1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION
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4 ATOMIC SAFETY AND LICENSING BOARD PANEL
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6 HEARING
7 ----------x Docket Nos.
8 In the Matter of: : 50-247-LR and
9 ENTERGY NUCLEAR OPERATIONS, INC.: 50-286-LR
10 (Indian Point Generating Units 2:
11 and 3) : ASLBP No.
12 ----------x 07-858-03-LR-BD01
13 Thursday, October 18, 2012
14
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16 Westchester Ballroom
17 455 South Broadway
18 Tarrytown, New York
19
20 BEFORE:
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22 MICHAEL F. KENNEDY, Administrative Judge
23 RICHARD E. WARDWELL, Administrative Judge
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25

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1 P R O C E E D I N G S

2 (9:04 a.m.)

3 JUDGE McDADE: Do any of the parties have

4 any preliminary matters before we get started?

5 MR. BESSETTE: Yes, Your Honor. This is

6 Paul Bessette for the Applicant. We just have one

7 witness availability issue we would just like to alert

8 the Board to. Dr. Tolley, who is our expert on the

9 land values contention, New York-17 has been

10 graciously supporting us this week and ready to

11 testify but like Dr. Shepherd, New York's expert, he

12 has teaching obligations that he -- in Chicago and he

13 has to get back next Tuesday. It is the middle of the

14 semester.

15 So if New York State-17 goes much beyond

16 Monday, we would like to discuss we may have a witness

17 availability issue. But I understand Dr. Shepherd is

18 not available to testify on Tuesday as well because of

19 his teaching obligations. So I just wanted to alert

20 that to you, Your Honor.

21 JUDGE McDADE: Okay, thank you.

22 MR. SIPOS: And Your Honor, this is John

23 Sipos for the State of New York. Mr. Bessette also

24 correctly described a constraint that is operating

25 upon New York. Dr. Shepherd, I think as the Board

1 knows, also has a teaching obligation at Williams
2 College on Tuesday.
3 So both those experts on NYS-17 appear to
4 have similar constraints, given their academic
5 responsibilities.
6 JUDGE McDADE: I not only would be very
7 disappointed, I would be very surprised if we are
8 unable to finish New York-16 and New York-17 on
9 Monday. And it would be my predisposition to make
10 sure that we finish those on Monday, even if it meant
11 starting a little bit early -- and starting early may
12 not be an issue because we have an issue with regard
13 to the room setup -- but going late in order to
14 accommodate both of them. We anticipated, quite
15 frankly, that we would be done with 16 and 17 already,
16 let alone by Monday. And certainly those individuals
17 have been available and have been inconvenienced and
18 we don't want to add to that inconvenience.
19 So I am confident that we can get through
20 16 and 17 by the close of our hearing on Monday.
21 MR. BESSETTE: We appreciate that. Thank
22 you, Your Honor.
23 MR. SIPOS: And Your Honor, the State has
24 another issue that it just wishes to alert the Board
25 about. I have been in consultation actually with Mr.

1 Bessette about this. Entergy produced to the State
2 some computer runs on Friday evening of last week and
3 the State is not yet prepared to present its final
4 position on that. And as I said, Mr. Bessette and I
5 have been in consultation but the State and its
6 experts have not yet had an opportunity to review in
7 ground truth those calculations.
8 JUDGE McDADE: Relevant to which
9 contentions?
10 MR. SIPOS: Actually there is two
11 contentions. One batch of computer analyses pertains
12 to New York-16 and there is also an analysis by Dr.
13 Tolley for New York-17. And it may be that we are
14 able to come to some sort of meeting of the minds of
15 that but I just I wanted to, in the interest of full
16 disclosure, alert the Board to that as well.
17 JUDGE McDADE: Well at least they are not
18 on New York-12 or Riverkeeper-TC-2.
19 MR. SIPOS: Thankfully, Your Honor.
20 (Laughter.)
21 JUDGE McDADE: But hopefully tomorrow you
22 would have an opportunity to look at those, have your
23 appropriate expert look at them and if there is going
24 to be an issue, contact us either by phone or email
25 tomorrow with regard to it.

1 MR. BESSETTE: Yes, Your Honor, I think we
2 would be able to advise the Board what the parties'
3 respective positions is and, if necessary, either
4 resolve it or take whatever action either party deems
5 appropriate.
6 Thank you.
7 MR. BESSETTE: Yes, Your Honor, and this
8 is Paul Bessette. We agree with that. We believe
9 that our sensitivity runs, our calculations that are
10 in the nature of what is very similar to what is
11 already produced and we would hope, given the
12 intervening week and the weekend, that New York's
13 experts could review those. We believe that is
14 reasonable. Thank you.
15 JUDGE McDADE: Prior to the hearing we
16 received sensitivity runs and testimony about
17 sensitivity runs assuming 50 percent of Dr. Sheppard's
18 estimate.
19 Are we talking about a run that includes
20 100 percent of Dr. Sheppard's estimate or is it
21 something else?
22 MR. SIPOS: Your Honor, it is John Sipos.
23 That is what Entergy has represented to us. And the
24 State's attorneys have been here, experts have been
25 here, so we really have not had the opportunity to

1 QAQC those runs. But Mr. Bessette can correct me if
2 I am wrong but I believe that Entergy asserts that it
3 hops from 50 to 100 percent.
4 JUDGE McDADE: From New York's standpoint,
5 in light of this new information, would we be able to
6 move ahead and start New York-16 today or is this
7 something that you would need to review before we
8 started New York-16 or before we finished New York-16
9 or is it something that we could go through New York-
10 16 and then make a determination later whether or not
11 it needed to be reopened?
12 MR. SIPOS: One moment, Your Honor. The
13 State of New York recognizes that we have critical
14 mass here in this room and does not wish to unduly or
15 in any way delay the proceedings. While the State has
16 concerns about the late production, the State does not
17 wish to delay the proceedings so the State would be
18 willing to start evidentiary hearings on New York
19 State-16. However, the State would like to reserve
20 the right to QA/QC examine the sensitivity runs and
21 come to sort of a deliberate conclusion about how to
22 address it. And there could be a possibility of a
23 response from the State or potential additional
24 proposed cross-examination questions or things of that
25 nature. We just have not -- we received them about

7:00 p.m. on Friday and we were in the throes of moving experts here and ourselves as well.

JUDGE McDADE: But even if we were to start on New York-16 today, and even if we were to finish New York-16 today, Dr. Sheppard is going to be back on Monday with regard to New York-17, so we would be in a position to reopen.

MR. SIPOS: That is correct. You know depending -- the State would like an opportunity to do a thorough review and it might take more than -- I would suggest it might take more than the intervening weekend. But again, the State does not wish to delay the proceedings but doesn't wish to be prejudiced.

JUDGE McDADE: But you won't know that until you and your expert have had an opportunity to look at it.

MR. SIPOS: That is correct, Your Honor.

JUDGE McDADE: Okay.

MR. BESSETTE: And Your Honor, not to belabor this, but I think the Board has realized over the last couple of days all the parties have had to address documents that have been disclosed. We have spent -- our experts had to review documents disclosed by Riverkeeper at 10:00 the night before and testify to them on the morning before. We believe this is

1 helpful to the Board. We think it is in the nature of
2 testimony we have already provided. Dr. Lemay is a
3 skilled expert we understand and we believe they have
4 had this for a week and it is certainly within the
5 realm to do it. But we understand and appreciate New
6 York's wanting to review and quality assurance this
7 information.
8 But again, we think it would be helpful to
9 the Board and we think by Monday it is certainly
10 reasonable for them to be able to address this
11 information.
12 JUDGE McDADE: And we are hopeful of that
13 as well but again we haven't seen the information at
14 all and, therefore, have no idea how long it would
15 take to review and New York hasn't had a chance to
16 review it. So hopefully Mr. Sipos will be able to say
17 no problem, you got it. But let's wait until they
18 review it and then if necessary the Board can review
19 it as well and decide whether or not it is reasonable
20 to delay or whether or not it is not putting New York
21 in an inappropriate position or an unfair position by
22 moving ahead.
23 But I think we have touched on that
24 enough. Why don't we see if -- we may not have to
25 worry about delays if we never get done with New York-

12.

MR. BESSETTE: Thank you, Your Honor.

MR. SIPOS: Thank you, Your Honor.

JUDGE McDADE: So let's get back to New York-12.

JUDGE KENNEDY: Thank you, Judge McDade.

MR. HARRISON: Excuse me, Your Honors. This is Donald Harrison over at the staff. I would like to see if I could make a comment regarding a comment that was made by Entergy's applicant yesterday regarding the use NUREG-1150, if that is acceptable.

JUDGE McDADE: Well we will, I am sure, be asking you about that.

MR. HARRISON: Okay.

MR. JONES: Your Honor, Joe Jones with staff. I do have a clarification to a statement that I believe may have left the wrong intention to the Board. And if I have the opportunity, I would like to clarify that.

I may have left the impression that there is a library of cesium data available from the cleanup of the Department of Energy Weapons Complex. And that is not what I intended to convey.

I intended to convey there is a lot of experience available from the cleanup activities but

these cleanups were of weapons-type materials such as plutonium, which is significantly more difficult to clean up than cesium.

A lot of advanced technologies came out of this program which are currently available today, some of which are identified in New York State Exhibit 000259 and 000261; 000259 discusses strippable coatings and 000261 discusses abrasive technologies and techniques.

I have used a couple of those techniques in the decontamination of cesium and that allowed us to complete these activities much more cost-effectively than we would have been able to do historically. And that was the message I had intended to convey. I appreciate the opportunity to clarify.

JUDGE McDADE: Okay but to state it now, perhaps Dr. Lemay would disagree with you with regard to which is easier to clean up plutonium or cesium but that is something that we touched on yesterday and I am sure we are going to touch on later today as well. But you have made the correction to your testimony yesterday and we appreciate it. Thank you.

JUDGE McDADE: Now was yours by way of a correction to testimony if we have something that was --

1 MR. JONES: No, Your Honor.
2 JUDGE McDADE: I'm talking, sorry, to your
3 colleague. I cut you off. And if it was sort of a
4 new concept that you wanted to just elaborate on, we
5 will get to that later. But if it was a correction of
6 prior testimony such as Mr. Jones's, we would like to
7 get to that now.
8 MR. HARRISON: No, it is an elaboration.
9 JUDGE McDADE: Okay, thank you.
10 JUDGE KENNEDY: I wonder if I could ask
11 Mr. Jones if you could characterize the DOE experience
12 level with cleanup of cesium. I mean, is there an
13 amount of data or experiential information on the
14 cleanup of cesium from DOE lab facilities?
15 MR. JONES: Your Honor, I am not aware of
16 -- this is Joe Jones with staff. I am not aware of
17 any specific cesium-related characterization or cost
18 data.
19 JUDGE KENNEDY: So that was your
20 clarification, that the experience was more with
21 plutonium-type cleanup situations?
22 MR. JONES: My personal experience
23 included cesium but I also had other contaminants in
24 my facility and of course we don't distinguish as we
25 are decontaminating so I don't have cesium-specific

data.

JUDGE KENNEDY: All right, thank you.

I would like to start this morning's evidentiary portion by taking us back to where I believe we ended yesterday. We circled back around, after much discussion of the MACCS2 input to Table 4 of Entergy Exhibit 000450. And again, we were talking about some of the key inputs. And as I understand where we ended yesterday, that in discussions with Dr. Lemay and the Entergy witnesses and the staff witnesses, that we are going to start today by focusing on CDFRM parameter and TIMDEC, T-I-M-D-E-C, and how it impacts the decontamination cost estimates that are produced by MACCS2 or that are relevant to the input to MACCS2.

I guess I would ask first Dr. Lemay if that is your understanding of where we ended yesterday.

DR. LEMAY: That is correct, Your Honor.

JUDGE KENNEDY: Thank you. Entergy, do you have a different view of where we ended yesterday and what parameters are of focus for today's evidentiary hearing?

MR. TEAGARDEN: Grant Teagarden for Entergy. No, sir. We agree.

JUDGE KENNEDY: Staff, if you would like to comment as well. Does that seem where we ended yesterday? And I will take a representative.

MR. HARRISON: This is Donald Harrison. Yes, I believe that is where we ended yesterday.

JUDGE KENNEDY: All right, thank you. I guess given that understanding, which was my understanding as well, that let's -- I would like to have the IT folks call up New York State Exhibit 000430 and in particular, page six of that exhibit.

(Pause.)

JUDGE KENNEDY: Thank you. The reason I have asked this particular exhibit to be displayed is it has the parameters of interest on it. It is not an Entergy exhibit but it is one that was produced by Dr. Lemay for the State of New York. But it has CDNFRM and TIMDEC and cascades into ultimate OECR dollar calculations.

It also has some of the other parameters that we talked about yesterday that were on Table 4 of the Entergy 000450 exhibit, in particular the VALWNF and we can see the POPCST, which received some discussion yesterday during the hearing.

I think it would be useful to have Dr. Lemay orient to what is presented here. I would ask

you to focus on the CDNFRM and how TIMDEC weaves its way, as I understand, it into that calculation. And then we will have additional discussion from Entergy and the staff and we will proceed down a path to investigate the reasonableness of these input assumptions.

So if you could walk us through what is being presented here Dr. Lemay, that would be appreciated.

DR. LEMAY: Dr. Lemay for New York State.

In Table 13 we summarize the result of the calculations. The first column presents the parameters --

JUDGE KENNEDY: I'm sorry, Dr. Lemay. Are these MACCS2 calculations?

DR. LEMAY: These are MACCS2 calculations.

JUDGE KENNEDY: Thank you.

DR. LEMAY: These are MACCS2 calculation and the results have been presented in OECR. So it is the aggregate of eight release categories multiplied by their respective frequency and sum to get an OECR. So it is a single value which is compared to the SAMA candidates.

So the first column gives the parameter that we are discussing. The second column describes

the parameter. The third column gives the value that was in the Entergy input deck. So this was the value that they were using for their calculations.

The fourth and fifth column give, where appropriate, the range of value that we considered in our assessment based on different methods of calculating the cost of decontamination or other parameters.

When we use the minimum value of a parameter, the corresponding OECR cost is in the minimum column of the OECR. When we use the maximum value of the parameter, the corresponding maximum value is presented in the last column of the OECR.

Below the minimum and the maximum value we presented the increase relative to the Entergy value. So we can see the impact of each parameter on the OECR separately and on the last column we can see the aggregate of all these changes on the OECR.

To summarize, the value of the OECR could triple or go up by a factor up to seven, depending on the parameters that we select within our new assessed value.

So it is not an insignificant change. We are talking a factor of three to seven relative to the current calculation performed by Entergy.

1 So let's focus first on CDMFRM with the
2 decontamination factor of three.
3 We arrived at the minimum value and if we
4 can scroll back just one page to Table 11. So we have
5 here the range of values. So you can see that the
6 minimum value corresponds to the approach used by
7 CONDO for light decontamination, $15,422 per person.
8 And the maximum value corresponds to the Site
9 Restoration Report at $417,00 per person.
10 What we tried to do here is to bracket
11 what could be possibly the best value. In each of
12 these approach, A, B, C, D, has strengths and
13 weaknesses. As you can see, the Reichmuth approach
14 does not help us with light decontamination. It is
15 inherently a discussion of heavy decontamination.
16 The method in RISO focuses on light
17 decontamination. It doesn't help us with heavy
18 decontamination.
19 JUDGE KENNEDY: Dr. Lemay, could you
20 explain the distinction between light decontamination
21 and heavy decontamination?
22 DR. LEMAY: Right. Light decontamination
23 uses techniques that will lead to a dose reduction
24 factor of three. And these have been lumped together.
25 It is a bit of a loose arrangement but we are talking

about things like vacuuming, cleaning. You have to understand that contamination is very fine radioactive dust that is not visible to the naked eye. And so essentially when we decontaminate, we try to clean and we will use different techniques. Some of these techniques achieve a low reduction in contamination and have a cost associated with them. And other techniques are more costly but also more aggressive in removing the contamination.

So and that is why the codes has these two families of decontamination factor because they have a family of techniques associated with the decontamination factor of three and a different family of techniques associated with the decontamination of 15.

JUDGE KENNEDY: So does the light and heavy then roughly correspond to the DRF of three and a DRF of 15. Is that --

DR. LEMAY: Correct.

JUDGE KENNEDY: -- the consistency here?

DR. LEMAY: Correct. And sometimes a match is not quite exact but it is good enough. Anything between two and five we say well that is about three and anything above ten we say that is about 15.

JUDGE KENNEDY: Thank you.

JUDGE WARDWELL: As another general question, are you suggesting by these A, B, Cs, and Ds techniques that you are recommending these be used in lieu of MACCS or is there some other reason for presenting these?

DR. LEMAY: What I am presenting here is not a replacement for MACCS. This is the replacement for a single parameter in the input deck that Entergy uses. And these values represent site-specific decontamination of costs for Indian Point.

JUDGE WARDWELL: So is it fair to say that they are presented more as an illustration to show that there are values different than were used by Entergy and now Entergy, who has the burden of proof, should demonstrate that their values are sound for Indian Point because there is some potential that the values might be different for that site.

DR. LEMAY: Correct.

JUDGE WARDWELL: Okay.

DR. LEMAY: So I would like to point out, for example, and we did not set out to get this result. I had a team of nuclear engineers working on this independently on each calculation method but when we saw the result, we noticed that none of the

bracketed value is lower than the value used by Entergy. In all cases, they seem to be higher. And I was a little surprised by that because I did not expect that result.

The site restoration report gives a very complete and very descriptive way of calculating the cost of decontamination but it is for plutonium so that is a weakness of that method. The CONDO method is very appropriate. It has been used in the UK. It is specifically for reactor accident. It includes a computer code that Entergy could run on its own data to create a site-specific decontamination cost just like we did. So CONDO is definitely probably the most appropriate method in this whole set of data.

JUDGE KENNEDY: Dr. Lemay, so CONDO is another calculational tool?

DR. LEMAY: To obtain a decontamination cost at site-specific.

JUDGE KENNEDY: Okay, thank you and does it use a reactor-type accident for want of a better word source term? And is the contamination that is being decontaminated here consistent with a reactor accident?

DR. LEMAY: That is correct. This is designed for deficient products released in a reactor

accident.

JUDGE WARDWELL: But again, Dr. Lemay, is that, to a certain degree, not important because you are presenting these numbers merely to show different values. Do we need to explore in much depth how you actually did these besides the fact that they were just run to come up with a range of numbers? And to get into details of how you actually calculate them for each one of these would be time consuming and I am questioning you on whether you think there is -- to what degree should we do this in order to justify your number versus their number?

DR. LEMAY: Okay, I can certainly walk you through every --

JUDGE WARDWELL: Let me ask that question simpler. Are you suggesting we replace their number with your number?

DR. LEMAY: What I am suggesting is that Entergy testified that they could not conceive of any other value than the values from what they call NUREG-1150 but really we are talking about Ostmeyer 84. And clearly there are other values out there. In the literature there is a computer code that can be run by Entergy to create decontamination costs that are site-specific. We have done it. It is definitely

1 possible.
2 So first it is a demonstration that it is
3 possible to create site-specific decontamination cost.
4 The second point is that when you look at the
5 literature out there and you try to derive site-
6 specific decontamination cost, they tend to be higher
7 than the one used by Entergy and not by a small
8 factor, by a significant factor.
9 Now it is not our burden or duty to
10 actually do a full SAMA analysis for Indian Point.
11 That burden lies with Entergy. So my suggestion is
12 that given that these values are different, given that
13 they are higher, but given that they also exist,
14 Entergy should go back and redo the calculation using
15 one of the techniques we proposed or other techniques
16 that we discovered since we wrote this report and come
17 up with a site-specific decontamination cost.
18 I don't think we need to go through every
19 painful step of the calculation. I think you get the
20 gist of what I have tried to present.
21 JUDGE McDADE: Dr. Lemay, am I correct in
22 understanding that part of what you're saying is that
23 the methodology used by Entergy is insufficiently
24 site-specific and that, for example, the CONDO
25 calculation would be much more appropriate in

identifying site-specific characteristics to underlie their SAMA analysis?

DR. LEMAY: Exactly.

JUDGE McDADE: What about the CONDO makes it more effective for site-specific analysis?

DR. LEMAY: In the CONDO program, you enter the density of population. You can enter the density of building, sector by sector. And you can also enter the mix of buildings in each sector. Are we talking about high rise or single home residential dwellings? Are we talking about industrial building? What's the fraction of the streets? What's the fraction of parks and recreational areas?

And the code can take all this information that's site-specific and look at all the techniques that you apply specifically for this type of building or surface area or land use and come up with the cost that's representative for this area.

JUDGE McDADE: Okay. Now going back to the previous slide if we could.

DR. LEMAY: Which is the next page.

MR. HARRISON: This is Donald Harrison from the staff. The staff do have comments on Dr. Lemay's analysis here. So there are certain aspects of the analysis that we believe if corrected would

actually be more in line with what the analysis from Entergy shows.

JUDGE McDADE: Okay, but believe me. We'll get to you here in a minute.

MR. HARRIS: I just wanted to make that point.

JUDGE McDADE: If you look at this, it talks about the decontamination here and I believe you're anticipating a 90 day time period.

DR. LEMAY: Okay. TIMDEC, this is the next set of values that are important for our discussion. And we have Entergy's value. These are values that are entered into the input file of MACCS2. It says that the light decontamination would take 60 and the heavy decontamination would take 120 days.

JUDGE McDADE: Okay. And that's the third and fourth lines down and the third column in.

DR. LEMAY: Correct.

JUDGE McDADE: In these other codes that you ran on the previous slide and going to something else, I believe in your testimony you opined that the 60 day, the 120 day, time period would be for an area like New York unrealistic. And I think at one point you indicated that it would require a work force of almost 1.5 million people in order to do the clean-up

within that period of time.

Do these other codes that you've used in the calculations use a similar 60 day, 120 day time frame? Or are they also adjusting for it? I think you indicated that even with a one year it would require 360,000-370,000 workers again which you viewed as unrealistic in order to do the clean-up.

So are we looking at the 60 and 120 days? Or are we looking at some period of year to four years on these calculations?

DR. LEMAY: Okay. The other codes will come up with an aggregate manpower requirement. How many man-years? And then you would spread this effort of man-years over as many years as necessary depending on the resources you have available.

And I think when Entergy says we scrutinized the input value to see if they're reasonable, this is the kind of thing I'm expecting. The MACCS2 output tells you how much it costs to decontaminate. And internally if designs have that cost to labor, that's again an input value that Entergy entered. It then divides the labor cost by the cost of one person-year, another value entered by Entergy. And it gets the number of person-year required to do the job.

1 If you get the value of 1.5 million,
2 clearly you've compressed the time scale so much that
3 you need an incredible number of people that are
4 clearly not available. If you allow the time to
5 spread over several years, then it becomes you get a
6 reasonable number of people. And I would argue that
7 in the case of the massive decontamination effort
8 anything over 100,000 to 150,000 people is not
9 reasonable.
10 As guidance I would say if you get 360,000
11 people to decontamination a particular release
12 category, you should spread the time of
13 decontamination over several years so that you get
14 100,000 to 150,000 people working on it.
15 JUDGE McDADE: But do these costs that
16 you've calculated here on the other slide include
17 input for the indirect costs of per diem of people
18 being excluded from their homes because the whole
19 concept here is to bring it to the point whether it's
20 a factor of three or a factor of 15 to where the area
21 is habitable again. So this presumes that until --
22 and again depending on the level of contamination
23 whether it's necessary for a decontamination factor of
24 three or 15. Until that happens, people can't move
25 in.

1 And I just want to know do these numbers
2 that you've calculated on the other slide include just
3 labor costs for cleaning up or did they also include
4 those derivative secondary costs based on a much
5 extended period during the clean-up will occur?
6 DR. LEMAY: They don't. This is strictly
7 the decontamination effort. The cost borne by society
8 and by the people that have been relocated or that
9 cannot return to their home is captured in other
10 parameters in this table, POPCST and DPRATE in row six
11 and eight.
12 So while people are away from their home,
13 their home depreciates at the rate of 20 percent a
14 year because it's not being maintained. And they
15 don't get to use it. And they have one-time allowance
16 of about $8,000 because they've been relocated. And
17 that relocation and interdiction can last anywhere
18 between a few months to 30 years. But that's the
19 amount of money you get for that inconvenience.
20 JUDGE McDADE: And that additional money
21 isn't capture on the other slide that you had.
22 DR. LEMAY: No. What we discussed in the
23 previous slide is strictly lines one and two, the
24 CDNFRM parameter.
25 JUDGE McDADE: Okay. Thank you. I just

wanted to make sure I understood it correctly.

MR. JONES: This is Joe Jones with the staff, Your Honor. Dr. Lemay indicated or stated that none of the bracketed values were lower than those in the Entergy estimate and I think there's reasons for that. The numbers are quite sensitive as we've seen.

JUDGE WARDWELL: Can we go back to Table 12?

MR. JONES: Well, let's start with Table 11.

JUDGE WARDWELL: That's what I meant. I'm sorry.

MR. JONES: And let's look at that bottom righthand value of $418,000. In the original submittal that was $898,000. It has been reduced $480,000 just in addressing a single comment in testimony from Sandia and a single comment from Entergy. So a half of million dollars per person. That's a very sensitive number.

But I think one of the main reasons that these estimates are higher than the Entergy values is the approach taken in Dr. Lemay's analysis which do not follow the rules of conservation of mass. I believe using his analysis and following his techniques he's decontaminating more cesium than

exists.

Now yesterday I explained that when MACCS calculates the deposition on an area of land, it looks at it as though it is a horizontal plane.

JUDGE WARDWELL: Horizontal.

MR. JONES: Dr. Lemay says in his testimony that all four of his approaches consider the 3D effects of buildings. He explains that the dry deposition velocities account for deposition on the buildings, on the trees and on the leaves of the trees.

And MACCS doesn't see that. MACCS sees a flat plane. So if MACCS calculates 100 curies falling on this flat plane when MACCS implements the decontamination factor of 15, it will reduce no more than 100 curies. And let's say that it becomes habitable at 99 curies. It certainly would not remove 110 curies. It removes, let's say, 99 curies.

Dr. Lemay in CONDO because CONDO provides you some detail. It's more of a cost estimating tool, not really specific to reactor accidents because the parameters in there are largely plutonium based and cesium based. It's both. So clearly it was not developed specifically for reactor accidents.

But CONDO allows you to include

1 decontamination of the walls, decontamination of the
2 interior and exterior. So if you put a building on
3 this flat plane where MACCS calculates 100 curies, now
4 you've got four walls and a roof. And you've got four
5 interior walls, a floor and a ceiling. You have 11
6 surfaces.
7 In Dr. Lemay's analysis, he applies the
8 heavy decontamination activities towards all of those
9 surfaces. So he's removing effectively 100 curies
10 from each of those surfaces to reduce this below
11 habitability. So 11,000 curies of cesium are being
12 removed when only 100 is present.
13 JUDGE McDADE: Is he actually doing that
14 or is he just simply indicating that it would be much
15 more difficult and time-consuming? In reality, you
16 don't have just simply a horizontal plane. In
17 reality, you have horizontal, you have vertical, you
18 have interior building, exterior building. And that
19 all of those factors need to be taken into
20 consideration. And that significantly complicates the
21 decontamination process.
22 Your view is that not only recognizing the
23 increased complication, but that it actually is
24 multiple counting of the contaminants.
25 MR. JONES: It's multiple counting of the

contaminants and it's identified quite clearly in the appendices where each of the exterior surfaces are identified, the amount of roadway or trees, the interior surfaces and they're still called heavy decontamination.

Effectively, if we were to try to do this in MACCS, we would try to -- Well, we couldn't do this in MACCS. But to conserve mass we would have to make some assumptions with regard to how that contaminant, the 100 curies, is dispersed on these 11 surfaces. We could assume it's evenly dispersed.

Well, now we've only got 9 curies per surface. That might actually lower your decontamination factor below a level of three. It might for larger buildings, high-rise structures, in the City of New York. You might through this type of analysis realize you don't have any decontamination because, sure, 100 stories were contaminated but to such a small amount that the dose at any given point does not require additional decontamination.

JUDGE McDADE: Okay. Dr. Lemay, how would you respond to Mr. Jones? Do you believe that these systems multiple count, the same contamination?

JUDGE WARDWELL: Before we go, can I ask a clarifying question of Mr. Jones? And Dr. Lemay can

1 proceed. It seems to me as I heard this that I was
2 convincing myself that while I'm a big proponent of
3 conservation of mass that clean-up is really based on
4 square footage. And clean-up cost would be based on
5 square footage until you're very last statement. And
6 then I started to appreciate you've only got so much
7 coming towards a high rise. And if it gets spread out
8 throughout the whole high rise, then you may not have
9 to do any clean-up because it's already diluted. Not
10 that we've ever used dilution as a solution to
11 pollution. But we've just achieved it here.
12 But there's got to be a drawing line
13 somewhere. I mean if you had a flat parking lot which
14 is what you're basically assuming that to me would be
15 the least expensive way to clean it up as opposed to
16 let's say we just had just a one story garage sitting
17 there. That still had levels above what you were
18 trying to achieve and some contamination had to be
19 removed.
20 Then it's really on square footage basis
21 because it's all there. And the way to get it you're
22 going to have to go in and clean the walls and clean
23 the ceilings and clean the roofs and other things just
24 in the process of this stuff getting into the building
25 as it naturally will through open doors or ventilation

systems. Isn't that correct?

MR. JONES: You're absolutely correct, Your Honor. MACCS2 is not a cost estimating tool. It's a cost accounting tool. We want to account for the cost to determine if it's reasonable.

JUDGE WARDWELL: I understand that. And I heard that.

MR. JONES: CONDO.

JUDGE WARDWELL: I'm not trying to compare to CONDO. I'm trying to just defend the way you've done it in MACCS. Is it fair to say that MACCS by taking a flat surface has the lowest cost that might be achievable for that mass balance?

MR. JONES: No, Your Honor. For two reasons -- Well, primarily because we know there's a building there. So if 100 curies are deposited, we certainly know it's not a flat infinite plane. So we know that the contamination will be dispersed to some amount. Uniform distribution is not a good estimation, but it's for planning purposes sometimes you do this. But we definitely know it's not an infinite plane. So it will be spread over some surface area and it will be effectively diluted over the surface area.

JUDGE WARDWELL: But if it isn't diluted

enough and it's still all above the criteria you want for the dose reduction, then, yes, there may be some walls that are below the level, some portions of the walls that may be below the level. But there may be other portions that aren't. And you're still going to have to go after that and basically clean everything on a square footage area.

Let's just take for instance you had not a flat surface, but you had a rounded surface. That's a larger square area than the flat surface is.

MR. JONES: You're correct, Your Honor. And in that rounded area you would have less contamination per square foot.

JUDGE WARDWELL: But you still have to clean it up. And so the effort by that person going over it, it's going to cost you more to clean that up I would think.

MR. JONES: Well, maybe not because it's less contamination. But it's taken into account, the cost is taken into account, with regard to the population density. So as Mr. Teagarden said yesterday a 200 person apartment complex with a high decontamination factor is going to cost -- I forget the exact number, but $2.7 million. So it's taken into account in that context.

But MACCS looks at that apartment complex. So it's flat plane. But then it adds the 200 people from a population density perspective and assigns $2.7 million for that parcel of land. We don't try to -- You just have to make too many assumptions to try to get any more precise when you're doing gross cost accounting type estimates.

DR. O'KULA: Your Honor.

JUDGE WARDWELL: Let me ask this one last question and then although I'd like to stick with that we'll start bouncing off and getting too many other people involved in this discussion. And I'll be much more confused than I am right now, right at the moment. We'll get to this.

Is MACCS2 able to discriminate in this situation assuming the same population exists between a flat plane in Oklahoma where this same amount of contamination comes and needs to be cleaned up as opposed to the clean-up of an area that has -- downtown New York?

MR. JONES: I would like to let Dr. Bixler answer that more precisely.

DR. BIXLER: It would just account for that in terms of population density. He only had a flat plane with, say, maybe single story buildings on

it. You wouldn't be able to put in so many people per square mile. But in New York City, you obviously could put in a lot more people because you have the multi-stories. So it would account for the difference in cost between those types of areas by means of population density.

What I think the point is here is that if you deposit a certain amount of contaminant into an area, but you have a lot of surface area for it to deposit onto, then effectively the dose to any one in that building becomes much smaller than you might have calculated it to be. And as a result you don't need to decontaminate so much as you thought you needed to do. In that sense, MACCS2 would give you a very conservative over estimate of the level of decontamination that you would really need compared with reality.

JUDGE WARDWELL: Let me rephrase this then. You're accounting for the variations in topography or structures by the population of parameter.

DR. BIXLER: Effectively yes.

JUDGE WARDWELL: No, Dr. O'Kula, would you like to add anything to that?

DR. O'KULA: Kevin O'Kula for the

1 Applicant. Your Honor, I think I can help in this.
2 JUDGE WARDWELL: But be careful because
3 I'm pretty satisfied with what I heard. Don't confuse
4 me more. But go ahead. In the battle sometimes just
5 as well to --
6 DR. O'KULA: So, Your Honor, you're
7 suggesting maybe I should remain silent.
8 JUDGE WARDWELL: Trug along. But I get
9 confused easy. Then we're going to have another --
10 We'll be here until midnight today.
11 DR. O'KULA: I think, Your Honor, to help
12 in this analogy with the discussion in terms of the
13 context of both the CONDO methodology and the RISO
14 methodology all surfaces in a building whether they're
15 in New York City or a multi-rise in the Plains would
16 not be created equal in terms of contamination.
17 The reality is that if an area is
18 contaminated with a building that the building would
19 be monitored or surveyed first so that the priorities
20 would be set for the clean-up. All surfaces would not
21 be bulk decontaminated blindly. That's a key point
22 that we need to keep in mind.
23 Access ways, ventilation intake systems,
24 those would be hunted down first or surveyed first.
25 Contaminants would be fixed if they're of the nature

to be moved around with traffic. They would be fixed in some way so not to be resuspended through ambient wind conditions or population, residents returning or work crews moving around.

So the point here being that if we look at the methodology that was applied by ISR for methods C and D we see multiple surfaces being equally attacked. This would be an informed process. Certainly of those surfaces would not be touched. They would not have enough contamination. So this is where the reality would be that I would concentrate where my survey crews have determined to be the culprits or the true places.

This is a highly prioritized process. I only have a finite number of resources. And so I will go for the biggest bang for the buck. Thank you, Your Honor.

JUDGE WARDWELL: Thank you.

JUDGE KENNEDY: You're not suggesting. I'm sorry. This is Judge Kennedy. Dr. O'Kula, are you suggesting that that's accounted for somehow in MACCS2? Or is that a comment in CONDO and RISO?

I've lost my way. Judge Wardwell understands it. Now I've lost my path.

