. ACHARYA

8 resumed the stand and, having been previously duly sworn,
9 were examined and testified further as follows:

10 BOARD EXAMINATION

11 BY JUDGE BRENNER:

12 Q On page 27 of the Applicant's testimony, paragraph
13 28 begins there and continues over to the next page -- did
14 I say page 27? That's what I meant to say. You discuss
15 there the six percent assumption and you discussed, in your
16 written testimony and also in response to one or two
17 questions, the fact that's the equivalent of exposures to
18 that, which would be accumulated.

19 It says in over two days -- should that be three
20 days? Was the factor .3?

21 Elsewhere in your testimony you have a factor for
22 the behavior assumptions for --

23 A (Witness Kaiser) The ratio of the shielding
24 factors for being out in the open, and normal activities, is
25 .7 to .3. And it was just on the basis of that that I

1 multiplied -- that I multiplied by about two.

2 Q And you state, in your written testimony, that the
3 assumption that six percent of the population, up to 25 miles,
4 does not take the protective actions, and the further
5 assumption that they have the accumulated exposure in that
6 time of over two days worth of "normal activities" leads to
7 increasing the public risk of early fatalities by 49 percent.

8 And you give your view that that's a small
9 increase for that calculation. If we applied different
10 assumptions of the percentage of the population that does not
11 take protective action, would we increase the percentage
12 increase, for risk of early fatalities, linearly? In
13 other words, if we assume 12 percent, would that become a
14 98 percent increase, and so on?

15 A I think that would be close enough, yes.

16 Q You said that would be close enough?

17 A Yes.

18 Q Has the Staff, either before or since the filing
19 of the testimony, done any sort of sensitivity analysis
20 to see what would happen if they varied the Staff's
21 assumptions further by assuming that six percent would not
22 take protective actions for the period of equivalent "normal
23 activities" exposure of a little over two days?

24 A (Witness Hulman) No, sir.

25 Q Is it possible for you to do that in some sort of

171b4

1 simply applied manner, so that you can give us what the
2 change would be, in your previous results, if you made
3 that assumption?

4 A It's not a straightforward estimate, in our
5 opinion, but we believe that the two assumptions that we've
6 made tend to bound the results.

end17

7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

18pbl

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

Q You're talking about the early re-look mode assumption as compared to the other mode. As we discussed earlier this morning and as described on page 5-80 of the FES.

A Yes.

Q But that would not bound the results that you would get if we applied the Applicant's 6 percent of the population not evacuating for the equivalent exposure of over two days, does it?

A I think it would.

Q Could you explain why? I don't understand why it would.

A Because the bounding assumption of late relocation for everybody -- I'm sorry, early relocation for everybody would tend to produce higher doses than just 6 percent of the people.

Q I understand now. You said would tend to produce. Are you confident that the result is higher?

A Yes.

Q Could you estimate up to what percentage assumption in the way the Applicant did it we could go before we approached what you term the bounding assumptions of the Staff's analysis, using the early re-look assumptions?

A Not directly. The reason I don't believe we can do it directly is that early fatalities are a

1 threshold function, not a linear function with percentages
2 of people that don't evacuate. So we would have to make
3 additional calculations to provide a firm estimate.

4 Q All right. You were able to state you were
5 confident that the Staff's bounding early re-look mode
6 assumptions would bound the Applicant's assumption that
7 6 percent of the population out to 25 miles would be
8 assumed to remain outdoors for 24 hours, rather than taking
9 whatever protective actions were recommended.

10 A I'm not sure that was the assumption. May I
11 just confer for just a moment?

12 (Staff witnesses conferring.)

13 Q I took that assumption, the latter one, from
14 page 27 of the Applicant's testimony. So if I have misstated
15 it, maybe you can straighten me out. Near the bottom in
16 paragraph 38.

17 A (Witness Hulman) Yes, I'm sorry. Go ahead.
18 Would you please repeat the question? There was something
19 in the question I wanted to check.

20 Q All right. My question was, I just wanted to
21 confirm, or maybe get the answer that it is not confirmed
22 that the Staff's bounding assumption which is the one using
23 the early re-look mode, as I understand it, would although
24 you could not easily do the comparative calculations that
25 I earlier asked you about, I thought you did state, nevertheless

18pb3

1 you were confident that that Staff bounding assumption would
2 bound the risk estimates that would result from applying
3 the Applicant's assumption that 6 percent of the population
4 out to 25 miles would remain outdoors for 24 hours after
5 the declaration of the emergency and then rapidly relocate.

6 A I believe that was what I said, and I stand by it.

7 Q All right. Would that confidence remain if we
8 doubled the Applicant's assumption to --

9 A I don't know, sir.

10 Q How far can I push you on the percentage where
11 you still remain confident?

12 A I know that the number at 6 percent is bounded,
13 but because of the threshold effect, I wouldn't venture a
14 guess.

15 Q Okay, I understand now. You know that only
16 because those results are already presented and you can
17 compare the results.

18 A Yes.

19

20

21

22

23

24

25

1 Dr. Acharya has pointed out to me that the
2 assumptions made by the Applicant, of six percent out to
3 25 miles, are also -- are also different than our
4 assumptions within the 10 miles, as well as outside 10 miles.
5 So it's not -- it's further, not directly evident that
6 any increase in the Applicant's assumptions would or would
7 not be bounded by our calculations.

8 Q We may have this already, but I want to make sure
9 because of the language on page 5-80 of the FES, near the
10 bottom, in terms of what the "six hour relocation time"
11 means in discussing the early re-look mode. The FES states
12 -- and I'm paraphrasing now -- that the assumption is that
13 people in the footprint of the plume, within 10 miles, would
14 leave the area six hours after plume passage. Does that
15 mean within six hours after plume passage, all those people
16 will have left or does that mean that nothing happens for
17 six hours and then the people are assumed to rapidly leave?

18 A (Witness Acharya) The computation assumes that
19 nothing happens until six hours and at the end of the six
20 hours, they would have disappeared.

21 Q That's what I thought, but the sentence was
22 susceptible of a different interpretation. Could the Staff
23 give me a feeling for the sensitivity of their results, if
24 we were to vary it six hours by increasing the time? Have
25 you done any parametric or sensitivity studies on that?

1 A No, we have not done that, no.

2 Q Would it be a linear percentage, that is, if I
3 increase the six hours by a third to eight hours, would I
4 increase your results by a third?

5 A It would not increase the percent to the time
6 because many of the people, within five miles or less, would
7 have already ben overkilled by the exposure from the plume
8 in the ground. And by giving additional two hours of
9 ground exposure would not very much increase the numbers of
10 fatality. So there might be a slight increase, but not
11 in proportion to the time.

12 JUDGE BRENNER: Thank you.

13 BY JUDGE COLE:

14 Q The Applicant's testimony, at page 26 and 27, in
15 that paragraph gentlemen, you indicate that the 50 percent
16 non-participating is too large.

17 A (Witness Levine) I'm sorry. I can't hear.

18 Q In Item 37, page 26, of the Applicant's testimony,
19 in that paragraph you indicate that 50 percent non-participa-
20 ting is too large and as at least a partial basis for that
21 you refer to the Sandia generic evacuation model, which
22 excludes natural disasters, indicating that they are
23 inappropriate. And further, stating that transportation
24 accidents were used to develop the descriptive models for
25 reactor accidents.

1 Could you provide me with a little more
2 information about why transportation accidents might be
3 more appropriate as an indicator of the level of non-
4 participation of people in evacuations?

5 A (Witness Kaiser) Yes. If you are thinking of a
6 transportation accident such as perhaps say a chlorine rail
7 tanker crashing, there is I think, the need to make sure
8 that you do get the people out because if you don't they
9 will be very much at risk. Whereas, for something like a
10 hurricane -- that's discussed in our reference 8 -- I
11 think there's probably a different attitude. Some people
12 would choose, as it were, to batton down in their houses
13 and ride it out.

14 I think those kinds of considerations, the kind
15 of response time needed, as well for transportation accident
16 would perhaps be more typical when measured against the
17 severe accidents that we've been looking at.

18 Q All right, sir. In the latter part of Item 37,
19 on page 27, right after the sentence that states that
20 transportation accidents were used in preparing the
21 descriptive models for reactor accidents, it states that
22 civil defense personnel observed five percent as a fraction
23 of non-participating people in actual evacuations. Do you
24 know, sir, what kinds of accidents they were referring to
25 there, the civil defense personnel that made these

1 observations?

2 A The Sandia model relied heavily on the Hans &
3 Sell paper and it is my understanding that the five percent
4 that they referred to is simply their interpretation of the
5 six percent that Hans & Sell used. In other words, they
6 say about five percent, six percent.

7 Q That wasn't quite my question. The sentence said
8 the description of the Sandia model states that civil
9 defense personnel observed five percent as the fraction
10 of non-participating people in actual evacuations. Do you
11 know, sir, what kinds of events that people were being --
12 for which the people were being evacuated?

13 A No, the only thing I can tell you is that the
14 Sandia study focused on transportation accidents. But I
15 cannot -- or did not -- know myself whether that particular
16 reference to the five percent was confined to those
17 transportation accidents, or not.

18 Q All right, sir. Thank you. Do you use the
19 Sandia generic evacuation model in any of your considerations,
20 other than as a backup to justify a six percent value for
21 non-participation?

22 A Yes, we used the Sandia generic evacuation model
23 as our base case evacuation model, when preparing SARA.

24 Q All right, sir, thank you.

25 JUDGE BRENNER: Any follow up, Mr. Elliott?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

MR. ELLIOTT: No.

JUDGE BRENNER: Commonwealth? City? Applicant?

Staff?

end9

20pbl

1 We have finished DES-3. We will take the parties'
2 pleasure as to whether we should discuss schedule now. I
3 would prefer, if it looks like we can finish DES-1 and 2 to
4 keep doing that.

5 MR. ELLIOTT: I believe we can.

6 JUDGE BRENNER: Ms. Bush, is that acceptable to
7 you?

8 MS. BUSH: Yes.

9 JUDGE BRENNER: I don't know if you want to break
10 up 1 and 2 or can take them together, Mr. Elliott. In part
11 it's a pragmatic decision. If you don't have very much on
12 each it won't be so long that people will forget what they
13 want to focus on, we could let you take them together.

14 Would that be acceptable to you?

15 MR. ELLIOTT: As a matter of fact I have only a
16 very, very few questions on DES-2, just a few. So we can
17 take them together if you want to do it that way.

18 JUDGE BRENNER: All right, why don't you do that.
19 Am I correct that the panel would be the same, Ms. Hodgdon?

20 MS. HODGDON: Judge Brenner, the testimony isn't
21 in. It's distributed, the reporter has a copy.

22 JUDGE BRENNER: Thank you. The Applicant's
23 testimony included them all, but the Staff's did not, and
24 we can do that at this time.

25

20pb2

1

whereupon,

2

G. DAEBELER

3

S. LEVINE

4

E. SCHMIDT

5

G. KAISER

6

L. HULMAN

7

S. ACHARYA

8

resumed the stand and, having been previously duly sworn,

9

were examined and testified further as follows:

10

DIRECT EXAMINATION

11

BY MS. HODGDON:

12

Q Mr. Hulman and Dr. Acharya, do you have with you

13

a document entitled NRC Staff testimony of Lewis G. Hulman

14

and Sarbeswar Acharya, responding to LEA Contentions DES-1

15

and DES-2, and the City of Philadelphia issues 13 and 14

16

related to the Limerick draft environmental statement?

17

A (Witness Acharya) Yes, I do.

18

A (Witness Hulman) Yes.

19

Q That document consists of 24 pages, plus Tables

20

1, 2, 3, 4 -- plus four tables and two pages of professional

21

qualifications of Lewis G. Hulman, two pages of professional

22

qualifications of Dr. Sarbeswar Acharya. Do you have that

23

document?

24

A (Witness Hulman) Yes.

25

Q Is this document, as described, true and correct

20p-b3

1 to the best of your knowledge and belief?

2 A If it contains the corrections that we provided,
3 yes.

4 Q Does the copy that you have show corrections that
5 you would have made?

6 A Yes.

7 Q Are any of those corrections so substantive that
8 you would like to point to them at this time -- significant,
9 I might say. Are there anything other than typographical
10 errors that have been changed?

11 A Yes.

12 Q Do you want to read those in then?

13 A I would like to explain one. On page 24, the
14 first paragraph --

15 JUDGE BRENNER: Excuse me, Mr. Hulman, could you
16 bring the mike just a little closer. Thank you.

17 WITNESS HULMAN: On page 24, the first paragraph,
18 third line, the numbers that were originally 16 and 11 percent,
19 respectively should be inverted. So that it reads, or 11
20 percent and 16 percent.

21 On the next to the last line and on the last
22 line, the probability numbers have also been inverted, so
23 that the next to the last line and the last line should read,
24 people in the southeast sector is 2×10^{-7} per reactor year.
25 And is 3×10^{-7} per reactor year for people in the east,

20pb4

1 southeast sector.

2 Other than that, all the rest of the corrections
3 are typographical.

4 BY MS. HODGDON:

5 Q And so as corrected your testimony as described
6 in with the corrections now explained by you -- is this
7 testimony true and correct to the best of your knowledge and
8 belief?

9 A (Witness Hulman) It is.

10 Q Dr. Acharya?

11 A (Witness Acharya) Yes.

12 MS. HODGDON: Judge Brenner, I move this testimony
13 be accepted into evidence and bound into the record as if
14 read.

15 JUDGE BRENNER: Just so I understand, we've gotten
16 the rephoto-ed copy, which I haven't had a chance to go
17 through. Am I correct that the handwritten changes made
18 in that copy, which are the ones you are now moving into
19 evidence are the same as the ones you've previously given
20 us in the individual --

21 MS. HODGDON: Yes, they're exactly the same. The
22 only difference is -- they're exactly the same. I'd also
23 note that the Board's copy of Tables 1 and 2 are reversed,
24 but the reporter has the correct copy.

