

Official Transcript of Proceedings
NUCLEAR REGULATORY COMMISSION

Title: INTERVIEW OF DR. JOSEPH RING

Docket Number: ---

Location: CAMBRIDGE, MASSACHUSETTS

Date: OCTOBER 23, 1995

Work Order No.: NRC- 370

Pages 22

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ADDENDUM/ERRATA SHEET

Page	Line	Correction and Reason for Correction
10	13	add hy after 21 st
10	16	remove 'th' before space
10	19	add some between day & exposure
10	25	remove as to replace with 'confer'
11	2	at the end add: "for the OK and"
11	4	delete after -- to period & replace with and OK specifies the beginning.
11	10	-- is 'a ball park estimate'
11	11	because it was left out.
11	14	-- is 'the first few minutes'
11	16	-- is after
11	25	-- is was 'been omitted' to the end of the working because of omission
13	16	-- was is 580 and
14	21	-- is OK
14	23	-- is 'to gain consensus'
16	16	remove not because I do have the
16	17	Confidence in the 25007R
17	14	It should be 'that I did because I was a member substantially different from standard was as I decided on a primary volume correction early on. This is to correct for the bias many of what was said
17	18	caustation is primary concentration
20	10	the 1 st 0.9 insert 'is' & the use 0.9'

ADDENDUM/ERRATA SHEET

Page	Line	Correction and Reason for Correction
5	10	change 'tried to see' since it was not a suggestion but a neurological correction or suggestion on KRP 30-34
5	23	corrected as 'collected' - that is what it said
6	1	delete 'him' to replace with '6'
6	2	is it as of the 'beginning'
6	12	insert the word 'appear' with: but which what was input into the KRP model - the because there was no time correction to end of computer analysis time
6	16	remove 'that'
	17	replace 'and of collection' with 'time of collection' because the transcript was poor
	23	delete the portion of his 24h rec'd samples to include '24h rec'd a known volume' - make the addition because it makes no sense otherwise
7	2	replace 'sent' to input
7	8	-- should be 'clear'
7	12	-- 'the maximum' should be 'primary concentration'
8	1	2nd word should be on 'not long'
8	3	it should be clarified that he he felt the reported date (the 11)
10 5		it went up & down
10	5	-- is 'the analogy'
10	10	anything should be 'anything about the particulars of' - this is good because I can put any date

1 UNITED STATES OF AMERICA
2 NUCLEAR REGULATORY COMMISSION

3 + + + + +

4 INCIDENT INVESTIGATION TEAM

5 + + + + +

6 INTERVIEW

7 OF

8 DR. JOSEPH RING

9 + + + + +

10 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

11 + + + + +

12 MONDAY,

13 OCTOBER 23, 1995

14 11:30 a.m.

15 + + + + +

16 INTERVIEWERS:

17 SAMI SHERBINI

18 BETSY ULLRICH

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

2 (11:34 a.m.)

3 INTERVIEWER SHERBINI: It's 11:30. And this is
4 the interview with Dr. Joe Ring. My name is Sami Sherbini.

5 INTERVIEWER ULLRICH: I'm Betsy Ullrich.

6 DR. RING: And I'm Joe Ring.

7 INTERVIEWER SHERBINI: Joe Ring. Let me
8 explain to you what we are doing. May I call you Joe?

9 DR. RING: Please.

10 INTERVIEWER SHERBINI: This is an investigation
11 team from the NRC, and we are looking into the intake, P-32
12 intake, that occurred in the cancer research lab about 3
13 months ago. We're trying to determine what happened, how
14 it happened, and assess the doses and so forth.

15 The interview is being taped and transcribed
16 just so that we don't have to take notes and so that we can
17 refer to it if we forget what was said during the
18 interview.

19 Tomorrow, within 24 hours, you could review the
20 transcript if you wish to make sure that everything that
21 was put in it is what was said and it was interpreted
22 correctly or if you wish to change it, you may do so in a
23 special change errata sheet.

24 DR. RING: That I'd like just as a routine. I
25 go through this a lot, and I see what happens in

1 transcripts an awful lot.

2 INTERVIEWER SHERBINI: Yes.

3 DR. RING: So I'd like to see the transcript.

4 INTERVIEWER SHERBINI: Sure. They'll be here.

5 Any time you wish to see them, you're welcome to.

6 INTERVIEWER ULLRICH: We'll give you the
7 telephone number of the individual to call to verify that
8 they're in before you would come over.