JUDGE WARDWELL: Well, Judge Wardwell

1 might think he understands it. Judge Wardwell might
2 pretend he understands it.
3 JUDGE KENNEDY: I understood. I tracked
4 you with your discussion of how in the real world you
5 would decontaminate a facility. And that's what I
6 believe you described. Is that true?
7 DR. O'KULA: Yes, Your Honor. That was my
8 comment to try to focus on how multiple surfaces
9 wouldn't be cleaned altogether the same way. But this
10 would be an informed process.
11 But to support Dr. Bixler and Mr. Jones'
12 discussion, in the MACCS2 code there is not that
13 resolution to the techniques and the way they would be
14 applied. And as Dr. Lemay pointed out, these are
15 largely grouped in two families whether light or
16 heavy. But then where the nexus comes in to
17 application and MACCS2 code would be through the
18 population.
19 JUDGE KENNEDY: Yes, and I think that's
20 the thing that's caught my attention here. And we've
21 talked about the flat plane concept and the high rise
22 concept. And it makes me start to wonder where the
23 complexity of decontamination comes into play here.
24 I've heard some argument that by using the
25 population density, using the flat surface approach,

that it's a, for want of a better term, bounding calculation. But I'm almost concerned that somewhere between the 25 story or 100 story high rise and the one or two story building with a complexity of decontamination that I don't know how that's accounted for in this. And I guess maybe if you could try to talk to how the population density approach with the flat surface deals with the uncertainty and the complexity of decontamination.

And I'll take that. Maybe Dr. Bixler would be the -- But I'll take anybody.

DR. BIXLER: Maybe Mr. Jones would be better at answering this question. But I'll take a quick stab at it.

I think the way that you would account for it in terms of applying the code is simply the way the number that come up with for the decontamination cost. But that number should -- When you come up with the number it should realize the fact that you're not going to decontaminate all the surfaces equally as Dr. O'Kula just pointed out. You're going to decontaminate preferentially some of them because they're more heavily contaminated to begin with. And it also should account for the fact that you have only a finite amount of contaminant in that area and that

now you're diluting it over a much larger surface.

So it all boils down to what you do to estimate the cost. And I think our belief here is that Dr. Lemay over estimated that cost by assuming that all the surfaces need to be decontaminated at the same level that you would have done if you'd had a single flat plane surface that you were decontaminating.

JUDGE McDADE: At the same level, I mean what we're talking about is not the level at the start or the level at the end. What we're talking about is a level that's going to be habitable. And all of those surfaces that individuals may be in close proximity to need to be contaminated to that level.

Now as I understood some of -- Or at least I thought I understood is that when you're dealing with the complex geometry that you would have in a real world situation that it's much more difficult to do the clean-up. Same amount of curies that are spread around, but if they're spread around on a flat surface it's relatively easy to clean them up.

If they're spread around on a complex geometry, you still have to clean all of those surfaces. You can't just presume that there's going to be a low level in some places and a high level in

others and only clean those areas where you presume there's a high area. So the cost is going to be there. And I don't think you can figure out a cost per curie. But the cost per curie is going to be significantly higher in a real world situation than in the assumption that goes in MACCS which is a flat plane.

DR. BIXLER: First of all, I think you would start out by characterizing the contamination level on the various surfaces and then decontaminate based on that. So you wouldn't end up decontaminating all surfaces equally. You would focus on the ones that had most of the contaminant on them and make sure you clean up to a level that would get you back down to habitability.

JUDGE McDADE: Would you do that on a theoretical basis? Or would you be testing different surfaces?

DR. BIXLER: You would be testing the surfaces and with cesium it's fairly easy to do that because it's a gamma emitter. So it's easy to detect the level of contamination that you have there as compared with plutonium on the other hand which is alpha emitter and very difficult to detect that radiation to determine what the level would be.

JUDGE McDADE: Okay. Dr. Lemay, we've had several people criticize your analysis here over the last several minutes. Would you respond?

DR. LEMAY: Yes.

JUDGE McDADE: Do you think that your analysis over counts the level of contamination? In other words, counts the contaminants multiple times? And, if not, why not?

DR. LEMAY: I disagree completely. The method we use is compatible with CONDO. It's compatible with the DECON code that was commissioned by U.S. NRC and NUREG/CR-3413, Exhibit New York State 000425, and in NUREG/CR-5148, New York Exhibit 000424. So I'm not creating some new method. This is the way people have done it in NUREG documents and in the CONDO.

The second issue is that MACCS does not have topography built in. It doesn't know about topography. It has no knowledge of what the landscape looks like.

It has what they call a source depletion model for deposition. And the source depletion model assumes that there is enough contamination in the cloud that what you remove will not appreciably disturb the cloud's shape. And the contamination will

get replenished by the eddies in the cloud. That's the basic assumption of the model that's based in MACCS. It's described very clearly that that's what they do.

So there is no intention to do a mass conservation according to surfaces the way Mr. Jones described. In the code, there is a transfer coefficient between the cloud and the surface.

And that transfer coefficient is blind to the orientation of the surface. It just knows that you have contamination in the cloud. You put this type of surface near by. There is so much that will move to the surface. And that's the deposition velocity.

It's a transfer coefficient between surfaces. And that transfer coefficient depends on the chemistry of the contaminant. It depends on the type of surface. It depends on the roughness of the topography. And it depends on the size of the particles.

And MACCS has deposition coefficient. We're not going to discuss that. They are what they are. We did not change them. We did not play with them.

But MACCS expects that when you put the

surface nearby contamination will stick to it. And that's all it knows. And that's how these deposition velocities are determined. They put the cloud of contaminant and they put the surface and they see how much sticks to it.

So this whole concept that we somehow have to conserve the mass is simply not true. And that's also not true because it's not reflected in the way people have calculated decontamination costs. They said, "Okay. We contaminate the surfaces. And then we decontaminate them depending on how many surfaces we have to decontaminate."

PARTICIPANT: Your Honor.

DR. LEMAY: I'm sorry. I'm not finished.

The contamination in MACCS is uniform and in real life it would not be. And actually that's a problem because we need to find out where the hot spots are and we need to deal with them.

But I would argue that if you send a crew of people in white suits to say "Go decontaminate this building," they would probably apply some technique uniformly first. And then they would check if they've left hot spots of contamination and go back to clean those.

I don't think they will go square

1 centimeter by square centimeter to determine which
2 technical they're going to use in that particular
3 wall. So I think that the approach of saying we have
4 contamination, we have to send crews in, they will do
5 their job and then this has a cost is reasonable. And
6 that's what people have done when they've tried to
7 come up with these costs.
8 And I wish I could scrutinize and examine
9 the way they came up with the cost that we have in the
10 Entergy sample Problem A. Presumably they did exactly
11 that.
12 JUDGE McDADE: Okay. Dr. Lemay, as I
13 think I understood Mr. Jones, he was saying that if
14 you have the same level of release and that amount of
15 contaminant falls on horizontal and vertical surfaces
16 it is going to be spread out. So, therefore, the
17 level of contamination on all of those surfaces would
18 be inherently less. Therefore, although you have more
19 surface to clean, you have less contaminant per square
20 foot of that surface.
21 And that your calculations according to
22 Mr. Jones don't take lower level of contaminant per
23 square foot into consideration. Do they?
24 DR. LEMAY: They don't because that's not
25 what happens. MACCS is not a mass conservation code.

It does not subdivide the universe in small cells and ensure that stuff that comes in must be balanced but just comes out. It just assumes that there is enough contamination in the cloud that when you deposit contamination of the surface you don't really disturb the shape of that cloud. There's enough stuff in that cloud to contaminate whatever you contaminate.

JUDGE WARDWELL: Dr. Lemay, Dr. O'Kula, we would like to conduct the interrogation if that's okay. We will get to you, but we don't want to lose our train of thought. And we will get to people when they need to respond.

But we can't have witnesses interrupting our thoughts because we have enough trouble up here as it is keeping our thoughts together. So I appreciate it if you'd let us continue with the witness. And we'll get to other people as we get through it. Hopefully, everyone will get a chance.

Dr. Lemay, the parameter we're dealing with here though is on a per capita cost basis, is it not? Doesn't that per capita allow for recognition of this increased cost for that given square footage? And by that I mean if it's a high rise there's going to be a lot of people in that square footage. And so what you're after is achieved by the fact that it's

factored by the population density.

DR. LEMAY: I think that whoever came up with the decontamination cost per person it's a brilliant insight because you think okay. One house costs so much. It has 2.7 people in it. If I have 30 houses, I have 2.7 times 30 people. And so if you start with a site with individual dwellings and you just increase the density of these individual dwellings, I think that what MACCS is doing is exactly right.

But where you start to question the approach is when you start to get into big buildings, high rise and the kind of city we have in New York and then you say, "Hm. You can't just keep extrapolating that line to that building."

JUDGE WARDWELL: I understand that. But I think as you said earlier with all of A, B, C and Ds there are some advantages. They have some problems. Every one of these models is not going to be able to represent reality exactly.

DR. LEMAY: Correct.

JUDGE WARDWELL: And so now then what do we need for a SAMA? And at least in this situation as I understand it, I can see how some of your concerns are at least addressed by the way the parameter is

represented. Wouldn't there be a duplication of cost if, in fact, they continue using the per capita cost and multiply by the population density and also doubling the square footage needed to be cleaned up in a given square footage of plane that exists on the ground? You'd be double-counting, would you not?

DR. LEMAY: Well, no. Sorry, Your Honor.

JUDGE WARDWELL: Or having some not representative of what it would be? I don't know if it would be double or not.

DR. LEMAY: I'll give you an example. When we calculate the value of non-farm wealth we take the value in each of the individual counties and we divide by the total population. That's an average value of non-farm wealth. When we calculated the decontamination costs per person, we calculated the decontamination cost for the 50 mile area and we divided by the population by the 50 mile area.

So we get an average cost per person. And we use it the way MACCS intended it to be used. It will scale with population. But it's a site-specific value that is based on the kind of mix of building and building density that we observe in New York. It's not based on I don't know what, some value that nobody knows where it comes from.

1 It based on we took the building density
2 and the types of building in the New York area. We
3 calculated the cost for the whole 50 mile area. Then
4 we divided by the whole population of the 50 mile
5 area. So we don't double-count. We simply calculate
6 an average cost that's site specific.
7 And then we apply it exactly the way MACCS
8 intended. So we're not questioning the way MACCS does
9 things. What we're questioning is where do these
10 values come from and how can we get site specific
11 values?
12 JUDGE WARDWELL: So now you're really back
13 to the origins of where did their number come from
14 that they selected as their starting basis. We've
15 been through that yesterday.
16 DR. LEMAY: And for better or worse, you
17 can criticize my values. You can examine them. You
18 can pull them apart. You can discuss the number of
19 floors I've used, the number of surfaces I've used and
20 it's understandable and it's something that you can
21 examine. We can't do that with the other numbers.
22 JUDGE McDADE: I could follow up on that
23 one thing. We talked about population density as
24 being a significant input into this calculation. Are
25 we talking here about population density as maximum

population, average population? What are we using?

For example, like in a certain area of Manhattan, you may have 50-60 story buildings where there is no residential population of those buildings. But during the course of the day you might have tens of thousands of people in the building.

Again, are you using a maximum? Are you using an average? Or what population density are you using?

MR. TEAGARDEN: Yes, Your Honor. Grant Teagarden for the Applicant. So the SAMA analysis is a spatially-averaged, time-averaged analysis. It uses -- Just to draw back to the big picture to help you see where I'm headed. We examine releases that could occur throughout the year, different times a day, different seasons of the year, different meteorological conditions to develop an average.

For population, we examine the permanent population, the transient population, but maintaining an average perspective. It's not a snapshot of a time of one day. It's a here's what the number of permanent residents are. Here's what the transient additions would be as far as visitors and things of that nature. And we have that extrapolated out to the year 2035, a time frame that goes beyond the end of

license renewal for Indian Point 2.

So this whole analysis is oriented towards a time and spacial average approach. However, for each sector, the population data is applied to each sector, each grid element of that polar coordinate system so that for the portions that are the very small portion of the 50 mile radial region, the entire analysis region, 7,854 miles, New York City, five boroughs make up approximately depending on how you calculate the numbers two to four percent of that. So it's a small amount.

For those sectors in the grid, the analysis region, we reflect the permanent residents that are there and like we do for the others as well as transients.

JUDGE McDADE: Again, we're going to get into the population issues in some detail hopefully soon.

MR. TEAGARDEN: Yes.

JUDGE WARDWELL: Yeah, this afternoon.

JUDGE McDADE: But in any event I just wanted to clarify that when you're talking about population density we're not talking about the maximum population that would be there at any given time. And the calculations that are being used in your SAMA

1 analysis you're using an average. And that's correct?
2 MR. TEAGARDEN: Yes, Your Honor. An
3 average that reflects the year 2035.
4 JUDGE KENNEDY: I guess that raises a
5 question. You talked about the land mass that makes
6 up the boroughs of New York City being a small
7 percentage. I guess I'm asking a question back to the
8 CDNFRM parameter whether the population density, the
9 make-up of the land in the 50 mile radius. Does that
10 inform the choice of value for CDNFRM?
11 I mean if we're going to use population --
12 If population density is used to weight the
13 decontamination costs, it would seem to me you've got
14 all that data and all that information on population,
15 population density and types of structures in that
16 region if that informed the selection of what's
17 turning out to be an important parameter here. And I
18 know you've testified that it's the NUREG-1150 value.
19 So help me understand.
20 I mean I understand getting credit for the
21 population density. But to me if you turn that
22 around, getting credit for the population density
23 means you inform the choice of the decontamination
24 cost by the types of structures and the population
25 density in the 50 mile region. And I'm asking was

that considered in the selection of this parameter.

MR. TEAGARDEN: Your Honor, this parameter we believe was costed based on a view towards a range of land uses, residential, industrial, commercial, open. For this particular variable, there would be a different variable for farmland. So we're just looking at the one for non-farmland. It would be costed on a broad, spacial view similar to a 50 mile region.

JUDGE KENNEDY: Do you have a sense of the percentage of surface area that this parameter would be applicable to? I mean, we've got the non-farm and the farm value is the way I'm perceiving this. Is this 50 percent of the land, 100 percent of that land, that this decontamination percent would be assigned to?

MR. TEAGARDEN: This would be assigned to a very high proportion of the land because the alternative would be farmland. So this would be assigned to any location that is not farmland in the site file for the IPEC SAMA analysis. For each of the grid elements, they would list what the percentage of farmland is in that particular sector. So it varies across the grid. And I don't have the numbers at my fingertips, but they're all relatively low as you

1 might imagine.
2 DR. LEMAY: I can help you, Your Honor.
3 The metropolitan area of New York City is four
4 percent. The semi-urban area is 76 percent. And the
5 other 20 percent accounts for water and farmland
6 that's not included in the calculation.
7 JUDGE KENNEDY: Thank you, Dr. Lemay.
8 JUDGE WARDWELL: And for the entire circle
9 area that we're dealing with.
10 JUDGE KENNEDY: I guess the other thing
11 that I made a note of here that I'm not sure I heard
12 a response to and I guess I'll start with Mr. Jones
13 since he raised it is this mass balance argument. I
14 think we've been now on both sides. Let's start with
15 you, Mr. Jones, and does MACCS2 conserve mass?
16 MR. JONES: Absolutely, and I would like
17 Dr. Bixler to explain precisely how.
18 JUDGE KENNEDY: Thank you.
19 DR. BIXLER: Yes, it definitely does
20 conserve mass. So I want to correct what was said
21 earlier. The way that it's done is there is a source
22 depletion concept in MACCS2 and the source would be
23 what's in the plume, what remains in the plume.
24 That can be depleted in a couple ways.
25 One is radioactive decay. So you can lose particular

radionuclides because they've decayed and turned into something else. So it accounts for that.

But the major thing that depletes the plume is that things deposit onto the ground. The deposition onto the ground as in part explained by Dr. Lemay you have a transfer coefficient called a deposition velocity and you have a surface area. But the surface area is just a flat plane surface area. So the amount that it accounts for that deposits is that the amount that would deposit onto a flat plane not including all the other surface area that might be present like trees and tall buildings or whatever they are.

So it does not deplete the plume by the amount of actual surface you might have in some location. It depletes it by this transfer coefficient times a unit surface area that just represents the flat plane area. What it accounts for as a loss from the plume is not related to the tall skyscraper buildings that you would have in New York City, for example.

Another way that the plume can be deposited is through rain. If it rains, then that brings the plume down to the ground fairly rapidly. But I think we're mainly talking here about what's

called dry deposition which is a slower, more gradual process.

JUDGE KENNEDY: The quantity of material that's in the plume, is that based on the source term from site-specific to Indian Point 2 or Indian Point 3?

DR. BIXLER: Yes, each calculation would be specific in the sense that it would keep track of a specific release that was postulated based on an accident that was calculated. That would be part of a level two analysis. And then that input goes into the level three, the consequence analysis, and it would account for that much material being transported. Yes, that's right.

JUDGE KENNEDY: And this is probably oversimplifying it, but the stuff is either in the cloud, it's on the ground or falling towards the ground.

DR. BIXLER: Yeah, it would be deposited relatively slowly. The deposition velocity used here is one centimeter per second. So if you think of material spread over a large plume and you calculate the concentration near the ground, then as it passes through it's depositing it at a slow rate onto the ground.

JUDGE KENNEDY: And presumably once the plume passes over the 50 mile region, MACCS, then it's done. I mean the calculation is over.

DR. BIXLER: That's right. As soon as the plume leaves the 50 mile grid, then it doesn't keep track of it any longer.

JUDGE KENNEDY: Do you have a sense? Is a large quantity of material still in the plume at that point or has it been deposited? Or does it depend?

DR. BIXLER: I think -- I don't know. I don't have a definite answer for you on that, but my belief based on past experience is that the majority of the plume would be deposited by the time you exit the 50 mile grid.

MR. HARRISON: And this is Donald Harrison of the staff. Be aware also that that's based on the release category you're responding to that smaller releases wouldn't make it through the 50 mile corridor at all. So You may have some very short distance deposition as well.

JUDGE KENNEDY: All right. Thank you. I guess what I was going to ask and again I may be oversimplifying the problem. But is there a parameter that's calculated within MACCS2 that does a continuous

mass balance? I mean the radioactive decay is a complicated factor here.

DR. BIXLER: Yes, there is. There's a parameter that's called Q in the documentation which is the amount of material. And it's correct in terms of activity. It would be the activity and it would be tracked for each isotope.

So you start out with a certain amount of activity. And that amount stays in the plume unless it decays and turns into something else or unless it's deposited. So it conserves that quantity as the plume moves down wind. Yes.

JUDGE KENNEDY: Thank you. I guess maybe Mr. Jones. How did you come to the conclusion that CONDO is not I guess conserving mass? Or is this just a difference in translation of parameters?

MR. JONES: CONDO doesn't care about the mass. It decontaminates what you're asking it to decontaminate. So if you put in a surface area at a decontamination level, it gives you a cost estimate that you should use for that level. And the reason the application of it did not conserve mass is that buildings were assumed to be decontaminated at a heavy decontamination level without the consideration of dispersion of the contaminant, you know, the

equalization of the contaminant around all the sides, interior and exterior of the building.

And Dr. Lemay's correct. The DECON model does have an application to account for buildings such as this.

But the DECON model in New York State Exhibit 000425A gives you the percentages that it assumes are going to be contaminated on a building so much for the outside, so much for the roof, so much for the landscaping. So it accounts for it in that context, whereas, MACCS does not.

JUDGE KENNEDY: I mean the picture I'm getting is that you contaminate a surface or a square footage in different types of topography and calculate a decontamination cost based on that.

MR. JONES: With MACCS2, that is correct.

JUDGE KENNEDY: Okay. And with CONDO do you have a sense? It would seem like what I was hearing from you is that it would be similar. It doesn't do a deposition model. It starts a contaminated surface of some type and then calculates the decontamination cost.

MR. JONES: That's correct.

JUDGE KENNEDY: And so there is a possible -- Your sense is that by just taking values from

MACCS2 and applying them to CONDO there's a translation problem here in terms of using too much surface area or too much concentration on a surface.

MR. JONES: Correct.

JUDGE KENNEDY: I guess, Dr. Lemay, two things. If you want to comment on the MACCS2 mass balance.

DR. LEMAY: Can I? I need to look into the MACCS1 user guide model description and I would like to discuss this when I come back after the break.

JUDGE KENNEDY: That's fine.

DR. LEMAY: And you had a second question, Your Honor.

JUDGE KENNEDY: I guess it was to address the way CONDO does its decontamination cost.

DR. LEMAY: Correct. You can assign fractions of the contamination to different surfaces. And ideally I guess if you get data that's what you should be doing. I don't think it makes a huge difference.

JUDGE KENNEDY: Did you take results from MACCS2? I guess how did you get your starting point for the CONDO decontamination? Where did that data come from?

DR. LEMAY: What we did is we separated

1 the 50 mile radius in roughly three areas. And
2 actually when I flew in from Canada, that's what you
3 see. You have on the outer edge of New York a semi-
4 urban area of fairly low density. And then you get
5 kind of a ragged edge where you see the building
6 density squeezing in and the houses are much closer.
7 And then finally when you come to LaGuardia you can
8 see the tall buildings. So that's roughly the
9 topography when you come. And I think that's a
10 reflection of how New York is.
11 So we did divide it New York into these
12 three very broad areas. And we tried to assign a
13 building density and a type of building typical of
14 each area. We calculated a cost per unit of land use,
15 one square kilometer of land use. We did that for the
16 50 mile grid using the correct population density in
17 each. And we calculated an average cost.
18 So what we tried to do is come up with a
19 number that scales with population accurately for the
20 Indian Point site. And that number should be
21 proportional to population within the Indian Point 50
22 mile site.
23 And for better or worse you can, Entergy
24 and NRC can, look at our numbers. They can poke at
25 them. They can change them. They can change a

fraction of the contamination on each wall. It's all there to examine and to modify and to improve.

And we took some of their comments to heart because they were good comments and we tried to incorporate them. And I'm actually interested to get as close as possible to the truth. I'm not trying to -- I don't have an agenda.

I think this is the approach we need to take. We need to actually sit down and look at the site around Indian Point and develop decontamination costs that are specific to this site based on data from New York and come up with some kind of average cost of per person that would work for the Indian Point site.

JUDGE KENNEDY: May I? Again, you pointed out in your earlier testimony that CONDO would have been maybe the most applicable tool here for coming up with this parameter. And at least at the light decontamination area we've been all talking about a parameter that changes by a factor of three to a factor of five.

I mean I think we have because there's been a lot of issues raised about this CONDO calculation. But again, taking a step back at this point, these numbers are only different by a factor of

1 three or a factor of five at the one end.
2 DR. LEMAY: Right.
3 JUDGE KENNEDY: And only focusing on CONDO
4 which is where we've been which we've been here for
5 most of the morning.
6 DR. LEMAY: But that's a big difference
7 when you look at OECR cost.
8 JUDGE KENNEDY: Understand. But you could
9 appreciate the magnitude of discussion just on this
10 issue which I think is a complex parameter.
11 JUDGE WARDWELL: Dr. O'Kula, do you have
12 some testimony that would add to some of the
13 discussion we've had here?
14 DR. O'KULA: Yes, Your Honor. Kevin
15 O'Kula for the Applicant. Several things would
16 support some of NRC staff witnesses in terms of the
17 characterization of these alternative models that have
18 been cited by ISR and New York State. I think first
19 of all I'm glad that NRC's staff clarified the nature
20 of the MACCS2 model in terms of being mass
21 conservative.
22 So what would be postulated to be released
23 in a severe accident from Indian Point is a finite
24 amount under the severe accident calculations that are
25 done as part of the PRA process that we discussed

yesterday. A finite amount of radioactivity is omitted over time into the atmosphere, constitutes the plume, travels downwind not in every direction. Every hour that it's postulated to occur is in the direction of a major metropolitan area such as New York City. But that's where the meterological data site comes into play.

But the point is that the plume only has a finite amount of material. If it's not in the cloud, if it's not still remaining the atmosphere, then it's deposited out on the ground.

Therefore in the unlikely event of a severe accident, the portions of the 50 mile radius closest to the plant would receive, would see and have the highest concentration of contaminants, radioactive material, pass over it. So it would stand to reason that this is a mass conservative model. As the plume travels and goes downwind, those parts that are at the 24 mile level, that plume will be more concentrated than the one that is leaving the 50 mile grid because it's been depleted. So the closer you are to the point of release, the more concentrated the plume would be.

The SAMA analysis looks at all types of release conditions. The focus by ISR and New York

1 State has been on one release category source term the
2 early high. And that is reflected of certain
3 combinations of failures, equipment calculations and
4 initiating events that would lead to the highest
5 source term including the highest amount of cesium-
6 137.
7 But there are also out of the release
8 categories considered in the SAMA analysis lower
9 source terms, those that are very minimal, non-failure
10 of containment and other conditions that are addressed
11 and can be traced backwards into how they started,
12 what failures would have to occur for those to lead to
13 those releases into the environment. But the size of
14 the plume not in every case would be large enough to
15 reach a major metropolitan area such as New York City.
16 Okay. The smaller plumes would be depleted again
17 through the dry deposition velocity mechanism that's
18 incorporated in MACCS2 and has been discussed by Dr.
19 Bixler. It would take a count over the smaller plumes
20 being effectively depleted by the time they went too
21 many miles downwind.
22 So the basis of the SAMA analysis is to
23 reflect on a spectrum of potential source terms, model
24 each one randomly in terms of the meteorological
25 conditions. Some would go in different directions.

A minor, small portion of those may make it as far as the New York City metropolitan area. Many others would not.

In terms of the database, just to look at these alternative methods. I think some of the data is interesting to look at in terms of the cost per square footage and as a long-term study may be a basis to say what was in CONDO, let's compare it to the draft document NUREG/CR-4148. Let's try to make some decisions about a path forward.

But I think the data for the most part in all the approaches that have been cited by Dr. Lemay in terms of -- let me clarify that -- methods C and D seem to rely on internal surfaces where we run into this dilemma on how those are accounted for and whether they would equally contaminated and therefore require equal decontamination to be habitable again.

So that to me at least in my expert opinion is really the crux of what is at issue with citing CONDO and RISO sources of data in constructing data spreadsheets that were provided in the exhibit from ISR in saying that these are comparable or a referenceable point of using these numbers as applicable potentially in a MACCS2 type SAMA analysis. That's I think a real issue.

It's the multiplication of surfaces within the various types of building densities that have been used by ISR that I think is really unrealistic and leads to artificially high cost estimates. And if that internal surface number is reflected realistically as I think has been provided by Mr. Jones and the NRC testimony from March, you could see these numbers falling much closer to what, if not, within the bounds of uncertainty, falling into those same ranges that were used by Entergy in its SAMA analysis. If we renormalize the numbers correctly to account for surfaces being contaminated non-uniformly, this would lead to a more closer outcome to what was achieved in the -- that was incorporated in the MACCS2 SAMA analysis.

I think those points of clarification need to be reflected in the Applicant's position.

JUDGE WARDWELL: Thank you.

JUDGE McDADE: Perhaps some additional points of clarification. I think we're getting to a point here shortly where we're going to be taking a break. But I would like to sort of pose a question both to the Applicant and to the NRC staff and get those answers and then take a break for a little bit.

Yesterday before we closed, it was sort of

a summary of the position of Entergy. In preparing your SAMA analysis you followed the guidance of NUREG-4551. You followed the guidance of NUREG-1150. You followed religiously and you are not aware of any better data, any better numbers, to plug in than what was suggested to you by that.

I would anticipate not adopting this argument at this point, but I'm anticipating that when this hearing is over New York will argue to us that the purpose of the SAMA analysis is not just to have paperwork to fill out an analysis, but rather to come as close to reality as possible. Here since the SAMA analysis should be site-specific and there are many of the parameters suggested by NUREG-1150 that aren't site specific, that the resulting SAMA analysis following the guidance in NUREG-1150 doesn't reflect reality adequately for the NRC to be able to take a hard look and make a judgment about the actual costs associated with severe accident.

And Dr. Lemay has put forward in his testimony and in the exhibits talking about Chernobyl in Exhibits 000249 through 000251, Fukushima 000264 to 000269 and the various reports that he submitted whether it be CONDO or RISO or Luna or site restoration in Exhibits 000249 basically to 000255.

He has put forward more sophisticated tools than the MACCS system which basically is an older system, looks at the best available back in 1984. But it really needs to be updated because it is no longer reliable. It just doesn't take into consideration enough variables.

That's the argument that I anticipate we're going to hear. Let's start with the NRC staff.

MR. HARRISON: I'll start on one point and this is the primary opening. This is Donald Harrison of the staff. And then I'll turn it to some technical comments on top of this.

Yesterday the Applicant mentioned NUREG-1150 as being -- I believe it was referred to as a seminal study at that time. The staff looks at it as even more than that and even more than just providing the best available information. It was used as a significant document supporting the Part 51 rulemaking activity and responding to comments in the regulatory history of the FR, Federal Register, that under the New York Exhibit 000127 I believe. It's mentioned in there as making a statement of the analysis performed for the GEIS, the Generic Environmental Impact Statement, represents adequate plant-specific estimates of the impacts from severe accidents that

1 would generally over predict rather than under predict
2 environmental consequences. Most of this discussion
3 was in the terms of source term which is a starting
4 point for this analysis.
5 It's also repeatedly referenced within the
6 Generic Environmental Impact Statement for license
7 renewal which is NUREG-1437. That's New York Exhibit
8 000131. And if I may there's just a few places I want
9 to refer to within Chapter 5 of that NUREG-1437.
10 On page 513, there's a reference to in a
11 number of places to NUREG-1150. This is I believe the
12 1996 time frame of the FRN or the Federal Register.
13 So it refers to this as the most recent NRC studies
14 that severe accident consequences that are found in
15 the NUREG-1150 analysis. It used as an example at the
16 bottom of that page as the study of five plants. And
17 it used to say "Source terms and frequencies specific
18 to a plant were determined. Advanced computer codes
19 were used." And as an example it cites the MACCS code
20 for consequence evaluation was used instead of CRAC"
21 which was considered to be the older version that was
22 done during the time of the 1970s, early `80s for the
23 WASH-1400 which was the initial father of PRA analysis
24 if you will, level three analysis.
25 If I jump to page 520, there is a

reference to NUREG-1150 in a couple of places. In one place, it talks about there's been more than ten years of additional knowledge about severe accidents. The information on the distribution of risk at a specific plant as estimated by NUREG-1150 report is considered more realistic and representative of the actual environmental impact due to the air pathway for severe accidents.

And again, these are just a handful of snippets if you will out of it. And I'll jump to the conclusion after this next one.

On page 599, there are statements about economic calculations were also benchmarked to the MACCS computer code to ensure that the calculated values were based on the most current models and data. And I know we've had comments about the fact that there's a report in 1984 that I'm not even going to locate. That's four references away from NUREG-1150. Within the Generic Environmental Impact Statement, it states that MACCS is used as the benchmark.

And then finally if I jump to the section 55 which is the summary and conclusion of Chapter 5 of the Generic Environmental Impact Statement, there's an overarching comment that's also reflected in the actual rule as Table B-1 which states that -- I want

1 to make sure I get the right one here -- "the expected
2 cost resulting from a severe accident at a nuclear
3 power plant during the renewal periods have been
4 predicted from evaluations presented for 27 FEISes."
5 And if I'm correct I believe Indian Point was one of
6 those 27. I'll have to confirm that. "Estimates of
7 the extent of land contamination have also been
8 presented in both cases. The conditional impacts are
9 judged to be of small significance of all plants or
10 for all plants. The staff concludes that the generic
11 analysis summarized above applies to all plants and
12 that the probability weighted consequences of
13 atmospheric releases fall out onto open bodies of
14 water. Releases to groundwater and societal and
15 economic impacts of severe accidents are of small
16 significance for all plants."
17 That being said, we still do SAMA
18 analysis. So it's not surprising to me with that
19 history that an applicant would actually refer back to
20 NUREG-1150 as available information and review it to
21 see if it's appropriate and applicable for this
22 application as being the available information that's
23 cited within the natural rule as part of that if you
24 take it into the Generic Environmental Impact
25 Statement. So with that statement.

1 MR. JONES: Your Honor, part of your
2 statement indicated that there may be suggestions.
3 JUDGE McDADE: Actually, it wasn't a
4 statement. It was a question.
5 MR. JONES: Your question was that how
6 would you respond to the potential need to update the
7 code. Well, the code is not being challenged by Dr.
8 Lemay and his alternative approach has merely
9 developed an input value. So I think really the issue
10 is whether or not those input values, the alternative
11 input values, were developed in any more appropriate
12 manner than the input values we currently use.
13 Dr. Lemay made a statement just a few
14 minutes ago that we shouldn't extrapolate MACCS to New
15 York City. Well, in fact, two of the alternatives,
16 Alternative A and Alternative B, extrapolate data to
17 New York City when they specifically say they're not
18 applicable.
19 The site restoration study, Luna, site
20 restoration/Luna Alternative A specifically says it is
21 not applicable to commercial areas, heavy industrial
22 or high rise areas. Yet it's one of the alternatives
23 used here. It's also a plutonium study, but it was
24 extrapolated to New York City even though the study
25 itself says it shouldn't be.

The Reichmuth study, Alternative Approach B, used the data from the site restoration study. So it in itself should not be applicable or extrapolated to New York City.

So I think really the question is whether or not the alternative input values are any more reasonable than the input values that were used, not whether or not any changes need to be made to the consequence model.

DR. GHOSH: This is Dr. Ghosh of the staff. I'd like to add an additional perspective. I think there are two things at issue. I think we've talked a lot about what we think about the methodology that went into developing these alternate inputs and why we think that they in some cases were inappropriate, for example, the mass conservation problem of applying the CONDO method. And in our testimony I believe Mr. Jones tried to guess what the effect of that might be if you took away that improper application to the MACCS code.

But I think ultimately what all of this comes back to is that when the NRC is taking a hard look and looking at the list of potential re-cost beneficial SAMA candidates that have been put forth by the Applicant, would taking this approach or taking

1 into consideration some of the uncertainties and what
2 was done in the SAMA analysis make a difference in
3 which we would have put in our Final Supplemental
4 Environmental Impact Statement, in our FSEIS, for
5 Indian Point? And I just want to point out a couple
6 of things.
7 I don't believe it would. If you look at
8 the list of final potentially cost beneficial SAMAs in
9 the FSEIS, Final Supplemental Environmental Impact
10 Statement, that's in Table G-2 of page G-4 and we
11 don't need -- Sorry. That's in Table G-6. That
12 starts on page G-36. And I don't think we need to
13 pull it up.
14 But if you add up the potential benefit of
15 theoretically actually implementing all those SAMAs,
16 you come up with a much greater than 100 percent
17 benefit for Indian Point. And you get over 100
18 percent for Indian Point 3.
19 So for Unit 2 you eliminate the entire
20 risk from the plant almost twice over. And the
21 population dose risk which is one element of the total
22 economic risk you eliminate twice over completely.
23 And basically what that says to us is that
24 if you actually -- There are multiple SAMAs that are
25 already identified to mitigate the same types of

accidents. So just to give you an example, this all comes back to identifying what are potentially incremental improvements you could make to the plant to further reduce risk. And steam generator tube rupture is one of the dominant accidents for both Indian Point 2 and Indian Point 3.

Entergy, of course, put forth candidate SAMAs for that. The staff took a very hard look at what Entergy had put forward and had asked a lot of questions in the form of requests for additional information. And Entergy produced additional analyses and explained why some of the candidates we were asking about were already implemented at the plant or why they weren't applicable in this case.

In one case, they actually added a SAMA candidate as a potentially cost beneficial candidate. And in one case they did a sensitivity analysis for a thermally-induced steam generator tube rupture and came up with another potentially cost beneficial candidate.