25 JUDGE BRENNER: All right. In the absence of

2opb5

1 objection we will admit the identified testimony into
2 evidence and bind it into the transcript at this point, as
3 if read.

4 (The document referred to follows:)

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

20pb6

1 JUDGE BRENNER: Now even though the testimony
2 covers other conventions, what you're going to cross-examine
3 I know will be DES-1 and 2 in terms of your focus.

4 MR. ELLIOTT: Correct.

5 CROSS-EXAMINATION

6 BY MR. ELLIOTT:

7 Q Is Staff aware of any planning, emergency
8 preparedness planning for relocation of the population beyond
9 10 miles of the Limerick plant?

10 A (Witness Hulman) At what level? At what level
11 of private or public --

12 Q At any level.

13 A At the federal level there has been some discussions
14 at the NRC-FEMA level. Below that at state, local level,
15 I understand there has been none.

16 Q At the federal levels which you just described,
17 is any planning yet in place?

18 A For Limerick?

19 Q Yes.

20 A No.

21 Q Did Staff perform any analyses of the case in
22 which no relocation takes place outside of the 10-mile
23 radius?

24 A I answered the question, yes and no. And I have
25 to explain that. For some of the sequences, those with --

20pb7

1 those sequences which could have been generated by a very
2 severe earthquake, the Staff did not assume early relocation.

3 Q My question was not early relocation. My question
4 was whether any analysis was performed in the case in which
5 no relocation takes place.

6 A (Witness Acharya) No.

7 Q Can Staff estimate in any way what the impact
8 on early health effects is, if no relocation assumption is
9 made?

10 A We would not make an assessment of that kind.
11 That's because that is unrealistic. The way we have assumed
12 the relocation in our analysis outside of the 10 miles is
13 the relocation from hot spots, highly contaminated ground.
14 It is not a relocation from all contaminated ground. It
15 is very realistic to assume that if any area involved highly
16 contaminated in the manner marked, the people would be given
17 prompt attention to those areas -- in those areas.

18 So we did not find it necessary to make an analysis -

19 A (Witness Hulman) If I could add. We have not
20 made such an assessment, and it would be very difficult to
21 project the numbers because of the threshold effect
22 considerations.

23 JUDGE BRENNER: Mr. Elliott, I take it, consistent
24 with your contention in DES-1, when you're referring to
25 relocation or lack of relocation assumptions, you're talking

20pb8

1 about beyond the plume exposure EPZ.

2 MR. ELLIOTT: Yes.

3 JUDGE BRENNER: I think it's confusing because
4 when you switch to DES-2 then you do it. And without
5 noticing it you'll be talking about a different geographical
6 area, so bear that in mind in your questions.

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 MR. ELLIOTT: I will make a note, when I move
2 on to DES-2.

3 JUDGE BRENNER: All right.

4 BY MR. ELLIOTT:

5 Q Is it possible that the impact on risk, if no
6 relocation is assumed, may be different for early fatalities
7 as opposed to early injuries, because of the higher
8 threshold dose required to trigger early fatalities than
9 early injuries, and because virtually all early fatalities
10 are expected to take place within the 10 mile EPZ, as beyond
11 it?

12 A (Witness Hulman) I'm afraid the question has so
13 many parts that it's hard to answer yes or no, or even give
14 a conditional answer. If you would break the question down
15 we, I think, could respond to the individual parts.

16 Q If one assumes no relocation, if one makes
17 that assumption, might the impact on risk of early injuries
18 in that event be different than the impact on risk of early
19 fatalities?

20 A (Witness Acharya) Yes, it's likely to differ.

21 Q What is the reason for that?

22 A Well, some -- perhaps you're indicating the reason
23 in your earlier version of the question. It could be that --
24 it is that the threshold for early injury is small compared
25 to the threshold for early fatality. So if the relocation

1 assumption beyond the ten miles would not be assumed under
2 the condition of no provision for supporting medical treatment,
3 early fatality could be noticed to larger distances.

4 But it would not have much impact on early injury,
5 because early injury -- the distance over which that could
6 occur -- is fairly large.

7 Q What are the dose thresholds assumed for early
8 fatality in the CRAC code?

9 A We made two sets of assumptions for the dose
10 response of the dose effect relationship for early fatality
11 and with respect to one organ -- that is, the total bone
12 marrow -- under the assumption of no supportive medical
13 treatment, the threshold for early fatality from bone marrow
14 exposure was assumed at 175 and the LD 50/60 was -- I may
15 not be able to quote it exactly. It is somewhat like 340
16 rems. And the 100 person fatality -- I don't remember it.
17 It is in the CRAC runs.

18 Now whereas our consideration of the early
19 fatality with the provision of supportive medical treatment,
20 the threshold was 320 rems to the bone marrow, 510 as
21 LD 50/60 and 615 for LD 100. For the other two organs,
22 namely the lung and gastrointestinal tract, the thresholds
23 were high and they are in the CRAC runs. I don't remember it
24 offhand. And they were -- there is no medical treatment was
25 assumed for these two organs.

1 Q Can you tell me what the dose threshold assumed
2 for early injuries was?

3 A Again, the same three organs were chosen for
4 estimate of early injury, as we had used for the estimate
5 of early fatality. For the bone marrow dose, the early
6 injury threshold was 55 and the dose response relationship
7 was more or less flat, up to 200 rems to the bone marrow.
8 And at 200 rems, it was 100 percent injury.

9 And for the other two organs, the thresholds were
10 high, but I don't remember the balance. They are in the
11 CRAC runs.

12 A (Witness Hulman) By threshold, we don't mean to
13 imply that if those kinds of doses, at the threshold level,
14 were to occur, that everyone receiving them would die. The
15 LD 50/60 statement, and the maximum number stated, described
16 the distribution of anticipated fatality.

17 Q Question to Applicant's panel. Applicant performed
18 no analysis of the case in which no relocation takes place,
19 did it?

20 A (Witness Kaiser) We did not because we thought that
21 would be completely unrealistic.

22 MR. ELLIOTT: I have nothing further.

23 JUDGE BRENNER: We can go to DES-2. When I said
24 we're dealing with DES 1 and 2, I should have noted the
25 obvious, that I assume everybody's planning to take DES-2

1 together with City 14-A, given the subject matter. Is
2 that a correct assumption?

3 MR. ELLIOTT: I was working on the assumption
4 that I was going to deal with DES-2. I was not going
5 to cross examine on City 14.

6 JUDGE BRENNER: All right. Ms. Bush.

7 MS. BUSH: I think our agreement was without my ex-
8 pert that I would not have to do cross examination. I don't
9 have anything --

10 MR. WETTERHAHN: I'm sorry. I cannot hear her.

11 MS. BUSH: I'm operating under the assumption that
12 our prior agreement was that I didn't have to cross examine
13 on my area. I have no contention or concern with delay time.
14 I do have some concern with evacuation time.

15 JUDGE BRENNER: All right. So you're planning to
16 hold your questions on City 14-A until next week?

17 MS. BUSH: Yes.

18 JUDGE BRENNER: If any remain, and we'll hear from
19 you. One thing you said, which Mr. Wetterhahn didn't hear,
20 but which I assume got on the record --

21 MR. WETTERHAHN: I thought I heard something,
22 that's why I wanted to hear better.

23 JUDGE BRENNER: Well, you won. Unless one of us
24 gets to it, said that you thought our agreement -- and I don't
25 know who you meant by "our" was that you wouldn't cross

1 examine until your expert was here. The arrangement was
2 that you wouldn't have to cross examine on your issues this
3 week. We didn't discuss the presence or absence of your
4 experts next week. We will later.

5 But that was not previously discussed.

6 MS. BUSH: I thought it was. My implied concern
7 was that I have my experts with me to assist in cross
8 examination, but any cross examination I wanted to do in
9 these areas I consider I would have raised them this week
10 or waived them on DES issues.

11 JUDGE BRENNER: Yes, but not on City 14-A. We'll
12 get into assumptions later. Our assumption was that when
13 we had a hearing on schedule, starting on schedule at 2:30
14 next Tuesday, that you would make whatever arrangements
15 you thought appropriate to have your expert here.

16 end21
17
18
19
20
21
22
23
24
25

22pb1

1 All right, Mr. Elliott, you can proceed to DES-2.
2 We're not precluding followup by any party, including the
3 city on DES-2 and 1, and that was part of the agreement also,
4 Mr. Elliott.

5 BY MR. ELLIOTT:

6 Q Question to Staff. With respect to its testimony,
7 paragraph 12, I take it that those accidents to which the
8 delay time is most sensitive are those with short warning
9 times; is that correct?

10 A (Witness Hulman) Yes.

bu 6

11 Q If we take a look at FES Table 5.11(c), page 5-76,
12 out of some 27 release categories, only six have warning
13 times for evacuation in excess of two hours; isn't that right?

14 A How many did you say? I didn't hear that.

15 Q I believe it's six. I hope I counted right.

16 JUDGE BRENNER: Mr. Hulman, is your microphone
17 on?

18 WITNESS HULMAN: I'm sorry, the answer is yes.

19 BY MR. ELLIOTT:

20 Q So I assume then that the remaining release
21 categories are those which are highly sensitive to evacuation
22 delay time estimates; is that correct?

23 A Some are sensitive, some are highly sensitive.
24 It's a degree.

25 Q The Staff's analysis does not include the

22pb2

1 contribution to risk of early health effects of those people
2 who receive a dose exceeding the dose threshold for early
3 health effects only after three hours have passed; isn't
4 that right?

5 A I don't understand the question.

6 Q There are some people who are projected not to
7 receive a dose reaching the early health effects dose
8 threshold until after a three or more hour period has passed;
9 isn't that correct?

10 A Yes.

11 Q The Staff's analysis does not include the
12 contribution to those early health effects of those people,
13 does it?

14 A There are a lot of people that would not receive
15 doses exceeding the threshold in three hours. For example,
16 people upwind would receive no dose whatsoever.

17 Q But I'm speaking about the number of people who
18 would receive doses exceeding the dose thresholds after
19 a period of three hours.

20 A No, I think you've clarified your question a bit
21 further. As I understand your question it's -- I'm not
22 sure I understand it except that it's with respect to whether
23 people would receive more than the threshold levels after
24 three hours. But I'm not sure I understand the kernel of
25 your question.

22pb3

1 Q Does the Staff's estimate include the contribution
2 to risk of early health effects for those people whom you've
3 just described?

4 A Yes.

5 Q In what way does it account for them?

6 A Their entire exposure under the assumptions that
7 we've made is counted.

8 Q If evacuation delay time is increased to three or
9 more hours there would be more people who would receive
10 doses reaching the early health effects dose thresholds;
11 isn't that correct?

12 A Yes.

13 Q If we go to page 9 of Staff's testimony, if we
14 look at the very last sentence. "Therefore, since the
15 delay times of one, three and five hours go together with
16 the speed of 10 miles an hour, the Staff did not use the
17 delay times of the Sandia report. The Staff used a 2.5
18 evacuation speed." Is that correct?

19 A (Witness Acharya) That's correct, 2.5 miles per
20 hour.

21 Q And that was based upon Staff's best estimate of
22 the evacuation speed?

23 A That's correct.

24 Q In reality, evacuation delay times are totally
25 independent of evacuation speed; isn't that correct?

22pb4

1 A We did not assume one or the other assumption,
2 that it's dependent or independent.

3 Q But in reality they are independent; isn't that
4 correct?

5 A They could be.

6 Q In what way would the time it takes for people
7 to prepare to leave be dependent upon the speed with which
8 they're able to leave?

9 A I don't take that strongly dependently. If the
10 question is what role will the travel speed play in determining
11 the time people will take to prepare after being notified
12 to evacuate, whatever traffic might be involved. It is
13 not the traveling in the evacuation routes.

14 For instance, given the warning to evacuate, some
15 might be in offices, some might be in work places, some
16 might be in the marketplace. So they would be traveling
17 to their homes in preparation for evacuation. So the speed
18 involved there is not the speed of evacuation which comes
19 after the people have already prepared for evacuation and
20 when they get in their car and take these routes.

21 Q Okay, thank you for clarifying that.

22 JUDGE BRENNER: Mr. Elliott, excuse me. At the
23 risk of the room getting too warm, maybe we should close
24 the windows. I'm worried about some early health effects
25 from the smell of that tar coming in through the windows,

assumptions. Specifically, although the CRAC (or CRAC2) code dispersion model assumes only radially outward directions for plume travel, and the evacuation model in CRAC (or CRAC2) assumes the motion of the evacuees in the same radially outward direction as that of the plume at the time of the accidental release, the staff regards these assumptions as mere artifices for consequence calculations (see FES Appendix J, first paragraph in pp. J-2). In an actual situation, the plume direction would be variable, and the evacuees' directions of motion would also be variable as dictated by the road network of the site-region. Therefore, the initial motions of all evacuees or their subsequent motions along the evacuation routes would not necessarily be always radial or coincident with the ambient direction of the plume travel. Thus, the plume and the evacuees that may be initially headed toward Philadelphia may not necessarily arrive together or in succession in Philadelphia or its outskirts. After crossing the boundary of the 10-mile EPZ, the evacuees would very likely be advised by emergency management officials via their automobile radios and by other means to reappraise their respective situations and directions. Outside the 10-mi EPZ boundary the evacuees would very likely be advised to exercise prudence and try to avoid the direction of the plume travel for two reasons; namely: (1) to avoid the plume so as to prevent inhaling contaminated air from the plume, and (2) to avoid traveling on the roads which are already contaminated by the plume from ground deposition. Thus, if after crossing the 10-mile EPZ boundary, the plume is still heading toward Philadelphia, then people would likely

be advised not to travel toward Philadelphia. On the other hand, if after crossing the 10-mile EPZ boundary the evacuees would learn that the plume is not headed toward Philadelphia, the evacuees may either voluntarily or upon advisement travel toward Philadelphia if it were convenient to do so (such as to make use of the provisions in mass-care centers that may be located in the outskirts of or in Philadelphia). Such a situation might cause some traffic slowdowns or back-ups in the outskirts of or in Philadelphia, but it would not result in entrapment of the evacuees in the plume which would not be or would not have been, in those areas.