9 DR. RING: Okay.

10 INTERVIEWER SHERBINI: Do you have the number
11 with you?

12 INTERVIEWER ULLRICH: I do.

13 INTERVIEWER SHERBINI: Do you know offhand what
14 it is?

15 INTERVIEWER ULLRICH: No. I'll look it up
16 before he leaves.

17 INTERVIEWER SHERBINI: Okay. Good point.

18 The purpose of this interview with Joe is to --
19 we understand you were asked to do an intake evaluation for
20 Dr. Li as a sort of backup for what was done here at the
21 Radiation Protection Office. The thing that I'm not quite
22 clear about is at whose request or who wanted to do this
23 check or whatever or a second opinion assessment of the
24 intake.

25 DR. RING: Frank called me and asked me if I

1 would take a look at it.

2 INTERVIEWER SHERBINI: Frank?

3 DR. RING: Frank Masse asked me if I would take
4 a look at that, the work that his radiation protection
5 people did, and if I would work with Dr. Li on whatever
6 data he had and to go through the MIT data with Dr. Li.

7 INTERVIEWER SHERBINI: Okay. So were there two
8 sets of data or just one set?

9 DR. RING: Dr. Li has taken many of his own
10 data points. He took an aliquot of all of his 24-hour
11 urine samples. And he counted them himself.

12 INTERVIEWER SHERBINI: Oh, okay. So there were
13 two sets of urinalysis?

14 DR. RING: There were two sets of urinalysis
15 data.

16 INTERVIEWER SHERBINI: Have you looked at both
17 of them?

18 DR. RING: And I looked at both of them.

19 INTERVIEWER SHERBINI: Okay. Could you tell us
20 what you found?

21 DR. RING: I'm sure you probably have seen some
22 of the work that I sent to Frank.

23 INTERVIEWER SHERBINI: I haven't yet. We have
24 requested copies of it, but I haven't seen it yet.

25 DR. RING: I didn't bring it with me, assuming

1 that you already had it.

2 INTERVIEWER SHERBINI: We probably do have it.

3 INTERVIEWER ULLRICH: We have copies of it. We
4 do have copies.

5 DR. RING: If you look at -- I'm going to be
6 off, but let's say within 20 microcuries either way because
7 I don't exactly remember the numbers offhand, but I took
8 Dr. Li's data with Dr. Li, went through what he did,
9 corrected for some of the things that were not done, like
10 background subtracts and whatever other things, tried
11 corrections as appropriate, and took the data and fit it to
12 the NUREG, the one Skrable did with the --

13 INTERVIEWER SHERBINI: Oh, the --

14 DR. RING: Was it the 4430, the --

15 INTERVIEWER ULLRICH: The big blue book.

16 DR. RING: -- big blue one on bioassay.

17 INTERVIEWER SHERBINI: Okay.

18 DR. RING: And I also ran it through INDOS
19 because INDOS is essentially where those numbers came from
20 and it's the ICRP 30 model.

21 INTERVIEWER SHERBINI: Yes.

22 DR. RING: And I did that with the data that he
23 corrected for the whole body count work. He reports to
24 have corrected it for time to noon. He did not subtract in
25 the data that he gave me the background continuum because

1 not being a gamma peak, but a continuum, we have him
2 subtract continuum and didn't know what it was. So he
3 didn't subtract the continuum. And I believe he came to
4 something like 630 microcuries of exposure.

5 INTERVIEWER SHERBINI: With the whole body
6 data?

7 DR. RING: With the whole body counting data
8 without the continuum subtracted. And for the --

9 INTERVIEWER SHERBINI: Is that the data he
10 obtained from --

11 DR. RING: That's the data he obtained from
12 Mitch in that he went and time-corrected it and adjusted
13 it.

14 The urinary concentrations -- let me go back to
15 the 24-hour void data. I believe that he went through and
16 corrected that for background and corrected it for
17 efficiency and corrected it to 12:00 noon and of
18 collection.

19 INTERVIEWER SHERBINI: That's the urinalysis?

20 DR. RING: For the urinalysis 24-hour voids.

21 INTERVIEWER SHERBINI: His data?

22 DR. RING: His data, where he took a sample
23 from the bottle that he gave MIT. I believe he gave them
24 all to Mitch.

