

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

1 In the Matter of:

2 IE TMI INVESTIGATION INTERVIEW

3 of Mr. David C. Carl, Environmental Scientist  
4  
5  
6  
7  
8

9 Trailer #203  
10 NRC Investigation Site  
11 TMI Nuclear Power Plant  
12 Middletown, Pennsylvania

13 May 18, 1979

14 (Date of Interview)

15 July 9, 1979

16 (Date Transcript Typed)

17 #219

18 (Tape Number(s))  
19  
20

21 NRC PERSONNEL:  
22 Mr. Thomas H. Essig  
23 Mrs. Corenthis B. Kelley  
24 Mr. Owen C. Shackleton  
25

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1 SHACKLETON: This is an interview of Mr. David C. Carl. Mr. Carl is  
2 an environmental scientist for the Metropolitan Edison Company assigned  
3 to the Three Mile Island nuclear station. This interview is beginning  
4 at 11:09 a.m. eastern daylight time on May 18, 1979. Present to  
5 conduct this interview from the U.S. Nuclear Regulatory Commission is  
6 Mr. Thomas H. Essig. Mr. Essig is the Chief, Environmental and Special  
7 Projects Section, assigned to Region III. Also present is Mrs. Corenthis  
8 B. Kelley. Mrs. Kelley is an inspector auditor with the Office of  
9 Inspector and Auditor for the U.S. Nuclear Regulatory Commission  
10 assigned to Headquarters, Washington, DC. My name Owen C. Shackleton.  
11 I am an investigator assigned to Region V. This interview is taking  
12 place in trailer number 203 which is located just south of the south  
13 security gate at the Three Mile Island facility.

14  
15 Just prior to going on tape I presented to Mr. Carl a two-page document  
16 from the U.S. Nuclear Regulatory Commission which sets forth the scope  
17 and purpose of this investigation. It further identifies the authority  
18 granted to the U.S. Nuclear Regulatory Commission by the United States  
19 Congress to conduct this investigation. It also identifies Mr. Carl's  
20 rights to refuse to be interviewed and to refuse to submit a signed  
21 statement.

22  
23 On the second page of this two-page document Mr. Carl answered three  
24 questions that are listed there, all in the affirmative. At this time  
25 to make it a matter of record on this recording I'm going to ask  
Mr. Carl to respond orally to these questions.

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1 SHACKLETON: Mr. Carl, did you understand the document that I am  
2 referring to?

3  
4 CAPL: Yes I did.

5  
6 SHACKLETON: And do we, the U.S. Nuclear Regulatory Commission, have  
7 your permission to tape this interview?

8  
9 CARL: Yes.

10  
11 SHACKLETON: And would you like a copy of the tape?

12  
13 CARL: Yes.

14  
15 SHACKLETON: Alright sir. That will be provided at the conclusion of  
16 this interview. And now Mr. Carl, to assist members of our investigative  
17 team as well as other persons who will be listening to your comments,  
18 would you please give us briefly your educational and work experience  
19 as it relates to the nuclear industry.

20  
21 CARL: I'm a spring 1978 graduate of the Pennsylvania State University,  
22 when I received a Bachelor of Science degree in meteorology. The  
23 specific option that I picked within my major was air pollution meteorology  
24 or environmental meteorology. Most of the special courses that were  
25 involved in that option had to do with micro meteorology and air

1 pollution meteorology. I came to work for Met Ed in August of 1978  
2 and have been there to date. I work in what is called Radiation  
3 Safety and Environmental Engineering section of Generation Engineering  
4 at Met Ed in production supervision.

5  
6 SHACKLETON: Thank you very much, Mr. Carl. And now I'll turn the  
7 interview over to Mr. Essig.

8  
9 ESSIG: I think before we begin the questioning there is one term  
10 which I'll define which we'll be using during the interview which I  
11 will provide a definition of for the purpose of making transcription a  
12 little easier. The term we'll be using is called chi over Q. Designed  
13 by the greek letter chi, capital, divided by capital Q and it is  
14 defined as the atmospheric dispersion factor or atmospheric dispersion  
15 parameter and can be typed X/Q and it is in units of normally of  
16 seconds per cubic meter. Now, to begin with the questioning. Mr.  
17 Carl, what I would like you to do for us is -- we are focusing on the  
18 st three days following the event of March 28. In other words we  
19 will be talking about activities that went on during the 28th, Wednesday,  
20 Thursday the 29th and Friday the 30th through midnight. What we'd  
21 like to establish first is exactly what you were called upon by your  
22 employer to do. Whether or not you were based primarily in the corporate  
23 office, you stayed there during the entire period of time and if so  
24 what were you called upon to do? Or if you did come to the site, any  
25 telephone contacts that you made, liaison with the various contractors

1 that are used here on the site, that type of thing. So if you could,  
2 what I'd like you to do now as the best you recall we recognize that  
3 the trail is getting a little cold now since it was better than a  
4 month ago...or a half ago that the event happened, we'd like as best  
5 you can to pretty much walk us through the three days following the  
6 event in terms of your activities and where you can, if possible,  
7 assign a time to a particular activity that you might have done. So,  
8 could you start with the 28th and just sort of recall the best you can  
9 your actions during the first three days? And then I'll take it from  
10 there.