The point I'm trying to make is that if you look at the existing list of candidates that are there and if you actually started to implement some of them, the incremental benefit of implementing additional SAMAs just goes down.

1 And we can't completely eliminate the
2 plant risk twice over. If we start to add more
3 candidates, we're going to towards eliminating the
4 same risk three times over. And I think that's
5 something that's worth keeping in mind in terms of
6 what would the real impact be on the endpoint that we
7 care about which is identifying a good list of
8 potential SAMA candidates for the plant.
9 JUDGE McDADE: Okay. Thank you. Does
10 Entergy want to be heard or given the fact that 1150
11 is the NRC's guidance rest on their explanations?
12 MR. TEAGARDEN: Yes, Your Honor. If we
13 could just take a moment. Grant Teagarden for the
14 Applicant. I would just echo Dr. Jones' clarification
15 and that is as we understand it New York State is not
16 criticizing the MACCS code per se in and of itself,
17 but rather just looking at the inputs to that.
18 Secondly, that the cost for the non-farm
19 decontamination is site-specific as we apply the
20 population density.
21 Third, the Approaches A and B come up with
22 very large cost estimates. And we haven't discussed
23 those too much and we may not need to. But it is I
24 think important to note that there are significant
25 aspects of the plutonium dimension of those

methodologies that need to be vetted if they become a serious consideration in the matter.

In regards to C and D of the application, the Approaches of C and D are CONDO and RISO. The concept of mass conservation is a fundamental technical principle as these two approaches would be applied. You can't decontaminate more than you start with.

And to use a bit of a positive illustration, if I want to paint my house and I have a single story house and I have a container of paint and I want to put two coats on the walls, now my house is two stories. My same container of paint I can only get one coat on each floor. If my house goes to three stories, I can't paint the third story. And it's that fundamental that as these approaches are applied mass has to be conserved.

And then I'll --

JUDGE McDADE: Could you address the corollary of that which is your description of putting paint on certainly is logical? But we're talking about taking paint off. So if you have a situation where now you have painted a two-story house as opposed to a one story house and were scraping it off, is it necessarily simply because you only have the

same amount of paint? You have two coats on the one-story house and one coat on a two-story house that you have a 50 percent reduction in work because --

MR. TEAGARDEN: The paint has to be present to scrap off.

JUDGE McDADE: No, I understand. But it seems that it would not necessarily be twice the work to scrap off paint that has two coats than paint that has one coat. And the corollary if it only had one coat it doesn't mean you'd only have to do half as much work in scraping it off as if you had the two coats which I think is sort of as I interpret it part of Dr. Lemay's argument.

MR. TEAGARDEN: And our numbers if we consider heavy decontamination two coats we more than double the cost for removing that paint than a single coat where so $5,000 versus $13,800. Stepping back if I have a plume coming towards a building, the windward face will receive the most deposition. The sides will receive significantly less. The back, depending on eddies, may receive very little or more than very little.

When it comes to decontaminating, certain surfaces will have higher deposition, higher contaminant levels. And when the costs are evaluated

1 and rolled together, mass conservation just has to be
2 viewed as a fundamental principle in my professional
3 judgment.
4 JUDGE McDADE: And not dismissing that,
5 but isn't part of this also that if you have a
6 uncomplicated geometry such as the flat parking lot
7 that Judge Wardwell referred to earlier that the cost
8 per curie of clean-up is going to be less? Same
9 amount of contaminants, but the fact that you have
10 inconsistent distribution makes the clean-up all that
11 much more complicated than if you just have one
12 surface where you have to do one thing. You treat the
13 whole thing the same. You go through. That's
14 conceptually and physically easy relative to doing
15 those same kinds of things; where as you postulated,
16 one side of the building has heavy concentration, two
17 sides of the building have low concentration, the back
18 of the building has no concentration, the roof may
19 have a different concentration. The ground areas
20 around the building may have different concentrations
21 because of runoff or because of other factors. All of
22 that makes it much more complicated which is why you
23 need a more complicated system.
24 MR. TEAGARDEN: We do not believe that
25 these cost estimates that were developed for NUREG-

1150 were developed based on decontaminating a 50 mile region parking lot. We believe they were costed based upon a mixture of residential and commercial and industrial property and open land. So we believe that those have been already costed into the parameters that were incorporated and used with a NUREG-1150 study that then were used by Entergy, used by other applicants and used in the latest, state-of-the-art reactor consequence analysis performed by the NRC.

And I would like to ask Dr. --

JUDGE McDADE: Already having been factored in it need not be factored in again.

MR. TEAGARDEN: Yes, Your Honor.

JUDGE McDADE: And shouldn't be. Not only need not, but shouldn't be.

MR. TEAGARDEN: Correct, Your Honor.

JUDGE McDADE: Before we have the break, Doctor, do you have something to add to this?

DR. O'KULA: No, I do not, Your Honor.

JUDGE McDADE: Okay. Judge Wardwell and Judge Kennedy, before the break, do you have anything further? I would like to come back after the break and ask Dr. Lemay to refer and comment on some of this and specifically to focus from my standpoint on the statements by Mr. Jones with regard to his focus and

directing us to focus on the input values here as the predominant factor that we should consider in our analysis here.

And Dr. Lemay, you also wanted to review the MACCS user guide in order to respond to an earlier question.

DR. LEMAY: Correct.

JUDGE McDADE: Okay. It's a little bit --

MR. SIPOS: Your Honor, it's John Sipos over there.

JUDGE McDADE: Yes.

MR. SIPOS: Hi. I have a clarification matter.

JUDGE McDADE: You don't have to make the argument I postulated. Was that the question?

MR. SIPOS: Actually my clarification issue goes to something else. Mr. Harrison was reviewing page citations in the GEIS and I think he had talked about 520 and 599. And then he referenced a Table B-1. I think I heard that. I was wondering which Table B-1 that was.

MR. HARRISON: This is Donald Harrison of the NRC staff. And I'm sorry I didn't -- I made a backwards reference. That's Table B-1. That's actually in the Part 51 rulemaking where it makes --

It's the long table that talks about being small. It uses the same concluding paragraph that I cited from the summary.

MR. SIPOS: Thank you. In the appendix of Part 51.

MR. HARRISON: Yes.

MR. SIPOS: Thank you very much.

JUDGE McDADE: Anything further before we break?

(No verbal response.)

Apparently not. Why don't we take until 11:20 a.m. Off the record.

(Whereupon, a short recess was taken.)

JUDGE McDADE: Any administrative matters before we get started? From the staff?

MR. HARRIS: No, Your Honor, this is Brad Harris for the staff.

JUDGE McDADE: Clearwater?

MS. GREENE: Not at this time.

JUDGE McDADE: Riverkeeper?

MR. MUSEGAAS: Nothing, Your Honor.

MR. SIPOS: No, Your Honor.

MR. BESSETTE: Just one point, Your Honor. This is Paul Bessette for the Applicant.

With regard to Your Honor's question on

MACCS2 code, if it's helpful to the Board, I would refer you to page 2 of our position statement where we quote the Commission, where the Commission has described the MACCS2 code as "the most current established code for NRC SAMA analysis." And it also "NRC endorsed guidance on SAMA analysis endorses use of a MACCS2 code." And I would cite to CLI 12-01 and CLI-10-22.

JUDGE McDADE: Which cases are those?

MR. BESSETTE: Your Honor, 12-01 is from the Pilgrim Nuclear Power Station license renewal. And 10-22 is also from Pilgrim.

JUDGE McDADE: Thank you.

MR. BESSETTE: Thank you, Your Honor.

MR. SIPOS: And Your Honor, this is John Sipos for the State of New York. I guess I would like some guidance from the Board. Mr. Bessette has just presented arguably illegal argument or mixed argument based on fact and law. And the State would appreciate some guidance as how the leeway that the Board is planning to entertain in types of arguments like that. It's not quite an objection, but I'd like to understand the rules of the road a little more.

JUDGE McDADE: Okay, well, one, it's not an objection because it wasn't evidence, so therefore

1 there wasn't anything really to object to. It doesn't
2 come in the record. Very quickly, Mr. Bessette made
3 a reference. It didn't take very much time. It's
4 there. Those cases exist. I didn't really take it as
5 had he stood up and started to explain the Pilgrim
6 case and why it would be controlling in this instance.
7 I would have asked him to please hold back until
8 later. But I had no objection to the quick reference
9 to the citation in a similar situation if New York or
10 the other parties believed that would be helpful
11 again, at a time not during the testimony, but when
12 I'm asking for administrative matters, if there's
13 something that you might -- that you think might be
14 helpful to the Board by way of a reference, whether it
15 be there and the statement of position did include a
16 bit of legal argument as did everybody's statements of
17 position included some legal argument.
18 And I think Mr. Bessette just wanted us --
19 to remind us of that as we listen to the testimony.
20 We hadn't forgot before we started the testimony, but
21 I can understand why he would suggest it to us. But
22 again, we're not inviting argument, sort of
23 interspersed within the testimony, but I don't think
24 that that went to the level of argument. And to the
25 degree that you or the others offer similar comments

that don't rise to the level of argument, we're not going to dismiss them.

MR. SIPOS: Thank you, Your Honor. I appreciate the guidance and we'll try to follow it as well. Thank you.

JUDGE McDADE: Are we ready to proceed? Dr. Lemay?

DR. LEMAY: Yes, Your Honor, Francois Lemay for the State of New York.

The first thing I would like to say is that the use of the MACCS2 code is not in question. I'm quite fond of the MACCS2 code. I think it's the right tool for doing this job. And all the statements relating to the use of the MACCS2 code in the NUREG-1150 just reinforced the fact that it's a good tool for these type of studies.

But what NUREG-1150 doesn't do is validate the input parameters that were used in the Indian Point SAMA analysis. And you can search all the volumes of NUREG-1150. I certainly did. The only references to decontamination costs are the two references I found. So it leads me to believe that that's a very specific part of the economic cost assessment was not peer reviewed, at least in the sense that U.S. NRC staff defines it. And it looks to

me that the only reference to these input parameters seems to be the Ostmeyer 84 report.

The second point is that the Applicant said that the input values that are used, they believe were calculated on the basis of mixed land use, with different types of buildings, different types of land use. We really have no way of knowing it, but how could we find out if it's possible? I think the only way to do it would be to actually do similar calculations and benchmark them against what we have as an unsupported and undocumented value. I think that's the way we would decide if these values effectively included mixed type of buildings or farmland or desert or whatever.

So I think part of it is important. If you don't have documentation to support a value, the next best thing is to benchmark it by trying to come up with similar calculations, similar values, and see if they fit. If they fit, it's probably because the people who calculated it in the first place used a mixed type of buildings. And if it doesn't, then you have to question why.

I have not yet found the information I'm looking for, but I would like to concede to Dr. Bixler that indeed MACCS has mass conservation between the

plume and the contamination deposited on the ground. So what goes on the ground is taken off from the plume. That is absolutely correct. But we're dealing with averages here and the average deposition velocity needs to represent different types of surfaces, different dimensions, and MACCS is blind to all those complications. It just has one average, deposition velocity in each sector, and for better or worse, that's the value that's used, whatever surfaces we have there.

So we have to be careful with how we characterize the mass conservation. Yes, it's a valid law of nature, but in this case we're dealing with averages that may represent very complex situations.

JUDGE WARDWELL: Is that transfer coefficient an input parameter or is it fixed?

DR. BIXLER: It's a moot -- I'm sorry.

JUDGE WARDWELL: It's my fault. I was eyeballing back and forth. I didn't mean to interrupt you.

DR. LEMAY: You enter which family of radionuclides it belongs to and you enter the size of the particles, but code has this internally.

JUDGE WARDWELL: But it's based on those parameters. So in essence, it is an input -- you can

1 adjust by how you adjust your input parameters.
2 DR. LEMAY: In a limited fashion, yes.
3 JUDGE WARDWELL: And that is a fair
4 assessment of that?
5 DR. BIXLER: Yes, I agree. It's an input
6 parameter. Yes, thank you.
7 DR. LEMAY: There is also a discussion of
8 release categories and the Applicant said that we tend
9 to bias our calculation towards the worst case. I
10 think that's simply not true.
11 What we did is we looked at each release
12 category separately and we tried to calculate the cost
13 the most accurately possible for each release
14 category.
15 JUDGE WARDWELL: And again, these are the
16 eight release categories?
17 DR. LEMAY: Right. Now the averaging
18 takes place when you combine them using the frequency.
19 You don't average things before you calculate. I'm
20 going to use an analogy. Let's say that we have a car
21 accident and the cost of totally wrecking the car is
22 high and we have breaking the tail lights is low.
23 Your premium for insurance will be based on the cost
24 of wrecking the car times the likelihood of wrecking
25 the car, the cost of breaking a tail light times the

likelihood of wrecking of tail light and then the insurance company will come up with a premium that will take that into account.

You can't tell the insurance company well, I would like you to average the cost of wrecking the car and the tail light before you calculate my premium. That wouldn't work. They will calculate each cost for each type of accident, the most accurately possible, and then do the averaging at the end when they combine the frequency.

And the OECR is pretty much like an insurance premium. That's the kind of liability that we're looking at in terms of cost in a statistical sense.

JUDGE WARDWELL: So you don't have a problem with the way it's done in MACCS?

DR. LEMAY: We don't and we actually support that. But the suggestion that we somehow biased our calculation towards the worst case is not correct. What we tried to capture is if I'm going to calculate the OECR, I just noticed that most of the cost comes from the worst accidents and that's quite logical. So we need to calculate those correctly.

If I make a mistake on the benign accidents, it has no impact on the cost. If I make a

mistake on the worst accident, completely changes the answer. So I'm going to scrutinize the calculation of the most severe accident more closely than I would scrutinize the case of the accident where there is no release. You had discussed that on the first day, why do we bother with that one?

So off course, we spent more scrutiny on the worst case accidents. And one of the things we did is we look how realistic is it to say we can decontaminate in 120 days when we're dealing with the worst case accident? And we understand that it's not realistic to assume that we would decontaminate --

JUDGE WARDWELL: Is this the TIMDEC parameter now?

DR. LEMAY: It's the TIMDEC parameter.

JUDGE WARDWELL: Well, why don't we get into the TIMDEC parameter? Is that a good idea?

JUDGE KENNEDY: Well, are you done with your opening remarks, Dr. Lemay?

DR. LEMAY: Well, yes. I think I addressed all the comments.

JUDGE KENNEDY: If we could have New York State 000430 again, Table 13 which is on page 6?

This morning we spent a lot of time on the CDNFRM parameter and I think we would like to give

1 some time to the TIMDEC parameter.
2 This is your table, Dr. Lemay. We'll let
3 you start, but I'm sure we'll have questions for
4 others.
5 DR. LEMAY: Okay, the TIMDEC parameter
6 appears in rows 3 and 4 of the table. It is the time
7 required for decontamination and in the way MACCS
8 works. At the end of this average decontamination
9 period, people are allowed back in their homes. So
10 we're talking about the time between when we started
11 the contamination and on average people start to go
12 back in their home. And I think we all agree and the
13 NRC staff and I that whatever value we put in there,
14 there might be people that come back in that sector
15 before and some people will come back in after, but
16 we're talking about the average time.
17 And the third column represents the values
18 that were used by Entergy in the input file.
19 The fourth and fifth column represents the
20 value that we deemed more appropriate and then we
21 showed the effect that changing the TIMDEC would have
22 on the OECR.
23 So going from 60 days to 1 year for light
24 decon and 120 days to 2 years for heavy decon,
25 immediately increases your cost by a factor of 2.

JUDGE WARDWELL: What's the justification for your numbers?

DR. LEMAY: Okay, they are twofold. The first one is we have unfolding experience at Fukushima that suggests that these things don't happen in 120 days. Even if common sense did not prevail, we would look at that evidence. The Japanese government took about a year to get organized to be able to start the decontamination in March 2011. And it's on-going now and that they plan to continue doing it for quite a while. It could be several years before it's completed. And we've provided references that describe that and it's an on-going story that -- and you can get reports almost monthly on how much progress they made in that decontamination effort, but it definitely did not happen in the 120 days.

JUDGE WARDWELL: Was Three Mile Island a severe accident?

DR. LEMAY: It was a severe accident because the core was damaged, but there was hardly any release.

JUDGE WARDWELL: So that's on our light side. How long did it take for that to be decontaminated?

DR. LEMAY: Offsite, they never got there.

JUDGE WARDWELL: Zero.

DR. LEMAY: Inside the plant, I think it took them ten years.

JUDGE WARDWELL: So it was basically no time.

DR. LEMAY: No time.

JUDGE WARDWELL: So that gets factored in, doesn't it?

DR. LEMAY: When you do the examination you don't spend time decontaminating.

JUDGE WARDWELL: Do you consider Fukushima probably on one of the higher ends, would remain one of the higher ends? I mean it's not necessarily the highest. We don't know what the highest is.

DR. LEMAY: Well, we've presented --

JUDGE WARDWELL: That's certainly a very severe accident, wouldn't you --

DR. LEMAY: It's a severe accident that's exactly within the range of accidents that Entergy has considered in its SAMA analysis. I would like to bring to the attention of the panel --

MS. LIBERATORE: Your Honor, Kathryn Liberatore for the State. I think it would be helpful to bring up New York Exhibit 000420, page 12.

JUDGE WARDWELL: And what is that?

DR. LEMAY: It shows how much cesium was released at Fukushima and how much cesium is released in each of the release categories that Entergy has modeled.

JUDGE WARDWELL: Sounds good.

DR. LEMAY: So what I plotted here is data from the -- the bar charts show the eight release categories as defined by Entergy in its SAMA analysis. And the blue bar charts are applied to IP2 and the red one applied to IP3.

On the vertical axis we see how much cesium-137 activity is released for each of these release categories. And so you can see that, for example, the first one is no containment failure, hardly anything released. And early high is the largest one and then you have a bunch in between.

The dotted line represents how much cesium-137 was released at Fukushima based on two different sources, the Japanese government and the French government. And these seem to be the most reputable sources I could find for how much cesium was released.

What I would like you to note is that early high is worse than Fukushima. And there is two other release category, early medium and late high

that are roughly the same as Fukushima. And then we have a gaggle of other release categories that are lower. So Fukushima is a bad one, but it's not the worst one. I would say it's in the range of the things that are considered in the SAMA analysis.

JUDGE WARDWELL: So likewise -- well, I'll ask later.

DR. LEMAY: So I would argue that --

JUDGE WARDWELL: Okay. You had a year for your minimum, you're assigning that to Fukushima. I look at this, if the distribution of the times for clean up are somewhat representative by just the activity released, I'm not -- it doesn't overwhelm me with values less than a year that Fukushima, that year to me would associate with Fukushima would be on the very high end of this. And we do have a probabilistic method here where we're trying to get, I hate to use the average value because -- we're trying to be in the middle. We're not trying to exaggerate one way or the other.

DR. LEMAY: I think what we're trying -- okay, I'm a safety analyst and I'm reviewing my input deck and my output and I'm trying to decide if I've done the right thing. So when I run a pretty mild accident like late low low, and I come up with a cost

of decontamination that requires 20,000 people, over 120 days, I would say that's reasonable and I can probably stick with my 120 days.

When I get to early high, and I get a cost of contamination that requires 1.5 million people to decontaminate in 120 days, then I'm not using a reasonable value for the decontamination time. I should spread the decontamination time over a longer period to make sure that I don't have much more than 100,000 people. So the decontamination time ideally should change with the release category to make sure that we use reasonable assumptions.

If we keep using the same cookie cutter approach blindly, and not checking our output, we get absurd results and people would say well, you just simply can't do that.

JUDGE WARDWELL: Mr. Teagarden, what was used in the Indian Point analysis to justify the 60 and 120 days?

MR. TEAGARDEN: Yes, Your Honor. The Indian Point analysis used the values used in NUREG-1150 and the justification would be that they were used in the seminal document of NUREG-1150 and also in recognition of how MACCS2 looks at TIMDEC in comparison with other mitigating strategies such as

extended interdiction which is another means of achieving a dose reduction that can be implemented within MACCS that MACCS goes through the evaluation to determine whether it's appropriate such that the time frame for more severe contamination areas would be extended and is addressed within MACCS under that framework.

JUDGE WARDWELL: Is there any information -- two questions. Is there any information in 1150 justifying these numbers in a similar trail that we tried to do with the CD? And I wish you would make those pronounceable acronyms like TIMDEC.

And second question is could you elaborate a little more on the interplay between this TIMDEC and that period of whatever you called it, intercession or something? I remember your testimony on it and I wasn't clear on how that was. So if you could answer both questions.

MR. TEAGARDEN: Yes, Your Honor. To the first question regarding a reference within NUREG-1150 on the TIMDEC values, offhand I do not know of a specific reference to the bases of that value within NUREG-1150.

Regarding your second question, how does this apply with this, how MACCS utilizes extended

interdiction. Yesterday, I gave the illustration that if there's a portion of land that would require a dose reduction factor of 16, that is slightly above the maximum dose reduction factor of 15 represented in the second level and the highest level implemented in the model.

So MACCS, therefore, would say what -- in addition to my active decontamination, I will also model a time period of interdiction when individuals still remain away from their properties while the passive processes of radioactive decay and weathering work to lower the dose such that at some further time they can -- the habitability criteria would be met.

So you could take an example of an area of land that may require active decontamination strategies and let's say five years of intermediate or extended interdiction. MACCS will evaluate out to 30 years. So some active decontamination is required and then for the more severely contaminated land a portion of time is needed for the passive dose reduction features to occur.

So now there is a period -- there is the four months for active decontamination; five years for extended interdiction. Now MACCS models, because a computer model has to make some simplifying

computational what do I do first, MACCS puts the decontamination up front. In real life that would be the desired approach, to decontaminate before material has -- migrates. However, for land that is severely contaminated it may not be surprising that there's going to be different priorities set. And if I know individuals are going to be away from their property for five years, I don't have to have all my workers doing the same spot at the same time. The workers can be doing this spot starting next year because I know even after they finish the residents can't return for another four years.

So there's this element of MACCS looks at these strategies together in the time frames that are represented are not meant to exactly mimic or the order is not meant to exactly mimic a real-life scenario. It's meant to put these strategies together in a way that can computationally be addressed in a manner for -- in a probabilistic manner where averages are in view.

JUDGE WARDWELL: Can you explain how the situation that Dr. Lemay presented is handled by MACCS or really is inapplicable to MACCS for whatever reasons you can state? That being the fact that you just couldn't get enough workers on site to do it

1 within the time frames that you have in regards to the
2 TIMDEC.
3 MR. TEAGARDEN: Well, I said not all areas
4 would have to be decontaminated at the same time. And
5 not all decontamination activities are going to
6 require the same amount of time and effort. And in
7 view of some of the time frames that Dr. Lemay is
8 proposing, time frames of 5 years and 15 years and 30
9 years, that time frame represents that people are in
10 the same place doing the same decontamination
11 activities for 15 years or 30 years. That's their
12 career to go and decontaminate this block of land.
13 That is not what we would judge as reality.
14 There's going to be a set of priorities
15 that are established as to what areas are addressed
16 first and which areas are addressed second.
17 JUDGE WARDWELL: And so in regards to his
18 argument, is that while the maximum number there is
19 maybe say an artifact of the process, is it possibly
20 factored out by the frequency of events as it comes
21 down and is reflected in any OECR or PDR or whatever
22 else is subsequently used in the SAMA analysis?
23 MR. TEAGARDEN: Yes, Your Honor. There's
24 a range of -- there's frequencies associated with each
25 release category and the lower release categories have

a significant part of the release frequency associated with them. If you were to do an average basis of how many workers are needed to achieve the average accident, we calculate numbers of the order of 60,000 to 80,000 people, the amount of numbers that would fill Yankee Stadium on any given Sunday. In view of averages, these sorts of numbers are things that are accomplishable.

JUDGE WARDWELL: These release categories are run all the way straight through the analysis separately and then they're combined at the end? Is that how they're performed or are they --

MR. TEAGARDEN: MACCS is run and the conditional results are then applied with the frequencies.

JUDGE WARDWELL: MACCS is run and then the frequencies for that particular one is multiplied by it and then you rerun it and the frequency associated with that is multiplied.

MR. TEAGARDEN: Yes, Your Honor. MACCS does not actually multiple the frequency, you do that yourself at the end. So MACCS develops the conditional results and you multiply it by the frequency in a spreadsheet or some other fashion and can total them up.

JUDGE WARDWELL: Dr. Lemay, would you like to --

DR. LEMAY: Well, first point is that MACCS internally needs to calculate how many workers it needs because it calculates the collective dose that these workers receive during decontamination. So it's a number that's built into the code. The calculation is so trivial that we can do it. It's just the total cost of decon multiplied by the labor fraction, divided by the cost of one person. That tells us how many people.

And I think that's a parameter that we need to look at because we want to make sure that we are reasonable.

Regarding the way MACCS works, doesn't expect 300,000 people to stay on the same spot. It expects these people to decontaminate whatever area needs to be decontaminated on average for that release category. And I have NRC Exhibit 000060 and in the case of early high the area that needs decontamination is 282 square miles. So these people are definitely not on the same spot. They are spread over 282 square miles doing their decontamination job. And yes, it would become a career. And I suspect that in Japan some people will do this to the end of their useful

life. But that's what we're dealing with here.

It is not reasonable to assume that all that activity will take place in 120 days. I think it just stretches belief.

JUDGE WARDWELL: But are we really dealing with the fact that people are going to be there for their careers? As I look at this diagram it says that for most of these it's going to be much less time than that.

DR. LEMAY: Well, in the case of early high, we need 346,000 person years so if we have 100,000 people, we probably need 3.5 years. If we have less, we probably need more. So that's really the balancing act. Stretching it over time has an impact on cost. And MACCS is blind to how you split the time between the intermediate phase relocation, the decontamination time or the interdiction because in the equation where it calculates the cost it sums the three times and it multiplies by the depreciation rate. So you can slice it and dice it any way you want. It doesn't matter. It takes the intermediate phase temporary relocation plus the decon time plus the interdiction time and then that's what goes into the cost equation.

JUDGE WARDWELL: Do you have a feeling for

what percentage of the OECR and I don't know if this relates to PDR because we haven't talked anything about that, but that each of these categories contributes?

DR. LEMAY: Yes, if you just keep scrolling on the same document, resuming on this one. This is taken from the Entergy SAMA analysis. And the values I've circled are the costs, the OECR. So we see that early high is 1.33 E to the 5 and the total is 2.12 E to the 5. So it's a big chunk of the total.

The other ones are 10 to the 4, 10 to the 2, so that one weighs pretty heavily in the OECR.

JUDGE WARDWELL: And the OECR has all of the level 3 probabilistic risk analysis have been done by the time we get --

DR. LEMAY: Correct, correct. So what we did is we take these -- the frequency comes out of the level 1 and level 2 analysis. Out of MACCS we get the population dose and the offsite economic cost. The population dose multiplied by the frequency gives us the population dose risk. The offsite economic cost multiplied by the frequency gives us the offsite economic cost risk.

JUDGE WARDWELL: How come -- as a kind of

a sidebar, but how come we haven't talked much about the PDR?

DR. LEMAY: The PDR does not contribute quite as much as the offsite economic cost. If you look at the two columns it's a small fraction, so -- if you make a mistake --

JUDGE WARDWELL: You're willing to concede that?

DR. LEMAY: Yes. My focus is okay, let's go for the stuff that really matters.

JUDGE McDADE: And just so the record is clear, we've moved forward. This is page 14 of New York 000420 that's up right now and this is excerpted from Entergy's Exhibit 000464, these tables 5 and 6.

DR. LEMAY: Correct, and the same data for IP3 is shown and it's roughly the same thing.

MS. LIBERATORE: Your Honor, Kathryn Liberatore for the State of New York. If we scroll down to the next page, these numbers are actually illustrated in pie charts that might be helpful to the Board.

JUDGE McDADE: Okay and referring to the top of page 15 of Exhibit New York 000420?

MS. LIBERATORE: Yes, Your Honor.

MR. BESSETTE: And Your Honor, we would

1 object. I think Ms. Liberatore is moving into the
2 point of testifying on behalf of her witness. I don't
3 have a problem with her pointing out an exhibit, but
4 now she's pointing out particular elements of those
5 exhibits.
6 DR. LEMAY: Can I point you to the
7 exhibit, Your Honor?
8 JUDGE McDADE: I didn't find inappropriate
9 what was done there, referring the witness to another
10 portion of the exhibit. That was helpful. And I will
11 allow that from counsel for Entergy as well with your
12 witnesses.
13 Dr. Lemay?
14 DR. LEMAY: Yes, so this shows the
15 contribution to the OECR for each accident and early
16 high contributes over 60 percent of the cost. So
17 that's wrecking your car when you calculate the
18 insurance premium. And if we just combine early high,
19 early medium and late high, they contribute over 90
20 percent of the OECR.
21 So I would argue that we can't average the
22 time it takes to decontaminate a trivial or benign
23 accident with the time it takes to decontaminate these
24 more severe accidents. We need to take values that
25 are appropriate for each accident and ideally that

1 should be done in the input file. It has not been the
2 practice in the past, but I think it needs to be the
3 practice.
4 DR. BIXLER: Your Honor, this is Dr.
5 Bixler for the staff. I'd like to make a few points
6 at some point, if this is a good time to inject a few
7 comments about a few things here.
8 JUDGE McDADE: Dr. Bixler, is it directly
9 related to what Dr. Lemay has just been talking on?
10 DR. BIXLER: Yes, it is. Can you flip
11 back to the previous page with those tables? The
12 first point is that the values there for the PDR need
13 to be multiplied by $2,000 per person-rem in order to
14 convert them into dollar values. And when you make
15 that correction to the values that are shown there,
16 they become comparable to the offsite economic cost
17 risk. That's a really important point I think.
18 JUDGE WARDWELL: But he's already conceded
19 he's not addressing the PDR, so it's of no issue here
20 at the hearing. Isn't that correct?
21 DR. BIXLER: It is somewhat of an issue
22 because it's really the sum of those two values that's
23 of importance, not just the OECR.
24 JUDGE WARDWELL: Right, we'll look to see
25 where we go from here and get through the SAMA

analysis. That will be reflected in it and that's what it is.

JUDGE McDADE: Before we do if I could, Dr. Bixler, where did the $2,000 come from?

DR. BIXLER: That's the current guidance to use $2,000 per person-rem. It reflects medical and other costs associated with exposure to doses.

JUDGE McDADE: And where is that guidance?

DR. BIXLER: I'm not -- I don't know the answer to that. Do you know --

MR. O'KULA: Your Honor, Kevin O'Kula for the Applicant. There are two NUREG/BR documents that we did not -- we noted in our testimony ENT0000450, but those are NUREG/BR-0084 -- I'm sorry, NUREG/BR-00 -- I'm sorry. I'm going to try a third time, NUREG/BR--0184 and then a second one, NUREG/BR-0058.

JUDGE McDADE: Thank you.

MR. O'KULA: The number, Your Honor, of $2,000 is based on regulatory guidance that is cited in one of those two BR documents.

MR. TURK: Your Honor, Sherwin Turk. Just for clarification, we've had different documents referred to as NUREGs or NUREG/CR or NUREG/BR. Could we have an explanation from one of the witnesses what those designations indicate because these are

1 different types of documents. I thought it might be
2 useful to have that clear on the record.
3 MR. HARRISON: This is Donald Harrison.
4 JUDGE McDADE: I thought we all were
5 dealing at least with the same lexicon here, but let's
6 just clarify. A NUREG/BR from one of the people --
7 MR. HARRISON: This is Donald Harrison
8 from the staff.
9 JUDGE McDADE: Mr. Harrison.
10 MR. HARRISON: BR refers to a brochure.
11 So it's one type of document. A CR is a contractor
12 report. And then if it's a straight NUREG without
13 following designation that means it was staff-
14 developed guidance. So those are the different
15 groupings.
16 JUDGE McDADE: Thank you, Mr. Harrison.
17 MR. O'NEILL: Your Honor, this is Martin
18 O'Neill, counsel for Entergy, disembodied voice over
19 here. Just for clarification on the record, the first
20 NUREG that Dr. O'Kula mentioned, NUREG/BR-0184 is
21 Entergy Exhibit 000010A-D. And the second NUREG that
22 Dr. O'Kula referred to is NUREG/BR-0058 and that is
23 Entergy Exhibit 000013.
24 JUDGE McDADE: Thank you, Mr. O'Neill.
25 DR. BIXLER: Your Honor, the other point

1 I wanted to make has to do with the time value as
2 money and other issues related to the use of such
3 large values of TIMDEC as are proposed here. Maybe
4 this is not the right point in the testimony to inject
5 those comments. If you think it is, I'll go ahead.
6 JUDGE McDADE: I think we're going to get
7 into that a little bit later. So let Dr. Wardwell
8 finish where he's going right now and as I said, we'll
9 get to that in a bit. Not a little bit, but a bit.
10 JUDGE WARDWELL: Well, I'm not so sure it
11 isn't a good time if it relates directly to the time
12 associated with TIMDEC as opposed to the total time
13 frame, specific to that without getting into where we
14 go from OECRs to final SAMAs. Go ahead.
15 DR. BIXLER: One issue is that in the
16 MACCS framework the entire cost of decontamination is
17 attributed as if it occurred in Year 1. If we're
18 talking about expending money over 30 years, that
19 doesn't make any sense. You wouldn't spend all the
20 money up front. You'd spend it over that period of
21 time. So there really ought to be some accounting for
22 the fact that you're spending the money over time and
23 the current value of that money is less than it would
24 have been if you spent it all initially in Year 1.
25 For example, if you assume that you spent

the money over a 30-year time period, that means the value in current dollars is only 27 percent of what it would have been if you'd spent it all in Year 1. So if you spent it over 30 years, it's 27 percent in current value. So that's one issue.

A second one is that if you take these times out to something like 15 or 30 years, you basically defeated the possibility in MACCS to even decontaminating at a DF of 15 because basically the property is decreased in value over that time to such a large extent that when you do the cost comparison, does it cost more to clean up or does it cost more just to condemn? When you make that decision if the value of the property is essentially decreased to zero or almost zero, then you're always going to just condemn the property and you're not going to do the decontamination. So that's another point I think that's important is that it really makes no sense to consider such long times as 30 years because it defeats the logic in the code.

JUDGE KENNEDY: Consequently, does one year make sense? I guess one year fits within that constraint.

DR. BIXLER: One year is at least within the allowable input parameters that MACCS would

1 normally allow you to consider.
2 JUDGE KENNEDY: So if you move closer to
3 the one-year time frame, you're more within the
4 construct of the MACCS2 code?
5 DR. BIXLER: That's true.
6 JUDGE KENNEDY: Thank you. Have we
7 finished the TIMDEC? Do we need to go back to that
8 figure?
9 JUDGE WARDWELL: I'm done with TIMDEC.
10 DR. LEMAY: But Your Honor, on the two
11 points raised by Dr. Bixler, he's correct about the
12 tests for the condemning properties done at the
13 beginning of the time period, so that's a feature of
14 the code. That's the way it works.
15 The second point, if you -- if we need to
16 decontaminate over a longer period of time, it is not
17 like buying a piece of equipment. We're dealing with
18 people and presumably the costs would continue to
19 escalate over time as they get the increases, so I
20 think these two effects cancel each other. So I would
21 question the idea that the costs would be 27 percent
22 if you do it over 30 years. But apart from that, I
23 think it's correct.
24 JUDGE KENNEDY: I think the major point
25 that I took away from that is that as we move out in

time, using MACCS2 to calculate the offsite economic cost risk is in question because there's other contributing factors and there's limitations in the code methodology, so I mean that was my takeaway.