25 INTERVIEWER SHERBINI: Yes.

1 DR. RING: And then he went back to his lab.
2 And he counted it. And we sent those all into INDOS. And
3 I think my memory says 571 was the number that he came up
4 with on that. They were within -- I think the range from a
5 high to low on the 24-hour urine samples and the whole body
6 counting samples was 9 or 10 microcuries from a high to low
7 on all the different samples. I can't remember which ones
8 were which at this point, but they were all --

9 INTERVIEWER ULLRICH: Sure.

10 DR. RING: -- within 10 microcuries.

11 INTERVIEWER SHERBINI: Okay.

12 DR. RING: He also had data for -- and I was
13 unable to determine from him whether they were his numbers
14 or Mitch's numbers, but I believe they were his. He never
15 specifically said they were his, but he said that he took
16 them, he calculated them. And I kept asking him if they
17 were his urinary concentrations from the first three or
18 four days or if they were numbers he got from Mitch. He
19 led me to believe they were different from Mitch's. So it
20 kind of fit that they really were his numbers.

21 INTERVIEWER SHERBINI: These are from the first
22 few days?

23 DR. RING: From the first few days up to, I
24 think it was, 8-22. And those were used in a urinary
25 concentration model and fed into INDOS and adjusted for the

1 daily void volume.

2 And they came out reporting an intake of
3 something around 560. Of course, it had a very substantial
4 error, something like 180. So let's call it 200
5 microcuries. So that was fairly wide given that it was
6 small volumes taken, you know, every 20 minutes, it seemed.

7 I didn't have a whole lot of reliance,
8 confidence in the numbers. But it really surprised me, as
9 you will see in my report, that when you did the iterative
10 weighted fit, it came right on in the range with the
11 others.

12 INTERVIEWER SHERBINI: Yes, yes, the fit's,
13 yes.

14 DR. RING: Also you've got to think you've got
15 a lot of data points on some of this stuff.

16 INTERVIEWER SHERBINI: Yes. From my
17 understanding, there seems to have been some disagreement
18 as to the dose being low, the intake being too low or
19 something like that, some discussion about --

20 DR. RING: Dr. Li said that when he came here,
21 they told him that his intake was 20 microcuries.

22 INTERVIEWER SHERBINI: That was from the first
23 day?

24 DR. RING: The first day, the 14th -- no. It
25 must have been the 19th because he reports to have had the

1 exposure by the 14th. I may even have some of this written
2 down.

3 He also said it changed a lot, it would go up
4 and it would go down, it would go up and it would go down,
5 it was 800 one day, it was 300 the next.

6 INTERVIEWER SHERBINI: That's what they told
7 him?

8 DR. RING: That's what he says they told him.
9 When I spoke with Frank Masse and Mitch, they said, "To our
10 understanding, his exposure is something or his intake is
11 something on the order of four-five hundred microcuries."
12 And this is when I started to work with them, which was the
13 middle of September. I was on vacation when they called.

14 INTERVIEWER ULLRICH: Do you have a date or a
15 week for that?

16 DR. RING: I'm looking for when Frank called
17 me, if that's what you're asking for. That's probably
18 easier down here, rather than looking through my notes.

19 INTERVIEWER ULLRICH: Okay.

20 DR. RING: Because when you're in a hurry, you
21 never can read your own notes very well.

22 Frank called me September 12th. I returned his
23 phone call on the evening of September 13th. And I met
24 with Mitch on the 19th. And my first meeting with Li was
25 on the afternoon of the 19th of September.

1 And on the 19th I met with Dr. Li, took his
2 numbers as he presented them, and used the NUREG and, as
3 Frank Osborne would say -- Frank is one of the guys that I
4 work with, and she's quite accustomed to Frank. So I'm
5 using -- Frank would go like this. And he'd say the number
6 700.

7 So, having had no opportunity to work with this
8 guy, having not seen any of his data -- and he was very
9 upset and agitated. So what I did is I said, "Well, I
10 don't know what's going on here. I don't know anything.
11 But one of the things that you tell me you need is you need
12 to have an estimate of the intake. Give me the values for
13 the counts on the 21st since exposure and give me the
14 counts on the 14th day since exposure."