11  
12 CARL: Alright. For the duration of the period in question for the  
13 three days I was located in the Reading office of Met Ed, the corporate  
14 office. On the morning of the actual incident, May 28, I got to work  
15 roughly about eight o'clock and learned that Unit 2 had tripped off  
16 line, but no one had informed us, my group anyway, what really the  
17 severity of the situation was. Roughly about nine o'clock, I would  
18 say, in talking with Michael Buring, who works in the actual radiation  
19 part of our group, radiation safety part, I learned that there had  
20 been some releases to the atmosphere and there was a question over  
21 actual meteorological conditions, wind speed, wind direction, how  
22 receptive was the atmosphere to mixing the actual release. At that  
23 time Mike made a request that I get in touch with Pickard, Lowe and  
24 Garrett who is Met Ed's contractor as far as collecting and reducing  
25 meteorological information from the island. I did call there and, I

1 believe, I spoke with -- I guess it would have to be either Tom Potter  
2 or Mark Abrams. I believe my first contact was with Tom Potter. I  
3 relayed to him that there was some sort of incident occurrence, sort of  
4 release occurring at the island and we needed some meteorological  
5 data, more or less right away -- wind speed, wind direction and some  
6 X/Q data to assess the mixing. Like I said before, there wasn't  
7 really a strong feeling for how serious the whole incident was going  
8 to become or really the nature of the incident yet. He followed  
9 through with my request and worked some calculations, I guess, off his  
10 computer that he has access to, at Pickard, Lowe and Garrett and later  
11 on in the day telecopied data to Met Ed's offices in Reading concerning  
12 the first few hours. I believe I requested data from seven o'clock  
13 a.m. through whenever he could finish the printout and telecopy it to  
14 me. As the day went on we realized that things were becoming a little  
15 bit more serious than perhaps what we had originally understood. I  
16 got a call later back from Tom saying that he had heard something on  
17 the radio as to the situation at TMI and that he was working on getting  
18 data to me as fast as he could. When I received the data from Pickard  
19 and Lowe later on in the day, I looked at it and spoke about it to  
20 Mike Buring and assessing which sectors would be affected, where the  
21 wind was coming from, the nature of the mixing and that sort of thing.  
22 I believe, right after that the data was fairly legible, I think; it  
23 came over a telecopier. What I did was, I took the data, reduced it  
24 and sent it off to the island. I got in touch with somebody from  
25 Health Physics, I believe it was Lynn Landry, who was in Unit 1's

1 control room at the time. I believe Health Physics was working out of  
2 Unit 1's control room. Informed him that I would be forwarding meteorological  
3 data to him from roughly seven o'clock in the morning and that's  
4 exactly what I did. I kept the original copies that I had gotten over  
5 the telecopier and sent that off to Lynn Landry.

6  
7 ESSIG: Excuse me, do you recall about time that was that you sent the  
8 data to Landry? Was it near the end of the...

9  
10 CARL: It was near the end of the day, if I recall correctly. And it  
11 had data from roughly seven o'clock a.m. through roughly one o'clock,  
12 two o'clock in the afternoon, roughly. I have a record of it but I  
13 can't think of it off hand.

14  
15 ESSIG: Okay.

16  
17 CARL: All right. As far as the first day is concerned, that was  
18 about the largest part that I contributed. Just assessing it and  
19 talking it over with Mike where the release was going and how it would  
20 mix with the atmosphere. As I recall the mixing conditions weren't  
21 very favorable at the time. There weren't a great deal of strong  
22 winds and stability was such that it didn't lead to a lot of mixing. I  
23 am just reading over the data. On the second day I continued to contact  
24 Pickard and Lowe. I believe now I was speaking to Mark Abrams. We  
25 had a little bit better feeling for the severity of what was going on

1 with release to the atmosphere, that sort of thing. We more or less  
2 set up a routine where he would request meteorological data from his  
3 computer at Pickard and Lowe and telecopy it to me in Reading. I  
4 would then look over the data, discuss it with Mike Buring, this was  
5 Thursday, I believe; and send it on to the island. As far as the  
6 second day sending it to the island, I believe, I contacted Mike  
7 Janouski who was also involved in health physics. I went through the  
8 same procedures again telecopied it to the island to Mike Janouski.  
9 That's about it for the second day.