And again, we may have to deal with that yet going forward, depending on where we end up with parameters, but I think it was a good caution that if we start pushing these numbers, these input numbers or these -- particularly TIMDEC, that there is some implication on how the code moves through its calculations. I think -- I'm not sure what to do with that yet, but that was my takeaway from Dr. Bixler.

JUDGE McDADE: And Dr. Bixler, was Judge Kennedy's takeaway what you intended for him to take away?

DR. BIXLER: Yes, I think that's exactly right.

JUDGE KENNEDY: I've got one question, at least one question going back to the one year number for TIMDEC. I understood it to be based on Fukushima information. Is that true?

DR. LEMAY: That's correct.

JUDGE KENNEDY: What impact did the tsunami have? Is this a pure decontamination time estimate or does the -- was there any consideration of

the fact that a tsunami also occurred and had a major impact on the infrastructure of Japan?

DR. LEMAY: When I looked at the reports, they seemed to indicate a series of steps that had to be taken before you could undertake decontamination. The Cabinet had to approve a special budget. That took time. They had to draw up plans before they could get a budget. That took time. They had to do a pilot project of decontamination to see which techniques were best and how to go about this thing. And they eventually also had to negotiate with each local community to find a location where they could bury the waste. And as you can imagine this is highly contentious.

I mean we have this case here, but you can imagine if they decided to come into each community and say where are we going to put decontamination waste? So all these things took about a year before they could really start. And so that could -- should probably be better modeled by an intermediate phase where you have temporary relocation.

The actual decontamination is ongoing and it seems like it will be ongoing for quite a while. And I believe that that will probably be the best data point that we ever get to find a realistic value for

how long it takes to decontaminate an area after a reactor accident.

JUDGE McDADE: So even though in the Fukushima circumstance, they were involved with earthquakes, tsunami, and the contamination from the nuclear facility, those same preliminaries would be applicable if it were only for the nuclear contamination?

DR. LEMAY: It seems to me that they would. If you want to spend $50 billion, I think there is going to be discussion about this. And you need to find the people and you need to create plans and you need to negotiate with communities. I can't see this happening in 30 days or 15 days.

JUDGE KENNEDY: I guess maybe a clarifying question. Did you consider the need for planning, testing, obtaining the funding and all that, is that in these decontamination times or is this just decontamination time?

DR. LEMAY: Well, it's hard for me to know exactly how long it will take to decontaminate because it's ongoing. But it seems to me that we cannot assume it will take less than one year. It took -- it was a year elapsed before they started. So at the minimum, it's one year. It's probably a few years and

like everything in this thing, I wanted to see what's the range of values that people seem to believe in and what's the impact on cost? So at the low end, one year seems about right for a severe accident. At the high end, God knows.

JUDGE KENNEDY: Thank you.

MR. JONES: Your Honor, if I could discuss a New York State exhibit with regard to the Fukushima response?

JUDGE WARDWELL: Go ahead.

MR. JONES: New York State Exhibit 000428, the last page.

JUDGE KENNEDY: Should we put it up on the screen?

MR. JONES: It might be beneficial.

JUDGE KENNEDY: Could we do New York State 000428?

(Pause.)

MR. JONES: Very last page. And I would call your attention to just two items on this page. Bullet 2 which is "removal of debris caused by the disaster 386 billion Yen."

JUDGE KENNEDY: I'm sorry, we're not with you. We're not on the last page.

MR. JONES: Page 34. That's a much better

1 page. Bullet 2, "removal of debris caused by the
2 disaster is 386 billion Yen." Down towards the
3 bottom, "reconstruction for nuclear accident, 355
4 billion yen." This is just something to put in
5 perspective because we don't have any documentation
6 that says that Fukushima took time to plan this
7 because they didn't have answers. I would interpret
8 this as they couldn't do anything anyway. They might
9 as well think about it for a while.
10 The area was so destructed that they had
11 to clean up debris and they will continue to do that
12 for years. So we really can't try to assume that they
13 took a nice, long drawn out planning process. They
14 may not have reacted because they couldn't react.
15 JUDGE KENNEDY: I guess I'd like to go
16 back to Dr. Lemay again and clarify this
17 decontamination, the TIMDEC parameter. We're back to
18 how much planning goes into pure decontamination time
19 which factors into decontamination cost. And if I may
20 again get your perspective. When you try to assign
21 numbers for TIMDEC, 1 year, 15, so on, 2 years, 30, do
22 you have a significant amount of planning associated
23 with that which is now being factored into
24 decontamination costs?
25 DR. LEMAY: It's not the decontamination

costs, Your Honor. The decontamination costs is solely controlled by CDNFRM. TIMDEC affects the depreciation costs of the property while people are away. And as I explained before, it doesn't matter if the people are away because they were temporarily relocated, because decontamination took time, or because there was interdiction following the decontamination. Whatever the cause of the delay for people returning to their house, that's what drives the cost associated with TIMDEC.

So if people cannot return to their house for whatever reason, then we get a high cost associated with that component of the cost equation. So it's not just TIMDEC. So we could say yes, it took longer to plan and then the decontamination was speedy or we could say planning was very short, but decontamination took time. The net effect on the cost will be the same. The code cannot make a difference because it sums these two values inside the code.

JUDGE KENNEDY: You're differentiating between the parameter CDNFRM as that's decontamination cost?

DR. LEMAY: Correct.

JUDGE KENNEDY: And it's your testimony that that's not influenced by TIMDEC?

1 DR. LEMAY: Correct.
2 JUDGE KENNEDY: That's another cost
3 calculation?
4 DR. LEMAY: Correct.
5 JUDGE KENNEDY: Dr. Bixler?
6 DR. BIXLER: Yes, I'd like to respond to
7 that. They are separate input variables, but they're
8 interrelated in the way that I was just explaining
9 earlier. If you increase the time of TIMDEC, you
10 ought to account for the decrease in the value of
11 CDNFRM to account for the fact that it's really
12 intended to be a present-day value of how much it
13 costs to do all the decontamination. So as you
14 increase the TIMDEC parameter, the value of the
15 decontamination costs should come down from what it
16 would have been if you're assuming that all that
17 expense were to occur in first year.
18 So there's a connection between those two
19 parameters and the analysts should consider that when
20 they choose the values for them.
21 JUDGE KENNEDY: Thank you.
22 JUDGE WARDWELL: Mr. Teagarden, I guess,
23 would you like to add any final comments in regards to
24 the selections that you used of 60 and 120 days after
25 hearing this testimony?

1 MR. TEAGARDEN: Your Honor, with regards
2 to Fukushima, it was an extraordinary event as I
3 believe we all recognize, the fourth largest
4 earthquake in the last 100 years, followed up by a
5 tsunami that impacted a region.
6 It wasn't specifically a reactor accident.
7 It was a reactor accident based on an external event.
8 And in the Entergy analysis, we include multipliers to
9 address external events --
10 JUDGE WARDWELL: Sorry to interrupt you.
11 I'm going to have to and I'll probably be doing this
12 to everyone.
13 We're trying to get done this, this
14 afternoon. We've got a bunch more questions to
15 answer. I would like you to focus on any
16 justification. I don't need to be refreshed on what
17 Fukushima is.
18 I'm interested in whether or not you feel
19 any justification needs in regards to defending your
20 selections of 60 and 120. And if you could focus on
21 that, that was the heart of my question. And if you
22 don't have any, that's fine. You've already brought
23 up some, but I thought there was some testimony. Now
24 I give you the opportunity to focus strictly on that
25 as concise as you can. Thank you.

1 MR. TEAGARDEN: Your Honor, the values
2 Entergy chose were consistent with NUREG-1150. They
3 are consistent with our knowledge of all the SAMAs
4 that we're knowledgeable on. Consistent with the
5 state of the reactor consequence analysis. And while
6 there may be lessons to be learned from Fukushima,
7 those are years in the making. Even as Dr. Lemay
8 noted, this continues to be a developing event.
9 The Entergy SAMA analysis was submitted in
10 2007, four years before the Fukushima event. So we
11 believe that these values are reasonable. Ten years
12 from now, we may have more data, but it's going to
13 take a lot of effort to sift through the data from
14 Fukushima to figure that out.
15 JUDGE WARDWELL: I'll get back to you in
16 a short while hopefully in regards to where we go from
17 here, i.e., the OECR and move to the cost benefit
18 because this is still just a number. It's not the end
19 of the SAMAs, we're still on the costing things of
20 this. That has some implications.
21 Dr. Lemay, I'm back to your chart on 13 of
22 241. I just want to quickly just cover the other
23 parameters. You had some discussion in the testimony
24 on VALWNF, V-A-L-W-N-F. I guess I will give up trying
25 to pronounce it.

1 Can you bring that up, Andy? 241, Table
2 13 and I don't know what page it's on. We were there
3 before. Exhibit 420, I'm sorry.
4 DR. LEMAY: It's Exhibit 430, and it's
5 Table 13.
6 JUDGE WARDWELL: Good, that's right. You
7 had the VALWNF and the other ones below it, but I know
8 in the testimony you did talk somewhat about the
9 VALWNF based on the numbers I see here, there's really
10 no need to spend much time on it because --
11 DR. LEMAY: It was a minor correction
12 because the CPI was not adjusted.
13 JUDGE WARDWELL: That's fine. Likewise,
14 the other ones seem somewhat non-influential except
15 for POPCST costs. Does this enter into you -- you
16 performed this, so obviously, it doesn't necessarily
17 be restricted to New York State 000016. So that does
18 have a fair amount of influence, at least in the
19 maximum level.
20 Do you want to talk about how you arrived
21 at your numbers so that we can see how Entergy might
22 want to defend their particular number based on your
23 comments?
24 DR. LEMAY: So Entergy used the value of
25 8,640 and that was based on a CPI adjustment of the

moving cost of $5,000 found in NUREG/CR-4551 in 1986. And essentially, they said okay, since the content of the house is contaminated, we're not going to move very much. And they chose this value. And I think that's probably an adequate value because really what are you going to move if your house is contaminated?

And then there is the personal income per day and the number of days of lost wages that are considered into the rest of this value. The Entergy value is based on the per capita income in the State of New York in 2005 and they assume an interdiction duration of 140 days based on NUREG/CR-4551.

We looked at this and we thought if there was an accident and we had a few million people that were relocated and lost their jobs, it would seem to me that the unemployment caused by this accident would be more similar to the unemployment we've lived through after 2008 than the historical unemployment. We're dealing with massive influx of new people that need a job. And what the New York State has done is during the 2008 crisis, they extended unemployment benefits to 93 weeks.

JUDGE WARDWELL: That's reflective of the minimum versus the maximum in your chart?

DR. LEMAY: Right, so essentially for the

minimum, we said okay, let's keep the value of 140 days and for the maximum we said let's use the current value of the extended benefit following the crash in 2008. It's a range.

JUDGE WARDWELL: So if you're only dealing with one range here, the others we had different decontamination factors which made sense to go high and low. This one doesn't have that right, so you just wanted to put bounding numbers on this.

DR. LEMAY: Correct, somewhere between 140 days --

JUDGE WARDWELL: So is it fair to say your position is it ought to be somewhere in the neighborhood of 25,000 is the average between the low and middle to compare against the 8,000?

DR. LEMAY: Yes.

JUDGE WARDWELL: Mr. Teagarden, what is the -- I assume 1150 is the basis of the 8640?

MR. TEAGARDEN: That's correct.

JUDGE WARDWELL: Is there any information that you're aware of at 1150 that justifies why that number is appropriate for Indian Point?

MR. TEAGARDEN: Your Honor, that was a value that looked at -- as a composite value for individuals having a disruption time of approximately

100 days; of commercial establishments having a disruption time of approximately 180 days. So they took the median of 140 days and used that as a basis. We did a check against historical unemployment figures and found that the value used here exceed the 40 plus years of historical unemployment and so we viewed that as a check for reasonableness.

JUDGE WARDWELL: Thank you. If everyone else is ready, I'm ready to move on to where we go to SAMA now.

Mr. Teagarden, we've come down here and we're now at the bottom of the page and we have a sum of the OECRs. There's another chart that someone could have with some of the PDFs and so yippee, we've got these numbers.

Now what -- briefly, how do we get -- where do those numbers fit into the cost benefit analysis?

MR. TEAGARDEN: Yes, Your Honor, if I could ask for our testimony exhibit number 000450, Entergy 000450, page 64. Page 64. And we can look at the top two tables there.

This, in essence, is the roll up of the values. So we have the four cost categories that go into the total for the SAMA cost benefit comparison.

The top item being the population dose risk, labeled also as the offsite exposure cost, followed by offsite economic cost, OECR. So you'll see that those two values added together are basically 90 percent of the costs. And then the onsite costs are a smaller fraction to reach the 100 percent mark.

It's worthy of note because there was some discussion about OECR versus PDR. PDR contributes 40 percent to the total --

JUDGE WARDWELL: They had already said that is not a concern.

MR. TEAGARDEN: But there is in the standpoint that many parameter changes that would see an increase in cost, see a reduction in dose.

JUDGE WARDWELL: Okay, explain that. Thank you.

MR. TEAGARDEN: Particularly as we're talking about cleanup attributes, if I am having people from their land for a long period of time while decontamination activities are occurring, or especially in artificial environments, but in essence, I'm spending more and they're going to have less dose. So the more we spend, typically the less dose people receive. So if I invest more in decontamination, typically, my dose values will go down.

Now it's not typically one for one. So -- but there is a measure and it depends on the parameter how that interplay comes about.

So merely saying that -- well if the OECR goes up 10 percent, doesn't that mean that the bottom line goes up 10 percent is not correct.

JUDGE WARDWELL: No, and that's why we're going through this process and it will be reflected in this process.

MR. TEAGARDEN: Yes.

JUDGE WARDWELL: It's good to keep that in mind, but we will see that in regards to seeing the final cost benefit and those mitigation measures that end up to be cost beneficial.

MR. TEAGARDEN: Yes.

DR. LEMAY: Yes. And Your Honor, Mr. Teagarden is absolutely correct and we did a correction. We did calculate the PDR and it made a very small change.

JUDGE WARDWELL: It doesn't matter. We will see whatever that is again. It's not defending your numbers. They need to defend their numbers with the input that you have and you don't have any inputs into the PDR, so we don't have to deal with much more than remember that in our minds that as we change,

these things will be compensated for.

What are the differences between these two tables?

MR. TEAGARDEN: The top table, Table 5 is for Indian Point Plant 2. And the second table --

JUDGE WARDWELL: Oh yes, 2 and 3. How many times I read that and glossed right over the 2 and the 3. Good thing I'm not a witness.

Fine, we've got these. Now, what do we do with them? Where do we go with the SAMA from here? This isn't the end of the SAMA.

MR. TEAGARDEN: No, Your Honor. Now we would compare these against the costs for implementation for a given SAMA candidate.

JUDGE WARDWELL: You don't compare these, do you?

MS. POTTS: This is Laurie Potts for the Applicant. Actually, these values represent the costs that would occur right now without the SAMA --

JUDGE WARDWELL: That's the baseline condition, if you will?

MS. POTTS: Yes. And then the next step is to change -- you know if the SAMA decreases the frequency of releases and comes up with a new value

and the delta between the two, the difference between the two, then is the benefit of the SAMA.

JUDGE WARDWELL: So you -- to put it in my words so that I understand it, and thank you for that, you're going to re-run these for the condition that exists with a mitigation effort.

MS. POTTS: Correct.

JUDGE WARDWELL: And see what you come out and the OECR may be up and the PDF may be down -- PDR may be down, or vice versa or who knows? It's going to do what it's going to do based on whatever technique you're evaluating and you're going to come up with these same type of costs. You subtract the two and that's the benefit of that cost. Is that correct?

MS. POTTS: Yes.

JUDGE WARDWELL: And now you have to think -- go ahead.

MS. POTTS: I was just going to add it's not the entire benefit because we also included -- these values come from our internal events PRA model, so we also included a multiplier to account for external events, such as earthquakes that is based on prior analyses.

JUDGE WARDWELL: That multiplier

multiplies what? The difference in the costs or --

MS. POTTS: Yes.

JUDGE WARDWELL: Okay.

MS. POTTS: And we also included a factor that is based on the uncertainty in the PRA model. It accounts for -- it's the 95th percentile, excuse me, the ratio of the 95th percentile to the mean. And on both Indian Point 2 and Indian Point 3, the combination of those two factors, the external event factor and the uncertainty factor was a factor of eight.

JUDGE WARDWELL: I remember that number. And that number is multiplied by the benefits.

MS. POTTS: Yes, we came up with the difference --

JUDGE WARDWELL: The difference.

MS. POTTS: Multiply it by eight and now that value is compared with the estimated implementation cost.

JUDGE WARDWELL: And all of that multiplication makes things more attractive.

MS. POTTS: Correct.

JUDGE WARDWELL: It's going to be higher.

MS. POTTS: Yes.

JUDGE WARDWELL: And then you end up with

tableization of the cost benefits and what do you do with that?

MS. POTTS: I think we discussed this a little bit yesterday. The ones that -- where the implementation cost is less than the benefit, then we put those into Entergy's process for determining if the modification would indeed occur.

JUDGE WARDWELL: Is there a screening process or anything and a step-wise process that's used or is that by the staff or was that done earlier in the process in regards to dropping some of these out and evaluating others that you're aware of?

MS. POTTS: You mean as far as how one might be impacted by another?

JUDGE WARDWELL: No, I wasn't thinking that so much. It was more simplistic. Trust me, I may have dreamt this. That's how shallow my life is. I dream this stuff after reading all this testimony.

(Laughter.)

Is there any screening process that you then use, once you've got all these calculations done, in regards to ranking them?

MS. POTTS: There was a screening process on the front end. We had come up with a list of many, many different alternatives based on industry

1 documents, other plant SAMA analyses, and we went
2 through all of those and determined if we've already
3 implemented it here or if it wouldn't work here or
4 that kind of thing. That may be what you're --
5 JUDGE WARDWELL: That's exactly it. So
6 you screened the mitigation alternatives before you
7 reran it to come up with those that you thought might
8 be plausible or haven't been done yet at your
9 particular plant.
10 MS. POTTS: Yes, sir.
11 JUDGE WARDWELL: Dr. Lemay, do you have
12 any -- that's the process you understood and the same
13 thing you would do?
14 DR. LEMAY: That's the same process as I
15 understand it, yes.
16 JUDGE WARDWELL: Good. Staff, Entergy
17 will not provide to you in their application that
18 these are the SAMAs and these are the ones that are
19 cost beneficial. Yippee. What do we do with it?
20 DR. GHOSH: Yes, so I was trying to get to
21 that a little bit before my earlier comment. If we
22 look at the potential impact of taking in some of
23 ISR's calculations into how would it impact the bottom
24 line which is are we going to find additional -- are
25 we going to review additional SAMAs that are

1 potentially cost beneficial?
2 I just want to point out a couple of
3 things. We've established with the tables here and
4 these tables show the maximum benefit if you
5 eliminated all risk at the plant as it's operating.
6 So if you eliminated all baseline risks, this is the
7 maximum achievable benefit. And we see that the
8 offsite economic cost element is the only one we're
9 playing with. That's the one at issue here that we're
10 talking about. It might be higher.
11 That accounts for about 50 to 55 percent
12 of the total benefit that could be achieved by a SAMA.
13 Any one SAMA is only to act on particular accident
14 sequences. To date, we've never seen a magic SAMA
15 that takes care of all risk. It's typically to
16 mitigate a particular kind of accident. So the
17 example I used earlier, steam generator tube rupture
18 is an important type of accident for both of these
19 plants. And you'll see that there is quite a number
20 of SAMA candidates that are already identified to
21 mitigate those accidents.
22 Now if you go to the FSEIS, we don't have
23 to go there, and you look at the list of potentially
24 cost beneficial SAMAs that have been identified
25 already for Indian Point 2 and Indian Point 3, as I

1 mentioned earlier for Indian Point 2, you would have
2 eliminated the entire plant risk twice over by the
3 SAMAs that are identified. Why is that? Because some
4 of their multiple SAMA candidates that are identified
5 as class beneficial that act on the same types of
6 accidents.
7 What the staff has done in our -- in what
8 we particularly do in the review process is we
9 concentrate on which accidents, if we reduce the risk
10 from those, would give us the most bang for the buck
11 and we look to see did the Applicant explore all of
12 the low-cost alternatives to mitigating those types of
13 accidents and through the back and forth with Entergy
14 in this case, we got substantial discussion and
15 additional explanation for why there weren't
16 additional SAMA candidates that appeared to be
17 potentially cost beneficial for those key accident
18 scenarios.
19 So increasing 50 percent of the benefit by
20 some small amount, maybe even a factor of 2, and
21 considering that our existing list of SAMAs is already
22 eliminating entire plant risk twice over, we don't
23 believe we're going to come up with any more SAMAs
24 that would be potentially cost beneficial and that
25 they would be cheaper alternatives to mitigating the

same types of accidents that were already looking at mitigating with the list that we have.

So with everything we've seen, we don't see a deficiency in what is in our FSEIS with respect to what have we missed in terms of what potentially cost beneficial SAMAs might have been revealed had one of these cost elements been slightly higher.

JUDGE WARDWELL: Thank you, Dr. Ghosh.

MR. HARRISON: If I could have one other thought? This is Donald Harrison of the staff as well.

JUDGE WARDWELL: If it's very brief.

MR. HARRISON: It's very brief.

JUDGE WARDWELL: That was very thorough.

MR. HARRISON: Yes, okay, the only point I want to make is when we get the information from the Applicant, we ask questions about additional things that we may be aware of that are considerations for cheaper cost beneficial benefits that we then pose as questions back to the Applicant to have them respond, to provide justifications for that detail.

So there's a thorough look at what's provided as well as list of questions we tend to ask about looking for other options as well to make sure we have a complete list of what we propose as SAMAs

for the FSEIS. So I just wanted to make that clear.

JUDGE WARDWELL: Thank you, Mr. Harrison.

Dr. Ghosh, is the Applicant required to implement any of these by -- let me just leave it at that.

DR. GHOSH: I think as we discussed yesterday, that's the topic of a couple of different SAMA contentions, so --

JUDGE WARDWELL: That's fine. We can leave it until that.

MR. HARRISON: I will add again, this is Donald Harrison, is that if the Applicant was asked to implement, they could look at the ones that are currently identified as potentially cost beneficial and likely determine that by implementing just a handful of those, they may have dealt with sufficient amount of risk that the other ones are no longer cost beneficial because the way the SAMAs are done one at a time. When you start to go towards implementation, they may actually look at the combination of SAMAs that might actually give a better benefit.

JUDGE WARDWELL: Could we go back to Table 13, Andy, again. This is for Mr. Teagarden.

We see here that what is New York State said gee, it might be as large a difference as this

when we get down right to the bottom that at a minimum, it might be about three and at a maximum it might be seven times.

Have you rerun your analyses with their changes to see what the change in the cost benefit ratio ends up to be with these changes?

MR. TEAGARDEN: No, Your Honor, we haven't. As a point to mention, I'm not sure it's been clarified, although it's been touched on with numerous comments. In actuality, you would want to take and develop a suite that -- a suite of parameter changes that you thought was representing a change that you thought needed to be done in the technical bases. So for instance, CDRFM and TIMDEC are related to one another. The individuals would be in an area for labor costs as related.

So implementing these particular changes does not necessarily reflect a consistent approach for application in MACCS. In actuality, you would need to step back, try to say what are we really trying to represent by some of the variability that's being shown. Where then do I -- how do I put a new combination, a suite of parameter changes together to analyze?

We believe that the values presented have

-- we don't agree with the technical bases for those. So then trying to take the next step and develop a consistent suite of parameter changes just was not something we attempted.

JUDGE WARDWELL: Let me ask another more fundamental question. If one was to say yup, boy, New York State is spot on. As far as I can understand, this should have been the justification for the selection of numbers at Indian Point. That doesn't necessarily mean that the cost benefit analysis is going to change by the same percentage as these OECRs do. Isn't that correct? Because you're taking the same CDNFMs and TIMDECs would also be used when ran it with a mitigation alternative in place, correct?

MR. TEAGARDEN: Correct, Your Honor.

JUDGE WARDWELL: So those are -- yes, this a lot higher number, but likewise when a mitigation is run that will be a lot higher number than with a mitigation now is run.

MR. TEAGARDEN: That's correct, Your Honor.

JUDGE WARDWELL: So by looking at the difference of that, some of that gets factored out, does it not?

MR. TEAGARDEN: That's true, Your Honor.

1 JUDGE WARDWELL: But you don't have any
2 handle on how much that would here?
3 MR. TEAGARDEN: No, Your Honor. Ms.
4 Potts?
5 MS. POTTS: Laurie Potts for the
6 Applicant. You know, it would be different for ever
7 SAMA also.
8 JUDGE WARDWELL: It certainly would, yes.
9 Maybe some wouldn't be a great deal, but fine, then
10 maybe it isn't -- yes.
11 Dr. Lemay, have you tried to put a handle
12 on how this results in the actual cost benefit
13 analysis because that's really what we're interested
14 in in the long run, isn't it?
15 DR. LEMAY: I don't, Your Honor, Francois
16 Lemay for State of New York. I don't have the
17 information to carry out this type of analysis.
18 I just don't.
19 JUDGE WARDWELL: Anyone else on this topic
20 area?
21 JUDGE KENNEDY: Is it fair to compare,
22 again, Dr. Wardwell talked about for the argument's
23 sake just implementing or accepting this level of
24 change, this delta in OECR. What I understand him to
25 do is try to compare it to -- maybe -- this may not be

1 the right comparison, but in my own mind, there are
2 SAMAs that -- there's cost benefit analyses that have
3 been conducted. And this is suggesting a change in
4 the cost of a SAMA analysis looking towards is there
5 another mitigation alternative that would be cost
6 beneficial.
7 I guess what I'm looking for and does it
8 make sense to look where the line was drawn for the
9 last mitigation alternative if that cost is of such a
10 number that no matter what -- if we accept -- if these
11 values were accepted by Entergy as a delta towards the
12 last benefit calculation, would there be a potential
13 mitigation alternative that would be cost beneficial
14 or is that -- I see a lot of stares over there. I
15 mean is that even a meaningful comparison? I guess
16 maybe -- start with the staff.
17 What I was hearing from some of what you
18 were saying, Dr. Ghosh.
19 DR. GHOSH: If I could -- actually, I
20 think Ms. Potts brought up a point before about the
21 margin that is already in the existing analysis.
22 There is an uncertainty factor that's applied to the
23 combination of the internal plus external benefits.
24 The external benefits multiplier itself, we believe
25 adds a degree of conservatism because it is based on

an over estimate of the CDF for reasons that we talk about in the FSEIS and that Entergy also discusses in their application. So there's some degree of cushion, you could say, in the external benefits multiplier and then that combined internal and external benefits is -- the total is again multiplied by an uncertainty multiplier.

Now the origin of that uncertainty multiplier happens to be the ratio of the 95 percentile CDF to the point estimate or mean of the CDF which is what comes out of the level 1 analysis. But the way that the NRC views the worth of that multiplier is that, in essence, it provides some cushion for any analysis uncertainties that may exist in the total analysis.

And it's just been a kind of a rule of thumb in SAMA analyses that the way you come up with that multiplier to represent to any analysis uncertainties as to take that ratio of the 95th to the mean or point estimates CDF. So with this factor of eight, that is applied to the initial calculation of total internal benefits, we believe there's actually a fairly large cushion that's already in there.

So let's say we were to look at the effect of some of New York State's increase in the OECR. We

established earlier the OECR is on the order of 50 percent of the total benefit that we're looking at so you could have to take these multipliers and bring them down by on the order of 50 percent, just to simplify because it does depend to some extent on SAMA to SAMA.

So maybe instead of a factor of 3 to 7, we're looking at a factor 1.5 to 3.5 as a starting point.

Then we also have to look at the other side of the equation which is the implementation costs because ultimately we're comparing the total change in benefit to the implementation costs. The implementation costs part of the equation isn't changing. So if you look at the net possible effect of taking these numbers, it's going to be something less than 1.5 to 3.5. And we're already using a multiplier of eight to account for analysis uncertainties. So I think we feel that to some extent the existing conservatisms and uncertainty accounting in the analysis may provide the boon to consider the possibility of this type of sensitivity.

This is all hypothetical because I think as we discussed, we don't really agree with the methods that went into coming up with some of these

1 differences. So just hypothetically, if we did
2 believe them, we think that the existing analysis
3 already can accommodate some of this, or all of it.
4 MR. HARRISON: And if I could just add one
5 thought. This is Donald Harrison of the staff. just
6 to support the fact that we believe there's margin
7 because of the use of the 95th percentile ratio to the
8 mean, the staff's guidance for making decisions when
9 using probabilistic risk assessment and licensing
10 actions, we refer to those to being risk-informed
11 licensing actions.
12 The metrics that we use for accepting
13 those applications is using the mean value from those
14 analyses. So just that typically when we do a license
15 application, it's the mean value. Here, we actually
16 ask them to look for SAMAs and ratio them up to the
17 95th to provide that margin.
18 JUDGE KENNEDY: I don't know if you
19 remember, Dr. Ghosh, I don't know if you remember your
20 testimony just before the break. And I think you may
21 have been trying to talk about this margin concept,
22 but you were referring to some of the parameters that
23 Dr. Lemay has identified here. And my takeaway from
24 that and I'm really asking you to confirm that is that
25 yes, he has introduced some uncertainty in various

NUREG-1150 parameters, carried forward in this Indian Point plant-specific analysis, but that you didn't believe that it would have any impact on -- and I'll use the word result. I'll let you put what word you'd like in there.

And I think that's what I was hearing this morning, just at the closure and that's why I didn't want to leave this morning's activities without coming back to that.

I mean we have a table here that tries to provide some perspective on the potential impact on the offsite economic cost risk, but --

DR. GHOSH: Yes.

JUDGE KENNEDY: Do you remember the testimony from just before the break? You were speaking and I think you were referring to this. I believe you were referring to this table. If you could confirm, deny, maybe just try to summarize quickly that point.

DR. GHOSH: Sure.

MR. TURK: I'm sorry, Sherwin Turk. I'm having a little trouble hearing the witness. Could I ask her to move the microphone closer and speak a little slower?

JUDGE KENNEDY: Sure.

1 MR. TURK: Thank you.
2 DR. GHOSH: Yes. That was an additional
3 point I was making. The one I made just a little bit
4 earlier, but that is an additional aspect. So there's
5 two things. You're right that my fundamental point is
6 that the ISR New York State analysis introduces some
7 uncertainty and into particular elements of the
8 benefit calculation. And I believe that the existing
9 margin in the analysis can accommodate this
10 uncertainty already. That was one point.
11 The point I was trying to make earlier is
12 actually an additional point on top of that which is
13 that the final results that we really care about which
14 is what is a good list of potentially cost beneficial
15 SAMA candidates? There, I was referring to the final
16 safety evaluation impact statement, Table G-6 which
17 shows the final list of potentially cost beneficial
18 SAMAs.
19 Just as an example, if you look at the
20 candidates for Indian Point 2, if you actually take
21 credit for implementing all of those SAMAs, you
22 completely eliminate the plant risk twice over. So if
23 we were to say what would be the additional impact of
24 these uncertainties, can we find additional SAMAs that
25 might be cost beneficial, I think the answer is that

is very unlikely because once you started to implement the low cost alternatives for mitigating the dominate accident sequences, the ones that are below the cut off right now are going to be -- it's hard to imagine that they would really become cost beneficial since there is already alternatives on the table to mitigate those same types of accident sequences that are disclosed as potentially cost beneficial in the FSEIS.

JUDGE WARDWELL: And there's no way to calculate those out without just rerunning all -- you'd have to start from the first mitigation that you implemented that value, but then you'd have to rerun it based on the new one on top of that one. You couldn't use the numbers from the previous one in any manner to figure out what that would be. It's a feature of a more independent analyses, is that correct?

DR. GHOSH: That's right. If you did in order, you'd have to re-baseline every time you took credit for one. And right now, each one is done separately, yes.

JUDGE KENNEDY: All right, that's good clarification. Thank you, Dr. Ghosh.

JUDGE McDADE: It's just about 1 o'clock right now. It may be an appropriate time to break

until 2 o'clock for lunch.

Before we break, are there any housekeeping matters that need to be taken care of during the lunch break from the staff?

MR. TURK: Not at this time, Your Honor.

JUDGE McDADE: Clearwater?

MS. GREENE: Not at this time, Your Honor.

JUDGE McDADE: Riverkeeper?

MR. MUSEGAAS: No, Your Honor.

JUDGE McDADE: New York?

MR. SIPOS: No, Your Honor.

JUDGE McDADE: Entergy?

MR. BESSETTE: No, Your Honor.

JUDGE McDADE: We're in recess until 2 o'clock.

(Whereupon, at 12:59 p.m., the hearing was recessed, to reconvene at 2:00 p.m.)

JUDGE McDADE: The hearing will come to order. By way of housekeeping, I had asked our law clerks to inform you with regard to scheduling. It is our firm intent, strong intent, crusade-level intent, to finish up on New York 12 today. But the likelihood of getting very far on New York 16, 17 are small.

So we advise that you could allow those witnesses to go forth, and not hang around on the off-

chance we might get to them very briefly today. It is our intent, as I said, to finish up. What we plan to do is to ask additional questions right now.

At that point, when we're finished asking those questions, to take a break. Given the nature of the testimony that we have heard and to ensure our own mutual understanding of the issues, we propose to do the same process that we did at the end of Technical Contention 2, which would be to allow interrogation of these witnesses by New York, Entergy and the staff, again with the concept that this will be brief.

It won't be repetitive, that if you believe that there are aspects of the testimony of your witness that either was susceptible to misunderstanding on the part of the Board, or testimony from the opposing witnesses, that you believe did not accurately reflect reality, that you will have an opportunity to do that.

Again, we're not looking into a lot of background about the witnesses' credentials, the witnesses, you know, who they're employed by. We have some -- I don't know who else was speaking. But so we will do that, again with the idea that the entire process should take no more than an hour, and we will do that in that order, New York, Entergy and then the

NRC staff.

It is our even stronger intent on Monday to ensure that we finish New York 16 and 17. I've been advised that I have a button up here that I can turn off all of the microphones, and that includes the microphones of Judge Kennedy and Judge Wardwell. So now we can test that. They would not be able to be heard.

So one way or another, we are going to finish 16 and 17 on Monday. But let me stop talking, and see if we can finish 12 here quickly. Judge Kennedy.

JUDGE KENNEDY: This is Judge Kennedy. I have just a couple of follow-up questions, and I'd like to go back to my favorite exhibit -- oh no, not my favorite exhibit, but the exhibit that we've been using for most of this contention, which is New York State 430, page six again, if you could. Probably burned into the screen by now.

VOICE: I'm sorry, which exhibit?

JUDGE KENNEDY: New York State 430. There it is. Thank you, thank you. I guess I'd like to turn back to the TIMDEC parameter. We've heard some discussion here during the hearing about its origin, and we've heard Dr. Lemay provide some counter views

on how to compute that number.