Q21. Have you made additional assessments to evaluate the consequences and risks associated with this assertion?

A21. Yes, we made additional bounding CRAC calculations to determine whether such a situation would significantly influence the FES findings.

Q22. What assumptions were made for this CRAC run, and why?

A22. We assumed that all the plume exposure pathway evacuees from within the 10-mi EPZ in the SE and SSE Sectors would wind up in those sectors between 20-mi and 25-mi (i.e. in Philadelphia and its outskirts) before the plume arrival and add to the local population. We considered this assumption a bounding one because many of the evacuees would be unlikely to go toward the City if the plume was also moving in that direction.

These assumptions were made to determine whether the consequence and risk estimates presented in the FES were adequate for such a situation.

Q23. What were the results?

A23. We have included herein tabular summaries of these new calculations. The attached Table 2 shows the estimated risks based on the new calculations as well as those based on the old calculations as reported in the Limerick FES Table L.1b -- both with the assumption of Evac-Reloc mode of offsite emergency response. Complementary cumulative distribution functions (CCDFs) corresponding to these risk estimates are shown in Table 3. For comparison, the CCDF values corresponding to the risk estimates in FES are shown in Table 4.

Q24. What do you conclude from these additional calculations?

A24. We conclude that there are no appreciable changes in the risks of the consequences identified in Table 2 and the corresponding CCDFs in Tables 3 and 4 that may result from such a situation. Therefore, we believe that the risks from such a situation are also adequately represented by the estimates provided in the FES.

Q25. What is City-14 part (e)?

A25. City 14(e) states:

The DES does not separately portray the health consequences under bad weather scenarios. Many weather scenarios, including theoretically bad weather conditions, are averaged together."

Q26. In what context are weather conditions considered in severe accident analyses in the DES/FES?

A26. They are considered in the CRAC calculations. Specifically, 91 sequences of hourly weather conditions are sampled from a full year of historical data at the site. That is, each severe accident is postulated to occur at 91 different start times, each start time associated with its own string of weather conditions leading to an associated set of consequences for the particular accident. The weather conditions are not averaged. It is only the consequence magnitudes associated with the 91 weather sequences that are averaged to obtain the conditional (upon occurrence of the accident) mean values of the consequences. Accident consequences for each of the 91 sequences of weather conditions, computed separately, are included in the CCDF curves presented in the FES.

Although the staff has not provided a separate showing of the effects of bad weather scenarios on risks, the tail ends of all CCDFs shown in the FES do implicitly portray the effects of bad weather conditions. Since the fraction of the year associated with bad weather conditions is much smaller than that associated with better weather conditions, the tail ends of the CCDFs have proportionately much lower probabilities.

In the framework of probabilistic risk analysis it is not a standard practice, and it is also the judgment of the staff that it is not necessary, to provide separate showings of risks stemming from good

and bad weather scenarios unless the specific weather scenarios were themselves the cause of reactor accidents. In Limerick DES/FES the staff provided separate assessments risks from accidents in severe earthquake conditions because severe earthquakes were considered not only to adversely affect the offsite emergency response, but were also considered to initiate the reactor accidents. Bad weather scenarios alone were not identified as likely to cause any severe accidents at the Limerick reactors.

Since reactor accidents can theoretically happen at any time of the year the staff considered the averaging of consequences estimated for several weather scenarios as appropriate to obtain the conditional mean values of consequences. The stratified sampling scheme used in the staff's CRAC analysis in the DES/FES systematically assesses a succession of weather scenarios at 4-days and 13-hour intervals uniformly distributed throughout the year. The 4 day interval is used to obtain a reasonably large number of weather samples (namely 91), and the 13 hour difference is added to the 4-day interval as an artifice to pick-up weather scenarios alternately associated with each of the AM and PM hours of a day. The succession of 91 "start times", therefore, is considered to pick up a representative number of good and bad weather scenarios.

Since the staff used a discrete set of 91 samples, it is possible that a few weather scenarios worse than those sampled may have been missed and, therefore, their effects may not have been reflected in

the tail ends of the CCDFs displayed in the FES. Although this would introduce uncertainties in the tail ends of CCDFs, both in consequence magnitudes (which could be somewhat higher) and in probabilities (which would be lower), the areas under the CCDFs (i.e., the risks) would largely remain unaffected.

The effect of bad weather scenarios may have impacts on evacuation. However, as stated in FES pp. 5-80 and 5-81 the "Early Reloc" mode may be a mode of offsite emergency response for very bad weather scenarios. Using this alternative offsite emergency response mode for all weather scenarios, an alternative evaluation of risk is shown in FES Appendix H. Therefore, the staff has provided a bounding of impacts of bad weather scenarios on Limerick risks. (See NRC staff's comments concerning Indian Point Licensing Board Recommendations to the Commission, dated February 5, 1984, pp. 17-18).

Q27. What is CITY-13, paragraph 1?

A27. City-13 paragraph 1 states:

Consequences to the citizens of Philadelphia in terms of dose-distance relationships are not presented in the DES analysis, nor, in fact are such consequences for any area. The absence of this explicit data makes it impossible for this Commission to accurately ascertain the likelihood of the public receiving doses in excess of Protective Action Guide ("PAG") levels, or in excess of some other unacceptable level of societal risk, at for example the 21 miles which is the distance a plume would

have to travel to reach the City of Philadelphia. Comput : analysis by the City has developed preliminary specific dose-distance consequence data for the high density Philadelphia area.*/ These findings raise serious questions about the adequacy of the DES.

*/ For purposes of this presentation source terms from the DES case II-T/WW were used. This sequence is 1/1000,000. The ingestion pathway assumptions as to no protective action as developed in NUREG-0396, were also used for these purposes. This analysis is not in all respects one that would be presented, for example, in testimony. It is a limited analysis made under constraint of the filing deadline for the sole purpose of presenting some dose-distance data and some high density population data to the Board to demonstrate the seriousness of the City's contention.

Q28. What is CITY-13 paragraph 2?

A28. CITY-13 paragraph 2 states:

Under these values, should there be a severe accident at Limerick with the wind moving toward the SE Sector, the chance of citizens of Philadelphia receiving a whole-body dose of 5 rems at the City boundary 21 miles down wind from Limerick is 70%; the chance of a 30 rem dose is 40%. (At the eastern boundary of the City on the Delaware River, some 30 miles from the plant, the public has a 55% chance of receiving a 5 rem dose and 15% chance of 30 rems). In 50% of such severe accident releases, given wind direction toward Philadelphia, the total exposure within the SE Sector in the 20-30 mile range could reach 10.5 million person-rems. This could result in as many as 8,400 latent induced cancers including 4,200 latent cancer fatalities.

Q29. What is your response to the comment in City-13 paragraph 1 regarding the adequacy of the DES analysis?

A29. In the Limerick DES/FES, as in DES/FESs for other nuclear power plants, the staff concentrated principally on identifying the impacts of environmental contamination as indicated by health effects to individuals and the population in the site-region due to radiological exposures, and on economic impacts of environmental contamination that may result from reactor accidents. Doses to individuals as

functions of distance, or doses to population groups at given distances, were considered as only intermediate parameters in the assessment of the impacts shown in DES/FES, and were not considered to be primary items for detailed presentation in the DES/FES.

However, probability weighted downwind individual whole body dose (i.e. risk of downwind individual whole body dose) from all severe accidents as a function of distance extending to distances beyond Philadelphia are presented in the DES/FES (See FES Figure 5.4i and Figure L.15). Also presented in the DES/FES are the probability distributions of number of persons that would receive doses to the whole body, thyroid and bone marrow in excess of 25, 300 and 200 rems, respectively, (see FES Figure 5.4.b and Figures L.1, L.2 and L.3 and FES Table 5.11g). Included in these estimates are the people of Philadelphia who might be so affected. The 25,300 and 200 rem values were selected solely on the basis that the resulting person estimates would be representative of post accident doses, but not because the values represent any specific risk criteria or health effect threshold. Besides being considered as not primary, presentation of conditional (upon occurrence of an accident) individual dose versus distance for all of the accidents listed in FES Table 5.11c would have required separate CRAC runs with only one accident processed per run, and would have resulted in substantial increase in the bulk of the DES/FES without providing any additional perspective regarding the important impacts (namely health and economic impacts).

Q30. What is your response to the dose versus distance assessment in City-13 paragraph 2?

A30. We made separate CRAC runs to calculate conditional downwind individual whole-body dose from early exposure versus distance for the release category II-T/WW quoted in the footnote to City-13, paragraph 1, which has a probability of about 2×10^{-6} per reactor year. This sequence, we note, is one of the worst accidents we analyzed in the FES. The results from these runs indicate that the conditional (upon the occurrence of the accident) mean values of downwind individual whole body dose from early exposure (inhalation dose integrated to 50-years) in the Philadelphia area would be as follows:

Within 20-25 miles:	27 rems
Within 25-30 miles:	16 rems

Q31. What are your estimates of population exposures in the SE and ESE sectors in the Philadelphia area?

A31. Our estimates of conditional mean values of population exposures (from early exposure) within 20-30 miles are about 18 million person-rems in the SE sector and about 13 million person-rems in the ESE sector.

Q32. What are your estimates of latent cancer fatality in the Philadelphia area that may result over all times from such doses?

A32. Our conditional mean value estimates are that within 20-30 miles there could be about 1100 latent cancer fatalities if the wind were to blow in the SE direction, and about 800 latent cancer fatalities

if the wind were to blow in the ESE direction. It should be noted from FES Table 5.11e that the probabilities of the wind blowing toward the SE and ESE directions are $1\frac{1}{6}$ percent and $11\frac{6}{11}$ percent, respectively. Additionally, the probability of the release category II-T/WW is about 2×10^{-6} per reactor year. Therefore, the probability of a II-T/WW type of accident impacting people in the SE sector is $\frac{2}{3} \times 10^{-7}$ per reactor year, and is $\frac{3}{2} \times 10^{-7}$ per reactor year for people in the ESE sector.

Q33. How do your person rem and latent cancer fatality estimates compare with those in the contention?

A33. Our conditional person-rem estimates are higher and conditional latent cancer fatalities are lower than those presented in the contention.

TABLE 2

Comparison of estimated societal risks within the entire site region shown in the FES with those calculated in response to City-14.

Consequence type	Risk per Reactor Year	
	From CRAC run for FES*	From new CRAC run in response to CITY-14
1. Early fatalities with supportive medical treatment (persons)	2.40(-4)**	2.40(-4)
2. Early Injuries (persons)	9.66(-3)	1.01(-2)
3. Latent cancer fatalities excluding thyroid (persons)	5.81(-2)	6.03(-2)
4. Latent thyroid cancer fatalities (persons)	1.21(-2)	1.27(-2)
5. Total person-rem	1.02(3)	1.06(3)

* These results are also shown in FES Table L.1b.

** 2.40(-4) = 2.40×10^{-14}

NOTE: See FES Section 5.9.4.5(7) for a discussion of uncertainties.

X

TABLE 3

Probability distributions of consequence types identified in Table 2 from new CRAC run in response to City-14.

MAGNITUDE	ACUTE FATALITIES X 1.00E+00	ACUTE INJURIES X 1.00E+00	TOTAL LATENT EF X 1.00E+00	TOTAL THYROID X 1.00E+00	TOTAL MANPEM X 1.00E+03
1.00E+00	1.47E-06	3.15E-05	8.67E-05	8.64E-05	8.67E-05
2.00E+00	1.42E-06	2.78E-05	8.67E-05	8.59E-05	8.67E-05
3.00E+00	1.38E-06	2.56E-05	8.67E-05	8.52E-05	8.67E-05
5.00E+00	1.31E-06	2.33E-05	8.60E-05	8.10E-05	8.67E-05
7.00E+00	1.21E-06	2.20E-05	8.39E-05	7.42E-05	8.67E-05
1.00E+01	1.07E-06	2.06E-05	7.84E-05	6.65E-05	8.67E-05
2.00E+01	6.87E-07	1.62E-05	6.32E-05	5.59E-05	8.67E-05
3.00E+01	4.67E-07	1.41E-05	5.69E-05	5.01E-05	8.67E-05
5.00E+01	3.43E-07	1.05E-05	5.16E-05	4.08E-05	8.67E-05
7.00E+01	3.14E-07	8.83E-06	4.89E-05	3.48E-05	8.66E-05
1.00E+02	2.88E-07	7.22E-06	4.69E-05	2.64E-05	8.59E-05
2.00E+02	2.26E-07	4.07E-06	4.20E-05	1.53E-05	7.55E-05
3.00E+02	1.82E-07	2.86E-06	3.59E-05	1.06E-05	6.60E-05
5.00E+02	1.31E-07	1.84E-06	2.83E-05	4.89E-06	5.77E-05
7.00E+02	9.48E-08	1.37E-06	2.26E-05	2.61E-06	5.40E-05
1.00E+03	6.14E-08	1.04E-06	1.71E-05	1.65E-06	5.09E-05
2.00E+03	2.35E-08	7.04E-07	8.47E-06	7.60E-07	4.64E-05
3.00E+03	9.54E-09	4.77E-07	4.30E-06	3.81E-07	4.39E-05
5.00E+03	2.67E-09	2.77E-07	1.59E-06	7.22E-08	3.86E-05
7.00E+03	1.07E-09	2.07E-07	8.60E-07	8.09E-09	3.16E-05
1.00E+04	2.08E-10	1.44E-07	2.63E-07	0.	2.61E-05
2.00E+04	0.	6.03E-08	4.02E-08	0.	1.57E-05
3.00E+04	0.	2.74E-08	3.91E-09	0.	1.04E-05
5.00E+04	0.	1.77E-08	0.	0.	5.07E-06
7.00E+04	0.	1.63E-08	0.	0.	2.40E-06
1.00E+05	0.	1.10E-08	0.	0.	1.08E-06
2.00E+05	0.	5.81E-09	0.	0.	1.90E-07
3.00E+05	0.	2.38E-09	0.	0.	7.27E-08
5.00E+05	0.	2.12E-10	0.	0.	1.08E-08
7.00E+05	0.	0.	0.	0.	2.06E-10
1.00E+06	0.	0.	0.	0.	0.
2.00E+06	0.	0.	0.	0.	0.
3.00E+06	0.	0.	0.	0.	0.
5.00E+06	0.	0.	0.	0.	0.
7.00E+06	0.	0.	0.	0.	0.
1.00E+07	0.	0.	0.	0.	0.
2.00E+07	0.	0.	0.	0.	0.
3.00E+07	0.	0.	0.	0.	0.
5.00E+07	0.	0.	0.	0.	0.
7.00E+07	0.	0.	0.	0.	0.
1.00E+08	0.	0.	0.	0.	0.
2.00E+08	0.	0.	0.	0.	0.
3.00E+08	0.	0.	0.	0.	0.
5.00E+08	0.	0.	0.	0.	0.
7.00E+08	0.	0.	0.	0.	0.
1.00E+09	0.	0.	0.	0.	0.
2.00E+09	0.	0.	0.	0.	0.
3.00E+09	0.	0.	0.	0.	0.
5.00E+09	0.	0.	0.	0.	0.
7.00E+09	0.	0.	0.	0.	0.