15 And interpolated across to get an averaging
16 because I was picking two numbers out of the space.

17 INTERVIEWER ULLRICH: Sure.

18 INTERVIEWER SHERBINI: Which day, 14th and --

19 DR. RING: Fourteenth and 21st day exposure.

20 And I interpolated, which isn't exactly the right thing
21 because you're drawing a straight line through a four-part
22 kinetic model.

23 And I said, "You're in the range of 700
24 microcuries. And you can adjust it down for times of
25 exposure" because there was some dispute as to time,

1 whether they used the beginning of the urinary collection
2 period or the end of the urinary collection period.

3 INTERVIEWER ULLRICH: Right.

4 DR. RING: And they used the end -- they used
5 the beginning. And so I tried to adjust for that by
6 subtracting a day, which was, again, grabbing a number out
7 of thin air. And I said, "Based on that, I'm looking
8 around 620 microcuries as the intake."

9 And he said he was interested in a number. And
10 he just --

11 INTERVIEWER SHERBINI: Okay. So you told him
12 600?

13 DR. RING: Yes. I told him about 600, and that
14 was the first day that I met him, within the first --

15 INTERVIEWER SHERBINI: That was on the 19th?

16 DR. RING: -- 20 minutes of talking with him.

17 INTERVIEWER SHERBINI: And that was based on
18 the NUREG?

19 DR. RING: That was based on the NUREG and
20 interpolation across some data points that were provided
21 there.

22 INTERVIEWER SHERBINI: And then you got all his
23 urine data and did the calculations for INDOS?

24 DR. RING: Yes. I got his numbers, his time of
25 assay and time of void -- the end of the voiding, and then

1 assumed that he had a noontime exposure because they didn't
2 have -- you know, there was some school of thought that it
3 was in the afternoon and the evening.

4 I have no idea what the time of exposure is.
5 So I assumed noon because it was halfway through the day.

6 INTERVIEWER SHERBINI: And that gave the 570 or
7 --

8 DR. RING: And that gave 570 to 580.

9 INTERVIEWER SHERBINI: Was he satisfied with
10 this assessment? Were there discussions about it or did he
11 accept it?

12 DR. RING: That's interesting. He kept telling
13 me that the number was 776 from the first time that I saw
14 him. Don't ask me where the 776 came from. Don't ask me
15 how he'd know. We never were able to come anything close
16 to a number of 776, but he said, "The exposure is 776."

17 INTERVIEWER SHERBINI: Did he tell you now he
18 got that?

19 DR. RING: No. I was never able to get any of
20 that. He told me the number was 776, and it kept on coming
21 up. Where it came from, I have no idea.

22 I told him that I would work with him. I
23 showed him everything, all the books out across the desk.
24 And we sat down there with paper. And he went through
25 everything with me. He made sure that we did the

1 subtractions right.

2 He verified the entries into INDOS. He
3 verified the scribblings on the paper. And he told me in
4 the end that everything was done right, that he agreed with
5 it, but he still thought that the number was on the order
6 of 800.

7 And when I spoke with him on -- I don't
8 remember the date. It was the first day you guys showed up
9 here. I didn't know you were here. And I was finishing up
10 my report. And I'm not sure he knew you were here or not,
11 but he didn't tell me that. So it must have been a week
12 ago today.

13 I spoke with him on the phone. I faxed him a
14 copy of the report. He called me back afterwards and said,
15 "Yep. I agree with everything you did. I agree that the
16 numbers is -- were the numbers that my data predicts, but I
17 still think the number is on the order of 800."

18 So what I said to him is, "That may be the
19 case. I can't tell you. All I can tell you is that I have
20 your data, and I have you as a physical structure and being
21 sitting there. And I know nothing else. I have to rely on
22 this ICRP methodology. And, you know, if you want to talk
23 about some scientific wild estimate, the number
24 mathematically calculates to 580 using the model, but would
25 you ask me -- if you asked me," which he eventually did,

1 "for some kind of an error," and I said, "Well, I would
2 easily throw in 25 to 50 percent just because. Why I don't
3 know. You're not standard man. Standard man has a urinary
4 excretion, a volume of 1.4 liters per day. You've got 2.7.
5 You're not standard man. So 25 to 50 percent. How's
6 that?"

7 And he said, "Well, thank you very much.
8 That's reasonable. I agree with everything, but I think
9 the number is 800."

10 INTERVIEWER SHERBINI: That was the last?

11 DR. RING: That was the last I spoke with him.
12 He said he agreed with everything I did, he did everything
13 with me, and that was it.