I guess just to close this issue, I'd like to go back through, first starting with Entergy, and talk about the TIMDEC parameter for DF 3 and DF 15, and discuss its origin, why it was selected to be plant-specific for Indian Point.

So if we could start there, and then I'm going to pass to the staff, just to keep this going. Thanks. Mr. Teagarden.

MR. TEAGARDEN: Yes, Your Honor. TIMDEC represents the time that individuals are maintained away from their residence while decontamination activities are occurring. The costs accrue during this time while the individuals are away, such that it establishes a cost basis.

So if individuals are modeled to be away from their home or one year or five years or ten years, then the costs are being accrued for that time. Individuals are not relocated back. For NUREG, I'm sorry, for the Entergy analysis, we used the NUREG-1150 basis for those values.

We believe that's appropriate because of the way that MACCS models TIMDEC in conjunction with evaluating the potential for extended interdiction, for the more severe cases where there could be

contamination. So that's the basis, Your Honor.

JUDGE KENNEDY: Is there any other, speaking mostly to the 60-day, 120-day, is there any guidance, any basis information coming out of NUREG-1150 that would be useful for the Board to hear, that would convince us that these would be appropriate values for use on Indian Point?

MR. TEAGARDEN: Your Honor, the FERC document, NUREG-3673, has a development where it goes through and puts the model in essence together. It looks at a time of 90 days, and then as it was implemented in NUREG-1150, they moved in one version up to 60 days, and then a further 30 days to reach the 120 days.

So there's, you know, there's a technical basis that's developed there. But it's, you know, as implemented in NUREG-1150, and then as carried forward in the latest state-of-the-art reactor consequence analysis.

JUDGE KENNEDY: Not putting words in your mouth, are you pointing us to this specific document, so that we could explore a basis for its use at Indian Point, recognizing that the number has changed going to 1150?

MR. TEAGARDEN: Your Honor, can we just

confer for one moment?

JUDGE KENNEDY: Sure.

(Pause.)

MR. TEAGARDEN: Your Honor, I think we'll just leave it as is.

JUDGE KENNEDY: Okay. Let's go back and -- let's go back through the 60-day, 120-day. Should we be looking at NUREG-1150, or should we go farther back to look at NUREG-3673?

MR. TEAGARDEN: NUREG-1150, Your Honor, I don't think has much discussion on this particular point. It's more just that we see in evidence that within NUREG-1150, they selected the 60 days and the 120 days. When you go back to the FERC document, there's just a discussion of the model development, where they explore how the model is developed. They use a basis of 90 days.

But then when it's carried forward in the NUREG-1150, that's modified to reflect the 60 days and the 120 days.

JUDGE KENNEDY: Well, when you say "model development," what are speaking of? Is that the MACCS code, or is it an input DEC for a particular plant site?

DR. O'KULA: Your Honor, Kevin O'Kula for

1 the applicant. That indeed is correct, and going
2 forward from the 1984 Entergy Exhibit 466, the Burke
3 documents, as we've been describing it, there was then
4 the generation or the development of the predecessor
5 to MACCS-2, the MACCS code, which preserved, at least
6 initially, the thinking captured in Burke in the Table
7 4-5 that we pointed to previously, on the three levels
8 of decontamination factor, the three TIMDECs values
9 that were quoted then.
10 And then the original basis for the three
11 levels of per capita decontamination costs. Those
12 were carried forward in the MACCS code documentation,
13 and I can pull out the Entergy exhibit number. But
14 suffice to say, this was a 1980, a late 1980's
15 development, and the thinking was that the CRAC2 code,
16 that was developed and supported early documentation
17 on safety from, with respect to severe accidents, was
18 being retired and evolved in a MACCS code.
19 So the three levels were maintained, as
20 well as the values of TIMDEC, and those were later
21 incorporated in NUREG-1150, Your Honor, with the
22 adjustments made as discussed by Mr. Teagarden with
23 respect to deciding that a 60-day period would be
24 appropriate, and looking at the upper bound to that
25 period of 120 days.

1 I would like to just incrementally add,
2 Your Honor, that sort of another qualitative
3 discussion point out of 3673, Entergy Exhibit 466, is
4 found in the middle of page 4-17. I think we've
5 referred to this document over and over again.
6 But it does qualitatively discuss a
7 sentence or maybe a little bit of a description, and
8 it may be worth putting up Entergy 466, and paging to
9 4-17 in the middle of the page. Can we do that, Andy?
10 Thank you very much, Your Honor.
11 Now I think the key set of sentences are
12 after the first sentence, decontamination cost
13 estimates incorporate information on a multitude of
14 possible methods, to be used in the decontamination of
15 non-farm areas, and have been weighted to account for
16 residential, commercial and industrial and public use
17 land areas on national average statistics.
18 There's a follow-up sentence that I think
19 also could be added. The methods to be employed for
20 each level of effort in each type of area include
21 combinations of decontamination techniques.
22 So we wanted that to be added to the
23 record, in terms of the basis out of Entergy Exhibit
24 466, in terms of those three levels that then evolve
25 to two levels. We've associated two levels of TIMDEC.

JUDGE KENNEDY: It's interesting looking at this, and I think that this was up on the screen yesterday, and it didn't occur to me until all the discussion today.

The concept that these have been weighted by land use, different types of commercial industrial properties, open up the question of a, and we probably don't know the answer, but what type of land use was used in this study, and at least it opens the door that the value could be adjusted for the land use profile around Indian Point.

And again, I think we're going to go back and bite our tail again, because since we don't know the original basis for the number, and then this opens the door that it has a weighting factor based on land use or a land use profile, I guess I'm wondering if any, did it occur to anyone on Entergy's side that this paragraph that you're pointing us to goes contrary, at least in my mind, contrary to the position you're trying to take, that this is a good value for Indian Point, unless the land use profile in this number is consistent with the profile around Indian Point?

I guess I'm asking if you would comment on that please. Either Mr. Teagarden or --

MR. TEAGARDEN: Your Honor, Mr. Teagarden here responding. Yes.

JUDGE KENNEDY: Go ahead.

MR. TEAGARDEN: We wanted to, I guess to highlight this particular text as it relates to the discussion that we had on, you know, flat plane versus, you know, MACCS distributing, depositing material on a flat plain, versus the costs being reflective of decontaminating a mixture of land uses.

Now the fact that this, the values developed in NUREG-1150 were applied universally across the five different sites means that in their minds, in the developer's minds, those values were sufficiently applicable to each of the sites, that they could be used that way.

That's, I think, generally consistent with the fact that the SAMA analysis is a spatially averaged analysis. It's looking at a mixture that would be reflective of 7,800 square miles. So it's kind of a global value that it reflects.

JUDGE KENNEDY: I guess now that I'm focusing again, is this more -- this sentence, two sentences more applicable to the CDNFRM parameter, as opposed to TIMDEC?

MR. TEAGARDEN: Yes, Your Honor.

JUDGE KENNEDY: Is that -- yeah, okay.

MR. TEAGARDEN: Yes, Your Honor.

JUDGE KENNEDY: So we shouldn't take this as being supportive of T-I-M-D-E-C?

MR. TEAGARDEN: No, Your Honor, not specifically, although the variables, as I mentioned earlier. The individual values with individuals variables are related to, have to be related to one another.

They form a suite of variables that reflect how the decontamination is modeled in total within the MACCS-2 code. So if the cost is linked to the time, which is linked to the dose reduction factor achieved.

JUDGE KENNEDY: So there is a linkage?

MR. TEAGARDEN: There is a linkage.

JUDGE KENNEDY: If I was to summarize and ask Entergy to confirm, it seems like to me, hearing the discussion here, that the TIMDEC values have their root in 1150, NUREG-1150?

MR. TEAGARDEN: Yes, Your Honor.

JUDGE KENNEDY: And the CD --

MR. TEAGARDEN: CDNFRM, sir.

JUDGE KENNEDY: We need a phonetic version of this, but that parameter, the C-D-N-F-R-M parameter

is also based in NUREG-1150?

MR. TEAGARDEN: Yes, Your Honor. All of these related, interrelated values for these interrelated variables we take consistently from NUREG-1150, and you wouldn't want to arbitrarily change just one of those values, because without evaluating the impact upon the other related variables, to make sure that what you're seeking to model is being appropriately reflected in the model.

JUDGE KENNEDY: So that the Entergy view is, and maybe others hold the same view, is that these parameters are linked in a complex way, that the user of the -- developing the input deck needs to be careful as to how they assign those parameters?

MR. TEAGARDEN: Very much so, sir.

JUDGE KENNEDY: So in addition to pointing to NUREG-1150 as the source of the parameters, I guess confirm that I see a reluctance to change either one of the values, without exploring the need to change the other parameter?

MR. TEAGARDEN: Yes, Your Honor.

JUDGE KENNEDY: I guess at this point, I'd like to give the staff a chance to help us -- if you've said it already, it's a confirmation. But at least give us your perspective on why the staff

1 believes that two TIMDEC parameters for the different
2 dose reduction factors are reasonable and appropriate
3 for Indian Point, and why the CDNFRM parameter is an
4 appropriate parameter for Indian Point?
5 MR. HARRISON: This is Donald Harrison of
6 the staff. I would just say, again within the
7 NUREG/CR-3673 that we have up here, there's one of the
8 things that the staff looked for was other places that
9 identify the mean time or an average time tor
10 decontamination.
11 There's a comparison in the later part of
12 this document, between what they call the new economic
13 model and the CRAC2 code, where they just have a
14 sentence that says the mean time to decontamination is
15 90 days.
16 So we looked at that as, if you will,
17 confirmation of the reasonableness of the numbers that
18 were being used today, given the history of where
19 these documents are from the mid-80's. They came
20 forward 60 and 120 days in NUREG-1150. Do we want t
21 talk about the non-farm factors or -- because it
22 seemed like you were asking about the other values as
23 well as TIMDEC?
24 JUDGE KENNEDY: I was. I think these are
25 three we've been -- and I'm not sure you had a chance

to confirm the reasonableness of the CDNFRM parameter this morning. So I'll give you that chance to enlighten us.

MR. JONES: Your Honor, this is Joe Jones for staff. When you're asking when the value was confirmed, are you asking with regard to the initial review, or the review of the testimony that has been presented to date?

JUDGE KENNEDY: That's a good question. I guess what I have in mind is the staff has, in the final supplementary Environmental Impact Statement, has acknowledged, at least in my mind, the reasonableness of Entergy's analysis.

I'm just, I'm asking to confirm that this is the value that was used, and the basis of that confirmation of its reasonableness. So it's that time frame, I guess, is what I'm looking for.

MR. JONES: Okay. One moment, Your Honor, please.

(Pause.)

MR. HARRISON: Yes. Well, I believe what we would stand behind is NUREG-1150 provides the basis for the use of that factor as well, as the value for the TIMDEC values.

JUDGE KENNEDY: And also for all three

parameters? Is that -- I'm sorry. Is that what you said?

MR. HARRISON: Yes. That's what our position would be.

JUDGE KENNEDY: It seems to me, and I guess I'm going to ask the question, that there's a level of confidence in the historical perspective of these values, that at least Dr. Lemay has pointed out another set of approaches that we've all -- we've heard testimony here today where we've gone back and forth on how well he did it and how, what the flaws and what the strengths are.

Do I understand the staff to believe that the values that are rooted in 1150, that go back in time and have maybe an older heritage, are still good today? Have you done, has the staff done an assessment, that these values have stood the test of time, and that there is no need to do additional analysis, to come up with better numbers?

MR. JONES: Your Honor, this is Joe Jones with staff. I think this exercise of reviewing the alternative input parameters has given us a great degree of confidence that the original values are reasonable.

If we look at the four approaches

presented by Dr. Lemay, and account for things like conservation of mass, the time value of money, the variability in the variables that were, the dependent variables that were changed, and if we look, and if we consider that the 15- and 30-year durations cause condemnation that would normally be decontaminated at a cheaper amount, we start to see those numbers coming down very close, and certainly within reason, within a level of uncertainty of the original values used in the analysis by Entergy.

JUDGE KENNEDY: All right, thank you. I'll pass the microphone to Dr. Wardwell.

JUDGE WARDWELL: I'd like to switch gears for a while, and cover a bunch of miscellaneous items that we haven't touched upon yet, just to make sure we've got, any questions we might have in regards to these issues aired here in a public format.

The first one I think I'd like to go to is Entergy's testimony on page 11. That's Exhibit 450 on page 11. I'm not sure you have to pull it up, and it deals with the NUREG/CR-5148, the draft NUREG/CR-5148, and I think I'd just like to ask a question.

Regardless of its origin or the quality of the document whatever, isn't it fair to say that it at least is an analysis or is it analysis of a SAMA at

Indian Point that did not use Sample Problem A. I direct this to staff, anyone on the staff that would like to answer that.

MR. JONES: This is Joe Jones for staff. If you'll let me take one moment to get to this page. We're talking about the draft document, NUREG/CR-5148, and the question is it effectively a SAMA analysis for Indian Point.

JUDGE WARDWELL: Is it a SAMA analysis at Indian Point, specifically tailored to Indian Point, that doesn't use Sample Problem A values?

MR. JONES: This particular document actually says it is not representative of Indian Point. It analyzed an accident at Indian Point, but it did some things that aren't in direct conflict with the SAMA analysis. It pointed the wind direction directly at the highest population areas.

So it calculated the highest cost, and that was the intent of this document. But it specifically says in here, and I have the page number referenced. If you'll give me a moment, I can identify where it says it is not applicable to Indian Point, or any other specific site.

JUDGE WARDWELL: Okay. Let me ask you this then. Did it use parameters that site-specific

1 to Indian Point, in whatever analysis that then did
2 you do in that particular document?
3 MR. JONES: This particular document in
4 general did not use parameters, in my belief that are
5 specific to Indian Point. It identifies the sources
6 of information in, I believe, Appendix C, and most of
7 those sources of information are traced to West Coast
8 vendors, where the analysts made calls to local
9 people.
10 The analysts were at Pacific Northwest
11 Laboratory in Washington State, and out of about 178
12 references, we see that most of these are West Coast
13 references. Other parameters developed in here were
14 developed using the RS Means Manual, which provides us
15 -- this is a construction manual that provides kind of
16 national level data.
17 They use those values directly. That's
18 not a bad source of information. It's used widely.
19 But the Means Manual provides an extensive list of
20 multipliers to take into account the locality, and
21 there would have been at least dozen specific locality
22 multipliers that should have been applied that
23 weren't.
24 So when I look at the analysis, I do not
25 see enough specificity to say that it was New York-

specific, and that's consistent with what the document says.

JUDGE WARDWELL: Do you recall if any of the parameters were, input parameters were site-specific to the Indian Point region?

MR. JONES: I would have to review the document for a moment, Your Honor.

JUDGE WARDWELL: Okay. I was even going to let you off the hook more than that, but you've offered to -- I thought you were going to say you have to look it over again at some point. But if you're going to look it over now, fine.

While you're doing that, I will move on to Dr. Lemay. How would you characterize this document? The same way that you heard Mr. Jones from staff, or do you have a different interpretation of it, now that we've all had a chance to review it in more detail since it came to everyone's attention?

DR. LEMAY: Francois Lemay for the State of New York. Before I started, I just want to correct the record, because I misspoke this morning. I said that the decontamination at Fukushima started in March 2011. It started in March 2012.

Regarding your question Your Honor, this document is an analysis of the decontamination costs

around Indian Point. Are we talking about the Terrell document?

JUDGE WARDWELL: We're talking about NUREG/CR-5148. It's a draft that was never finalized, I believe, and was discovered.

MS. LIBERATORE: Your Honor, Kathryn Liberatore for the State. Is this New York State Exhibit 424-A through BB, just for clarification purposes?

JUDGE WARDWELL: 424, yes.

DR. LEMAY: So it's 424, which is the -- yes. That document, NUREG/CR-5148, is the analysis of a decontamination cost around Indian Point, and it is true that many sources of data are from the West Coast and other places, but they used site data, they used the population density, they used the land use around Indian Point to calculate the cost.

I want to be clear. I'm not advocating that the results of that assessment should be used for a NEPA analysis. That's not, and we were not aware of this document when we developed our four methods. But it seems to me that NUREG, the NRC in the 80's was exploring how to calculate decontamination costs at various sites, and this is one example.

They used a methodology that is very

similar to CONDO. They partitioned the land in different types of land use; they looked at building density. They looked at the number of surfaces in the building; they looked at the labor fraction and they tried to come up with the cost.

Then if we divide that by the overall population, we can get a cost of decontamination per person. So I'm not advocating this particular example as a NEPA-type and site-specific analysis for Indian Point. I'm presenting it as one example of what can be done if you decide to do a site-specific analysis.

And many of the parameters that are in that example are wrong. They are not what we're talking about today. But it's an example.

JUDGE WARDWELL: Do you recall any of the input parameters that were site-specific to Indian Point, that aren't site-specific in the SAMA analysis that Entergy has performed?

DR. LEMAY: Population density. The land use, the building density in each of the grid sectors. The document takes a database of Census data, and maps it over the grid, and it tries to extract as much information as possible from the Census data, to do the best possible mapping of the land use.

So it goes a little in more detail than

1 what MACCS does, and I guess that was the purpose of
2 this research project.
3 JUDGE WARDWELL: Mr. Teagarden, do you
4 have any comments in regards to those parameters that
5 he mentioned, that he alleges have, were specific to
6 Indian Point, and to what degree does MACCS address
7 those in the SAMA analysis, those same site-specific
8 parameters in the SAMA analysis?
9 MR. TEAGARDEN: Your HONOR, the draft
10 NUREG-5148 reflects a stylized assessment, to
11 demonstrate a code that we understand is a -- no
12 longer around, available, operable, not clear. How it
13 ever continued on past this document, we don't find
14 much of any reference to literature.
15 To the degree that they used an Indian
16 Point population density, the Entergy analysis uses an
17 Indian Point population density. To the degree that
18 Indian Point uses land use, the SAMA analysis uses
19 appropriate land use and this used reportedly a
20 representative land use for New York.
21 However, there are other important
22 elements, just one of which are the source terms. The
23 source terms that were used as part of this analysis
24 were generic source terms.
25 JUDGE WARDWELL: I'm not trying to focus

on that. I'm more focused on what are those that were site-specific inputs? That's all I'm interested in, the inputs, and it seems that it's your position that MACCS has addressed those that were brought up by Dr. Lemay.

I assume that you've done it on the various grid sectors within the radial area that you provided uniquely to each one of those, representing what is there in that particular condition. Yes. Dr. Lemay.

DR. LEMAY: Yes. Your Honor, in MACCS-2 we have only, in the grid elements, we have very few. There is not much we can say. We can say if it's land, if it's farm or if it's something else, or water. So that's the extent of the land use.

Then there is the value of non-farm wealth, for grid elements. So there is not the level of detail that -- it doesn't say if we have, if we're dealing with tall buildings or we're dealing with industrial area or anything like that. It's not there. That's the kind of thing that I believe Dr. Terrell was trying to integrate in his analysis.

Can I comment, because Entergy seems to be going back to this mass balance thing. Can I just comment on this for a moment?

JUDGE WARDWELL: The answer is yes, possibly not right now. I don't multi-task very well. Flag me again if I breeze through, once we get through. I've got several topics to cover. I will get back to you after I resolve this topic. If I forget, too bad. No. Just flag me.

JUDGE McDADE: Actually, excuse me. Dr. Wardwell, before you do, if we could just take a very brief break in place. I just, I'll be right back. Excuse me.

(Whereupon, a short recess was taken.)

JUDGE McDADE: Excuse me. For a moment there I started to feel a little bit nauseous, and it wasn't as a result of the testimony. I think it was the result of my lunch. But thank you for indulging me there. Judge Wardwell, we're back in session.

JUDGE WARDWELL: Mr. Jones, you must have had plenty of time now to peruse that.

MR. JONES: Yes, Your Honor, and I would agree. Land use and population density are about the only two Indian Point-specific parameters that I've identified here.

I did find it on page 1.11, where it specifically said that the results that are reported should not be considered as representative of a

1 reactor accident consequences, either for pressurized
2 water reactors in general, or for the Indian Point
3 reactors.
4 JUDGE WARDWELL: I think we're aware of
5 that. We're again focusing on the input parameters.
6 That's what's of interest to us. If in fact they were
7 site-specific input parameters that weren't done by
8 Entergy, that would be of interest, that someone else
9 has done something like that, regardless of the
10 adequacy or the effectiveness of the model that
11 they're plugging it into is somewhat irrelevant.
12 DR. O'KULA: Your Honor, Kevin O'Kula for
13 the applicant. We'd just like to Point out that the
14 database that is provided with the New York State
15 Exhibit 424, one of the letter divisions there. But
16 after examining the document for the weeks following
17 its disclosure, it does appear that the sources of
18 data that were used in the development of the document
19 for decon, are of the same vintage, if not earlier,
20 than those that would have been accessed with by Burke
21 at the same Point.
22 They're both vintage documents. This one
23 stemmed from the same time. 3413, which was the basis
24 for the later document that's being discussed,
25 NUREG/CR-5148 or New York State 424, all did their

data review as far as methods on various substrates or surfaces to be contaminated, roughly about the same time.

If not moreso, that the draft NUREG/CR-5148 was somewhat earlier, in fact. Mr. Jones has made the Point previously that West Coast resources were evaluated for methods and costs per unit area, on various techniques.

But if you look at those dates in the techniques that were assessed, those are, to a large extent, no different from what was largely in place in the late 70's early 80's.

So I would conclude, based on my opinion, that the database that is encoded into decon, a cost of that accountability code is much similar to what has presently been more homogenized, but also is incorporated in the cost figures that were included in Burke, and then later made their way into the basis for NUREG-1150, and that we draw upon in the Entergy/SAMA analysis.

MS. LIBERATORE: Your Honor, Kathryn Liberatore for the State. Just a Point of clarification. It appeared Dr. O'Kula was reading from a document. I was just wondering if that was a particular page of NUREG/CR-5148 that we could cite?

JUDGE WARDWELL: Can you reference, if you were reading from something, were you reading from some page, and could you --

DR. O'KULA: Could that have been -- Your Honor, could that have been Mr. Harrison?

JUDGE WARDWELL: Dr. O'Kula.

DR. O'KULA: I was not reading. My discussion was based on just comparing my notes on the draft NUREG/CR-4158 (sic).

JUDGE WARDWELL: Thank you. Dr. Lemay.

DR. LEMAY: Yes. The same, in roughly the same section, and unfortunately I don't have the document in front of me, but Dr. Terrell also says that one of the things that could be seriously in error is the decontamination factors, and the techniques used in the cost.

He warns that given the limited data available, they could be seriously in error. That's a warning he gives in the document. So if they're the same vintage and the same sources, and they seem to be comparable to the Burke document, maybe the same warning should apply.

JUDGE WARDWELL: Thank you. Now you had another area you wanted to discuss.

DR. O'KULA: Your Honor, thank you. One -

1 -

2 JUDGE WARDWELL: No, no. Dr. Lemay.

3 DR. LEMAY: Yes.

4 DR. O'KULA: I'm sorry.

5 JUDGE WARDWELL: We're through going back

6 and forth on 5148.

7 DR. LEMAY: Before lunch, we discussed the

8 mass balance between the plume and the deposition, and

9 MACCS uses an average deposition velocity to

10 contaminate the ground. That's a single value that is

11 average. But it's a known fact that deposition of

12 velocity increases with surface roughness.

13 So as the surface goes from a plane of

14 water, to a plowed field, to a forest, to a city, the

15 deposition velocity increases. So we use an average,

16 which is appropriate on average. That means that in

17 some area, the actual contamination would be lower

18 than the average, and in the cities, it would be

19 higher than the average.

20 So although MACCS uses that uniform

21 average value, we're justified to spread the

22 contamination, because that's what's going on, and the

23 actual value would be higher. And that's just the way

24 MACCS work. It's using this average, and it is

25 understood by everybody using it that that's an

1 approximation.
2 In some areas, it will overestimate; in
3 some area it will underestimate, and it comes in in a
4 wash.
5 JUDGE WARDWELL: Have you made any
6 attempts to quantify any differences associated with
7 any of the cost parameters, or even the resulting OECR
8 or PDR, that might result from getting more refined in
9 that area?
10 DR. LEMAY: No. But what I'm saying is
11 that although there is a mass balance on average, we
12 can't use that as a basis to say that a code like
13 CONDO is inapplicable and useless and should not be
14 used. That's simply not true. There are some physics
15 behind it, and there is a reason why people who use
16 CONDO think it's a good approach.
17 JUDGE WARDWELL: But you're not advocating
18 the use of CONDO for a SAMA analysis, is that not
19 correct?
20 DR. LEMAY: I don't -- well, I'm not
21 advocating the use of any code for a SAMA analysis.
22 What I'm saying is let's try to look at methods to
23 hone in on what is the cost of decontamination.
24 JUDGE WARDWELL: Thank you.
25 JUDGE McDADE: Dr. Lemay, one thing based

on what you just said, and you were referring that the code looks to averages. The fact that here, the most densely populated part of the area of concern is toward the far outside of the 50-mile radius, would that, given the nature of the MACCS code, tend to make it more conservative than otherwise? Looking at the site-specific geography around Indian Point.

DR. LEMAY: The U.S. NRC and the European Union have done studies to study how much conservatism there is and how much uncertainty there is, and it very much depends on a lot of things. The wet deposition velocity is so much bigger than the dry deposition velocity. Any time it rains, that skews the results completely.

It's very hard to generalize and say the results would be -- there would be more contamination on the edge or less contamination. I'm not willing to make general statements like that.

JUDGE McDADE: So it's not your assumption that there would be, if there had been a plume, and if the prevailing wind direction were to the south, that the level of contamination, say in Peekskill would be significantly higher than that in Staten Island?

DR. LEMAY: I'm not sure I understand the question. You mean close by the Indian Point site,

and in the city itself?

JUDGE McDADE: Yes. Close by, within a few miles, as opposed to within 45 miles.

DR. LEMAY: Well, given the same airborne concentration, if you are dealing with a smooth surface like a plowed field, you will tend to be a little bit below the average, and you probably would have a little bit less contamination than what the average suggests.

If you're dealing with Manhattan, where the ground roughness is much, much bigger, you would tend to have a little more than the average. So that's what I'm saying.

JUDGE McDADE: Even though it was more geographically removed?

DR. LEMAY: Well, given the same concentration. So on top of that, we have to allow for dilution as you spread out where the cone spreads, and it gets more and more dilute.

But MACCS will calculate that dilution and grid element by grid element, it will look at the airborne concentration, and then it will deposit that on the ground, and then it will calculate a decontamination cost, based on CDNFRM.

So the code takes care of that for us. It

will spread the contamination in a given series of sectors, based on its model. Then it will try a different wind direction and do the same thing. It keeps doing that to build those histogram of costs, and we're always interested in the average for the histogram.

So the contamination in close by to the plant tend to be higher, and it tends to be lower as you move outward. But clearly there are scenarios where the contamination in Manhattan is sufficient to require decontamination.

JUDGE McDADE: Thank you, Doctor.

JUDGE WARDWELL: Dr. Lemay, in your study, you went in and modified the code for some of your analyses. In what situations did you do that, and why did you do it?

DR. LEMAY: When we started to model to calculate those costs, we realized that we would enter a value that we wanted to enter, like three years for TIMDEC, and the code would stop and say you entered an incorrect value.

So what we did is we looked into the source code, and there was a line of code that said, you know, check if the DEC is between this and that. We simply increased the upper range. We compiled, re-

ran the test problems, and then carried on with our original program.

JUDGE WARDWELL: So the limits of 10 DEC was one that you changed, and do you remember what you changed it from and to?

DR. LEMAY: Yes. The one with CDNFRM, Your Honor.

JUDGE WARDWELL: Okay.

DR. LEMAY: Again because, as we tried to different values, it said can't do that. I won't even look at your input.

JUDGE WARDWELL: Mr. Teagarden, do you have any idea why MACCS would put a limit on things like the CDNFRM?

MR. TEAGARDEN: Your Honor, I'll be glad to briefly note that for codes, you typically would put limitations, because putting a value beyond that may not be appropriate for algorithms that are within the code, perhaps formulas or algorithms that have a range of applicability, or secondly, because just the value might be judged as an unlikely value; it would never be expected to be used.

Such that it's a way to flag the user, that you probably don't really mean to do this, do you, put in a value that is outside the range of

normal practice. So I mean those are two reasons, but I also defer to Dr. Bixler.

JUDGE WARDWELL: And this is merely your hypothesis, based on experience. It's not knowledge of the MACCS-2 limitations?

DR. LEMAY: That's correct, Your Honor.

JUDGE WARDWELL: When was this code written? In the 80's was it, if I remember correctly?

DR. LEMAY: The code has been progressively developed, with major releases at different times. So the date for Version 113.

JUDGE WARDWELL: How about the latest version, the oldest? When was it first written and put out.

DR. BIXLER: I can clarify that. It was originally released in 1997. There are a couple of dates for early documents that were published along with the code. There's originally a 1997 SAND report, that's a Sandia report. That was 1997. A year later, it was republished as a NUREG report in 1998. So you could use either of those two years as a reference point for when it was first released.

JUDGE WARDWELL: Thank you, Dr. Bixler.

JUDGE McDADE: But the input factors go back to the mid-80's; is that correct?

1 DR. BIXLER: Some of the inputs were
2 modified along the way, or added along the way. Some
3 of the older code versions, going back to CRAC
4 particularly, didn't even allow a lot of the user
5 inputs that are now available to the user as inputs.
6 They were just hard-wired in the code.
7 So these particular ones that we're
8 talking about now, I'm not sure what the origin of
9 them was or when they were first added as input
10 values. But they certainly are part of MACCS-2, since
11 the beginning of MACCS-2.
12 JUDGE McDADE: Then we had talked
13 yesterday or the day before or the day before that,
14 I'm not sure at this point, about the use of the five
15 different plants, Surry, Zion, Grand Gulf, that they
16 took data from that and they developed the input
17 factors from a compilation of that data. That
18 occurred back in the 1980's, the mid-80's, '84-'85?
19 DR. BIXLER: Well, for NUREG-1150, that
20 was done at -- that was published, I believe, in 1990,
21 and in the late 80's was when the work was actually
22 done. So that would be the right time frame.
23 JUDGE McDADE: Okay, and one thing, and
24 again, it may be in my notes from yesterday. But with
25 regard to that, the data from those five plants, were

we looking at high value, low values, average, median, mode? What exactly, what was our takeaway from that --?

DR. BIXLER: Yeah. The intention of most PRAs, and I believe that, I'm quite confident that includes NUREG-1150, is to do a best estimate analysis. It's not intended to be conservative or anti-conservative. It's intended to be best estimate, whether you interpret that as a median or a mean. But something in the middle of the range certainly.

JUDGE McDADE: Okay, thank you. Sorry, Dr. Wardwell.

JUDGE WARDWELL: Mr. Teagarden, what does this model run on? Can you run it on a laptop?

MR. TEAGARDEN: You can, Your Honor.

JUDGE WARDWELL: Staff, do you have any other insight in regards to any MACCS-2 information that has been provided to you, that indicates why these limitations were placed on these N/A values?

DR. BIXLER: I don't know for sure, because I wasn't involved with MACCS-2 at its onset. I became involved around 2000, the year 2000. So a few years after it was first published.

JUDGE WARDWELL: Have you seen anything in the documentation that you could cite in regards to

the reasoning for limitations of these import parameters?

DR. BIXLER: I haven't seen that. But my strong belief, as a pretty knowledgeable MACCS user, is that some of the things that we talked about earlier, that if you go much beyond one year; one year was set as the upper bound, because the framework of the code was based on one year, not more a year.

As soon as you start to get into multiple years, then you have to worry about the time value of money. You have to worry about some of the logic regarding the choices of decontamination that are made.

One example that I could give for that is that you make -- in MACCS-2 framework, you make the decision at the beginning of the long-term phase, do I need to decontaminate or don't I, and if the time frame that you're going to decontaminate is long enough, it could be that just radioactive decay and weathering would have gotten you below the habitability criterion level, and you wouldn't need to decontaminate it.

But the decision is made up front. It's made at the beginning of the long-term phase, and you may have decided that you needed to decontaminate and

spend that money, when in fact because you're going to interdict for 15 years anyway, because of the long decontamination period, you really didn't need to make that decision. So there are a number of --

JUDGE WARDWELL: How about the CDFRM value?

DR. BIXLER: The CDFRM?

JUDGE WARDWELL: CDNFRM. It's the way I read it; I know what you mean. Decontamination cost for non-farm.

DR. BIXLER: Well, as we've said, that that -- the value of that --

JUDGE WARDWELL: It appears that your previous reasoning doesn't apply to that, does it?

DR. BIXLER: That's a different issue. I believe that the value that we're using, or was used by Entergy, and we used most recently in the SOARCA study, the state of the art reactor consequence analysis study, is a reasonable one.

JUDGE WARDWELL: That's not my question. My question is why -- do you have any insight into why these limitations are placed on the magnitudes of input parameters in the MACCS-2 code? You related the TIMDEC one, but that reasoning wouldn't apply to this particular parameter, would it?

DR. BIXLER: Okay. Now I understand your question. Yeah, there is a limit in the code, but I don't recall right now what it is. But it's significantly higher than the value used by Entergy, but not as high as some of the values used by ISR.

JUDGE WARDWELL: So the answer is you don't know why there's a limitation on it?

DR. BIXLER: That limitation, I would believe, is somewhat more related to just reasonable bounds, that the original authors of the code thought should be applied to those parameters, and not that they necessarily would modify the functionality of the code itself.

JUDGE WARDWELL: They do that for all parameters?

DR. BIXLER: Most every one, yes.

JUDGE WARDWELL: So most every parameter is bound, in regards to the input values?

DR. BIXLER: Right.

JUDGE WARDWELL: And that's not listed in the users guide?

DR. BIXLER: Yes, it is listed in the users guide.

JUDGE WARDWELL: Oh, the bounds of them are listed?

DR. BIXLER: Yes.

JUDGE WARDWELL: Dr. Lemay, do you have any comments in regards to what you heard, in regards to the reasoning or the lack thereof, of why those parameters were selected?

DR. BIXLER: I think they just picked a value and said well, part of the reason for bounding value is to make sure that if the user makes a typo, and types the wrong number. We're trying to help him locate that mistake.

So they would say well, I don't think it has any impact on the model. Simply it's trying to help the user identify typing mistakes, and that's common in these codes.

JUDGE WARDWELL: Thank you. Moving on to the next topic area, Entergy testimony 450 on page 31, the second paragraph, and I'll just read it. There's no need to refer to it necessarily, but it says "The exposure pathways considered during this period are ground shine, resuspension and inhalation, and food and water ingestion."

I was curious, Mr. Teagarden. Is that water ingested including ground water ingestion?

MR. TEAGARDEN: MACCS has a model that models, in essence like I said, the atmospheric

deposition onto ground water bases, and then it has some very, what we describe as simple models for an assumption of individuals will ingest that water.

So I don't know that I would describe it was much as it's not a detailed, you know, model that models that migration of contaminants into an aquifer in the local region. It's not at all complex --

JUDGE WARDWELL: So it's more of a surface water than ground water --

MR. TEAGARDEN: Surface water that is -- I would characterize it as probably more assumption-driven, but Dr. Bixler may have a more nuanced explanation of it.