TABLE 4

Probability distributions of consequence types identified in Table 2 from CRAC run for FES.

MAGNITUDE	ACUTE FATALITIES	ACUTE INJURIES	TOTAL LATENT DEF	TOTAL THRUOUT	TOTAL HANDED
1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
2.00E+00	1.42E-06	3.15E-05	8.67E-05	8.64E-05	8.67E-05
3.00E+00	1.42E-06	2.78E-05	8.67E-05	8.58E-05	8.67E-05
5.00E+00	1.30E-06	2.50E-05	8.67E-05	8.52E-05	8.67E-05
7.00E+00	1.31E-06	2.35E-05	8.60E-05	8.10E-05	8.67E-05
1.00E+01	1.41E-06	2.20E-05	8.39E-05	7.41E-05	8.67E-05
2.00E+01	1.07E-06	2.00E-05	7.84E-05	6.62E-05	8.67E-05
3.00E+01	6.07E-07	1.82E-05	6.28E-05	5.51E-05	8.67E-05
5.00E+01	4.07E-07	1.41E-05	5.64E-05	4.96E-05	8.67E-05
7.00E+01	3.43E-07	1.05E-05	5.11E-05	3.40E-05	8.60E-05
1.00E+02	3.14E-07	6.83E-06	4.84E-05	3.43E-05	8.58E-05
2.00E+02	2.88E-07	7.21E-06	4.68E-05	2.61E-05	7.58E-05
3.00E+02	2.26E-07	4.07E-06	4.19E-05	1.47E-05	6.59E-05
5.00E+02	1.62E-07	2.85E-06	3.58E-05	9.98E-06	5.74E-05
7.00E+02	1.31E-07	1.84E-06	2.82E-05	4.32E-06	5.35E-05
1.00E+03	9.48E-08	1.35E-06	2.22E-05	2.40E-06	5.04E-05
2.00E+03	6.14E-08	1.02E-06	1.68E-05	1.59E-06	4.63E-05
3.00E+03	2.35E-08	6.78E-07	7.80E-06	7.84E-07	4.38E-05
5.00E+03	9.54E-09	4.84E-07	3.75E-06	3.09E-07	3.85E-05
7.00E+03	2.67E-09	2.70E-07	1.47E-06	4.01E-08	3.16E-05
1.00E+04	1.67E-09	1.49E-07	7.81E-07	3.42E-09	2.58E-05
2.00E+04	0.	1.41E-07	2.40E-07	0.	1.53E-05
3.00E+04	0.	6.03E-08	4.01E-08	0.	4.85E-06
5.00E+04	0.	2.72E-08	3.87E-09	0.	4.55E-06
7.00E+04	0.	1.77E-08	0.	0.	2.26E-06
1.00E+05	0.	1.63E-08	0.	0.	1.82E-06
2.00E+05	0.	8.38E-09	0.	0.	1.86E-07
3.00E+05	0.	9.01E-09	0.	0.	7.27E-08
5.00E+05	0.	2.38E-09	0.	0.	1.08E-08
7.00E+05	0.	2.12E-10	0.	0.	2.06E-10
1.00E+06	0.	0.	0.	0.	0.
2.00E+06	0.	0.	0.	0.	0.
3.00E+06	0.	0.	0.	0.	0.
5.00E+06	0.	0.	0.	0.	0.
7.00E+06	0.	0.	0.	0.	0.
1.00E+07	0.	0.	0.	0.	0.
2.00E+07	0.	0.	0.	0.	0.
3.00E+07	0.	0.	0.	0.	0.
5.00E+07	0.	0.	0.	0.	0.
7.00E+07	0.	0.	0.	0.	0.
1.00E+08	0.	0.	0.	0.	0.
2.00E+08	0.	0.	0.	0.	0.
3.00E+08	0.	0.	0.	0.	0.
5.00E+08	0.	0.	0.	0.	0.
7.00E+08	0.	0.	0.	0.	0.
1.00E+09	0.	0.	0.	0.	0.
2.00E+09	0.	0.	0.	0.	0.
3.00E+09	0.	0.	0.	0.	0.
5.00E+09	0.	0.	0.	0.	0.
7.00E+09	0.	0.	0.	0.	0.

LEWIS G. HULMAN
PROFESSIONAL QUALIFICATIONS

I am the Chief of the Accident Evaluation Branch, Division of Systems Integration, in the Office of Nuclear Reactor Regulation. I was formerly the Chief of Systems Interaction Branch and Chief of the Hydrology-Meteorology Branch, also both in the Office of Nuclear Reactor Regulation.

My formal education consists of study in Engineering at the University of Iowa where I received a BS in 1958, and an MS in Engineering Mechanics and Hydraulics in 1967. In addition, I have taken post-graduate courses at the University of Nebraska, MIT, Colorado State University, and the University of California, and numerous management, technical and computer utilization courses sponsored by the government.

My employment with NRC (formerly AEC) dates from February 1971 with both the Office of Nuclear Reactor Regulation and the former Office of Reactor Standards, and for consultation on the siting of materials utilization facilities. I have been responsible for the assessment of the potential for accidents resulting from natural phenomena, system performance under accident conditions, the generation and transport of fission and activation products within and outside nuclear power plants, and the radiological consequences of accidental releases. Since December, 1981 I have supervised the preparation of all the accident sections for DES's and FES's, and participated in the staff's evaluation of the Indian Point and Limerick PRA's. In addition, I participated in the development of the technical bases for safety guides and standards, and in research assessments.

From March 1980 through mid-April 1981 I was employed in private industry as a Vice President with Tetra Tech, Inc. in Pasadena, California. During this period I was responsible for business development, and for managing several contracts involving various engineering studies, including several contracts for government and industry. Of note were studies of a nuclear power plant in Yugoslavia for the International Atomic Energy Agency, risk and risk aversion studies in the Dominican Republic, a refinery intake design in Indonesia, and hurricane risk assessments in Texas, North Carolina, Florida, and New Jersey.

From 1968 to 1971, I was a Hydraulic Engineer with the Corps of Engineers' Hydrologic Engineering Center in Davis, California, where I worked as a consultant for most Corps' offices, participated as an instructor in training courses, and conducted research.

From 1963 to 1968, I was a Supervisory Hydraulic Engineer with the Philadelphia District, Corps of Engineers. As Assistant Chief of the Hydrology Branch, I was responsible for design aspects of multi-purpose dams, navigation projects, coastal engineering development and special studies on modeling of dams, inlets, water supply, and shoaling, salt water intrusion, and the effects of dredging. I acted as advisor to the

District Engineer, Philadelphia, on drought problems in the 1960's and represented him in technical meetings of the Delaware River Basin Commission - chaired interagency committee which evaluated the effects of the drought.

From 1958 to 1963, I was a Hydraulic Engineer with the Omaha District of the Corps of Engineers. I was responsible for the hydraulic design of flood control channels, hydraulic design of structures for large dams and several flood control projects. I also received training in, probabilistic assessments, hydrologic engineering, structural engineering, sedimentation, river training studies and design, and water resource project formulation.

I have published in journals of the American Society of Civil Engineers, the American Water Works Association, the Journal of Marine Geodesy, the National Society of Professional Engineers, the American Geophysical Union, and in internal technical papers and seminar proceedings of the Corps of Engineers, the AEC, and the NRC.

I am a registered Professional Engineer in the States of Nebraska and California. I am a member of the American Society of Civil Engineers, the American Meteorological Society, and the American Geophysical Union.

PROFESSIONAL QUALIFICATIONS
DR. SARBESWAR ACHARYA
U.S. NUCLEAR REGULATORY COMMISSION

I am Sarbeswar Acharya, the Senior Radiological Engineer with the Accident Evaluation Branch, Division of Systems Integration, Office of Nuclear Reactor Regulation. I have served on the Commission staff since January of 1977 in several capacities. My assignments have included assessments of radiological consequences to man and the environment of normal and accidental releases of radionuclides from nuclear power reactors, mathematical and computer modeling thereof, assessment of the generation and transport of radioactivity in reactors themselves resulting from accidents, and technical monitoring of Commission-funded confirmatory research and technical assistance contracts for modeling of external and internal radiation dosimetry to calculate age-dependent radiological dose conversion factors. I am presently responsible for developing and applying improved methods of assessing accident risks of reactor operation for use in Environmental Impact Statements. I have participated in accident risk assessments in virtually all nuclear power reactor Environmental Impact Statements since 1980, and aided in formulation of the procedure for the staff implementation of the Interim Policy Statement on "Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969." I performed the technical analysis for the staff assessment of accident consequences and risks of the Indian Point reactors, and presented expert staff testimony on the subject at the Indian Point ASLB hearing in February 1983.

Prior to joining NRC in 1977, I was employed by the Bechtel Power Corporation for about 3 years. During this period I developed computer models to evaluate the effectiveness of containment sprays containing chemical additives for radioiodine control under accident conditions in pressurized water reactors, developed computer models for assessing decay heat loads in spent fuel pools for design of cooling systems, developed assessment methodologies for evaluating doses to control room operators and the offsite population from accidental releases of radioactivity, and performed nuclear fuel-cycle economic analysis. During the 1970-71, 1971-72, 1973-74 academic years I taught physics and mathematics at Hawthorne School in Washington, D.C. During 1972-73 I was a post-doctoral research fellow at North Carolina A&T State University doing research in molecular physics, and teaching physics and mathematics to science and engineering students.

My academic training consists of undergraduate courses at Utkal University in India during 1948-52 in physics, mathematics, chemistry and biology leading to a B.S. degree in 1952 with emphasis in physics. During 1952-57 I studied at the University of Delhi in India receiving an M.S. degree in physics in 1954 and engaged in graduate-level research in physics. From 1958 to 1966 I taught physics at undergraduate and graduate levels at colleges affiliated to the Utkal University. From 1967 to 1970 I studied and taught physics and related mathematics, and performed research at the University of Maryland. In 1971 I received a PhD from the University of Maryland, with emphasis in theoretical particle physics and quantum field theory. I have taken

several specialized training courses since receiving my PhD in such areas as nuclear power plant design and operation, professional engineering registration, system reliability, health physics and radiation protection, mathematics and statistics, probabilistic risk analysis, and nuclear reactor safety.

I am a member of the American Nuclear Society and the Health Physics Society.

22pb5

1 especially with the windows --

2 (Discussion off the record.)

3 BY MR. ELLIOTT:

4 Q I have just one question for Applicant's panel.
5 In paragraph 25, the last sentence states that both of
6 these components affect the result, and to a certain extent
7 a shorter delay time can be compensated for by a slower
8 speed. It's to a certain extent, but not entirely; isn't
9 that correct?

10 A (Witness Levine) I didn't hear the question.

11 Q You say to a certain extent --

12 A I didn't hear the very last part.

13 Q All I did was read your last sentence. You're
14 saying that to a certain extent a shorter delay time can be
15 compensated for by a slower speed, to a certain extent. It
16 cannot be a complete compensation; isn't that correct?

17 A (Witness Kaiser) I would agree with you, yes.

18 Q Pardon?

19 A I agree with you.

20 Q Would you agree with me that with respect to
21 delay times in excess of three hours, it has been shown that
22 CCDF curves are generally insensitive to evacuation speeds
23 ranging from 5 to 40 miles an hour?

24 A Yes, that is a conclusion from some of the Sandia
25 work that I think we cited.

22pb6

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

MR. ELLIOTT: I have nothing else.

JUDGE BRENNER: Any followup? City? Commonwealth?

MS. FERKIN: No.

MS. BUSH: No.

1 JUDGE BRENNER: Applicant?

2 CROSS EXAMINATION

3 BY MR. WETTERHAHN:

4 Q The term LD 50/60 was used. Does that denote
5 the fact that 50 percent of the individuals affected by a
6 certain dose would die within 60 days?