14 INTERVIEWER ULLRICH: Before we get off of his
15 data, do you have any idea what counting system he was
16 using, how good those numbers were?

17 DR. RING: No.

18 INTERVIEWER ULLRICH: Okay. You didn't ask
19 about --

20 DR. RING: I did not ask about that. And one
21 of the reasons I didn't is he told me that they were --
22 that he had confidence in them. And I was looking for a
23 place -- my first concern was that I had an individual
24 there who had no confidence in anything. And I had to
25 choose which areas to challenge and which ones to not.

1 I wasn't going to challenge his counting system
2 because if you take a look at the numbers sample to sample,
3 the results and the numerics of the results are so close
4 that it wasn't really an issue as far as I was concerned
5 because -- I don't remember the numbers, of course, but if
6 you take a look at Mitch's numbers or MIT's numbers, you
7 know, 138 DPM per ml. And he was 132.

8 INTERVIEWER ULLRICH: Okay.

9 DR. RING: As I said to him right at the
10 beginning, if whole body counting data and the urinalysis
11 model for the 24-hour voids were within 20 to 50 percent,
12 I'd be happy.

13 And as we sat there, I was looking at him. I
14 said, "Remember, they're going to be separate. They're not
15 going to be close." And when they came in with 9 out of
16 600, if you will, I looked at him and I said, "We had to
17 have done something wrong. They're not supposed to be this
18 close."

19 And he said, "No. We did them right."

20 And I said, "Are you sure?" We had to have
21 done something wrong, you know, just seeing them come out
22 like this. So I really tried to concentrate my efforts on
23 making him comfortable with what was going on, see if I can
24 help him understand what was going on to it, and reach some
25 kind of understanding on where we go.

1 I had a limited scope to review with him what
2 was done and to see if I could help him understand what was
3 done and come to some number that he would agree to.

4 The MIT numbers were done on the Packard 2,500
5 TR. And I have a lot of experience with those guys and did
6 not have confidence in the number.

7 INTERVIEWER ULLRICH: Okay.

8 INTERVIEWER SHERBINI: Did you analyze MIT's
9 data the same way?

10 DR. RING: I went through MIT's data. I got
11 the printouts from Mitch, verified the backgrounds and
12 verified the times, the decay corrections.

13 I just wrote a program to do the decay
14 corrections. So you'll see that there is a slight
15 difference between my redo of MIT's numbers and MIT's redo
16 of MIT's numbers.

17 I don't know what number of significant figures
18 were carried by MIT. I just took whatever was on the paper
19 and ran it in. And then whatever number came on, I just
20 rounded it to three significant digits and entered it.

21 INTERVIEWER ULLRICH: Okay.

22 INTERVIEWER SHERBINI: And the intake agreed
23 with --

24 DR. RING: My number had matched MIT's within a
25 few microcuries. I was 574, 572, 575, something in that

1 range. And when I redid MIT's numbers on INDOS, I gave
2 them to 581.

3 INTERVIEWER ULLRICH: Okay.

4 INTERVIEWER SHERBINI: That's for both the
5 urinalysis and whole body?

6 DR. RING: Well, I did all three. I did the
7 urinary concentration, 24-hour voids, and the whole body
8 count data.

9 INTERVIEWER SHERBINI: The difference between
10 the concentration and the 24-hour voids, it's really the
11 same model, but they used the default volume or the --

12 DR. RING: No. I corrected the volume.

13 INTERVIEWER SHERBINI: The volume.

14 DR. RING: What it did for him because he was
15 so substantially different is I decided on a number early
16 on. And I took the urine volumes that were recorded by MIT
17 from 8-22 to 9-14. And I averaged those, and it came to
18 2.687 liters per day. And so I adjusted the castration
19 model based on that.

20 If you take a look at the initial measurements,
21 some of them are only separate by 20 minutes and they have
22 no radioactivity values in them at all. So you're going to
23 have a very wide error.

24 INTERVIEWER SHERBINI: Okay. Don't both models
25 use the 24-hour urine as a basis for calculation?

1 DR. RING: They use the retention functions.

2 INTERVIEWER SHERBINI: Yes. And so whether
3 it's a 4-hour or concentration, I guess the program just
4 what, adjusts it to the expected data excretion. Is that
5 what it does?