JUDGE WARDWELL: Dr. Bixler, do you have a more --

DR. BIXLER: Yeah. I would agree with what Mr. Teagarden just said, and add just a little bit more to it. There are a couple of -- it really is more of a surface water model, not a ground water model. It has a portion of the model that has to do with direct deposition onto surface water, a lake, a reservoir, whatever it is, and the consumption of that.

It also has a runoff contribution, where things that are initially deposited onto land

eventually make their way into the surface water. So it has those two contributions that are accounted for.

JUDGE WARDWELL: But it doesn't have a contribution from the soluble portion of any of these, that might migrate into the ground water. Is that what you're saying?

DR. BIXLER: No. It does not consider the migration through the ground water. That's right.

JUDGE WARDWELL: Thank you.

JUDGE McDADE: In that regard, again perhaps a little bit definition of the word "migration." But you mentioned reservoirs with regard to water.

Is there anything in this calculus, site-specific? For example, if a reservoir is located in the center of the affected area, very close to the facility, but it is going to supply drinking water to a more remote location, is there any way that this particular code can pick that up and factor in those costs?

DR. BIXLER: It does account for the water being consumed. It doesn't really consider who would do the consuming. The ingestion of water and also of food is considered as societal dose. So it's attributed to the society, you know, in that region.

But it doesn't necessarily assign that dose to an individual.

JUDGE McDADE: Okay. But for example, and we're going to talk tomorrow or Monday about commuters, water commuting.

If you have a reservoir located in the immediate zone, but you have water being consumed by people, either at the periphery of the zone, say like New York City and tens of millions of people, or outside the zone, can this, as a site-specific factor, a site-specific parameter, adjust those costs?

In other words, for example, if there were an accident, the area around Indian Point were contaminated. The drinking water for New York City was contaminated. You would have tens of millions of people having an issue with drinking water.

Would this code pick that up as a cost to be factored into the SAMA analysis, and if so, how?

DR. BIXLER: It would include it as part of the population dose that gets turned into the PDR, the Population Dose Risk.

So yes, it would account for it. It wouldn't consider whether it was New York City drinking the water or someone else. It would just calculate the total dose that would occur from someone

drinking the water, and add that into the overall population dose.

JUDGE McDADE: Okay. So we're not looking at say just the square footage of the surface of the reservoir. There's a factor in there, that there are X million people drinking the water?

DR. BIXLER: Yeah. I would think of it more in terms of a mass balance in this situation. You deposit so much onto the water that based on the surface area of the water. So that, and then so much runs off into the water from the surrounding land.

That much contaminant accumulates into the water. Then the model assumes that all of that is consumed. Whatever got into the reservoir or lake gets consumed by someone. It doesn't really consider which one, which person or persons or group of people that might be. It just accounts for the total dose of consuming all that contaminant.

JUDGE McDADE: Okay, and I'm not talking right now, and we're talking about a couple of different things.

I'm sorry for my question being less clear than it should have been. I'm not talking right now about the impact of the dose, or the fact that people drinking the water and receiving a dose of a

radionuclide.

Rather, what I'm talking about is, for example, if there were a significant population that would be deprived of its source of drinking, because they wouldn't be able to use it for a significant period of time. Would that, the economic costs of replacing that water be captured in this code, and if so, how?

DR. BIXLER: No Your Honor, it would not be. It would attribute the, a dose from the water. It wouldn't -- so there would be an economic impact from consumption of that water, but it wouldn't -- it would not attribute an economic cost to that.

JUDGE McDADE: Okay. It wouldn't pick up an economic cost for the non-consumption of the water, and requiring an alternate source?

DR. BIXLER: That's correct.

JUDGE McDADE: Okay.

JUDGE WARDWELL: Dr. Lemay, did you have, need a response to any of the information just discussed?

DR. LEMAY: On this issue, my belief is that the water is consumed in each sector. You calculate a collective dose.

So if there is few people living near your

hypothetical reservoir, they get collective dose for drinking the highly contaminated water. But the people that are in a different sector don't necessarily consume that contaminated water.

DR. BIXLER: Could I respond to that?

JUDGE WARDWELL: Yes.

DR. BIXLER: Yeah, that's true in a sense. It comes to the definition of how you're calculating things.

But in essence, it is true that if the water body was in a particular sector, then it would assign the population dose to that sector. In effect, it doesn't matter, because if it had assigned it to any other sector, the value would have been the same anyway.

It's accounting for the entire consumption of all that water. Whatever the quantity of water is that's now contaminated, it's all being consumed. It's just a matter of, you know, which group actually consumes it.

JUDGE WARDWELL: So really the analysis, if I hear you correctly, is essentially consuming the radionuclides, not the water? Mass balance again.

DR. BIXLER: That's right, that's correct, yes.

JUDGE McDADE: And again, perhaps I apologize for the clarity, but both Dr. Lemay and Dr. Bixler, my question had to do not with the dose factor, but rather whether or not the economic cost. For example, you have a water supply. People, millions of people turn on their faucet and get water to drink.

The economic cost, if for a period of time during clean-up, they couldn't turn on their faucet and get water, but rather would have to have water trucked in from other locations. Whether or not those kinds of economic costs are captured, and from what I understood you saying, there is nothing in this code that would capture those economic costs?

DR. BIXLER: That's correct. Let me add an additional detail to what I said about consumption of the water. There is a limit on -- a dose limit that's imposed in the input, that says that quote "people cannot get more than a certain dose per year."

There's an upper limit, based on regulations, that would impose a limit, and if things were too contaminated to meet that limit, then there would be -- there would be an accounting for interdiction of food and water.

So that would, that could be implemented

in the code. It may say that particularly food from farmland is too heavily contaminated, nobody can eat it. So we're going to count that as a loss instead of -- so that could become an economic loss.

But it doesn't do that for water in particular. It does not account any economic value to the loss of the water. I think what would probably happen in reality is that people would buy bottled water in that area, and consume that. Lots of people already do that anyway.

So I think it would maybe stimulate more use of bottled water than you would have otherwise. But no, that would maybe be the primary remedy to the situation.

JUDGE McDADE: But in any event, that economic, additional economic cost is a factor?

DR. BIXLER: It is not factored in. That's right.

DR. GHOSH: May I add something? This is Dr. Ghosh of NRC staff. I think what you're getting at is the potential economic accounting for something like a resource, like a natural resource, that you have a body of water that becomes contaminated.

MACCS does account for the doses from that, and because we use a linear, no threshold dose

model, to some extent it doesn't matter who's drinking that water. We're going to add up all the doses and get the similar number, approximately the same number.

I think your second issue was aside from this dose accounting, are we accounting for the economic impact of losing some resource? I just want to comment on that.

Certainly, MACCS does not do that. That is not part of our NRC guidance right now. The NUREG BRs that I believe Dr. O'Kula referenced before, those are the primary guidance documents we have for doing any kind of cost-benefit analysis, which includes the guidance that the applicants used and that we review to for the SAMA analysis.

That's NUREG/BR-0184, as well as NUREG/BR-0058. They do not talk about that economic loss as being required to be part of the accounting. So right now, by NRC policy, we don't consider that. However, you may know that there is what's called a SECY paper in front of the Commission on, you know, reevaluating, potentially reevaluating how economic consequences are dealt with with the NRC.

This is a policy issue that the Commission will be looking at. But our current policy is not to include those in the economic cost accounting.

JUDGE McDADE: Okay, thank you.

JUDGE WARDWELL: Moving on to the next topic, I'll refer to page 57 of Entergy's testimony, and at the very top it says "Based on the pedigree of NUREG-1150 and NUREG/CR-4551 data sources, we know of no more appropriate data that is readily available for licensees to use in a SAMA analysis, to satisfy the purposes of NEPA."

There has been a recent email that's come of note, in regards to some statements made in that, specifically that the pedigree of some of these NUREG-1150 values is not known, and is offering a research project to help improve the pedigree of these values.

I'd ask the staff, are you aware of any other documents besides this email that has advocated the need to improve the pedigree of these NUREG-1150 values?

DR. GHOSH: No, we are not aware of any other documents, and I explained in an affidavit that I believe has been filed for this proceeding, on giving context to what that set of emails, plus what looked like an attachment to an email that in fact wasn't an attachment to an email. It was a separate document that was all bundled together in an ADAMS package, as part of a FOIA information request.

1 Even that particular line in that
2 document, just so we know the context of it, that
3 proposal was submitted as part of, as a staff proposal
4 for long-term research.
5 The NRC has a program called the Long-Term
6 Research Program, where we try to identify research
7 projects that will be useful to the NRC five to ten
8 years down the line, to fulfill some critical
9 knowledge gap or maybe up and coming technology that's
10 going to be coming down the pike.
11 We want to make sure we have this forward-
12 looking view, to get ready for any issue, regulatory
13 issues that will come up. Now as part of this Long-
14 Term Research Program, staff were allowed to submit
15 any proposal that an individual wishes to have
16 considered.
17 Then there is a committee set up, a review
18 committee of senior level staff from across the
19 agency, with very diverse expertise, to evaluate those
20 proposals. That particular proposal was submitted by
21 a staff person who unfortunately is deceased at this
22 point, so we could not have him clarify what he meant
23 by that line.
24 But his proposal was evaluated by the
25 review committee of eight people, and they ranked his

proposal as one of the lowest among all of the proposals that were submitted that year, in part because the committee did not feel that he had identified any critical knowledge gap or technology gap or problem with the way we are doing things currently. So just to give some background of --

JUDGE WARDWELL: What year was that?

DR. GHOSH: This was, his proposal was submitted at the end of 2010, as a proposed project for fiscal year FY '13.

JUDGE WARDWELL: So this study obviously hasn't been funded, and do you know of any other studies that have been proposed or funded with regards to modifying the 1150 values?

DR. GHOSH: No. That particular project was not funded. Just in general, as part of, you know, NRC has a number of codes, primarily through Sandia in the arena of severe accidents, that we routinely maintain and update as we go along.

You know, we have our planned maintenance and update activities, and certainly as part of that, you know, we can envision that we might be revisiting some of these issues down the line. But there's no concrete project at this point for that particular issue.

1 JUDGE WARDWELL: Thank you, Dr. Ghosh.
2 Dr. Lemay, do you have any comments on that?
3 DR. LEMAY: I think it would be useful to
4 get a good pedigree, Your Honor.
5 JUDGE WARDWELL: Thank you. Dr. Ghosh,
6 earlier today you nicely summarized the SAMA process
7 and how you evaluate the various cost beneficial ones
8 that were generated from this process, which is
9 primarily a probabilistic analysis; correct?
10 DR. GHOSH: Yes.
11 JUDGE WARDWELL: Have you ever seen any
12 facility then step back and say fine, we've done that.
13 But let's just take a look at, I guess I would call it
14 a semi-deterministic, still using a probabilistic
15 Level 1 and Level 2 really.
16 But you know, we do not know which
17 direction the wind will be going, as one example. So
18 let's take a look at what would happen, just so we
19 know what it is in a deterministic manner, if it went
20 in only -- if it went in that direction during the
21 time the action did occur, because you don't know that
22 it isn't going to.
23 Again, I want to back up a bit and just
24 emphasize that I'm fully aware and fully appreciate
25 why the probabilistic method is used, and that makes

sense.

What I'm just saying now is has anyone just stepped back and say let's add onto that, at least one pass of this analysis, doing something like forcing the wind directly towards the New York City area.

Run the MACCS code, but force it to be in that direction. I guess you just put the wind in all the directions. I don't know how you do it, but if -- you get my drift. Have you ever considered, or do you know of anyone that has considered just doing a deterministic pass at this analysis, to really get the upper bound, if you will, of what the impacts might be?

DR. GHOSH: Yeah. I personally am not aware of -- certainly MACCS can be run in a mode, where you look at a particular weather sequence and then blow it towards a particular, in a particular direction. I personally am not aware of a study that has been done like that.

However, MACCS always produces a statistical output of results, based on different weather conditions and, you know, for different wind directions. The one thing that we do know is that these distributions tend to be a lot more normally

distributed.

So that if, for example, you're looking at the mean value, which is the one we used by our regulatory policy, it tends to be skewed towards a higher percentile.

So the mean -- if you had a perfectly normally distributed outcome, the mean would be the same as the median, which means half the time it's higher, half the time it's lower.

In fact, what we find with most applications that we've done, and my colleagues have done more than I have. But and I think they found the same thing. The mean tends to be skewed more towards the 70th percentile, sometimes even a little bit higher.

So we already know that by looking at the mean, that the majority of, perhaps up to 70 percent of the outcomes in terms of weather conditions and where the wind's blowing, is going to be lower than what we are using, for example.

So we have some data. We haven't maybe looked at a specific, more specific than that. But we do have a statistical measure to do that.

JUDGE WARDWELL: And that percentile deals mostly with the velocity rather the direction though?

DR. GHOSH: That would lump everything together. So all meteorological conditions, which I think Mr. Teagarden explained we looked at a year's worth of weather data, and made sure that that year's worth of weather data is representative of the general meteorological conditions, and there's a statistically significant sampling that's done.

So this is based on thousands and thousands of weather trials, and then looking at the statistical.

JUDGE WARDWELL: I understand that, but in fact, if the prevailing wind is from the east, then in fact your analysis would blow it away from one of the most sensitive receptors, who is pretty much south?

DR. GHOSH: Yeah. But in this case --

JUDGE WARDWELL: So that's what I'm saying.

DR. GHOSH: Yeah.

JUDGE WARDWELL: Do you take this -- and I understand you say you do not know of this. I think you've answered my question, that you do not know of anyone that's then just stepped back and said "okay, in addition to these analyses, I want to see what would happen if this occurred when there is a northerly wind blowing everything towards the south,

because that is a very sensitive receptor in that particular location at this site, where lots of other facilities don't have quite this sensitive receptor."

It might be prudent for me to do that. You don't know of anyone that's done that?

DR. GHOSH: Right. But you know, the mean result in general is skewed towards those sensitive areas. That's kind of why the distribution of results has a lot of normal distribution, because the average tends to be skewed towards --

Let's say only 20 -- this is completely hypothetical, but let's say only 20 percent of the time the wind is blowing towards the major metropolitan area. But that 20 percent of the time, the consequences are greater, could be a lot greater.

That gets weighed much more heavily in the average than the 80 percent of the time that it's blowing towards forest land, where you know, people ma not be living. So that's naturally accounted for in the statistics, which is why the mean, the average tends to be skewed towards those heavy results.

JUDGE WARDWELL: Thank you very much. I appreciate that testimony. Again, Dr. Lemay, do you have any comments on that?

DR. LEMAY: That's actually -- I believe

that for the Indian Point, the wind is predominantly from the north. Maybe Entergy can confirm that, but that's my belief.

JUDGE WARDWELL: Thank you. Does anyone have any knowledge of what the predominant wind is here just quickly?

DR. LEMAY: Your Honor -- oh, go ahead. Go ahead.

DR. O'KULA: Your Honor, Kevin O'Kula for the applicant. There is some seasonal variation.

JUDGE WARDWELL: But keep it simple.

DR. O'KULA: On average, the wind would be blowing north to south. But it can be balanced seasonally.

(Off record comment.)

JUDGE WARDWELL: You support Dr. Lemay's statement? Is that a yes.

DR. O'KULA: It is bar-bell shape, and there is some, also some preference based on seasonality, of going in the opposite direction.

JUDGE WARDWELL: Sure. Thank you. My last topic here is an area that I tend to get a little confused on, and I'll refer to 450 of Entergy's testimony on page 66, and again I think I can read it to you, to get us off and rolling.

It deals with the dose reduction factor and the difference between that and the decontamination factor, and I think I'll just ask Mr. Teagarden to explain that a little more indepth for me, and the nuances associated with it, and when you should or shouldn't be using it, especially in regards to the testimony that was brought up here. That was kind of long discussion.

I don't want to get into the details of that discussion, because I'm not sure it's really relevant to the key matters that we have to deal with here. But when I review the testimony, I'd like to have more information in this area, so I can come from a better position.

MR. TEAGARDEN: Yes, Your Honor. We highlighted the distinction, because MACCS works off of a dose reduction principle. When you look at data sets for how effective decontamination activities may be, they don't always include activities that don't remove material.

So if I have a -- if I have open land, I can reduce the dose by deep plowing, where I essentially take the surface material and plow it over and shove it down a foot or two. Then I get natural shielding from the new soil above it.

1 That gives you a dose reduction. However,
2 from a decontamination factor, it doesn't give you
3 anything, because you haven't removed the
4 contaminants.
5 That's what we wanted to highlight, is
6 that when you go to some of these data sources for
7 picking out decontamination efficiencies, you know,
8 you can have elements that are, that may provide you
9 some dose reduction, but they would say that they
10 don't have any effective decontamination factor
11 reduction. That can play an important role in dose
12 reduction strategies.
13 JUDGE WARDWELL: Say that sentence over
14 again. I'm sorry. I was writing a note right in a
15 key spot.
16 MR. TEAGARDEN: Many of these data sets
17 for decontamination techniques will not represent the
18 dose reduction that can be achieved, because their
19 focus is on removing material, not reducing dose. So
20 sometimes you can look in these data sets and now have
21 a decontamination factor of one, even though meaning
22 nothing is being removed, even though you can achieve
23 dose reduction.
24 So we wanted to highlight that, because
25 just skimming through a library of decontamination

1 techniques, if they are listing things in the form of
2 decontamination factors, it can be misleading, because
3 it doesn't mean that they can't provide effectiveness
4 that goes beyond the value that's listed.
5 JUDGE WARDWELL: How do the techniques
6 come into play and inputted in SAMA? I guess that's
7 something we really haven't talked about, because
8 there's a plethora of them that could be chosen. Are
9 they randomly chosen again, or is it input-selected?
10 MR. TEAGARDEN: Yes, Your Honor. They are
11 built into the variables within MACCS. If you can
12 imagine you have a library of potential
13 decontamination techniques, you would, for a
14 particular, you know, application, you could pick
15 different ones that would be appropriate to the
16 facility that's right before you.
17 JUDGE WARDWELL: So you can input that
18 selectively? Is that what you're saying?
19 MR. TEAGARDEN: Well, I'm saying that a
20 range of techniques would be used, and there's a
21 library of techniques that could be applied. And you
22 know, in the decontamination strategy, you would be
23 saying this technique makes the most sense here.
24 All that has to be rolled together into a
25 very homogenized manner, as Dr. O'Kula mentioned

earlier, or used a term in this regard, in that you apply this technique and maybe that gives me a dose, a decontamination factor of five, and this one gives me a decontamination of seven.

All I'm really going after is a dose reduction of three, and I need these different pieces to come together, to achieve that for the particular structure or area that I'm looking at. So it's a matter of compiling these, and having --

This is why I think it's important for subject matter experts to be involved in the development of values for these sorts of parameters, because you need to recognize which techniques will be employed from this library of perhaps 100 techniques, and what order might they be applied in, and what does each one give you within the variables of what you're looking towards.

But from MACCS, they all have to be assimilated into it cost me this much to get a dose reduced by three. It cost me that much to get a dose reduced by 15.

JUDGE McDADE: Well, are those site-specific, or are those taken from 1150?

MR. TEAGARDEN: They're taken from NUREG-1150. These are the values for CDNFRM.

1 JUDGE WARDWELL: Say that again?
2 MR. TEAGARDEN: What we're talking about
3 is what gets rolled up into the cost for non-farm
4 decontamination, CDNFRM, and the associated dose
5 reduction factor.
6 JUDGE WARDWELL: Those are the only
7 parameters that represent the selection of the --
8 MR. TEAGARDEN: The suite of techniques
9 that would be chosen for the range of facilities that
10 you are looking to decontaminate.
11 JUDGE WARDWELL: So in actuality, there is
12 no designated suite of any decontamination activities
13 that are going on here. It's all represented by that
14 number, of which we already have a discussion of the
15 foundation of that number?
16 MR. TEAGARDEN: Yes, Your Honor.
17 JUDGE McDADE: Okay, and let me just --
18 excuse me if I'm confused. But you have a facility,
19 for example, like one of the facilities that was
20 described, Grand Gulf. Within ten miles around Grand
21 Gulf, within 50 miles of Grand Gulf, there's virtually
22 no concrete. It's primarily farmland.
23 You would be able to reduce, as you've
24 described, the dose by plowing under contamination in
25 the farmland. You would have very little material to

remove. If you were in an area surrounded by concrete, and particularly and you had cesium and the cesium bonded with the concrete, in order to conduct a decontamination, in order to reduce the dose factor, you wouldn't be able to just run a plow acre after acre.

You would need to pick up concrete and not only pick it up; you would then need to transport it and you would then need to store it someplace. Are those differences of sites, and say from -- you know, we talked about Zion being similar to Indian Point, Grand Gulf not being.

Are those variances picked up in the code? Is there any kind of input factor that would pick that up, or would the decontamination costs appears for the same overall dose to be the same, whether it was outside of Grand Gulf or outside of Indian Point?

MR. TEAGARDEN: Yes. For the distinction that you used in your example, of farmland versus non-farmland, those are evaluated within MACCS, because we have two separate cost values, one for farmland on a per acre basis for decontamination, and then one for non-farmland.

Then the one for non-farmland, as we read earlier from the Burke document, is based on a mixture

of residential, of commercial, of industrial. And you know, that mixture then was viewed as applicable to all five sites for the NUREG-1150 study.

JUDGE McDADE: But there would be nothing that would figure the difference, say in disposal costs, between an urban area like New York and an urban area like Chicago? You would look to any site-specific information, as far as disposal costs of the contaminants?

MR. TEAGARDEN: There is not a distinction within here, such that they had a difference between Zion outside of Chicago and another site somewhere else, Grand Gulf.

JUDGE McDADE: So the only difference between contamination costs is just that one bright line between farmland and non-farmland?

MR. TEAGARDEN: And with the levels of dose reduction, that's correct.

MP Your Honor --

JUDGE WARDWELL: It's DFs; is that correct?

MR. TEAGARDEN: Sorry?

JUDGE WARDWELL: When you said "dose reductions," that's the DF value?

MR. TEAGARDEN: That's correct.

1 JUDGE WARDWELL: Now does this -- if one
2 was trying to derive these values on their own, and be
3 consistent with what has been presented, consistent
4 with the approach that's been presented in 1150 or
5 assumed by 1150 or inherent in 1150, whichever way we
6 want to word it, would one lean towards complete
7 removal, or in fact would always go to removal, or can
8 in fact some of them be buried and still there, but
9 just reduced? Getting back to the DF versus the DRF
10 again.
11 MR. TEAGARDEN: And this is where perhaps
12 it emphasizes the two aspects, one of, you know, the
13 importance of the right people evaluating this, to
14 have a breadth of understanding of the different
15 techniques.
16 But each of those techniques has an
17 associated cost, and if one particular technique may
18 have a higher removal rate but three times the cost,
19 when trying to apply that everywhere may result in
20 condemned land.
21 So there are, you know, it's there are
22 multiple trade-offs that have to be evaluated in
23 regards to the cost of the individual techniques and
24 their application, and their application on particular
25 substrates. I'm not sure if I've fully answered your

1 question.
2 JUDGE WARDWELL: Well, you haven't. You
3 have and you haven't. You've emphasized the
4 complexity of this, and aren't we paralyzed to say
5 what went into the ones at Indian Point, because in
6 fact we have no information really how that number was
7 derived.
8 We can't make a comment on whether that
9 weighted more towards burial or removal or what
10 technique. It's just a number that's there, that we
11 have to live with. Is that correct, for the non-farm?
12 MR. TEAGARDEN: For the non-farm? Yes.
13 It's the value that was from NUREG-1150, that you
14 know, we hold to be a seminal document.
15 JUDGE WARDWELL: Dr. Lemay, would you like
16 to comment?
17 DR. LEMAY: Okay. First, to be absolutely
18 clear on the record, yes, that's true. MACCS-2 has no
19 way of specifying techniques or anything at that level
20 of detail. It has only one aggregate value, the cost
21 of decontamination per person.
22 JUDGE WARDWELL: And is there any guidance
23 on what that value should reflect, like oh, the goal
24 is to have removal. But if you can't have removal, it
25 should be --

1 DR. LEMAY: The only guidance is that you
2 have to achieve a dose reduction factor of three or a
3 dose reduction factor of 15.
4 JUDGE WARDWELL: So they don't care
5 whether it's buried or it's --
6 DR. LEMAY: And they don't care if it's
7 semi-urban, residential, parkland. It's a very simple
8 model, and that's the only value we have to play with.
9 JUDGE WARDWELL: Well, would you really
10 characterize it as a simple model? I mean certainly
11 this --
12 DR. LEMAY: That part, yeah.
13 JUDGE WARDWELL: This parameter carries a
14 lot of weight, it seems like, if it's --
15 DR. LEMAY: Right, right.
16 JUDGE WARDWELL: If this is the burden it
17 has to also carry, in addition to just, I mean, the
18 cost. I guess it makes sense it would have
19 represented these various mitigation alternatives.
20 Not mitigation, decontamination alternatives.
21 So back to where I started with this.
22 Again, Mr. Teagarden, why were you interested in
23 clarifying the DF versus the DRF, the decontamination
24 factor for the dose reduction factor? Say that one
25 more time, now that I understand where we end up.

MR. TEAGARDEN: Contention 12 took some different shapes and forms throughout its history, and one element of that was that a view that dose, a dose factor, I'm sorry, a decontamination factor greater than 10 was not readily achievable.

Some of that flows from the Sandia site restoration report. They were working with plutonium; they were working to, where they have concerns that because of the alpha nature of the radiation, the toxicity, the long half-life, they tend to say it's better just to demolish things and take it away.

In the midst of all of that, and some of these discussions and references where decontamination factors were applied and specified, in saying things like see, none of these DFs are very high. That's because they weren't reflective of the variety of techniques that can be used to reduce the dose.

We didn't want a mischaracterization of what was achievable for dose reduction, by looking at individual techniques for removing contaminants.

JUDGE WARDWELL: Thank you.

JUDGE McDADE: Before, just one quick question, sort of a follow-up on some of the one that I was asking before about input parameters. Is there any input parameter for the interdiction of

infrastructure, to be a site-specific factor?

For example, in the New York metropolitan area, if a certain area around Indian Point were to be closed off for a period of time to outside people, and you didn't have access over the Tappan Zee Bridge or the George Washington Bridge, the economic impact of that could run into the tens of billions of dollars.

That same situation occurring in Chicago, that would limit people driving north from Chicago to Milwaukee, maybe I'm showing a regional bias here, but would have less of an economic impact. Is there any way of, in this system, to identify those costs associated with the interdiction of infrastructure on a site-specific basis?

MR. TEAGARDEN: Your Honor, the variable POSCST represents the disruption cost. It's a one-time payment. You know, we've talked about it. It's reflective of loss of income for a time, associated with that disruption, of approximately 100 days for individuals, 180 days for commercial establishments, and therefore a median of 140 was used.

You know, that variable, because it's a per capita value, represents, I believe, a site-specific nature, where when you have, where you have particular locations with high population density, and

1 those individuals are removed from their land for
2 decontamination purposes. So they are undergoing a
3 disruption for some period of time. Because of the
4 per capita value, those values are scaled accordingly.
5 JUDGE McDADE: Okay. But what I'm talking
6 about are not the populations who reside or even work
7 within the area. The example that I gave, for example
8 of the George Washington Bridge and the Tappan Zee
9 Bridge, probably on a daily basis, tens of millions of
10 dollars' worth of commerce pass over those bridges,
11 either going up the East Coast or down the East Coast.
12 And my question is, and again even in a
13 similarly dense area such as Chicago, you don't have
14 it as a transit corridor the way you do in the New
15 York metropolitan area. I was just wondering if those
16 kinds of economic disruptions are captured on a site-
17 specific basis anyway, and if so, how?
18 DR. BIXLER: Your Honor, I think I can
19 help with the answer to this question, if that would
20 be okay.
21 JUDGE McDADE: Please.
22 DR. BIXLER: Yes. The value that goes
23 into the site file, that captures the wealth
24 associated on a per capita basis, includes the value
25 of land, the value of all improvements both on the

land, utilities, infrastructure, everything. That all needs to be captured as part of the value that is included in that file.

So for an area like New York City, that would be included in the value on a per capita basis. So that if you either interdict or you condemn any land, it accounts for those values.

JUDGE McDADE: Okay. I'm not really sure how, Dr. Bixler, and again, we're not talking about tearing down the Tappan Zee Bridge.

We're talking about the economic costs associated with if for a period of time, such as 60 days or 120 days, individuals were not able -- not people who live in the area, not people who work in the area, but people from Massachusetts, Rhode Island, who are manufacturing or are purchasing manufactured goods, that they can't transit that corridor without a significant detour.

Are those -- and I don't want to belabor the point. Are those economic costs picked up any place?

MR. TEAGARDEN: Your Honor, if I may add to my original answer, because Entergy did do something that other applicants I'm familiar with have not. Only a few have done it; Entergy was one, where

they ran a sensitivity case for adding to, in addition to the tangible wealth, the potential for loss of tangible wealth, tangible property that Dr. Bixler noted.

Entergy ran another case to look at the economic impacts from a gross county product basis, a gross domestic -- a smaller version of the gross domestic product basis. It's what's produced in the area. So they did this in terms of, you know, so loss of tourism income, loss of business income.

So they took that value, and they added it to their tangible wealth value, such that their site-specific value incorporates two dimensions. One is the tangible wealth, and the other is the loss of produce income, so to speak, for a given period of time.

JUDGE McDADE: Okay, thank you. Dr. Lemay, do you think these costs are picked up?

DR. LEMAY: Okay. Francois Lemay for the State of New York. What my colleague said is exactly true, but the precision that needs to be made, the calculation is sector by sector. MACCS has no way of modeling transit or things that are outside. It cannot move wealth between sector or account for something outside a 50-mile zone. That's not the way

it's designed.

Everything that's in, that's been said is absolutely true for sector by sector. That's the way MACCS works. It looks at the wealth in a sector; it looks at interdiction in a sector; cost of relocation in a sector, and it just sums them.

I think we would get into a very complex model if we tried to move people around and wealth around and account for stuff outside the 50-mile zone. But that's not the way MACCS work. Is that --

DR. BIXLER: Let me just dd a little bit more to that explanation. If a bridge, for example, that was your example that you brought up, happens to be in a grid element in the MACCS-2 calculation, it would be considered as part of the infrastructure that would be assigned.

It would have a value and it would be divided per capita, and included in the overall value of the property in that area, in that grid element. If that grid element were interdicted for some period of time, like 30 days or 100 days or whatever, 120 days, then there would be a loss of value associated with not being able to use that property.

So it would include bridges. It doesn't account for necessarily people coming in from outside.

1 But it does account for the fact that the bridge is
2 not being able to use, and there's a loss of economic
3 value associated with it.
4 JUDGE McDADE: Okay, thank you Dr. Bixler.
5 DR. GHOSH: Could I add just one more
6 thing? This is Dr. Ghosh for staff. The sensitivity
7 that Mr. Teagarden mentioned, the NRC adopted that as
8 the base case for the SAMA analysis. So the FSEIS,
9 the numbers that are in the FSEIS reflect that bumped
10 up value.
11 So in addition to the infrastructure
12 losses, the GDP losses are also accounted for in the
13 base case SAMA analysis.
14 JUDGE McDADE: Okay, thank you. No more
15 questions?
16 JUDGE KENNEDY: No more questions.
17 JUDGE WARDWELL: No questions.
18 JUDGE McDADE: Once again, a statement I'm
19 sure you thought you'd never hear, is that the Board
20 has no additional questions on this contention. Based
21 on what I said earlier, it's now about five minutes of
22 4:00. If we stood in recess until 4:15, would that be
23 enough time for the parties to pull together their
24 questions, or would you request a longer period of
25 time than 4:15?

1 Again, what we anticipate doing is going
2 for about another hour, once we come back, and not
3 more than that. Mr. Sipos, would you suggest 4:15,
4 4:30? What would you suggest?
5 MR. SIPOS: Your Honor, I'd like to split
6 the difference. How about 4:20?
7 JUDGE McDADE: Okay.
8 MR. SIPOS: I'll be conservative, and I'll
9 go with 4:20 in splitting the difference.
10 JUDGE McDADE: From Entergy's standpoint,
11 would that be sufficient time for you?
12 MR. BESSETTE: Yes, Your Honor, and before
13 we adjourn, I do have one housekeeping matter. But
14 I'll let you finish on this issue.
15 JUDGE McDADE: Okay. Mr. Turk?
16 MR. TURK: We just wanted to note a
17 potential scheduling problem, Your Honor. One of our
18 witnesses may not be able to join us again next week,
19 if we need to do Contention 16 on Monday. There's a
20 medical issue that may need to be dealt with.
21 MR. HARRIS: Your Honor, this is Brian
22 Harris for the staff. This is with Mr. Harrison, but
23 his testimony is not really directed to New York 16.
24 So it shouldn't affect the staff's or the Board's
25 ability to go forward on New York 16.

1 JUDGE McDADE: Okay. It's your view that
2 it would not significantly compromise the staff's
3 position, if Mr. Harrison were not here. It would be
4 helpful to you if he were, but it wouldn't
5 significantly compromise?
6 MR. HARRIS: That's correct, sir.
7 JUDGE McDADE: So what you're saying is
8 that you wouldn't object to going forward on 16 on
9 Monday, even and unfortunately hopefully he will be
10 here. But under the unfortunate circumstances if he
11 were not, you would still be prepared to go ahead?
12 MR. HARRIS: Correct. But if there was
13 some question that Your Honors may have already
14 determined you need to ask him in particular, then it
15 would be useful to do that today. But there may not
16 be anything about his personal testimony that you
17 intended to question, that somebody else couldn't
18 answer.
19 JUDGE McDADE: I mean my first reaction to
20 that is that, and I don't mean this to be
21 inappropriate, but the staff witnesses on Monday would
22 be somewhat fungible; but the witness who would be
23 able to answer one question would be able to answer
24 the other. Perhaps one would be better able to answer
25 it, and would feel more confident in doing so.