7 A (Witness Achary) From bone marrow exposure, yes.

8 Q That is the meaning of the term LD 50/60?

9 A That's correct. The fatality is 50 plus --
10 60 days after exposure.

11 Q Mr. Hulman, you stated -- in response to a question
12 with regard to federal planning around nuclear power plants --
13 that there was no federal plan in place for Limerick right now.
14 Will there be some specific or generalized federal plan for
15 Limerick that gives you some assurance that you could
16 evacuate the number of people you were discussing in your
17 testimony?

18 A (Witness Hulman) I think we were talking about
19 relocation, not evacuation?

20 Q Yes, I should have used the term relocation beyond
21 the 10 miles.

22 A My understanding of the planning at the federal
23 level is that it's generic planning and it's not plant
24 specific, but it is sufficiently likely -- in my mind -- that
25 it would apply to Limerick as well as any other reactor

231b2

1 in the United States.

2 Q And this federal planning gives you the assurance
3 that you can take appropriate protective actions, if necessary,
4 beyond 10 miles or so of the plant?

5 A That federal planning, plus experience in natural
6 disasters, plus the experience at Three Mile Island.

7 Q Applicant's panel, I understand that there is a
8 difference in the evacuation model between CRAC and CRAC 2,
9 that CRAC assumes a delay time, a single delay time, and
10 then a speed where CRAC 2 allows you to assume a variable delay
11 time and a fixed speed or a -- a fixed speed. Are these
12 models in the coefficients both based upon the same experimental
13 or observed data, as far as evacuation is concerned?

14 A (Witness Kaiser) Before I answer your question,
15 I just would like to point out that the model the Staff
16 uses in CRAC is essentially the same as the CRAC 2 evacuation
17 model. Going beyond that, your question about the data base
18 -- yes, indeed, the same data base was used in the original
19 model used in CRAC and the model that goes under the name
20 Sandia generic model.

21 Q Then if the data base is appropriate, although
22 you can fit a curve or a delay time and an evacuation speed
23 to that data, in many ways you cannot independently assume
24 an evacuation delay time without compensating for it with a
25 delay speed or a speed of evacuation to fit the data. Isn't

231b3

1 that correct?

2 A Correct. The data base essentially gives you the
3 total time for evacuation, which is the sum of the delay time
4 plus the time taken to move away at whatever the evacuation
5 speed is. And obviously, the requirement on the people who
6 are trying to fit that data, is to reproduce the total
7 evacuation times. And that can be done with certain
8 flexibility between the delay time and the effective evacuation
9 speed.

10 Q So the two are not independent variables then?

11 A Not in that particular context, they are not,
12 MR. WETTERHAHN: Thank you. I have no further
13 questions.

14 JUDGE BRENNER: Staff?

15 MS. HODGDON: I need a moment.

16 (Pause.)

17 JUDGE BRENNER: We can jump in with what I think is
18 just a question or two, while you're considering what you want
19 to do.

20 MS. HODGDON: Yes, if the Board would do that.

21 BOARD EXAMINATION

22 BY JUDGE COLE:

23 Q Page 4 of the Staff testimony, and I guess it
24 also pertains to Table 1. In the third line from the bottom
25 of page 4, from this table, referring to Table 1, we see

231b4

1 that relocation for hot spots outside the 10 mile EPZ, the
2 probability is 5,000 or more persons would be affected is
3 about 1×10^{-6} . What is your definition of "affected?" Is
4 it as stated in the earlier part of response to question 10?

5 A (Witness Acharya) That's correct. The number
6 of people that relocated. That would be the people who --
7 we mean the people who would be relocated.

8 Q Yes, and the criteria for relocation is?

9 A That if the projected ground dose for seven days
10 would reach or exceed 200 rems to the total bone marrow from
11 ground contamination alone.

12 Q So if somebody was going to get under 200 rems
13 in a seven day period, 200 rems to the bone marrow in a
14 seven day period, they would not be included in your
15 estimates of the number of people to be relocated?

16 A That's correct.

17 Q All right, thank you.

18 JUDGE BRENNER: Ms. Hodgdon, do you want some
19 more time? We could take a short break, if you want.

20 MS. HODGDON: No, we don't need any more time.
21 We have no questions.

22 BY JUDGE COLE:

23 Q I guess, to me, the 200 rems to the bone marrow
24 seems to be an awfully large dose. Could you describe to me
25 the rationale that was used in arriving at 200 rems to the

231b5

1 bone marrow?

2 A Yes, I will do that. 200 rems to the bone
3 marrow, delivered over a short period of time, could be
4 lethal. So that is actually just about the threshold of
5 early fatality, in absence of medical treatment. Now the
6 WASH-1400 developed the rationale that if the measurements
7 would indicate, in any area, such high dose over a seven
8 day period of time, the immediate protective action
9 would take place, or would be recommended by immediate
10 protective action. They meant -- well, this assumption
11 is since the people would be advised of the protective
12 action would be taken on behalf of them, then people would not
13 be allowed to receive all that dose, which is calculated
14 across seven days. The people from those places would be
15 looked at much earlier, so that much earlier was translated
16 to 24 hours.

17 That is, at the end of 24 hours, after the plume
18 passes the person affected in these hot spots would be
19 transferred to some other place.

20 Now we had a similar assumption in our analysis
21 for the population beyond 10 miles, but it's -- for WASH-1400
22 we assumed that it would take place two hours after. So those
23 are the ground dose for seven days, 200 rems to the bone
24 marrow. The people would move from such hot spots only
25 after receiving two hours of ground dose.

1 A (Witness Hulman) Judge Cole --

2 Q Let me tell you what my concern is, and you can
3 address that, too. I guess if I was out in that area,
4 I'd want somebody to tell me if I was going to get 20 or 25.
5 200 seems to be a lot more than I'd want to receive before
6 someone would say you ought to move,

7 A You're absolutely right. I think everybody
8 would be told that they were in contaminated areas and they
9 would be told that they should move away and get as little
10 dose as possible. Every effort would be made to see that
11 the people were helped to relocate or move away. But there
12 could be no assurance that that will happen.

13 Therefore, the assumptions we've made -- we
14 believe -- are on the conservative side, but not so conserva-
15 tive as to be totally unrealistic. They are on the conservative
16 side.

end23

17

18

19

20

21

22

23

24

25

24pbl

1 Certainly doses at this range that approach the
2 lethality levels or anywhere close to it should be avoided.
3 And every effort, I'm sure, would be made to avoid such
4 doses.

5 Q Okay, your concerns are the same as mine then.

6 A Yes.

7 JUDGE BRENNER: Any followup, Mr. Elliott?

8 MR. ELLIOTT: Yes.

9 RE CROSS EXAMINATION

10 BY MR. ELLIOTT:

11 Q Mr. Hulman, in response to a question by Mr.
12 Wetterhahn, now you indicate that this federal planning that
13 you had referred to before is generic planning applicable
14 to all reactor sites; is that what you're saying?

15 A (Witness Hulman) Yes. And that's consistent with
16 the answer I gave to your question about whether there was
17 any planning for Limerick at the federal level outside 10
18 miles.

19 Q Your answer was no; isn't that correct?

20 A That's correct.

21 Q So you're saying it wasn't for Limerick, it was
22 for Limerick and every other reactor site; is that your
23 answer?

24 A That's the same as all.

25 Q But it's not the same. It's not for Limerick, is

24pb2

1 it?

2 A In my mind, it applies equally well to Limerick
3 as to any other reactor site.

4 Q What agency?

5 A FEMA, EPA are two examples.

6 Q Two examples of what?

7 A Of discussions of what would be done to aid the
8 people to prevent doses from occurring that could be avoided.

9 Q What discussions are you referring to?

10 A I'm talking about discussions that have been
11 held in NRC's office that I've been party to. There's also
12 a discussion in the references Dr. Acharya points out in
13 NUREG 0654.

14 Q Aren't those references for ad hoc measures?

15 A They are of an ad hoc nature, but there is still
16 some planning associated with even ad hoc. It is not of the
17 type that one needs to formally store equipment or practice
18 implementation.

19 Q When you say discussions, have the discussions
20 been translated into anything other than academic discussions?

21 A I don't understand your definition of an
22 academic discussion.

23 Q Well, you're talking about discussions. I can
24 have a discussion with someone sitting here, and now I can
25 say that I've had a discussion about planning for relocation.

24pv3

1 You would agree with me that there's a great deal of difference
2 between having a discussion about planning and planning,
3 isn't there?

4 A I would agree with your hypothesis, but I don't
5 think we were talking about planning as much as what would
6 likely happen and what measures would be taken, at least at
7 the federal level, if not at other levels to prevent these
8 doses from occurring.

9 Q So what planning are you talking about? What is
10 the plan?

11 A I don't think I referred to a plan.

12 Q Well, you referred to planning. Does planning
13 contemplate the presence or existence of a plan?

14 A No.

15 MR. ELLIOTT: All right. I have nothing else.

16 JUDGE BRENNER: Any other followup?

17 MS. FERKIN: Yes, I have a question.

18 RE-CROSS EXAMINATION

19 BY MS. FERKIN:

20 Q Following up on Mr. Elliott's last line of
21 questioning, Mr. Hulman, the interagency discussions that
22 you just referred to. Is this under the auspices of the
23 same group of agencies or the same planning council that
24 was responsible for NUREG 0654?

25 A (Witness Hulman) Yes.

24pb4

1 Q Are these discussions geared towards issuing
2 possibly subsequent -- a subsequent planning document or that
3 builds upon NUREG 0654?

4 A I understand that is a possibility.

5 Q And what is the time frame we're talking about
6 here?

7 A I don't know.

8 Q Are these discussions in an early stage? How
9 long have they been ongoing?

10 A At least for three years that I'm familiar with.

11 Q Do you anticipate any kind of planning document
12 being issued as a result of these discussions in, let's say
13 the next six months?

14 A I can't answer the question. I think the people
15 that are responsible for the emergency planning coordination
16 with the other federal agencies would be more familiar
17 with that than myself. I have participated in discussions
18 however.

19 MS. FERKIN: Fine. Thank you.

20 JUDGE BRENNER: Witnesses don't usually give
21 schedules on what other agencies might do.

22 MS. FERKIN: One can always ask.

23 JUDGE BRENNER: That's true. Any followup on
24 that? Or Mr. Elliott's questions?

25 All right. I think we have completed LEA's

24pb5

1 contentions. We can temporarily dismiss the panel in the
2 sense that they'll be back next week on -- I guess possibly
3 be back next. We have to get a report on what's going to
4 happen with the city's issues, but they're dismissed for
5 now, and we thank you.

6 Are we going to see these witnesses again, Ms.
7 Bush? Just give me the bottom line.

8 MS. BUSH: There's a good probability we will,
9 yes.

10 JUDGE BRENNER: All right. In that case I won't
11 say goodbye forever, but thank you for your time this week,
12 and we'll look forward to hearing from you all next week.

13 (Joint Staff and Applicant panel excused.)

14 JUDGE BRENNER: Shall we take a brief recess
15 and then come back and get the reports? Let's do that. We
16 will expect to hear when we come back from the recess what
17 is still in controversy among the parties involving the
18 city's issues, and then we will launch into a discussion of
19 what schedule we should -- whether we should vary the
20 previously adopted schedule for next week. And that may be
21 affected by various factors, including what you tell us
22 in response to the first point.

23 So let's --

24 MS. BUSH: Could I ask you what you want other
25 than I know --

24pb6

1 JUDGE BRENNER: Use the microphone.

2 MS. BUSH: Is this issue of concern still alive
3 or not? Are you requesting for ones that are still ongoing?
4 A further -- I can define them somewhat, although I want to
5 stick to my original issue of concern, but I could give the
6 sort of concerns in light of the testimony.

7 JUDGE BRENNER: As much as you can tell us, I
8 think that would be helpful. But I assume the other parties
9 will not be hearing it for the first time. That was one of
10 the purposes of taking a longer break.

11 MS. BUSH: We have talked about what additional
12 information I need, and particularly as to 13.

13 JUDGE BRENNER: I'm not talking about additional
14 information. I'm past that point. We're ready to go to
15 litigation next week. I'm talking about what is still in
16 controversy.

17 MS. BUSH: Information is basically the controversy,
18 at least on 13. On 8, it's not.

19 JUDGE BRENNER: People have presumably put into
20 evidence what they want. Anything else that is done in the
21 nature of settlement the parties are free to do. But we're
22 not going to require different testimony now.

23 MS. BUSH: No, I understand that.

24 JUDGE BRENNER: It may be that further discussion
25 during this brief recess might avoid lengthy, on the record

24pb7

1 surprises among the parties when we come back. Let's recess
2 until 3:10 to give you a little more time.

3 (Recess.)

4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

1 JUDGE BRENNER: Putting City 15 aside, we still
2 have in the area of severe accident contentions City 13, and
3 14. We had scheduled -- and this reflects the adjusted
4 schedule as well -- that we would begin the litigation of those
5 issues at 1:30 on Tuesday. We have already discussed, in
6 several disparate places in this record, that the City wants
7 to request an adjustment of that, for reasons that they
8 will tell us.

9 In addition, we want to learn what is still
10 in controversy in City 13 and 14. And maybe we should start
11 with the last one first, then.

12 MS. BUSH: With regard to City 14-a, there is
13 still in controversy whether the Staff has provided a sound
14 basis for the two mile per hour evacuation speed. Specifically
15 whether the use of the evac re-look and early re-look
16 analyses provide reasonable bounds on evacuation speed and
17 health effects, and whether the 2.5 mile per hour evacuation
18 speed is consistent with 1.5 miles per hour in Indian Point.

19 With regard to issue 14-b --

20 JUDGE BRENNER: Let's stay with 14-a for a
21 minute. So the contention, as worded, is still your
22 issue in controversy?