6 DR. RING: Right, yes.

7 INTERVIEWER SHERBINI: Do you have any
8 questions, Betsy?

9 INTERVIEWER ULLRICH: Have you used INDOS in
10 this kind of an evaluation before?

11 DR. RING: We've done research, but,
12 fortunately, not had this kind of need at the university
13 where I work. I mean, it's not mentioned, but I am one of
14 Ken's students. And I worked with him when he put together
15 INDOS, and I've had a decent amount of experience with
16 INDOS.

17 But no, we just don't see -- in this line of
18 business, you just don't see intakes that require the use
19 of this.

20 INTERVIEWER ULLRICH: But you're fairly
21 comfortable that INDOS handles it pretty well?

22 DR. RING: I've done them by hand and verified
23 them against the number that INDOS gives. So I'm
24 comfortable with them. INTERVIEWER ULLRICH: Okay.

25 DR. RING: And I have one example that was

1 probably three-quarters of an inch worth of paper, and it
2 gave me a better number than my hand calculations did
3 because it turns out I made a couple of mistakes along the
4 way. But I've got a lot of confidence with INDOS.

5 INTERVIEWER ULLRICH: Okay. And you are
6 licensed to use INDOS?

7 DR. RING: I am licensed to use INDOS.

8 INTERVIEWER ULLRICH: Okay. I don't believe I
9 have any other -- yes, I do. Did you discuss with Dr. Li
10 at all some of his concerns about the different models? I
11 know that he had described some questions about retention
12 functions and the retention fractions. Was any of that
13 explained to him along the way by you?

14 DR. RING: We talked about it --

15 INTERVIEWER SHERBINI: Okay.

16 DR. RING: -- quite a bit. His biggest
17 question was: Which value of FU do you use? Given that
18 ICRP 30 has a .6 and ICRP 54 has a .9 and your NUREG has a
19 .9, originally I started working. And I said, "Well, you
20 take an average of the two, and you use .75."

21 Everybody else wanted to use .9. So I used .9.
22 And we talked about where that .9 came from. And I tried
23 to explain to him that it was an ICRP value, a whole bunch
24 of different resource programs throughout the world on that
25 particular subject. And they take a representative value.

1 So could it be .6 or could it be .9? Yes. I
2 don't know. I don't have enough data to tell what it is
3 for him because the only thing I know for sure is that I
4 have a volume of urine with a concentration of
5 radioactivity or total activity. That's the only thing I
6 know in this system.

7 And so I said, "Well, you may have a difference
8 of opinion on which one one uses, but I have to choose
9 something. And since they have more references for .9 and
10 everybody seems to want to use .9, you could use .6, .75,
11 .9. I can't tell you which one is right for you. I can
12 tell you that if I plot you on the curve, the expected
13 versus the actual numbers, you are so close to the curve
14 that I can't tell the difference. So the only thing that
15 could be a dispute at that point, a substantial dispute,
16 would be the selection of FU. And I have no way of telling
17 you what is the right FU to use."

18 INTERVIEWER SHERBINI: Selection of FU would
19 not affect the data.

20 DR. RING: No. It would just -- it would put a
21 bias in the line.

22 INTERVIEWER ULLRICH: Okay. Were you asked to
23 do any other evaluation of any other portion of MIT's
24 assessment or was this just on the urine data and the whole
25 body data?

1 DR. RING: Urine data, whole body, yes, right,
2 and try to work with Dr. Li.

3 INTERVIEWER ULLRICH: Okay.

4 INTERVIEWER SHERBINI: So you used .9?

5 DR. RING: I used .9.

6 INTERVIEWER SHERBINI: Okay.

7 DR. RING: I used .9 because there were more
8 references on it.

9 INTERVIEWER SHERBINI: Okay. I think ICRP
10 supports it, mentions .9.

11 INTERVIEWER ULLRICH: I have no other
12 questions.

13 INTERVIEWER SHERBINI: Okay. In that case,
14 then, thank you very much, Joe.

15 DR. RING: Thank you.

16 INTERVIEWER ULLRICH: We can go off the record
17 now.

18 (Whereupon, the foregoing matter was concluded
19 at 11:59 a.m.)

C E R T I F I C A T E

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: INTERVIEW WITH DR. JOSEPH RING

Docket Number: --

Place of Proceeding: Cambridge, Massachusetts

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

M. Rudoff
Official Reporter
Neal R. Gross and Co., Inc.