1 But it doesn't appear that there would be,
2 that you would be left totally and, you know, being
3 very selfish, the Board would be left totally at a
4 loss, to be able to get its questions answered?
5 MR. HARRIS: No, Your Honor. I think that
6 we'll be able to answer any questions that you have,
7 going forward on Monday.
8 JUDGE McDADE: Okay. Do you want to
9 rethink the -- since we've been talking?
10 MR. SIPOS: I actually do, Your Honor, but
11 I also know Mr. Bessette has a housekeeping. So
12 before I move the chains, I'd like to turn it over to
13 Mr. Bessette.
14 MR. BESSETTE: Thank you, Your Honor.
15 During lunch, Mr. Sipos and I consulted with regard to
16 New York 17, and we wanted to note that if the Board
17 has any concerns about completing New York 17, the
18 parties would be amenable perhaps to a schedule
19 change, to moving that to December, if that's
20 something that would make the Board feel more
21 appropriate for timing of that contention.
22 It was somewhat mooted by Your Honor's
23 statement that we plan to get through that. But we
24 have consulted, and wanted to let you know that was an
25 option, that both New York's experts and Entergy's

1 experts could support. That's all.
2 JUDGE McDADE: Thank you. Should we just
3 say then 4:30 that we come back?
4 MR. SIPOS: Yes. Thank you, Your Honor.
5 JUDGE McDADE: We are in recess.
6 (Whereupon, the proceedings in the
7 foregoing matter went off the record at 3:58 p.m. and
8 went back on the record at 4:30 p.m.)
9 JUDGE McDADE: The hearing will come to
10 order. Any other new administrative matters before we
11 get started?
12 (No response.)
13 Apparently not.
14 MR. BESSETTE: Your Honor, this is Paul
15 Bessette.
16 JUDGE McDADE: Apparently. Okay.
17 MR. BESSETTE: Just before we begin the
18 cross-examination, we understand the process the Board
19 has outlined for this contention. But for the record,
20 as Mr. Fagg noted yesterday in his oral motion, we
21 believe such procedures are inconsistent with the
22 Commission direction on this.
23 But we understand the Board's ruling, and
24 we don't want to take up much time of the Board. But
25 if the Board would recognize this as a standing

1 objection for any other contentions that may have
2 these procedures, we are ready to move on.
3 JUDGE McDADE: We understand, and we will.
4 And, you know, the Board felt that the very limited
5 examination that we had on Tuesday was very helpful to
6 the Board and increased our security that we
7 understood the issues, and, therefore, we think we are
8 optimistic that this will be as helpful as was that
9 brief interrogation on Tuesday. So --
10 MR. BESSETTE: Thank you, Your Honor.
11 MR. SIPOS: Your Honor, a housekeeping
12 matter. I'm sorry. Ten minutes ago I got an email
13 from one of our -- one of the State's witnesses on New
14 York-37, who is encountering some -- a medical issue.
15 And I'm happy to discuss it, mindful of HIPAA, I
16 believe.
17 But right now the witness seems to be
18 bedridden, and perhaps I will talk to Mr. Bessette and
19 Mr. Turk about how that impacts things next week. I
20 literally got it 10 minutes ago.
21 JUDGE McDADE: Okay. Who is the witness
22 and --
23 MR. SIPOS: Mr. David Schlissel, S-C-H-L-
24 I-S-S-E-L.
25 JUDGE McDADE: Okay. Well, he -- I'm not

1 really sure of the legal term, but is pretty much the
2 whole ball of was for New York on 37?
3 MR. SIPOS: He is a large part, yes, Your
4 Honor.
5 JUDGE McDADE: Okay. Did he give you any
6 reasonable estimate as to his anticipated recovery
7 period? Because we're talking now -- today is
8 Thursday. We're talking about Monday.
9 MR. SIPOS: He did not provide a
10 prognosis, and we will do everything we can to find
11 more about the situation. I just -- I wanted -- I
12 literally opened the email, and I'm letting everyone
13 in the room know about it.
14 JUDGE McDADE: Okay. Let me --
15 MR. SIPOS: Do you think we will get to 37
16 on -- well, this gets to the issue of 17 and I guess
17 5, good old contention 5, which is out there as well.
18 JUDGE McDADE: Well, I mean, let me go
19 back. I mean, here is kind of the thing, and to a
20 degree I want to kick it back to you all. I would be
21 hopeful of getting to 37 on Monday, certainly if not
22 on Monday on Tuesday. It is scheduled to go after 16
23 and 17.
24 On the other hand, there is a possibility
25 -- and ---

1 MR. SIPOS: I misread the email. I
2 misread who it was from. It's actually from former
3 Commissioner Peter Bradford, not -- it's the same
4 situation and the same contention. Sorry to
5 interrupt, Your Honor.
6 JUDGE McDADE: No. But -- okay. My sort
7 of question to you all is this. One would hope that
8 we could get to 37 on Monday, and, you know, based on
9 how long it has taken us for the first two, you can
10 sort of dismiss my optimism with -- you know, with a
11 shrug. But we would hope to get to it by Tuesday at
12 the latest.
13 That said, we may not get through all of
14 the contentions that are currently on track -- the 10
15 or the nine contentions that we had by the end of next
16 week, and that is why we had time set aside in
17 December.
18 If it appeared that, one, he is not going
19 to be available next week, we could remove it from the
20 schedule and move it to the end of the Track 1, which
21 would mean that it probably then would be heard in
22 December. But what I'd like you to do is just consult
23 among yourselves tomorrow, because, you know, once we
24 start this it's the same thing, that, you know, you've
25 advised witnesses and they're on schedule.

1 So when you change it from one to another,
2 you know, to accommodate one witness, you know, and we
3 certainly need to accommodate if it's a significant
4 health issue, it then can adversely impact the
5 schedules of other witnesses. So I don't want to make
6 an absolute pronouncement on this.
7 So -- at this point, so if you could
8 consult among yourselves tomorrow, hopefully you will
9 have a better idea of what the medical circumstance
10 is. And then, in the event you desire to have it
11 taken off the schedule, either, you know, to have it
12 move after, you know, the -- some of the other
13 contentions that we would have next week -- in other
14 words, if he says, "Well, I know I can't be there
15 Monday, but I think I can be there Tuesday, but I
16 definitely can be there Wednesday," you know, then we
17 can, you know, try to do that again if it doesn't mess
18 up significantly other witnesses.
19 On the other hand, if it's something that
20 there is no reasonable likelihood that he is going to
21 be recovered by next week, then the sooner we can
22 start trying to adjust.
23 So, again, if you could inquire further
24 tomorrow, Friday, we've got that day, consult with the
25 staff, consult with Entergy, and then, you know, have

one of the parties deputized to contact us, either with a consensus -- you know, a joint request that we do A, or, alternatively, expressing the parties' different views of how we should proceed on New York-37.

MR. SIPOS: Very well. And I would be also willing to explain to Your Honors and to Entergy counsel and NRC counsel the condition possibly -- I don't know if there is a sidebar in this proceeding, but I am just a little reluctant to put everything on the record, given the medical issue.

JUDGE McDADE: Well, I'm -- you know, I'm sort of predisposed at this point in time for the Board not to inquire further. I am willing to take your representation that the witness, for medical reasons, is not able to be here, and, you know, there is no predisposition to inquire beyond that, you know. But --

MR. SIPOS: Very well, Your Honor. Thank you.

MR. BESSETTE: And, Your Honor, we'll be available to confer tomorrow.

JUDGE McDADE: Okay. Thank you, Mr. Sipos.

MR. TURK: Your Honor, for the staff, Sherwin Turk. Just let me note for the record that we

have a witness on both contention 17 and 37 who will not be available in December. I will discuss that with the other parties, hopefully this evening, because a lot of us will be packing and traveling tomorrow.

So I would propose that the parties talk tonight to see if we can come up with a joint proposal for a schedule and get that to you as quickly as possible, hopefully tomorrow, so that Your Honors will know which contentions we would like to proceed with on Monday and Tuesday and Wednesday of next week.

JUDGE McDADE: And, again, you know, that is part of, you know, hopefully we will have a better feel for the medical condition, and the witnesses' availability, you know, again, if not Monday, would Wednesday work? And is this Dr. Hiser?

MR. TURK: No. It's Mr. Stuyvenburg.

JUDGE McDADE: Okay.

MS. GREENE: Your Honor?

JUDGE McDADE: Are we ready?

MS. LIBERATORE: This is Kathryn Liberatore for the State of New York. Your Honor, I just have a few targeted questions directed to clarify the witness' testimony.

MS. GREENE: Your Honor, I'm sorry. I

apologize --

JUDGE McDADE: I'm sorry.

MS. GREENE: -- for interrupting. I was trying to get your attention.

JUDGE McDADE: I'm sorry, Ms. Greene.

MS. GREENE: And I would rather do that, because it's an administrative matter now. Not to add confusion, but we also have some witness availability issues, which we have been trying very, very hard to resolve. But perhaps in crisis, there is opportunity. I don't know.

But I can tell you that all of our witnesses but one are available on October 24th. That one is available in December. However, in the first few days of December we actually have three witnesses that are not available. So I don't know whether that would help solve a problem, if -- and perhaps accommodate everyone. But I do agree that perhaps we -- the parties should meet amongst ourselves and see if we can create a proposal that will work.

But I did want to let you know we have been trying very, very hard to solve it, and I didn't even want to bring it to your attention. But at this point, it is pretty clear what we can and cannot do.

JUDGE McDADE: Okay. But are you

suggesting the possibility of moving up the Clearwater contention that currently would be scheduled for Wednesday, and trying to move that earlier in the week?

MS. GREENE: No. Wednesday would work for all but one witness, and perhaps that witness could, if we need to go into December, come back and be the first person on December 10th.

JUDGE McDADE: Okay. And -- fine. We will get into this -- and, again, if you can be part of those consultations among the parties and, you know, hopefully we will be in a better position. Is it just the 24th that that one witness wouldn't be available?

MS. GREENE: It is only on the 24th that that particular witness is not available. But in December, of our witnesses, there are -- there is one day in December when all three of the witnesses -- anyway, I can explain the configuration. I actually have an Excel spreadsheet of it, but --

JUDGE McDADE: Okay. And if you could perhaps just send us an email with that --

MS. GREENE: Yes.

JUDGE McDADE: -- information, with the copies to the parties, either this evening or

tomorrow.

MS. GREENE: I will do that.

JUDGE McDADE: Okay. Thank you.

MS. GREENE: Thank you.

MS. LIBERATORE: Your Honors, Kathryn Liberatore for the State of New York. I just have a few targeted questions directed to clarifying witness testimony that was offered on contention 12 yesterday and today.

Dr. Lemay, Dr. Ghosh earlier today discussed an uncertainty factor of eight. What does this uncertainty factor account for?

DR. LEMAY: The uncertainty factor of eight accounts for external events such as seismic events and the uncertainty in the Level 1 and Level 2 PSA.

MS. LIBERATORE: So is it true that the uncertainty factor of eight was not designed to take into account uncertainties in the Level 3 PRA?

DR. LEMAY: That's correct.

MS. LIBERATORE: If we could bring up Entergy Exhibit 466, please, and go to page 4-17. This is NUREG/CR-3673. I believe witnesses have been referring to this as the "Burke document." If we could highlight the area that we had highlighted

1 earlier.
2 This question is directed to Dr. O'Kula or
3 Mr. Teagarden, whoever prefers to respond. Isn't it
4 true that the entire context of this portion states
5 that non-farm area decontamination cost and
6 effectiveness have been weighted based on "national
7 average statistics," is that what the document says?
8 MR. TEAGARDEN: Yes. Yes, based on
9 national average statistics.
10 JUDGE McDADE: Okay. Thank you, Mr.
11 Teagarden.
12 MS. LIBERATORE: I have one question for
13 Ms. Potts. Yesterday you testified that analysts
14 performing a SAMA analysis would have determined that
15 Sample Problem A values, adjusted for the Consumer
16 Price Index, were reasonable. You also mentioned that
17 you review the analysts' work.
18 Could you please point me to any documents
19 that describe your role in the review process or that
20 demonstrate your review of the analysts' determination
21 that the Sample Problem A values were reasonable?
22 MS. POTTS: Yes. The RAI response that we
23 talked about yesterday does provide some information
24 that you are looking for.
25 MS. LIBERATORE: Is that the only

1 document? This question was just directed to --
2 MS. STOLLEY: I'm sorry, Your Honor. I'm
3 sorry, Your Honor, to interrupt. If it would help, we
4 do have the exhibit number. My name is Martha Stolley
5 for Entergy. I apologize. The exhibit number is
6 Entergy Number 000460, if it might help Ms. Potts.
7 JUDGE McDADE: I'm sorry. Could you
8 repeat that?
9 MS. STOLLEY: Entergy 000460 is the number
10 of the exhibit that Ms. Liberatore is referring to,
11 and it might be helpful to pull that up on the screen.
12 MS. LIBERATORE: And I believe this is a
13 document that we discussed yesterday. I was really
14 inquiring as to whether there is any other documentary
15 evidence of your review of the analysts' determination
16 that Sample Problem A values are in fact reasonable.
17 MS. POTTS: I don't believe there is
18 anything else that has been entered into the record.
19 I could speak to what I reviewed, if you would like,
20 but I don't believe there is any other documentation
21 that is in the record.
22 JUDGE McDADE: Well, if you could,
23 describe what it is your review consisted of and then
24 how, if at all, it was documented. In other words, is
25 your review something that is documented internally at

Entergy, or is it --

MS. POTTS: Yes, Your Honor. When the engineer did the analysis, it was written, of course. And it was also reviewed by another engineer in the Fuels and Analysis Department, and as well as his manager. And when I performed my review, it was a little bit higher level review, but it was to bring in my experience with the SAMA analyses in general, because I have worked on several of them.

And my comments that I provided were in an -- on an Entergy comment form and the engineers responded to my comments and made appropriate changes.

MS. LIBERATORE: Did any of those comments address the reasonableness of Sample Problem A or NUREG-1150 economic cost input values?

MS. POTTS: I honestly don't remember at the moment if they did.

MS. LIBERATORE: Are those comments an exhibit in this hearing?

MS. POTTS: I don't believe so.

MS. LIBERATORE: Okay. Now, turning to Dr. Ghosh -- and I apologize -- I can't see you, and I haven't been able to see you for this entire proceeding. But I just have a few questions for you as well.

Today you indicated that Mr. Lee's proposal -- and this is his proposal relating to the pedigree of the Sample Problem A input values -- so you indicated Mr. Lee's proposal was evaluated by a Review Committee of eight people and was ranked the lowest.

I have three very basic questions about your testimony. First question is, did you or anyone on this panel participate in the review of Mr. Lee's proposal?

DR. GHOSH: Let me first clarify one thing. I said that Mr. Lee's proposal was -- I don't remember the exact language I used, but his proposal was ranked one of the lowest. I can't say with certainty that it was the lowest of all of the ones that were considered.

So now going back to the end of 2010, I had just assumed a new position at the NRC. The previous project manager for the long-term research program had just passed away, and I kind of inherited the project management of that temporarily for a few months to fill in for the staff person who had passed away, different person than Mr. Lee who also subsequently passed away.

So I was involved in the process, but I

1 entered the process in the middle. So I wasn't the
2 project manager when the proposals were first
3 submitted. And when I did review the exhibit by New
4 York State, it was kind of the first time that I
5 recollected seeing anything about that particular
6 proposal, because I wasn't part of the original
7 submission process.
8 I did coordinate the activities of the
9 review group, who subsequently reviewed all of the
10 proposals. And I went back to my notes, and my
11 affidavit explains what the Review Committee had done
12 with the -- that particular proposal.
13 MS. LIBERATORE: Were any other panel
14 members part of that Review Committee?
15 DR. GHOSH: No, they were not.
16 MS. LIBERATORE: And how did the Review
17 Committee conduct its review? For example, were there
18 meetings? Were there emails exchanged? Could you
19 just give us a little insight as to that?
20 DR. GHOSH: Sure. I believe there were
21 three separate meetings where they sequentially
22 reviewed all of the staff proposals that were
23 submitted that year. And as I said, there was a
24 committee of about eight senior staff people from
25 across the NRC with different areas of expertise.

1 And they deliberated amongst themselves to
2 rank these proposals along five elements, which really
3 go to, does this proposal talk about a fundamental
4 knowledge gap that we need to remedy, is there
5 something that is wrong with what we are doing
6 currently in our regulatory application or that is
7 forward-looking that needs to be fixed, just to give
8 a couple of examples.
9 MS. LIBERATORE: Was there a decision-
10 making matrix applied to Mr. Lee's proposal, for
11 example?
12 DR. GHOSH: Mr. Lee's proposal, along with
13 all of the other staff proposals that were submitted
14 that year, were ranked alongside evaluation criteria,
15 which I believe I laid out in my affidavit. Each of
16 those criteria were -- are assigned a weighting, and
17 the final rank was determined by adding up the scores
18 across those five evaluation criteria.
19 MS. LIBERATORE: Did the Review Committee
20 document these five criteria in writing, or are there
21 any meeting minutes or any other documentary evidence?
22 I understand you have submitted an affidavit, but
23 there -- you haven't submitted any evidence of the
24 Review Committee's determination of the ranking of Mr.
25 Lee's proposal?

DR. GHOSH: Because this is part of the NRC's budget formulation process, the Commission paper itself is Official Use Only. And my understanding is that because budget information -- internal budget formulation information is typically non-public.

And I guess it's beyond my state of knowledge in terms of the criteria that the NRC uses, but I know that the documentation for this process and the Commission paper is not public. The final results in terms of which projects are funded eventually do get documented in a NUREG that is periodically updated. That is NUREG-1925.

If you go to the latest version of NUREG-1925, it lists all of the ongoing research projects of the NRC. And the ones that are being conducted as part of the long-term research program are identified.

MS. LIBERATORE: But that document would not discuss the reasons why Mr. Lee's proposal was ranked as it was.

DR. GHOSH: That's right. What that -- there is -- that NUREG describes the evaluation criteria that are used to evaluate the various proposals. And there is information on the proposals that do survive and get funded. There is information about what those projects are and what the status of

1 those projects are.
2 MS. LIBERATORE: Dr. Ghosh, moving on to
3 one other topic you discussed that I would like to
4 clarify, you took us through the SAMA cost-benefit
5 analysis. But would you agree that as costs increase,
6 the difference between the costs and benefits of the
7 SAMAs are cost beneficial, so that -- that delta or
8 that difference actually decreases?
9 DR. GHOSH: When you say "costs increase,"
10 which costs are you talking about?
11 MS. LIBERATORE: The total cost that's
12 used in the SAMA analysis.
13 DR. GHOSH: Implementation cost or averted
14 cost from --
15 MS. LIBERATORE: Implementation cost.
16 DR. GHOSH: You are talking about the
17 benefit side of the equation? I'm sorry. Can you
18 repeat your question?
19 MS. LIBERATORE: That's okay. I'll
20 rephrase. So as the costs associated -- the onsite
21 and offsite costs associated with a severe accident
22 increase, for SAMAs that have already been determined
23 to be cost beneficial, wouldn't the difference between
24 the costs and benefits of those SAMAs decrease? So
25 they would become more cost beneficial?

1 MR. TURK: Your Honor, I would ask for the
2 question -- Sherwin Turk. I find the question
3 confusing. I would object to it and ask her to ask it
4 again in a more clear manner, because I can't
5 understand it.
6 JUDGE McDADE: The objection is sustained.
7 Would you please rephrase? I think it was actually
8 clearer the first time you asked it.
9 MS. LIBERATORE: When we are looking at
10 SAMAs that have already been -- SAMA candidates that
11 have already been determined to be cost beneficial, if
12 the costs associated with a severe accident, the
13 onsite and offsite costs increase, wouldn't the delta
14 between the costs and benefits of those SAMAs actually
15 decrease, such that those costs -- already cost
16 beneficial SAMAs become more cost beneficial?
17 DR. GHOSH: Okay. I think I understood
18 your question. I believe your question is the
19 implementation cost is staying the same. If the
20 benefit term, which is the averted cost element, were
21 to increase, would the net benefit increase for a
22 given SAMA? I believe that is your question.
23 MS. LIBERATORE: Yes.
24 DR. GHOSH: Yes. That is correct. And as
25 I pointed out earlier, I think a couple of times, the

1 SAMA analysis is done on a per SAMA candidate basis.
2 So if you were to look at the list of potentially cost
3 beneficial SAMAs that are provided in the FSEIS, and
4 you added up the total benefit of all of those, for
5 Indian Point 2, for example, you are going to
6 completely eliminate the plant risk twice over.
7 So while -- so in that set of SAMAs alone,
8 you are -- there is more than twice -- you know, there
9 is twice the entire plant risk. So it is true that
10 you can increase the benefit of a particular SAMA
11 candidate, but in terms of the results of the SAMA
12 analysis, you know, that -- my thought still holds in
13 terms of, what more would you be achieving?
14 MS. LIBERATORE: Ms. Potts, didn't you
15 testify earlier that when Entergy is looking at these
16 cost beneficial SAMA candidates they put those into an
17 internal process to determine which candidates to
18 input?
19 JUDGE McDADE: To input --
20 MS. LIBERATORE: Implement.
21 JUDGE McDADE: -- or implement?
22 MS. LIBERATORE: Implement.
23 MS. POTTS: Yes.
24 MS. LIBERATORE: And would Entergy look at
25 the delta or the difference between the costs and

1 benefits of a factor in deciding which cost beneficial
2 SAMAs to implement?
3 MR. BESSETTE: Your Honor, this is Paul
4 Bessette. Again, we have to object as this question
5 is beyond the scope of SAMA 12. Again, it is going
6 into implementation requirements, which is beyond the
7 scope of this contention.
8 MS. LIBERATORE: Your Honor, this --
9 JUDGE McDADE: I think it is within the
10 scope, as I understand the question. As the SAMA has
11 become more cost beneficial, does that increase the
12 probability of their being implemented?
13 MS. LIBERATORE: Or is it a factor that
14 Entergy would look at in determining whether to
15 implement a SAMA. For example, if, you know, there is
16 a $100 difference versus a $5 million difference, I
17 mean, is that something that you would consider?
18 MS. POTTS: I believe that that would be
19 one of the factors that would be considered.
20 MS. LIBERATORE: Okay. And the following
21 question is for, really, anyone on the Entergy panel.
22 Isn't it true that Entergy determines that to render
23 IP2 SAMA 025 cost effective its benefit would have to
24 increase by 11 percent?
25 MS. SUTTON: Your Honor, this is Kathryn

1 Sutton. Could counsel please direct the witness to
2 that particular line item?
3 MS. LIBERATORE: Yes. It's Entergy
4 Exhibit 000003, answer A89.
5 MS. SUTTON: And can we please put that up
6 on the screen?
7 JUDGE McDADE: What page is that on?
8 MS. LIBERATORE: It's answer A89. Let me
9 see if I can find the page.
10 JUDGE McDADE: Okay. We have it up.
11 MR. BESSETTE: Your Honor, this is Paul
12 Bessette. I believe that's testimony in a different
13 contention.
14 MS. LIBERATORE: Yes. That is testimony
15 on a different contention, but it was offered -- as
16 you can see, KRO, GAT, and LAP. I believe those stand
17 for the panel we have here. And I think this is
18 relevant to the Board's questions as to what effect an
19 increase in OECR -- a factor of three to seven
20 increase in OECR would have on the ultimate SAMA cost
21 beneficial analysis.
22 JUDGE McDADE: It may well be that the
23 witnesses on this panel aren't able to answer the
24 question. But the question is, at this point, for
25 Indian Point 2, SAMA 025, having to do with the cost

effectiveness and whether or not these witnesses are able to address that. Is that correct?

MS. LIBERATORE: Yes, Your Honor. There is a statement -- and I'm reading verbatim -- "For IP2" --

JUDGE McDADE: You don't have to read verbatim.

MS. LIBERATORE: Oh, okay.

JUDGE McDADE: Just ask your question. And the witnesses -- these witnesses may or may not be able to answer your question.

MS. LIBERATORE: Okay. This is --

JUDGE McDADE: If this document helps them, then it can help them. It is just simply there for their reference.

MS. LIBERATORE: Okay.

JUDGE McDADE: We're not, you know --

MS. LIBERATORE: This is prefiled testimony, sworn testimony, that is attributed to these three panel members.

JUDGE McDADE: I understand.

MS. LIBERATORE: Okay. So given the testimony that IP2, SAMA 025, to become cost effective its benefit would have to increase by 11 percent, wouldn't it be true that SAMA would become cost

effective if the OECR were to increase by a factor of three to seven?

MR. BESSETTE: Your Honor, we renew our objection. I think it is highly abnormal, and beyond the scope of this contention, to go ask witnesses on -- testimony on other contentions. This is just completely inappropriate and beyond the scope of this contention, so we're going to renew our objection.

JUDGE McDADE: Okay. I'm going to sustain that objection. The evidence will be in the record. New York will be able to make arguments with regard to it. I don't know that the testimony of these witnesses, even though they did enter this testimony, it is not testimony that the Board needs clarification on on this contention.

The argument can be made based on the evidence that will be in the record when you make the argument. But at this point, you have identified that, you know, as the averted costs increase, it makes the SAMA more cost beneficial and, you know, so --

MS. LIBERATORE: Your Honor?

JUDGE McDADE: Cutting to the chase, I sustain the objection.

MS. LIBERATORE: Okay. Our position is

that this relates directly to questions Judge Wardwell was asking earlier.

Okay. Two final questions. This is for staff. Has a MACCS2 code ever been promulgated as a regulation?

MR. HARRISON: This is Donald Harrison of the staff. The answer to that is no. We don't typically promulgate regulations for specific computer codes.

MS. LIBERATORE: Does any regulation require the use of MACCS2 or Sample Problem A in NUREG-1150?

MR. HARRISON: Again, NUREG-1150 -- this is Donald Harrison -- is a NUREG document. It does not establish regulation or requirements of such for requiring specific things to be done.

DR. GHOSH: If I could add -- this is Dr. Ghosh for the staff. Again, those two NUREG/BR guidance documents that we talked about earlier -- that's NUREG/BR-0184 and NUREG/BR-0058 -- does specifically call out the MACCS2 code as an appropriate code to use for cost-benefit analyses.

MR. HARRISON: And if I may --

JUDGE McDADE: Okay. But, Doctor, that's a guidance document, not a regulation.

1 DR. GHOSH: That's right. That's a
2 guidance document, not a regulation. The only other
3 thing I would point to, I believe Mr. Harrison this
4 morning cited to a number of places in the GEIS a rule
5 from 1996 where MACCS was used as the basis for the
6 findings in the Generic Environmental Impact Statement
7 for license renewal, which is a Commission rule. So
8 it has been used as the basis for Commission findings
9 in a rule.
10 JUDGE McDADE: Thank you.
11 MS. LIBERATORE: Nothing further. I turn
12 it to my --
13 MR. SIPOS: Your Honor, I would like to
14 pick up from Ms. Liberatore. I just have a few
15 questions. I have a rule of the road question for
16 you. Is it acceptable if I stand? My sight lines are
17 pretty flat out on the left side of the table.
18 JUDGE McDADE: It is fine.
19 MR. SIPOS: Thank you, Your Honor. And
20 can everyone hear me?
21 JUDGE McDADE: Yes.
22 MR. SIPOS: Okay. Very good.
23 First question is to Mr. Harrison. Mr.
24 Harrison, the SAMA analysis performed by Entergy for
25 Indian Point's Unit 2 and Unit 3, and approved by the

NRC staff, examines severe reactor accidents at those facilities, correct?

MR. HARRISON: I guess I am not quite following your question, but, yes, the severe accident mitigation alternatives that are evaluated are for the evaluation of severe accidents using a probabilistic approach.

MR. SIPOS: Right. And they are severe accidents for the reactors, are they not?

MR. HARRISON: Yes. What you review is -- the Level 1 is for core damage within the reactor. Level 2 takes you through releases from core damage event through the containment to a release point, and then Level 3 takes you from the release point to actually the calculation of doses and land contamination, that type of thing.

MR. SIPOS: And those SAMA analyses did not examine severe accidents to the spent fuel pools at Indian Point Unit 2 and Unit 3, correct?

MR. HARRIS: Your Honor, the NRC staff would object. This is Brian Harris for the staff.

JUDGE McDADE: Sustained.

MR. SIPOS: Dr. Ghosh, I believe this morning you testified that the existing list of SAMA candidates would eliminate all risk posed to the

1 plant. Is that correct?
2 DR. GHOSH: What I said is that if you
3 were -- no. I don't necessarily believe that to be
4 the case. But I said if you add up the benefit that
5 is attributed to that list of SAMA candidates that are
6 in the FSEIS, that they would -- for Indian Point 2
7 they would essentially completely eliminate the plant
8 risk twice over.
9 And the reason that that -- of course that
10 doesn't make sense, right? And the reason for that is
11 that many of the SAMA candidates are acting on the
12 same accident sequences. So that if you were actually
13 to implement one of them, it would of course change
14 your baseline risk.
15 And we talked a little bit about this when
16 Judge Wardwell asked a question about that. It would
17 bring down your baseline risk. And when you relooked
18 at the risk profile, a SAMA that is acting on those
19 same accident sequences would no longer be as
20 beneficial as is shown in that list of -- in that
21 table, that final table in the --
22 MR. HARRISON: This is Mr. Harrison. If
23 I can just add to that. The reason that happens is
24 because the SAMAs are evaluated one at a time. And so
25 you can have multiple SAMAs that essentially address

the same calculated risk, and artificially, then, if you try to sum them, so you would get a number bigger than the actual calculated risk at the plant.

And so it is not to mean that if you fix these things the risk at Indian Point goes to zero or even better. It is a calculation and how the calculation is done.

DR. GHOSH: Right. So there are essentially diminishing returns. As you -- if you were to do it in a sequential manner, you have increasing diminishing returns for implementing subsequent SAMA candidates.

MR. SIPOS: And so when you were talking about the existing list of SAMA candidates --

DR. GHOSH: Can you use your mic?

JUDGE McDADE: Yes. If you could move back and at least be behind the microphone, we --

MR. SIPOS: Sorry, Your Honor. And sorry, Dr. Ghosh. When you were talking about the existing list of SAMA candidates, you were talking about the list that appears in the FSEIS, correct?

DR. GHOSH: That is correct.

MR. SIPOS: Thank you. Why would you not want to have the fuller list of potentially cost beneficial SAMA candidates before you decide which

ones should be implemented?

DR. GHOSH: If we were to look at the effect of some of the potential uncertainties in the Level 3 portion of the analysis, which has been the subject of this contention, there is no reason to think that they would disproportionately affect particular SAMAs more than others.

Now, if you look at the initial -- if you look at the full list, for example, in the ER and the responses to the Requests for Additional Information, which kind of provide the full record of all potential candidate SAMAs, the ones that appear in the FSEIS generally are the more cost effective ways of mitigating the most important accident sequences at Indian Point.

So as you -- and so for the reasons we mentioned, as you sequentially start going down the list, you are reaching diminishing potential returns for implementing other SAMAs. The ones that are further down the list typically are starting out as being less potentially cost beneficial.

So if you were to bump up the benefit for all of those SAMAs, there is no reason to think that the ranking of the SAMA candidates would change.

MR. HARRISON: Your Honors, can I ask to

1 clarify? Because I thought there was a phrase there
2 that was, at least in my mind, misleading. And it's
3 the word "potential." Could we maybe clarify what the
4 question meant in the context of --
5 JUDGE McDADE: Are you saying that Dr.
6 Ghosh believes --
7 MR. HARRISON: The way the question was
8 worded was the fully potential --
9 JUDGE McDADE: Mr. Harrison, are you
10 saying Dr. Ghosh's testimony was unclear?
11 MR. HARRISON: I'm saying the way she
12 responded was to infer that there is some full
13 potential list out there that -- and the word
14 "potential" means something in the context of SAMAs.
15 So I just wanted to make sure Dr. Ghosh --
16 JUDGE McDADE: Dr. Ghosh, do you feel that
17 you need to clarify your answer?
18 DR. GHOSH: Did I answer your question?
19 I --
20 JUDGE McDADE: Doctor, the question is to
21 you, whether you wish to clarify your answer. Do you
22 think it was -- that you understood the question and
23 you are satisfied with your answer?
24 DR. GHOSH: I think I understood the
25 question. If --

1 MR. SIPOS: Thank you.
2 MR. TURK: Your Honor, may I -- Sherwin
3 Turk. I'm sorry, Your Honor. What Mr. Harrison was
4 pointing out is that the term "potential" --
5 JUDGE McDADE: No. I understand --
6 MR. SIPOS: Objection, Your Honor.
7 JUDGE McDADE: -- what --
8 MR. SIPOS: It's a state of --
9 JUDGE McDADE: I understand what Mr.
10 Harrison was trying to point out. There was a
11 question asked of the witness. There was no objection
12 to the question. The witness says that she understood
13 the question and that she is satisfied with her
14 answer. It is not up to Mr. Harrison to try to
15 rectify.
16 As you know, Mr. Turk, you are going to
17 have an opportunity here in just a few moments. And
18 if you feel something needs to be clarified, that is
19 the appropriate procedure for doing it --
20 MR. TURK: Thank you, Your Honor.
21 JUDGE McDADE: -- and the appropriate
22 time.
23 Mr. Sipos?
24 MR. SIPOS: Yes, Your Honor. A question
25 for Mr. Jones and Dr. Bixler. Did you come onto the

NRC team in approximately the September/October 2009 timeframe?

MR. HARRIS: Objection, Your Honor. What is the relevance? This is Brian Harris for the staff.

JUDGE McDADE: I'm going to allow it.

MR. JONES: This is Joe Jones for staff. As I sit here, I know this has been a long contract, but I cannot answer that question. I do not recall specifically when we came onto this project.

MR. SIPOS: Was it around the time that there was a discovery of an error in the wind direction calculations?

MR. JONES: It was prior to that time.

MR. SIPOS: And who discovered that error?

MR. JONES: Sandia performs an independent review. That is what we are looking at when we review a SAMA analysis, and Dr. Bixler discovered the error.

MR. SIPOS: Thank you. I would like to ask Mr. Wilkie if he could bring up New York Exhibit 000131C, and specifically I'm looking at Table 5.3 at page -- I'm going to be starting out at page 5-23, if you could get that up.

Mr. Jones, yesterday you testified in response to some questions from Judge McDade that the Indian site is "similar" to the Indian Point site. Do

you recall that? I'm sorry. The Zion site is similar to the Indian Point site?

MR. JONES: I recall discussing it with respect to population density and --

MR. SIPOS: Yes.

MR. JONES: -- some attributes.

MR. SIPOS: And when NUREG-1150 was being prepared, do you know approximately how many people lived within 50 miles of the Zion reactors?

MR. JONES: I reviewed the population density at that time, and it was on the order of 13- or 1,400 persons per kilometer squared. I do not know the 50-mile population.

MR. SIPOS: And, Mr. Wilkie, I'm trying to get to -- I believe it's page -- it's PDF frame 46 of 148. I hope I'm in the right -- and specifically -- and if we could go to PDF page 49 of 148.

Your Honor, I apologize. I'm trying to get to page 5-24. I have -- I have mixed up my PDF references. Oh, that is it. Your Honor, if I could just have -- is this New York 000131C? Yes, it is.

Your Honor, may I have one moment?

JUDGE McDADE: Sure.

MR. SIPOS: I'm sorry.

JUDGE McDADE: While you're looking for

that, let me just clarify one thing. Mr. Jones, there was a question asked that presumes some testimony that you gave yesterday.

My recollection of your testimony -- and I'm trying to find out whether it is correct -- is not that the Zion was inherently similar to Indian Point, but, rather, that it was the most similar to Indian Point of the five that were reviewed. Do you recall what your answer was?

MR. JONES: I don't recall my answer from yesterday. But of the five sites, that is correct.

JUDGE McDADE: Okay. And would you adopt the presumed testimony that it is in fact not only the most similar but that it is objectively similar to Indian Point?

MR. JONES: I believe I would, yes.

JUDGE McDADE: Okay. Thank you.

MR. TURK: Your Honor, this is Sherwin Turk. My notes indicate that the question was, is there any area that is even remotely similar to New York City regarding population density, building density, and property values? And the answer was, yes, the Zion site. The question was, anything remotely similar.

JUDGE McDADE: Okay. And the answer that

we just got from Mr. Jones is that he viewed it as the most similar, and also objectively he viewed it as similar. And one of the reasons we are having little sessions like this is so that we can clarify and make sure that we all recollect what the witnesses say exactly the same.

Mr. Sipos?

MR. SIPOS: And, Your Honor, I apologize because apparently my version of this document is slightly different. I am in the NUREG-1437 Volume 1, and I am trying to get to page 5-23.