23 MS. BUSH: Yes. With regard to 14-b, the issue
24 still in controversy is whether the conditions stated are
25 reasonable and/or relevant with regard to the backups toward

1 Philadelphia, whether the emergency planning evacuation
2 expectations are reasonable as related to backups in
3 Philadelphia, and whether analysis done for the testimony
4 reasonably portrays backups toward Philadelphia. So I
5 believe the wording in that contention would be still in
6 controversy.

7 With regard to 14-e, which had to do with
8 bad weather, we are in agreement that the tail-ends portrayed
9 in the table are probably due to bad weather. There still
10 is a controversy as to whether it is good policy to look at
11 bad weather and we do not believe that the analysis portrays
12 the effects on Philadelphia of an accident, under the
13 conditions of bad weather.

14 With regard to the number 13 --

15 JUDGE BRENNER: I'm sorry. Staying with 14-e, does
16 that mean the first sentence of that two-sentence contention
17 stays in, but not the second sentence? Or is the second
18 sentence in, but only to the extent you've explained it? I'm
19 not sure. One of your statements was almost a word-for-word
20 reading of the first sentence, so I'm assuming that's in.

21 MS. BUSH: We believe that the Staff here has
22 portrayed bad weather scenario in the sense that the peak
23 values at the bottom of the table are probably due to bad
24 weather conditions.

25 JUDGE BRENNER: Yes, I know. You said that, or

1 something like that. I don't know how to apply that, in
2 terms of whether the second sentence is still part of the
3 contention or not.

4 JUDGE MORRIS: Is your concern that, notwithstanding
5 that, you would like the consequences expressed separately?

6 MS. BUSH: No, we do believe that the consequences
7 have been stated separately because the left hand column
8 of that table would have the consequences in it. The bottom
9 numbers. However, there is a statement that it is not good
10 policy to look at bad weather alone. And we do have a
11 disagreement with that.

12 In the testimony there is a rebuttal, more or
13 less, or a statement to that effect, and we have a
14 disagreement with that. However, we do believe that the
15 tail-end numbers portrayed are the result of bad weather.
16 Therefore, we have gotten a bad weather portrayal.

17 JUDGE BRENNER: Have you answered my question?
18 I'm sorry. I haven't heard it.

19 MS. BUSH: Would the second sentence come out?

20 JUDGE BRENNER: Yes.

21 MS. BUSH: I'm sorry. I can't provide an
22 answer to that, at this time.

23 JUDGE BRENNER: All right. Given that, it's
24 still in.

25 MS. BUSH: Yes.

1 JUDGE BRENNER: Okay, that completes 14. It's
2 everything that was admitted is still in controversy.

3 MS. BUSH: Yes.

4 JUDGE BRENNER: Although, you've given us some
5 details, my statement went to the wording of the contentions?

6 MS. BUSH: Yes.

7 JUDGE BRENNER: All right. Do you want to
8 do 13, then?

9 MS. BUSH: Yes. 13 has been very problematic.
10 We do not -- have not yet ascertained whether -- well, let
11 me start with the testimony. We do not believe that the
12 analysis provided in the testimony does provide health effects
13 on the city of Philadelphia, such that we can see as a
14 function of population density health effects.

15 The Staff has provided some peak values and has
16 done a run for a peak value case, 2TWW. However, we still
17 have an issue of concern, as to portrayal of the health
18 effects on the city of Philadelphia. We have had
19 extensive conversations about this and have not really
20 -- I don't -- I'm not sure the issue has really been
21 joined, in terms of what information is available, or could
22 be made available.

23 It's a very complicated area and very difficult
24 for each side to understand the other. And I think we've
25 discussed this probably a total of two or three hours with

251b5

1 experts.

2 JUDGE BRENNER: All right, the portion of 13 that
3 was admitted, the first two paragraphs, was not the most
4 concise of contentions, but given the time frame we were in
5 we did not want to attempt to reword it on our own, when we
6 were at the stage of admitting the contentions. I take it
7 you have no rewording to offer, then?

8 MS. BUSH: That raises a concern that I have,
9 Your Honor. I brought my transcript from March 19th, to
10 review today, in terms of discussion I had on the record.
11 There may have been some confusion that has arisen because
12 of the wording of the contention.

end25

13
14
15
16
17
18
19
20
21
22
23
24
25

1 It might be useful for me to now try to
2 articulate the contention or point to references in the
3 transcript earlier where I did.

4 JUDGE BRENNER: If you had a problem with the way
5 we admitted the contention, it's late. But go ahead.
6 I'm not sure what your point is. You also have the
7 advantage, as they say, because I don't have the transcript
8 in front of me. But go ahead.

9 MR. WETTERHAHN: Your Honor, there's also the
10 further advantage, if we responded to the words of the
11 contention in the testimony --

12 JUDGE BRENNER: I understand. Let's hear what
13 the city has to say.

14 MS. BUSH: I don't have the second day, but I
15 thought it said it was as discussed in the prehearing
16 conference. And I had been working under that assumption.
17 What I stated, at the prehearing conference; is --

18 JUDGE BRENNER: I'm sorry. What was discussed at
19 the prehearing conference?

20 MS. BUSH: The substance of the contention, in
21 terms of looking at the density element of the city of
22 Philadelphia, that high population density element. The dose
23 is a function of distance and the probability of occurrence
24 of the accident separated from the consequences. The
25 probability of occurrence of the accident separated from the

1 probability of the consequences.

2 JUDGE BRENNER: I'm not going to adjust everything
3 you've just said. Let me point this out, and then you can
4 respond. I have our April 20th, 1984 order in front of me,
5 which confirmed our rulings admitting these contentions.
6 And on page 3 of that order, we state that we have admitted
7 the first and second paragraphs only of City 13. We have
8 a one line summary of the subject matter of the contention.

9 That's not meant to summarize the scope of the
10 issue. It's just a handy reference to the subject. The issue
11 is as stated in the contentions, to the extent we have
12 admitted them.

13 And then we have the reference. And with
14 respect to City 13, we referenced transcript pages 8782-84
15 in which we discuss the reasons for our ruling on City 13.
16 8782 to 8784. And I'm taking that from our order, which is
17 over a month old now. And the requested initial rulings
18 were -- I guess that one -- I don't remember. It was either
19 March 19th or April 9th.

20 MS. BUSH: It was March 19th.

21 JUDGE BRENNER: All right. Yes, the later date was
22 DES.

23 MS. BUSH: The two paragraphs of the contention
24 are stated in Staff testimony page 20 and 21.

25 JUDGE BRENNER: Well, I have the original filing

1 in front of me.

2 MS. BUSH: Which is verbatim.

3 JUDGE BRENNER: That's the contention, as far
4 as we're concerned. Do you have a problem with that?

5 MS. BUSH: It's just if people are able to
6 understand when I have latent induced cancers and latent
7 cancer fatalities, in the contention, if they realize that
8 -- what I've been talking about, the population density element
9 that we are not just concerned with an individual dose, but
10 we are concerned with what health effects occur if you take
11 into account the high density population area.

12 JUDGE BRENNER: Well, let me suggest this. The
13 wording in the contention was yours, in those two paragraphs.
14 We didn't touch the language. I would have liked to.
15 Sometimes the City's issues are -- it's nice to have a full
16 explanation of what's in a parties' mind, but I have
17 trouble grasping a statement of an issue and that's related
18 to my statement about the more recent filing also, on
19 the emergency planning.

20 The same could apply to City 13 to some extent.
21 I've admitted the first two paragraphs. If there's a problem
22 on the scope, when we get into the litigation, I'm sure we'll
23 hear about it in the course of the litigation, and we'll hear
24 argument. So it would certainly behoove the parties to
25 discuss, before we start the hearing next, whether or not there

1 might be a problem. That is, if you're planning to ask
2 questions on areas not covered in the testimony, I suspect
3 you're going to have a scope problem and you'd better
4 discuss it in advance for a number of reasons. They may
5 agree with you that yes, that does appear to be an issue
6 and they'll be prepared to answer your questions on it,
7 even though it's not in the testimony. Or you'll be
8 alerted to the fact that they're going to disagree with
9 you and can prepare your arguments. Or it may be a simple
10 matter and, even though you don't agree on the scope of the
11 issue, a pragmatic effect might be to go ahead and just get
12 it on the record.

13 There are a lot of options. But when you catch
14 people by surprise, that's when people panic and get back
15 into a corner, with all kinds of objections. And you can
16 avoid that.

17 MS. BUSH: We have been discussing these pieces
18 of information. The health effects of people, not just one
19 individual.

20 JUDGE BRENNER: Well, we've had the contention.
21 We have the parties' interpretation of the contention, as
22 reflected in the testimony they chose to put forward to
23 respond. The City had an opportunity to put forward testimony
24 and they did not. And we will deal with the litigation on
25 this next week.

1 But you're free to discuss any areas you want
2 to inquire into and into which you think there might be a
3 dispute, because you can't avoid it. If the only objection is
4 surprise, rather than a scope disagreement, you can avoid
5 that by telling them now, because a surprise objection might
6 well be granted unless you take steps to foreclose that
7 objection.

8 MR. WETTERHAHN: Your Honor, can I object to that
9 previous -- I assume it's a ruling, by the Board? I think
10 that considering the time frames involved, and the issues --

11 JUDGE BRENNER: It wasn't a ruling, to preclude
12 a surprise objection, but it could affect our ruling on it.
13 And that's obvious.

14 The extent to which it affects it depends on
15 what the argument is going to be about. But we seem to be
16 having a lot of arguments in the abstract and I want to
17 terminate that right now.

18 All right, so everything in the City's issues are
19 still in controversy?

20 MS. BUSH: Yes.

21 JUDGE BRENNER: All right. Now let's talk about
22 the schedule. It's correct, is it not, that we've had that
23 week schedule for quite some time, now?

24
25

27pbl

1 MS. BUSH: Yes, we have.

2 JUDGE BRENNER: All right, and I want you to
3 tell us what the city's problem is, which we've heard about
4 for the first time in bits and pieces this week. Some as
5 recently as today, and what your solution is. And you might
6 include your definitive time estimate for your examination
7 and so on for your cross-examination.

8 MS. BUSH: Okay. Your Honor, my witness -- excuse
9 me, my expert that is going to assist me, and neither he nor
10 I thought about the problem of travel time, if we start on
11 a Tuesday in a week that there is a holiday. And that has
12 created a problem for starting on Monday.

13 In addition to that --

14 JUDGE BRENNER: We're not starting on Monday.

15 MS. BUSH: I mean starting on Tuesday. In
16 addition to that, I learned last night that my witness has
17 a family obligation that has arisen for Tuesday night. And
18 in light of travel time, he would not be able to be on the
19 east coast until 4:00 or 5:00 on Wednesday.

20 My expected cross-examination time would, I
21 believe -- a very conservative estimate would be for between
22 one and two days, especially in light of any potential
23 problems we might have about City 13. With regard to the
24 other three issues, I believe my cross-examination time
25 would be less than a half a day.

27pb2

1 JUDGE BRENNER: Let me see if I understand. One
2 to two days on City 13, plus half a day on 14?

3 MS. BUSH: No. Half a day on City 14 and a half
4 a day to a full day, depending on problems with this
5 Philadelphia specific information.

6 JUDGE BRENNER: One to two days is the total
7 estimate.

8 MS. BUSH: Yes. Therefore, I would request that
9 there could be some accommodation made in terms of scheduling
10 other things earlier in the week, or other people's
11 cross-examination or whatever. That the city be able to
12 have its cross-examination begin on Thursday and to be
13 completed that week.

14 JUDGE BRENNER: Well, I don't think we can put
15 other cross-examination first because you're the prime party
16 with an issue in controversy. Even if we somehow, with
17 the combined panel had the Staff ask any questions they
18 have of the Applicant's witnesses and vice versa, I would
19 guess, based on experience and a lack of any major
20 disagreements as I read the testimony between the Staff and
21 the Applicant that would consume a very short period of time.

22 And it would not be the best way to proceed in
23 any event. But as a practical matter it would not solve your
24 problem. Let me observe that the calendar has not changed.
25 Monday was always a holiday. We emphasized that when we

27pb3

1 said we would start on Tuesday. I don't know how long we've
2 had that week scheduled, but it's been a long time, long
3 in terms of months, not just weeks.

4 Certainly -- well, I don't have the exact date,
5 but certainly I believe since -- I believe since the week of
6 March 19th, but maybe a little before then. And given your --
7 I take it your request is that you not begin your
8 cross-examination until Thursday morning.

9 MS. BUSH: Yes. If I might add a few points,
10 Your Honor.

11 JUDGE BRENNER: Well, let me put the time estimates
12 together. You have one to two days. You wouldn't finish
13 your examination until the end of the day Friday. That's
14 without any of the other parties going ahead. That would
15 mean that the hearing would continue on June 3rd -- I'm sorry,
16 June 4th and beyond in Bethesda, for which we've scheduled
17 days. But we want to avoid the sessions there.

18 MS. BUSH: I realize that makes it difficult for
19 me in terms of having expert assistance when the other
20 parties' cross-examination is going to begin, unless my
21 witness stayed over the weekend.

22 JUDGE BRENNER: My problem is there's a holiday
23 and everybody knew it, you and your witness. You'd better
24 tell me more about what you vaguely referred to as a family
25 obligation if you want any relief based on that.

27pb4

1 MS. BUSH: Well, my witness' son is receiving a
2 leadership award from the community. He is one of two
3 finalists in a contest for community leadership. And he's
4 a sixteen-year-old young man, and it's important. My witness
5 is a Mormon and his family values and his religious values
6 are very important. He doesn't work on Sundays. And his
7 family situation is an obligation, an important obligation
8 to him.

9 That has been something that has consistently
10 been true in working with him.

11 JUDGE BRENNER: How long has this award, which
12 is certainly very nice for the young man -- how long has
13 that been known about?

14 MS. BUSH: I don't know. Monday when I talked
15 to him he was in Brooklyn, not in L.A. where he lives.

16 JUDGE BRENNER: My question is how long had he
17 known this?

18 MS. BUSH: I don't know how long before that he
19 did know that. But there were other parties that were
20 involved in this, and there was some sense it would be later
21 in the period rather than this early in the period when we
22 got to the city's cross-examination.

23 JUDGE BRENNER: Let me suggest something that might
24 not have occurred to you as a possible solution to this,
25 because let me tell you, you need a solution. It's just a

27pb5

1 suggestion, I don't know how good we feel about it as a
2 Board but I want to get your reaction and then the reaction
3 of the other parties to everything you've said so far plus
4 what you and I are going to discuss right now.

5 You certainly have had the testimony and access
6 to your witness so you can prepare your cross-examination
7 to the extent feasible in advance, correct?

8 MS. BUSH: Yes.

9 JUDGE BRENNER: Your problem is you may get some
10 answers that surprise you or throw you.

11 MS. BUSH: Right.

12 JUDGE BRENNER: And your witness cannot be here
13 until late in the afternoon on Wednesday.

14 MS. BUSH: Yes.

15
16
17
18
19
20
21
22
23
24
25

281b1

1 JUDGE BRENNER: What if we started on the
2 scheduled time of Tuesday afternoon? Since the difference
3 between Tuesday afternoon and Wednesday no longer matters
4 to your witness. He, in his view, cannot travel in any
5 event until Wednesday morning or on the red-eye Tuesday
6 night. I don't know. Why can't he get here Wednesday
7 morning?

8 MS. BUSH: Well, I didn't ask him about a red-eye.
9 I could have asked him about a red-eye.

10 JUDGE BRENNER: Well, my suggestion is going
11 to be this. You start your cross examination Tuesday
12 afternoon and you finish. And if the time is such that you
13 finish your cross examination, you finish it. Then if you
14 have any particular problem that you think you need to
15 follow up on, you don't have to tell us that until after
16 you confer with your witness. You can confer with your
17 witness as soon as he gets here. And after that conference,
18 you come back and tell us -- which would be no later than
19 Thursday morning.

20 And it seems to me you might be able to accelerate
21 that by getting him here earlier on Wednesday. I don't quite
22 understand why he can't get here earlier on Wednesday, but
23 that's up to you, nevertheless. That would be for your
24 benefit, if he can get here earlier. But no later than
25 Thursday morning.

1 You can point out to us any particular facts that
2 you've cross examined on, or that any party's cross
3 examined on, where your witness has told you there is a
4 material thing in the record that is significant and
5 important, and he's got some further questions to suggest
6 to you, that you should ask.

7 You make that presentation to us orally, at the
8 opening of the Thursday session, and we'll hear you out. And
9 if we decide it's important and significant, we'll let you
10 pursue those points. Even though it would not strictly be
11 follow up, in the sense that it may be based on your own
12 questions. It's just that without your advisor being there,
13 you didn't appreciate that you should have followed up on it.

14 Have you considered an arrangement like that?

15 MS. BUSH: I think that the City would have
16 minimal harm from a situation like that if we could --

17 JUDGE BRENNER: You said minimal harm?

18 MS. BUSH: Yes, if we could -- if we determined
19 on Thursday morning that the areas that I cross examined
20 on, that I didn't understand, or weren't clear, if I could
21 just follow up on cross examination instead of having to
22 discuss at length what it is, and if I could just do my
23 questions.

24 JUDGE BRENNER: Well, my concern is that we want
25 to hear because by then we would want to hear what the points

281b3

1 are, not just let you go ahead, because we would have
2 gone through the rounds of follow up already. And by
3 then we will have heard enough where we could make an
4 informed judgment, as to whether we need it to decide the
5 case on the merits.

6 And if you've had your witness's advice that
7 something is important, it behooves you to be able to
8 articulate what it is and why it's important. It seems to me
9 that is not a burdensome requirement.

10 If we're in doubt, we might decide to give you the
11 leeway, but if it's apparent to us that it wouldn't be
12 productive, I don't want to have to sit here for additional
13 time, which we could determine in advance would be
14 unproductive.

15 MS. BUSH: Well, if my expert were here with me,
16 or if we did have the hearing when he could be here, I would
17 not -- it wouldn't be necessary to go through that process,
18 so that no additional time would be taken by following the
19 same procedure.

20 JUDGE BRENNER: But we can't wait until Thursday
21 to start the hearing next week. It's that simple.

22 MS. BUSH: I'm not saying that. I'm saying that if
23 I go through the cross examination without assistance, for
24 the day and a half before Thursday morning, then for me to
25 question in clarification questions -- if there were confusing

1 matters on the day and a half before -- it wouldn't take
2 any more time than if I did it during the cross examination.

3 JUDGE BRENNER: I'm sorry. I'm not following you.

4 MS. BUSH: I'm saying that there is -- you're
5 proposing that there be some -- you were saying that there
6 be some showing, before I do cross examination. And I
7 was saying --

8 JUDGE BRENNER: You want to avoid the showing
9 and just ask the questions?

10 MS. BUSH: Yes.

11 JUDGE BRENNER: Well, I'm sorry. I want to hear
12 what the questions are going to be on, by that point in the
13 hearing, because we will have heard your cross examination
14 and will be able to make a judgment as to whether it's
15 important or material. It's the same judgment when a party
16 is proceeding with cross examination and we determine
17 we're going to cut that party off because the cross
18 examination, up until that point, has not been productive.

19 And based on the cross plan, the cross examination
20 still to come is not going to be productive. So that's a
21 judgment we make all the time. and it would be particularly
22 important given the flexibility we're showing you.

23 MS. BUSH: I guess I'm not following you because --

24 JUDGE BRENNER: Okay, well I understand that.

25 In any event, your excuse isn't sufficient to

1 justify delaying the hearing for your witness. It's that
2 simple. Neither excuse is sufficient.

3 We would have been willing, I think, to start
4 Wednesday morning, even though your excuse isn't sufficient.
5 But what you're asking for now shows that there is no
6 difference between Wednesday morning and Tuesday afternoon.
7 And given that, we'll stay with Tuesday afternoon. I don't
8 think I have to recount the family obligations that people
9 participating in this hearing go without.

10 MS. BUSH: No, you certainly don't, to me.

11 JUDGE BRENNER: I know. Nor to me, nor to
12 anybody else here. You, as the counsel for the City, think
13 that excuse is sufficient for us to delay the hearing?

14 MS. BUSH: I do, Your Honor, for this reason.
15 I don't believe that there is any due process harm to the
16 other parties and I do believe that there would be harm to
17 the city, in light of the fact that we have four days
18 scheduled the next week.

19 JUDGE BRENNER: There is harm, in terms of it's
20 been a long scheduled week. Whether or not the harm arises
21 to due process is something else. I don't have to decide
22 the harm is that great, given the insufficiency of the excuse
23 and given what we've offered now, although we'll talk about
24 whether we'll actually do that among the Board members.

25 But after hearing from the parties -- but given

1 what we've offered, I think we've minimized any harm to the
2 City, which harm it's visited upon itself through its
3 agents and witnesses -- not witnesses, he's not even a
4 witness. And you can get a lot of advice in advance.

5 All right, let's hear from the other parties.

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

end28

29pbl

1 MR. WETTERHAHN: Perhaps if this was the first
2 time with this expert the Board could consider this as going
3 towards good cause why you should delay it. However, this
4 is not the first schedule matter which is involving this
5 expert. There was a month ago when the Board chastised the
6 city of Philadelphia.

7 I believe it was incumbent upon this city, knowing
8 what it knew about the about the Board's desires as far as
9 schedule to assure that its expert was available. So it's
10 not the first time.

11 The second thing is, these two weeks of hearing
12 have been built around the city of Philadelphia. We have
13 delayed the consideration of the city's issues until the
14 second week just so the city's expert could be here, and
15 now we see for the greater part of the second week the expert
16 can't be here.

17 So I don't think there's any good cause as far
18 as prejudice of the other parties. Let me tell you the
19 same panel members as need be here, and will be here for
20 possibly an extended time due to this procedure, need to be
21 back in their office also, writing the testimony with regard
22 to the City 15.

23 You might say, well, Tuesday's interchangeable
24 with Friday, but it's not. The contentions are due the
25 following Monday, I believe.

29pb2

1 JUDGE BRENNER: The testimony you mean.

2 MR. WETTERHAHN: The testimony, such that I believe
3 the Applicant would be prejudiced by starting even on
4 Wednesday. And for having this elongated procedure, I don't
5 see there was anything arising even close to good cause. And
6 I don't think the Board's procedure is warranted in this
7 instance.

8 JUDGE BRENNER: You mean even our adjustment is
9 not warranted.

10 MR. WETTERHAHN: Yes, sir. Particularly if the
11 schedule for our cross-examination should go faster than the
12 city thinks and we finish some time on Wednesday, then we're
13 going to have the Board and the parties waiting around until
14 the expert gets here and --

15 JUDGE BRENNER: Yes. One comment on that, as
16 a practical matter, the reason I didn't want to apply that,
17 and I considered it, is that the city is in control to some
18 extent to the pace of its cross-examination, and I didn't
19 want that to be a factor. That is, if the cross-examination
20 was more rapid than estimated, I didn't want that to
21 redound to the detriment of the city, if we're otherwise
22 willing to offer this flexible arrangement.

23 MR. WETTERHAHN: Finally, if there had been
24 a quid pro quo, if the city had said we could have concentrated
25 our efforts on a single issue or subpart thereof, and therefore

29pb3

1 we could have dropped an issue. After all the negotiation
2 and discovery I think that could have been a factor that the
3 Board should consider.

4 But here we are after all this point in time --
5 and I'm not saying the city had bad faith or anything, but
6 we still have the same contentions as we do -- that we did
7 on the 19th of March. So I think that's a consideration
8 the Board should place in its decision.

9 So for all these reasons I don't think that
10 any delay is warranted. And I don't believe it is necessary
11 to fulfill the requirements of the Commission's regulations
12 to put into place the procedure that the Board suggested.

13 JUDGE BRENNER: Ms. Bush, isn't it correct that
14 your advisor, whom you've told us is this Mr. Finlayson has
15 known for a long time that the hearing was scheduled to start
16 at 1:30 p.m. on May 29th.

17 MS. BUSH: He has known what the hearing schedule
18 for these issues were. We did not know when we would begin
19 because we did not know how long LEA was going to go. The
20 June 4th schedule for filing of testimony I recollect was
21 set at the request of the company instead of May 11th.

22 JUDGE BRENNER: That's true.

23 MS. BUSH: And the prior scheduling problem that
24 the city had was not accommodated in the sense that the
25 testimony following that I believe remained on May 11th,

29pb4

1 even though my witness was not available for a three-week
2 period prior to that.

3 JUDGE BRENNER: Well, I think Mr. Wetterhahn's
4 point was we would have gone into the city's issues this
5 week, starting this afternoon except for problems scheduling
6 your expert in this week, which we accepted since we recognized
7 that the adjustment in the schedule this week was a later
8 adjustment.

9 Nevertheless, if there had been some greater
10 flexibility there then that would have alleviated some of
11 the problem. I think that was his point.

12 MS. BUSH: Well, as it turned out, we didn't the
13 Staff testimony until last Friday, and I don't think we
14 would have been prepared to be in hearings this week and
15 be available to start cross at 3:00 today or tomorrow.

16 JUDGE BRENNER: I think that's a correct
17 observation and I've already commented on what I think about
18 what happened there to the Staff. Does the Staff has a
19 position?

20 MS. HODGDON: Let me say with regard to that that
21 one reason that although the city agreed to receive the
22 testimony --

23 JUDGE BRENNER: I don't want to hear about the
24 Staff's testimony. And believe me, it's to your benefit for
25 us not to discuss that again.

29pb5

1 MS. HODGDON: Well, I do think it's been
2 misrepresented, what the facts are. If you don't want to
3 hear about, I won't speak about it.

4 What Mr. Wetterhahn states with regard to the
5 Applicant's witnesses is equally true of the Staff's, or
6 perhaps more so, in that they too are engaged in writing the
7 testimony on City 15, and have scheduled their participation
8 on that effort around the dates that have been established.
9 And those dates were established to accommodate the city's
10 needs.

11 Despite the their other obligations, and even
12 though they have obligations to this case, with regard to
13 these contentions which we will litigate next week, and to
14 City 15 and also other cases, they've made themselves
15 available on a daily basis, and sometimes more than that
16 for extended telephone conversations with the city's expert
17 in an attempt to settle aspects of the city's contentions.
18 They've done additional work, they've done additional runs,
19 they've extended themselves, and they've taken up a lot
20 of time for the city.

21 I think it's rather late to be coming in and
22 saying that the city would like to start on Thursday because
23 that upsets our schedule, and our schedules unfortunately
24 go beyond this case. We have other obligations. And so
25 we find that we would be extremely prejudiced to have to

29pb6

1 meet the schedule that Ms. Bush suggests.

2 JUDGE BRENNER: All right. Give us a few moments.

3 (Board conferring.)

4 JUDGE BRENNER: In fact, give us ten minutes
5 until 4:00.

6 (Recess.)

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

#30 arl

1 JUDGE BRENNER: We are back.

2 We are going to start the hearing as scheduled
3 next week at 1:30 Tuesday afternoon. We will complete
4 as much as we can complete and if we are finished everything
5 before the end of the day Wednesday, that's fine. Even if
6 we are, we will allow the City until Thursday morning
7 if it needs the time to make a motion that, based on any
8 discussion with its expert adviser, that it has some
9 particular points it wants to ask further questions on, and
10 we will judge whether the record would be aided in a
11 material significant way by those questions. We would
12 have to get a precise identification in any such motion.