And, Mr. Jones, I would just like to direct your attention to the entry for Surry. Would you please read what Table 5.3 lists for the population within 50 miles of Surry as of 2030?

MR. JONES: Could you clarify which document this is, please?

MR. SIPOS: Yes. I believe this is NUREG-1437, Volume 1. This is the GEIS from 1996.

MR. JONES: We will need to go back to that page, then.

MR. SIPOS: And Surry is at the bottom of the -- sort of the lower third of that page. Thank you, Mr. Wilkie.

MR. JONES: If the third column is

population, then that says the 2030 population is about 2.5 million.

MR. SIPOS: Thank you. And could you go to the next page, please, Mr. Wilkie? Bring that up for Zion?

And, Mr. Jones, would you please read what Table 5.3 lists for the population within 50 miles of Zion as of 2030?

MR. JONES: As of 2030, the population for Zion reads "approximately 8.2 million." You need to consider that Zion sits on a Great Lake.

MR. SIPOS: I'm just asking if you could read what the chart says.

MR. JONES: Okay.

MR. SIPOS: Thank you. And if we could go back, then, to page 5-22, two pages back. And, Mr. Jones, would you please read what Table 5.3 of the GEIS lists for the population within 50 miles of Indian Point as of 2030?

MR. JONES: It lists a population of approximately 15.2 million.

MR. SIPOS: Thank you. One moment, Your Honor. No further questions, Your Honor.

JUDGE McDADE: From Entergy?

MR. BESSETTE: Your Honor, Ms. Stolley

will be asking the questions.

MS. STOLLEY: I'm Martha Stolley, for the record. Thank you, Your Honors.

Dr. Lemay, my first questions are addressed to you. If we could put up on the screen New York State Exhibit 000242. And, actually, I'm not sure whether the revised tables are a different exhibit number. One moment.

DR. LEMAY: If I may help, the revised tables are from Exhibit 000430, New York State --

MS. STOLLEY: Thank you.

DR. LEMAY: -- 000430.

MS. STOLLEY: Thank you, Dr. Lemay. So 000430 instead, on page 6. I'm sorry. It's page 5, I apologize.

Dr. Lemay, this is the revised Table 11 that you provided, correct?

DR. LEMAY: Yes, it is.

MS. STOLLEY: And those numbers -- all of the parameters, other than Entergy's of course -- oh, you can't hear me? Sorry. All of those parameters have changed since the original report, which you submitted in December of 2011, is that correct?

DR. LEMAY: It is correct. We made changes following the comments provided by Entergy and

the staff, and some of the comments were valid and we revised our calculations.

MS. STOLLEY: And the numbers I just want to go through for a second. The original report that you prepared based on your analysis and your testing and your examination, for the site restoration for Approach A, for light decontamination, the range was from 136,000 to 272,000. Is that correct?

DR. LEMAY: If you'll give me a second.

MS. STOLLEY: Page 23 of New York State 000242.

DR. LEMAY: It is correct.

MS. STOLLEY: And for heavy decontamination, the original parameters or the original range -- excuse me -- was 449,000 to 898,000. Is that correct?

DR. LEMAY: That is correct.

MS. STOLLEY: And as you can see from the screen here, they dropped substantially to 91 -- 92,000 to 184,000 for light decontamination -- and I'm rounding. And for heavy decontamination, 209,000 to 418,000, correct?

DR. LEMAY: That is correct.

MS. STOLLEY: For Reichmuth, the numbers were originally 200,000 to 252,000, is that correct,

in your original report?

DR. LEMAY: It is correct.

MS. STOLLEY: And now dropped by about 150,000, 130,000. And then, for CONDO, Dr. Lemay, the original numbers were 19,000 to 30,000 for light decontamination, and for heavy decontamination 90,000 to 140,000. Is that correct?

DR. LEMAY: That is correct.

MS. STOLLEY: And then, finally, for RISO, the numbers were originally 36,000 to 59,000, correct?

DR. LEMAY: That is correct.

MS. STOLLEY: So your lower dropped from 19,000 to 15,000, and the upper dropped from 898,000 to 418,000, correct?

DR. LEMAY: Correct.

MS. STOLLEY: And those original numbers, again, were based on your original analysis before hearing comments from NRC staff and Entergy, correct?

DR. LEMAY: Correct.

MS. STOLLEY: And just briefly, I wanted to go through what those changes were based on. Approach A, as far as I can tell, you originally erroneously included the cost of compensation in the CDNFRM figure.

DR. LEMAY: That's correct. We included

1 this cost at 60 percent of the cost of
2 decontamination.
3 MS. STOLLEY: And that actually caused
4 that number to drop by --
5 DR. LEMAY: By 60 percent.
6 MS. STOLLEY: -- 60 percent. Sorry. You
7 just said that. Because those numbers should have bee
8 included or were accounted for in the POPCST number,
9 correct?
10 DR. LEMAY: Absolutely correct.
11 MS. STOLLEY: For Approach B, the
12 Reichmuth, you erroneously included the total
13 $8 billion to clean up costs -- $8 billion Canadian,
14 that is -- when only a fraction of that, about 15
15 percent, was actually cleanup cost versus lost
16 earnings, worried well treatments, tourism reduction.
17 Is that correct?
18 DR. LEMAY: That is correct.
19 MS. STOLLEY: And for Approach C, you
20 erroneously included surface water and farmland in the
21 area used to calculate CDNFRM, correct?
22 DR. LEMAY: That is correct.
23 MS. STOLLEY: And that is the same for
24 RISO, you erroneously included surface water and
25 farmland in the area used to calculate the CDNFRM?

1 DR. LEMAY: That is correct.
2 MS. STOLLEY: One other thing, Dr. Lemay.
3 And you have essentially acknowledged this in your
4 testimony. For the CONDO and RISO approaches, you
5 incorrectly assumed uniform deposition of
6 contamination, correct?
7 MS. LIBERATORE: Objection, Your Honor.
8 I believe that mischaracterizes the witness'
9 testimony.
10 JUDGE McDADE: Sustained. Just ask the
11 witness the question. We don't need to go back into
12 -- we don't have the transcript, and, you know, one of
13 the things, you know, witnesses should never do is
14 just accept when someone says that is what they said
15 necessarily that that is what they said. We don't
16 have the transcript, so just ask the question as to
17 what his view is.
18 MS. STOLLEY: Do you acknowledge that you
19 treated this as if the contamination was uniformly
20 deposited on all surfaces?
21 MS. LIBERATORE: Objection. I don't know
22 what "this" refers to. I think the question is
23 unclear.
24 JUDGE McDADE: Sustained. If you could
25 clarify "this."

MS. STOLLEY: Do you acknowledge that in your calculations, in your use of the CONDO code and in RISO, that you modeled it as if there were uniform deposition of contamination on all surfaces? Equal decontamination/deposition on all surfaces.

DR. LEMAY: We modeled the decontamination effort for all of the outside surfaces of the building and some outside surfaces inside the building, assuming a uniform contamination. That is correct.

MS. STOLLEY: And in your testimony, in your rebuttal testimony -- well, withdrawn. Just a moment, Your Honor.

In your -- and you acknowledge that that was incorrect, that that was incorrect, to calculate it as if there were uniform deposition of contamination.

DR. LEMAY: I disagree with that statement. I think that you illustrate the value of having documented basis for the cost of decontamination, because we can get a peer review and identify mistakes, and then correct them. I think that's a valid point, and I am happy with that.

Regarding the decontamination, as I have explained, MACCS uses a uniform deposition velocity for the whole 50-mile site, and that value is an

average. And for plowed fields and surface water, the actual deposition would be a bit lower. And for urban areas, the deposition would be a bit higher.

So we are justified to distribute the contamination that is in the plowed over all surfaces, because in actual fact the deposition velocity transfers more contamination. But MACCS does not capture that. It calculates an average.

So I would reject the -- what you just said.

MS. STOLLEY: Well, Dr. Lemay, I would like to draw your attention to your rebuttal testimony, which is New York State 000241.

MS. LIBERATORE: This is Kathryn Liberatore for the State. I believe it is actually 000420. There was -- New York State 000420. I think there was an error in labeling it the first time.

MS. STOLLEY: Thank you.

JUDGE McDADE: We're talking about the rebuttal testimony.

MS. STOLLEY: Yes. New York State 000420, I apologize.

JUDGE McDADE: New York 000420.

MS. STOLLEY: Mine says 000241.

Page 45. The question was, "What is your

1 response to NRC staff's testimony in A74 that ISR's
2 assumption of uniformity for the exteriors and
3 interiors of buildings renders ISR's cost estimates
4 unrealistic and unreasonable?"
5 Your answer was, "NRS -- NRC staff is
6 correct that contamination would not be uniform on
7 building roofs, exterior walls, and interior space,
8 but it is not cost effective to differentiate between
9 the portions of surfaces which would require
10 decontamination and those that would not -- those that
11 would not in any given building. It is more likely
12 that bulk decontamination, such as hosing or
13 vacuuming, would take place first, followed by
14 verification for hot spots."
15 Dr. Lemay, firstly, do you acknowledge
16 that you did -- do you -- reading this, do you now
17 recall acknowledging that you made a mistake in your
18 calculations in terms of uniform deposition of
19 decontamination -- of contamination?
20 DR. LEMAY: It is not a mistake. The
21 MACCS is full of averages. It contains average
22 numbers for many quantities, and we cannot capture all
23 of the details of what is going on in terms of
24 evacuation time, in terms of population, and in terms
25 of all of the details of where the contamination takes

place.

So it is appropriate to use averages, and it is understood that these averages will not represent the fine details of what is going on. And I think the answer I am providing here is consistent with that picture. So when we do the calculation, we use averages. And in the details, there might be things that are different from the average.

And when we talk about average, it means that sometime the actual situation is above the average, and sometime it is below the average. And that captures the non-uniformities that you are discussing right now.

MS. STOLLEY: Then, I guess my question is, where does average -- where do averages come into place in terms of uniform -- assuming uniform deposition of contamination? What are you saying you are using as averages with regards to that?

DR. LEMAY: MACCS produces an average contamination per unit area. That is the level of understanding that MACCS has. But if you actually look at Fukushima, you would see differences between deposition over a plowed field and over an urban area, and you would see differences within the same building.

And these differences would sometime be above the average and sometime below the average. And what I said is that in urban area it would tend to be above the average because the surface roughness is higher. And, as it is well known, the deposition increases with surface roughness.

So although over the whole 50-mile area we have some average value, in the case of the urban area we tend to get more deposition, more contamination. This is not captured by MACCS, but we can use it when we distribute the activity over many surfaces.

So we cannot -- we cannot try to make MACCS do things that it was not meant to do. But we can use our knowledge of what is going on to interpret the results.

MS. STOLLEY: Dr. O'Kula, can you comment on Dr. Lemay's response?

DR. O'KULA: Kevin O'Kula for the applicant. In terms of -- in terms of using averages, I, again, would reflect on the fact that these postulated, highly unlikely accidents that are severe accidents of -- that are being evaluated in a SAMA analysis context, are occurring at a point 20, 30, 40 miles away on reaching urban areas, suburban areas, and so on, and as well as close into the site of the

1 point of release.
2 And so appropriately it would be useful to
3 look at average values as reflective of the amount of
4 deposition that would occur, the type of building
5 structures in an area, because, consequently, the
6 resolution quality of the code is such that these
7 results make sense in an average to each grid element.
8 But in terms of this specific issue, in
9 terms of the uniformity of contamination to a
10 structure, a building, what we are trying to -- what
11 we are trying to integrate is the fact that worker
12 contamination -- or decontamination costs would be
13 assessed for every surface no matter if it's
14 contaminated or not, or some gradations in that
15 distribution.
16 And what is -- the best of my opinion,
17 what is being accounted for in internal building
18 surfaces make the assumption that all surfaces need to
19 be remediated to come up with some degree of
20 habitability.
21 And this is really not the case. Work
22 crews would not be assigned with a uniformity of
23 surfaces and just do what you can blindly. Some
24 surfaces would be decontaminated, and others would
25 not.

1 So I think this drives the fact that the
2 costs are assessed in both CONDO and RISO databases on
3 a per unit surface area basis. And when all surfaces
4 need to be remediated or decontaminated, then all
5 surfaces have to be addressed. The costs are then
6 determined in a commensurate way.
7 And it is as if all surfaces in the
8 building that are being decontaminated, regardless of
9 the cost per unit area, are being remediated to the
10 same level that the contamination might exist on the
11 rooftop. And this is unrealistic, in my opinion.
12 MS. STOLLEY: Now, you mentioned -- I
13 believe there was testimony yesterday about a
14 multiplier that Dr. Lemay applied in his CONDO and
15 RISO --
16 DR. O'KULA: Yes, I did. This I think was
17 referred to in NRC staff testimony in March of this
18 year by Mr. Jones. And this multiplier accounts for
19 the multiple surfaces, principally in the space of --
20 in the context of internal walls, as well as external
21 walls, in both cases with the dominant approach being
22 internal walls.
23 It was noted that there is a multiplier
24 there to account for the fact that urban settings and
25 semi-urban settings have slightly larger, based on

building type and the type of structure that is being decontaminated, would scale by the number of surfaces in those buildings.

And so there is a judgment call made in the CONDO approach to multiply surfaces to be decontaminated. And, unfortunately, I think, again, as a cost accountability tool, the code is blind to, are all surfaces the same contaminated level? And they wouldn't be, in reality, but the costing is done as if all surfaces needed to be remediated.

So the multiplier comes into play by building type, the average number of floors, and the average number of internal surfaces that would need to be remediated. So they are, in a sense, in the spreadsheets that Dr. Lemay provided.

In the December 2011 exhibit, there are calculations for these surfaces that come into play. And as observed by Mr. Jones, and also that we understood to be the case, these unfortunately are painting the picture of an unrealistic decontamination effort that would be required.

MS. STOLLEY: So when you said "judgment call," you meant, in this case, by Dr. Lemay, in terms of what multiplier to use.

DR. O'KULA: Correct.

MS. STOLLEY: Okay. If you applied a more reasonable, realistic scaling factor, what would happen with the bottom line number, with the CDNFRM?

DR. O'KULA: Okay. And I need to be clear that this is in -- with respect to Approaches C and D in the revised table.

But doing a quick glance at the scaling factor that I think was inappropriately added to the spreadsheet to apply the CONDO methodology, again, in spreadsheet form, not by running the code but in the spreadsheets that were performed by ISR, if those are renormalized back to I think a more common sense value, the values for both light contamination and heavy decontamination for Approach C, as well as Approach D, the RISO approach, fall very close to the values estimated by Entergy in its SAMA analysis.

MS. LIBERATORE: Objection, Your Honor. I asked "more normalized value." I'm not sure this analysis has been disclosed, and I am not sure if this is a guesstimate that Dr. O'Kula is coming up with on the spot. I'd just appreciate a little more detail so the record is clear.

JUDGE McDADE: This is the opportunity of Entergy to ask the question. I think it was an appropriate question. I'm going to allow the witness

to answer in the way he thinks is most responsive, and the objection is overruled.

You can continue, Doctor.

DR. O'KULA: Thank you, sir, Your Honor. In the informal look I took at the CONDO and RISO values, the surfaces -- the surface factor for both internal walls and exterior walls have renormalized that value or made it more realistic to one.

When I did that, the values in the end product of the spreadsheet, in my informal look, became much like those applied in the Entergy SAMA analysis.

MS. STOLLEY: While we are talking about CONDO, is there any indication that you have found that Dr. Lemay actually used the CONDO code?

DR. O'KULA: To the best of my reading of --

MS. STOLLEY: Ran the code, I should say. I apologize.

DR. O'KULA: I'm sorry?

MS. STOLLEY: Ran the code, used the code, whatever the proper verbiage is.

DR. O'KULA: Yes. I understand -- I have read the CONDO base documents, and I have read Dr. Lemay's report produced in December of 2011 and the

rebuttal testimony provided in July of this year. And I think the point needs to be made that the code was not exercised.

The spreadsheets were provided, which are illustrative of the approach taken by ISR, but the code in fact furnished the database and a methodology, but there is no way to know if the code would have calculated the same answers that were provided by ISR in the spreadsheets.

MS. STOLLEY: With regards, again, to the CONDO code and RISO code and Dr. Lemay's use or not use of the code, can you explain for us what this category is called hyper-urban?

DR. O'KULA: Yes. My understanding is that hyper-urban refers to a building density and a population basis of a highly urban area. That is beyond the definition or beyond the defined level of urban that the CONDO computer code authors defined, and so it was felt -- this, again, is my judgment, that it was felt by ISR that they needed to account for particularly highly urban areas that went beyond the bounds determined by the original CONDO code authors.

MS. STOLLEY: Now, the CONDO code, that is a UK code, is that correct?

1 DR. O'KULA: Yes, it is.
2 MS. STOLLEY: So one would assume that
3 they could use it for analyzing a situation in London,
4 correct?
5 DR. O'KULA: It would be -- not knowing
6 specifically the building density and population
7 exactly to the tee in London, but it would be my
8 assumption that it should work for a situation such as
9 London.
10 MS. STOLLEY: And there is no hyper-urban
11 category in the CONDO code, correct?
12 DR. O'KULA: As far as I can tell from the
13 CONDO documents, there was not a defined density that
14 was used as hyper-urban.
15 MS. STOLLEY: And presumably, if it did
16 exist, it would be used in an analysis of a plant
17 accident outside of London, which is comparable in
18 size to New York City, right?
19 DR. O'KULA: That would be my
20 understanding.
21 MS. STOLLEY: So this is something that
22 Dr. Lemay invented?
23 DR. O'KULA: Again, reading from the CONDO
24 documentation, I would -- and also the reports
25 prepared by ISR, I would -- I would concur that it is

a -- it is an additional category of building density and people density that was uniquely determined.

Dr. O'Kula, I want to go -- or, Mr. Teagarden or Ms. Potts, I would like to ask briefly about the NUREG-1150. Can you tell us about the pedigree, everything about -- we talked very briefly yesterday about peer review of NUREG-1150.

MS. LIBERATORE: Your Honor, I would object to this as repetitive. We have gone through the history of the --

JUDGE McDADE: Well, I don't know if it's going to be repetitive yet or not until I hear the question. Please continue.

MS. STOLLEY: Dr. Lemay seems to contest the pedigree of NUREG-1150. We went over very briefly yesterday about one -- first draft and second draft. We did not go into detail about the actual pedigree of NUREG-1150. So if you could please detail that for me. Dr. O'Kula, if you can go ahead?

MS. LIBERATORE: Your Honor, same objection. I believe we did go through the history in gory detail yesterday.

JUDGE McDADE: And I want to make sure that I've got a correct understanding of it. The objection is overruled.

1 Doctor, you can answer.
2 DR. O'KULA: Yes. Thank you, Your Honor.
3 And in terms of the -- I think we addressed two
4 comments that were contained in the final wrap-up to
5 NUREG-1150 that turned out to be public comments.
6 Just for the record, there were additional subject
7 matter and independent peer reviews of the information
8 of NUREG-1150.
9 There were three formal peer reviews
10 completed on the 1987 first draft of the report in
11 February. Two were initiated by the NRC, and one was
12 initiated by the American Nuclear Society. I need to
13 point out that these are independent reviews.
14 The national laboratories that did the
15 work are then not counted as reviewers, so --
16 JUDGE McDADE: Doctor, excuse me, just for
17 clarification for me. Three peer reviews of exactly
18 what? Of --
19 DR. O'KULA: Of the initial draft to the
20 document, to NUREG-1150.
21 JUDGE McDADE: Okay. The initial draft,
22 are we talking about the document that is unpublished,
23 or are we talking about further down the road?
24 DR. O'KULA: This was the 1987 draft,
25 which is fully retrievable.

1 Okay. There was also associated with this
2 work -- NRC also discussed the methods of the draft
3 NUREG-1150 with the ACRS, the Advisory Committee on
4 Reactor Safeguards, on several occasions.
5 Secondly, the NRC also formed a Peer
6 Review Committee under the provisions of the Federal
7 Advisory Committee Act to review the second draft
8 which was published in 1989, and answer followup
9 questions with respect to its adequacy of the work.
10 So it is important before -- so two
11 drafts, several rounds of review, before the document
12 and its associated set of supporting documentation on
13 all three levels of the PRA, before that became
14 finally published in December of 1990, gives some
15 confidence to the nature and breadth and depth of the
16 work that was done.
17 MS. STOLLEY: Was the second draft also
18 reviewed and commented on by NRC's Advisory Committee
19 on Reactor Safeguards?
20 DR. O'KULA: I believe that's correct.
21 MS. STOLLEY: In your experience, Dr.
22 O'Kula, how would you compare the level of review and
23 scrutiny that was given to NUREG-1150?
24 MS. LIBERATORE: Your Honor, I'm going to
25 object on relevance here. No one -- we are not

disputing --

JUDGE McDADE: I'm going to overrule the objection.

MS. LIBERATORE: -- portions --

MS. STOLLEY: Do you want me to repeat the question?

DR. O'KULA: No, I understand. The level of peer review and independent subject matter expert review, in my opinion, was unprecedented.

MS. STOLLEY: Just a couple more questions, Your Honors.

We heard mention -- we have heard mention several times throughout this proceeding of -- to SOARCA, the State of the Art Reactor Consequence Analysis -- Assessment, sorry. If you could comment on that, Dr. O'Kula?

DR. O'KULA: Yes, I would like to, and I will be brief. The SOARCA analysis was a long-term project begun in 2006 and concluding this year. Two computer codes were supplied in support of the analysis. Indeed, this was not a PRA analysis, but severe accident sequences were identified on the parts of two public -- two lightwater reactors -- Surry and Peach Bottom, and then specific sequences were identified.

And understanding that we wanted -- or the NRC wanted to understand, are we improved or have we -- with more accurate analyses, are we better able to understand the nature of severe accident risks? But the second part, not only to identify the sequences and see what new mitigation measures and understanding of -- better on the research that has been done over the last 20 years, if we have made any gains in understanding the nature of severe accidents.

The second part was a computer code analysis to look at the effects to individuals or -- in the 50-mile region around Peach Bottom and Surry.

Now, the SAMA type quantities were not evaluated in SOARCA. But the decontamination model was employed in SOARCA, the same one that is in the part of the successor to MACCS2, WIN-MACCS, the same model was employed in terms of habitability criterion, when to bring populations back onsite to their residences in terms of cleanup criteria.

So those quantities are different in terms, but the model had to be set up and run as if it was a SAMA-type analysis to make sure that the returning residents would not receive long-term doses above the same threshold habitability criteria that we talked about.

So the SAMA analysis -- the SOARCA analysis is contemporary. The final documentation was publicly disclosed in the early part of this year -- 2012 -- and it remains a reaffirmation of the techniques applied in the Indian Point SAMA analysis with respect to decontamination model as -- with respect to the same TIMDEC quantities, as well as the same scaling practice that was done for decontamination per capita.

MS. STOLLEY: So, Dr. O'Kula, just to clarify, were the CDNFRM and the TIMDEC parameters that we have been talking about these last two days, were those considered -- those 1150 values considered in the SOARCA study?

DR. O'KULA: Yes, they were.

MS. STOLLEY: And did the SOARCA study team use the same parameters for CDNFRM and TIMDEC, the same values as Entergy used in its IPEC SAMA analysis?

DR. O'KULA: There were -- for TIMDEC and the level of decontamination reduction factors, the 3 and 15 that we have discussed previously, those values were identical. There are some differences in terms of CDNFRM that are still within the range of those used by Entergy in its SAMA analysis, but they are

similar.

MS. STOLLEY: They used the base of 3,000 and 8,000.

DR. O'KULA: That would be my understanding.

MS. STOLLEY: Okay. And then, the 60 days and then 120 days for DF 3 and DF 15, respectively?

DR. O'KULA: That's correct.

MS. STOLLEY: And that was -- the SOARCA study -- and I know it hasn't been finalized, but that came out in January of 2012?

DR. O'KULA: Originally, the draft summary report and a brochure document came out in the early part of this year. And then, two supporting plant-specific volumes, which we have in our testimony as exhibits, were also noted and came out about the same time. Yes.

MS. STOLLEY: Nothing further, Your Honors.

JUDGE McDADE: Okay. Dr. O'Kula, very quickly, are any of the three peer reviews of the 1987 draft in front of us as an exhibit?

DR. O'KULA: My understanding, at least mentally, with respect to the Entergy exhibits, we have not provided any of those peer reviews.

JUDGE McDADE: Okay. So the same would be --

DR. O'KULA: As exhibits.

JUDGE McDADE: The same would be true of the ACRS review and then the peer reviews of the 1989 draft?

DR. O'KULA: Your Honor, I believe that is correct.

JUDGE McDADE: Okay. Dr. Lemay, the CONDO code, did ISR develop that code?

DR. LEMAY: We did not.

JUDGE McDADE: Do you know who did?

DR. LEMAY: NRPB and the United Kingdom.

JUDGE McDADE: Okay. Did you run the code?

DR. LEMAY: We did not.

JUDGE McDADE: Okay. Where did those inputs on the spreadsheet come from?

DR. LEMAY: They come from the models that are described in the CONDO manual.

JUDGE McDADE: Okay. And Dr. O'Kula talked about normalizing values to make them more realistic. In your view, should he have done that, or was that an inappropriate step?

DR. LEMAY: Well, if I understand

correctly, it is difficult to speculate on what he has done. But I think he said that he went to the spreadsheet and replaced the area multiplier that accounts for the multiple floor in the building and set them to one. So now we are back to decontaminating a parking lot. So in that -- from that point of view, I think that is not justified.

JUDGE McDADE: So in your opinion, that was not scientifically sound.

DR. LEMAY: Well, of course, if we take a calculation that tries to account for a building with multiple floors, and we go back to decontaminating a parking lot, it seems to me that we lost the intent of this calculation.

JUDGE McDADE: Okay. Thank you.

The NRC, are you ready?

MR. HARRIS: Yes, sir.

Mr. Jones, you just heard both Dr. Lemay and Dr. O'Kula talk about having to normalize the CONDO code calculations. Can you explain whether or not you agree with what Dr. Lemay said or Dr. O'Kula?

MR. JONES: Excuse me. Yes. This is Joe Jones with staff. I am not sure I followed Dr. Lemay's response with regard to normalizing to one it turns this into a parking lot. The approach to

normalizing this would have been to distribute the contamination equally, so that you don't -- so that you maintain conservation of mass.

You still only have, as I described earlier, you know, a set amount of curies in a specific area. So if you are going to add floors, you have to decrease the -- you have to ensure that you are not decontaminating more than the fixed amount of contamination that the MACCS code has calculated.

MR. HARRIS: What impact would that have on Mr. Lemay's numbers that he has in his chart -- it's Table 11 -- on the CONDO numbers that -- that's Exhibit New York State 000430.

MR. JONES: That would have an effect of artificially increasing the cost, because you are applying a heavy decontamination factor to areas which likely, by the time you disperse contamination over many, many floors, is now a light decontamination factor or even less.

MR. HARRIS: Do you have some -- an opinion on how big that impact would be?

MR. JONES: I looked at this from a very basic perspective of a simple building with four walls and a roof, so we have five exterior surfaces and six interior surfaces, four walls, a floor and a ceiling.

So if there are 11 surfaces, I believe we simply divide by 11 to conserve the contamination, in which case if we had a DF of 15, a decontamination factor of 15, we are -- and this is not precise -- but we are effectively reducing that to something on the order of one and a half or two, which is now a much lower cost to decontaminate.

MR. HARRIS: Thank you. You were cut off when you were trying to explain about the location of the Zion plant. Could you finish your answer?

MR. JONES: Yes. The Zion plant, as I read in the specific NUREG, has a population of about 8.5 million projected in 2030. But the Zion plant sits on the shore of Lake Michigan, so half of the SAMA area is effectively water.

So if you have eight and a half million people in half of a SAMA area, you can look at that as 17 million people in a whole SAMA area. Population density-wise, it is not dissimilar from the Indian Point SAMA area.

MR. HARRIS: Thank you. Dr. Bixler, earlier today we were talking about what would happen if you contaminated a source of drinking water. And Judge McDade had asked you, how do we account for the cost of if you had to interdict the drinking water if

it was contaminated, so that people wouldn't receive the dose? Can you elaborate on your answer earlier?

DR. BIXLER: Sure. There are two ways that you could do a cost accounting for the contamination of the water. One would be to interdict it and to attach some cost to that. The other option is to assume that people drink the water, which they may really not do. But if you assume that they did, then there is a dose attached to that, and then a -- that shows up as a population dose and gets assessed as a cost.

So you can do one of two things. You can either attach a cost to the dose that would be attributed to that water, or you could attach a cost directly to the remediation of the water.

MR. HARRIS: And if you interdicted the water, would anybody experience any dose?

DR. BIXLER: No. If you interdicted it, then you would be precluding people from drinking the water. So you are assigning a value in one place or the other. It's not both. It is one or the other. Either there is a dose and a cost associated with that, or a cost of remediation.

MR. HARRIS: Dr. Ghosh, earlier we -- Mr. Sipos had discussed about, you know, how the NRC

1 considers this -- I will try to use his term -- a full
2 list of potential candidates for SAMAs. Does the NRC
3 actually not look at any -- do they exclude any SAMAs
4 from consideration that are provided by Entergy? Any
5 mitigation -- well, let me rephrase that.
6 When the NRC gets the environmental report
7 and the SAMA analysis from an applicant, does the NRC
8 staff exclude any mitigation measures from that --
9 from being analyzed?
10 DR. GHOSH: Okay. I think I understand
11 the question. The answer is, in the NRC staff's
12 review of a SAMA analysis and the environmental
13 report, we would look at the full list of candidates
14 and review the entire process of the analysis that was
15 described yesterday.
16 So we would look at the -- how that
17 initial list was generated, how some of them were
18 screened out in what is called the Phase 1 analysis,
19 and then the detailed analysis. And I think, as I
20 mentioned today, we typically ask a lot of questions
21 about even additional candidates beyond those that are
22 provided in the environmental report.
23 So I think the answer to your question is
24 no, we don't exclude from consideration any candidate
25 -- you know, SAMA -- possible SAMA candidate that is

1 identified in the application.
2 MR. HARRIS: Thank you. No further
3 questions, Your Honor.
4 MR. TURK: Your Honor, I would like to ask
5 a few additional questions on behalf of the staff.
6 Thank you, and I'll keep them very brief.
7 To Mr. Jones, earlier you were discussing
8 some of the factors mentioned in the report about
9 Fukushima, and you highlighted that perhaps some of
10 the reason for a year delay by Japan commencing
11 efforts to remediate involved earthquake-related or
12 tsunami-related factors.
13 Did you also notice anything else in that
14 list that might be relevant to why Japan may have
15 taken so long to begin efforts?
16 MR. JONES: I did. If we could call up
17 that exhibit, that would be helpful. It was the Road
18 to Recovery. I don't recall the exhibit number.
19 MR. TURK: I believe it's New York 000428.
20 MR. JONES: And I think we were on page 34
21 of that document.
22 MR. TURK: That's my understanding.
23 MR. JONES: If you notice on this
24 document, most of the costs or many of the large costs
25 are attributed to the disaster. We have disaster

relief. We have removal of debris caused by the disaster. We have additional public infrastructure projects.

Now, that is replacement of damaged infrastructure from the tsunami, and that is 1.4 trillion yen. Those huge numbers indicate to me that the response in Japan had a lot of things they were looking at, and decontamination might not have been an initial priority.

MR. TURK: And when you refer to disaster, are you referring solely to the nuclear accident there?

MR. JONES: No. This is with respect to the tsunami. The reconstruction for the nuclear disaster is a separate cost.

MR. TURK: And just one point of clarification. Earlier today you were talking about an adjustment to a study, said that you were confident that the original values are reasonable if you account for the conservation of mass, the time value of money, a change in other values.

When you were talking about adjusting a study and finding in the end that it came close to -- reasonably close to the numbers used by Entergy -- those were your terms as I recall -- what study were

1 you referring to as doing that adjustment to?
2 MR. JONES: I was referring to the values
3 in the ISR report, as revised with the subsequent
4 submittal.
5 MR. TURK: We have nothing further, Your
6 Honor.
7 JUDGE McDADE: Okay. That should do it,
8 then. We are done with --
9 MS. LIBERATORE: Your Honor, just one
10 quick question. I would like to -- Kathryn Liberatore
11 for the State of New York. I would like to request
12 that any spreadsheets or analyses documenting Dr.
13 O'Kula's informed review of the "normalized results
14 for CONDO" that he referenced be disclosed to the
15 State.
16 JUDGE McDADE: Okay. Basically, we are
17 done with this particular contention. I'm not going
18 to rule on that right now. We will have the
19 transcript here shortly, and New York would then be
20 able, at that point, to file a motion that we could
21 have a response to, and we could then rule on it at
22 that point in time. But you certainly wouldn't be
23 prejudiced by not having us rule on it at this
24 particular point in time.
25 MS. LIBERATORE: Thank you.

JUDGE McDADE: Anything, before we break, from Entergy?

MR. BESSETTE: No, Your Honor. Thank you.

JUDGE McDADE: Okay. At this point, then, Ms. Greene, you are going to get back to us tomorrow with regard to the problems you have on witnesses for next week and for December.

We are going to have consultation among the parties with regard to the availability of your witness on New York 37, and to have either a joint request, either a statement that let's leave 37 where it is, that hopefully the witness should be able to appear on Monday or Tuesday of next week. If we need to change that, hopefully we can have an agreement as to that. If not, we can have expressed, via email, the parties -- the positions of the different parties.

Anything else that we need to take up before we break?

(No response.)

And other than that, we will wish you a good weekend, and see you at 9:00 on Monday morning. I have been advised by Mr. Wilkie that it is realistic, given that we have set this room up once, that we will be able to set it up in time to be able to start at 9:00, and would then hope that we can get

1 through at least, you know, New York 16 and New
2 York 17 on Monday.
3 MR. TURK: Your Honor, Sherwin Turk. May
4 I ask one question about scheduling?
5 JUDGE McDADE: You can ask maybe two or
6 three.
7 MR. TURK: Well, we are going to be
8 talking with other parties about witness problems,
9 but --
10 MR. SIPOS: Your Honor, could I just
11 interrupt one moment? Dr. Lemay and his colleague
12 have a plane. Could the witnesses be excused while
13 the lawyers chat with Your Honors?
14 JUDGE McDADE: Thank you very much. You
15 are excused.
16 DR. LEMAY: It was a pleasure, Your Honor.
17 JUDGE WARDWELL: And I'd like to comment
18 that everyone did a very nice job with this
19 contention, by the way. I was impressed with all of
20 the witnesses.
21 Thank you.
22 MR. SIPOS: Thank you, Sherwin. Sorry to
23 interrupt.
24 MR. TURK: Your Honor, we could do this
25 off the record. I wanted to --

JUDGE McDADE: That's fine. Then, we are -- the hearing is adjourned until 9:00 tomorrow morning. Okay? 9:00 Monday morning, excuse me.

(Whereupon, at 6:10 p.m., the proceedings in the foregoing matter were adjourned, to reconvene at 9:00 a.m., on Monday, October 22, 2012.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

Proceeding: Entergy Nuclear Operations

Docket Number: 50-247-LR and 50-286-LR

ASLBP Number: 07-858-03-LR-BD01

Location: Tarrytown, New York

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken and thereafter reduced to typewriting under my direction and that said transcript is a true and accurate record of the proceedings.

Neal R. Gross

Official Reporter
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