13 In making our ruling, it is our judgment that
14 the excuses offered, both on the new discovery that a
15 holiday occurs on that Monday on the part of Mr. Finlayson,
16 and on his family obligation on Tuesday evening, which you
17 have described, are both woefully insufficient to the point
18 where, in my subjective judgment as an attorney, I would
19 not with a straight face give those excuses to a court of
20 law. And I'm surprised that the City did in this case.
21 No court in the country would accept those as an excuse
22 for delaying a trial, especially a long-scheduled, complex
23 one. We don't have to go that far in our ruling.

24 I will note my personal view that Mr.
25 Wetterhahn's observations, given the previous scheduling

1 discussions involving this particular witness and the
2 City quite some weeks ago -- I guess about a month ago --
3 should certainly have put Mr. Finlayson as well as the City
4 on notice that they certainly had better comport to the
5 schedule we did adopt.

6 As far as when Mr. Finlayson will be here, if he
7 will be here at all, that is up to the City and Mr.
8 Finlayson. As we said, the excuses are not accepted as
9 justifications. They are insufficient.

10 Be that as it may, it seems to us he could
11 still be here very early Wednesday morning.

12 In terms of the other potential subject next
13 week -- that is, whether or not we need any further
14 discussion of the findings on welding -- we will make
15 that determination as soon as we can. We may not be able
16 to make it until late Wednesday. We will be quite busy also.
17 We will be receiving the findings of the Staff and the
18 Applicant and the other interested parties that choose to
19 file any on Tuesday, and we will be doing our own work.

20 MS. BUSH: I should note for the Board's informa-
21 tion there is a possibility I would be finished with cross
22 examination at the end of the day Tuesday.

23 JUDGE BRENNER: All right, but there are potential
24 follow-up questions, and we will still give you the
25 opportunity we allowed you. And, as I said, we don't want

1 that opportunity to be a disincentive for you to be
2 efficient in your cross examination. So we are not going to
3 take away the opportunity because you finish earlier, which
4 will presumably give you more time to confer with whoever
5 you want to confer with.

6 Now, if you can determine sooner than Thursday
7 that you have no follow-up, that's acceptable, but it won't
8 be required, and I think that is already a lot of leeway.
9 If you finish Tuesday, and we are not otherwise in session
10 Wednesday, we might try to make some other quick adjustments,
11 but whatever adjustments we make will not deprive you of
12 the opportunity, unless you say you can do it in less time,
13 of making any further motion you have.

14 It may be we can do something with respect to
15 welding, if necessary, earlier. It may be that Mr. Romano
16 could be informed that we might possibly, if an oral
17 argument is required, like to do that on Wednesday afternoon.
18 But tell him that is not the expected time. The more
19 probable time would still be Thursday.

20 Presumably he has previously been informed.

21 MS. HODGDON: I should tell him that it's
22 Thursday and possibly Wednesday, and if Wednesday, he would
23 be informed in time.

24 JUDGE BRENNER: Yes. And obviously if we can't
25 ve him sufficient notice, we are not going to require him

1 to come in here on a moment's notice. Tell him we need
2 some flexibility, if possible.

3 MS. HODGDON: Yes. I understand.

4 JUDGE BRENNER: On the subject of welding, how
5 early can we get those filings of findings?

6 MS. HODGDON: Do you want them served here?

7 JUDGE BRENNER: Yes.

8 MS. HODGDON: We'll get them at the beginning of
9 the hearing, I presume, at 1:30.

10 JUDGE BRENNER: I'd like to be able to read them
11 before we start at 1:30, if feasible. Can we work something
12 out?

13 MR. WETTERHAHN: Where will the Board be on
14 Tuesday?

15 JUDGE BRENNER: We can come here earlier, or we
16 can tell you off the record where you can leave it for us.

17 MR. WETTERHAHN: We are attempting to get it out
18 of our office on Friday, so we will either get it to your
19 offices on Friday afternoon, or make arrangements to get it
20 to you by messenger some time late Friday or Saturday.

21 JUDGE BRENNER: That would be very helpful to me
22 and to the Board.

1 MR. RUTBERG: Can you let us know where you're
2 going to be on Monday -- Tuesday, I mean?

3 JUDGE BRENNER: We'll let you know and maybe you
4 can get it to us by around 11:30 or so on Tuesday. That
5 would be helpful because it would give us a couple of hours
6 to read it. That's the obvious reason.

7 MR. RUTBERG: I could give you on the start of the
8 session?

9 JUDGE BRENNER: Yes, but I can't read it while
10 we're in session. All right, findings for severe accidents.

11 MR. WETTERHAHN: At least LEA and Applicant had
12 discussed findings. What we would like to do is, since it
13 appears we're going to sit and finish next week on all but
14 the City's water issue, I think it would be easier to set
15 a single schedule for all but water issues, using the
16 standard schedule, starting on the day that we close the
17 record on these issues.

18 JUDGE BRENNER: We did not mean to separate out
19 this week from next week. I'm sorry if anybody inferred
20 otherwise.

21 MR. WETTERHAHN: So we would propose the usual
22 schedule and LEA is in agreement. I had a short discussion
23 and I don't know whether the City wants to raise a legal
24 issue, but it informed me off the record it believed the
25 Staff should go first, because it has the burden of proof in

1 NEPA issues. But that's off the record, unless --

2 MS. BUSH: My statement was the Applicant should
3 not be the only party that had a right to rebut the Staff
4 in the sense that we might all have disagreements with the
5 Staff.

6 MR. WETTERHAHN: Well, Applicant's response to
7 that is that the Commission's rules, with regard to the
8 findings, cover all issues. And because the Applicant has
9 the burden of proof on all issues, it is the Applicant's
10 right to have reply findings and reply findings by other
11 parties are not called for or contemplated. And they are
12 unusual, to say the least, in previous cases.

13 JUDGE BRENNER: Sometimes they've been helpful,
14 though, in previous cases. Well, I've heard that for the
15 first time. And I have a suggestion, in a moment, on that
16 subject. What about the schedule, though? You may want
17 to adjust the sequence, but the idea is to get the schedule
18 in for next week.

19 MS. BUSH: I have no problem with the standard
20 schedule. I believe Mr. Wetterhahn indicated, in his
21 20 days and 30 days.

22 JUDGE BRENNER: When to start, if we're not talking
23 about the standard schedule.

24 MS. BUSH: Keeping it to next week is fine with me.

25 JUDGE BRENNER: A possible option, which I don't

1 think would change the time much, would be to work a
2 schedule out, so that we can get findings which include
3 City 15, but have the parties working on the findings on all
4 the other subjects and keying a schedule from the completion
5 of City 15, if it is completed on the week of June 19th.
6 If it's not completed that week, we can backup and key in
7 a schedule for all the other findings anyway, without City
8 15.

9 But if City 15 is finished that week, we can
10 have a findings schedule that would start with the first
11 findings being filed two weeks after that. That would allow
12 the parties to adjust -- we'd get an integrated document
13 and it would give the parties a chance to adjust anything they
14 might arguably relate.

15 Although it would only give you two weeks from
16 that point, if you've done your work correctly and
17 consistent with the schedule the parties have just proposed,
18 the findings and all the other issues would be essentially
19 completed by then. And the first filer would have the
20 two weeks to pick up anything it wants to pick up, about
21 City 15.

22 And then from those two weeks, we would key
23 the same interval of days after that. I've -- I don't have
24 it in front of me, but I guess it's 10, 10 and 5. Would that
25 be acceptable?

1 We'll talk about Ms. Bush's point in a moment.

2 MR. WETTERHAEN: That is acceptable to Applicant.

3 JUDGE BRENNER: Staff?

4 MR. VOGLER: Two weeks after the week of June the
5 19th?

6 JUDGE BRENNER: Two weeks after the day we
7 complete the litigation on City 15, if it is completed that
8 week.

9 MR. VOGLER: Who files?

10 JUDGE BRENNER: The first filer, we don't know
11 who that is, yet.

12 MS. HODGDON: The party with the burden of proof.

13 JUDGE BRENNER: Well, maybe you can tell me who
14 that is, on this issue.

15 MR. VOGLER: In other words, you'll file them on
16 schedule after that?

17 JUDGE BRENNER: Yes.

18 MR. VOGLER: And the City wants the right to reply?

19 JUDGE BRENNER: We didn't get to that. Don't
20 worry about that part, yet. Just the schedule adjustment. Is
21 that all right? You'll have to do the same work in the
22 same time frame, in order to meet that schedule. There is
23 no doubt about it.

24 MR. VOGLER: City 15, then, will just be appended
25 to the filings that will follow these issues? You're not

1 talking about a separate document?

2 JUDGE BRENNER: Correct, but whether it's appended
3 or you have to integrate it depends on the issues. But we
4 get to findings on all the severe accident risk assessment
5 contentions.

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

end31

321b1

1 Now, if it turned out that City 15 was not
2 completed that week, as you know, if that's the case we
3 won't be able to complete City 15 until July. Then we would
4 not hold the filing schedule until then. We'd back up and
5 get findings also, starting with the two weeks, but just
6 on the other issues. But we'll cross that bridge if we come
7 to it.

8 All right, now, in terms of the sequence problem,
9 what if we substituted the Staff for the Intervenors, in
10 terms of when they would file? That is, the Staff would file
11 10 days after the Applicant. Then the Intervenors would file
12 10 days after the Staff and then we'd give a right of reply
13 to both the Staff and the Applicant? That would permit the
14 City to file and LEA to file, after seeing the Staff's
15 findings and it would still -- by adding the reply for the
16 Staff on the same schedule -- the Applicant would reply.
17 Allow the Staff, if it desires, to reply to anything in the
18 intervening findings.

19 MR. VOGLER: You're talking for the Staff then,
20 somewhere around July 17th or 18th, providing it's finished.

21 JUDGE BRENNER: I don't know what date it's going
22 to be.

23 MR. WETTERHAHN: In that case, I would just ask
24 for a slight adjustment. Usually, we only reply to
25 Intervenors in bulk. Therefore, I'd like 10 days, instead

1 of the usual 5 because we'd just be receiving the Intervenor's
2 findings and we'd have only 5 days to reply, instead of the
3 usual 15.

4 JUDGE BRENNER: Yes. I overlooked that and I
5 agree with your point. We could do that.

6 MS. BUSH: Why is that?

7 JUDGE BRENNER: Because it's a NEPA issue. Ms.
8 Hodgdon was going to jump in and say it's the party with the
9 burden of proof. And if we'd set that, it might be the Staff
10 filing first. I'm not sure.

11 MS. HODGDON: I was trying to make a joke.
12 I'm terribly sorry.

13 (Laughter.)

14 JUDGE BRENNER: I know. I understood it in that
15 spirit, so you don't have to be sorry. But it is a matter
16 of less than precise certainty, and I understand Philadelphia's
17 point on that score. And that's why I thought this adjust-
18 ment would make everybody happy. Maybe that's an impossible
19 goal.

20 But I don't hear any objections. Maybe we can
21 adopt that?

22 MS. BUSH: Yes.

23 JUDGE BRENNER: So two weeks after we complete
24 City 15, if we complete it the week of June 19th, the
25 Applicant will file its proposed findings and we will adjust

1 all these for working, business days, when we know what
2 the schedule will be. And then 10 days after receipt of the
3 Applicant's, the Staff will assure that all parties receive
4 its proposed findings. 10 days after that, LEA and the City
5 and the Commonwealth -- if they each wish to file -- will
6 file their proposed findings and then, 10 days after that,
7 the Staff and the Applicant will have the right of reply.

8 If we don't finish City 15 that week, we will
9 adopt the same schedule for all issues other than City 15
10 and we'll have to separate out City 15. When you do file the
11 last batch of findings, why don't you be sure to give us
12 the appearances of counsel as you would like to see them
13 for the entire partial initial decision. There have been
14 various counsel in and out and that way, we can get it in
15 the exact sequence in which different parties seek to list
16 them.

17 And the appendices for which the Applicant has
18 been providing cumulatively can be accumulated for the
19 entire part by the last filing also. If City 15 is included.

20
21
22
23
24
25
end32

33pb1

1 Is there anything else that we need to discuss?
2 Ms. Bush, in some of her comments I want to recognize for
3 the record that a lot of the messages you've been carrying
4 to us as counsel rather than as matters of your own doing,
5 and we recognize that, but nevertheless we have to comment
6 on the situation. So we certainly don't hold you as the
7 individual messenger responsible for the situation, at least
8 not solely responsible.

9 MS. BUSH: I think I have mixed feelings about
10 it because I feel like there's too much in the -- I have
11 mixed feelings about it because as an individual I feel I
12 go too far in the other direction than society as a whole
13 does. And it's a difficult social question of work and
14 family.

15 JUDGE BRENNER: It can be a difficult one, I know,
16 but we have the proceeding along scheduled and one object of
17 having things scheduled well in advance as we have endeavored
18 to do is to allow people as individual human beings to do
19 other things in their lives that are important to them,
20 whether it be work related or not work related, knowing the
21 schedule well in advance as opposed to suddenly telling you
22 we've got a schedule on very little notice.

23 So hopefully some of our advance schedule has
24 achieved that. But it's not a perfect world and we all have
25 to make trade-offs.

33pb2

1 All right, well, thank you all for your time and
2 effort this week and I hope you have a nice weekend holiday
3 and we'll see you all at 1:30 in this courtroom next week
4 on Tuesday.

5 (Whereupon, at 4:18 p.m., the hearing was
6 recessed, to reconvene at 1:30 p.m., Tuesday, May 29, 1984.)

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

CERTIFICATE OF PROCEEDING

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

This is to certify that the attached proceedings before the
NRC COMMISSION

In the Matter of: Philadelphia Electric Co.

Date of Proceeding: 24 May 1984

Place of Proceeding: Philadelphia, Pa.

were held as herein appears, and that this is the original
transcript for the file of the commission.

Ann Riley
Official Reporter - Typed

Ann Riley
Official Reporter - Signature