10  
11 ESSIG: Would you have telecopied it roughly at the same...near the  
12 end of the day again?

13  
14 CARL: That's correct.

15  
16 ESSIG: Okay. And this time it was to Mike Janouski instead of Lynn  
17 Landry.

18  
19 CARL: That's correct.

20  
21 ESSIG: Okay.

22  
23 CARL: Friday again the data came in and --- along about Friday we  
24 had -- I had tried to get a grip on things as far as a summary of the  
25 first few hours of things. I started a summary function of meteorological



1 data in relation to where the wind was coming from, how strong were  
2 the winds and what sector was affected. That went for the actual date  
3 and hour and what I've done with that was compiled it and made copies  
4 of it. I have a record of that now, a full record in Reading and I've  
5 sent that to the data reduction and management group. As far as the  
6 third day was concerned, again I believe I sent it to Mike Janouski in  
7 health physics, all the meteorological information; and other than  
8 that I can't think of anything really important as far as contacts at  
9 the island was concerned.

10  
11 KELLEY: David, I believe you referred to the incident date as being  
12 May 28. Would you clarify it for the record that that actual month is  
13 March?

14  
15 CARL: That is correct. I'm sorry. It is March 28.

16  
17 ESSIG: Dave I would like to talk with you a little bit about a particular  
18 procedure and I would like to first describe the procedure for the  
19 record and then talk with you a little about it. The procedure to  
20 which I am referring is radiation emergency procedure 1670.4 and its  
21 title is, "Radiological Dose Calculations." Have you seen this procedure  
22 before? Are you...

23  
24 CARL: I have seen it but I'm not familiar with it.  
25

1 ESSIG: Okay, you have not. Were you ever given an opportunity perhaps  
2 to review it?

3  
4 CARL: No I was not.

5  
6 ESSIG: You were not. There is one particular section of the procedure  
7 that I would like to talk with you about just a little bit. Maybe I  
8 could just have you quickly look at it. It's not very long. This  
9 particular section to which I am referring, Section 4.3 called "Selection  
10 of Overlay (Isopleths)." Would you have a look at that section there.  
11 It's just a couple of things I want to ask you about it. It just runs  
12 on the paragraph on this page and then down to well, not quite all of  
13 the second page.

14  
15 [PAUSE OF ABOUT 30 SECONDS]

16  
17 ESSIG: While Mr. Carl is reviewing that procedure for the record the  
18 term that I just used, "isopleth," is spelled i-s-o-p-l-e-t-h and in  
19 this instance it's used to describe a transparent overlay which I have  
20 setting in front of me. Actually two overlays for two different  
21 meteorological conditions, and the isopleths are plots of X/Q values  
22 which we previously defined as a function of downwind distance for  
23 meteorological conditions called stable and unstable.  
24  
25

1 ESSIG: Have you finished.

2  
3 CARL: Yes I have.

4  
5 ESSIG: What I would like to do is just, somewhat for my own information  
6 as I'm going through trying to evaluate the actions taken on site  
7 here, what I'd like to do is -- I'm not by training in meteorologist,  
8 I'm a health physicist. But I've had to use in the course of my  
9 health physics duties, particularly in environmental assessment, I've  
10 had to use X/Q values and I only have a very rough idea of how they're  
11 generated. So I'll probably be asking you some--what appear to be  
12 somewhat fundamental questions just more for my own information to  
13 help me as I'm going through. I have in front of me now a copy of the  
14 chart from the Unit 1 wind speed and direction recorder for the period  
15 of time that we are interested in -- March 28, 1979 through March 30.  
16 What I'd like to do is to discuss a couple of particular periods of  
17 times and how you feel, Mr. Carl, this procedure would or should have  
18 been applied.

19  
20 CARL: Before you continue I'd like to say that as far as practical  
21 work with this sort of thing, implementation of this procedure and  
22 comparing strip charts, I have not in the past done that sort of  
23 thing. I have not had opportunity to be at the island and work with  
24 this procedure and compare the strip charts. So I don't feel as  
25 though I could give a worthwhile answer as far as not having training

1 in this sort of background. The theory I understand, but as far as  
2 the practical application and/or implementation of the procedure with  
3 strip charts, I don't feel as though I'm extremely, or at all qualified  
4 to give you that information.

5  
6 ESSIG: Maybe there is another individual in the plant that I should  
7 ask that same question of, right?

8  
9 CARL: Perhaps the person or persons who is...

10  
11 ESSIG: Can you suggest a name to me?

12  
13 CARL: I don't know at the time who was monitoring the equipment in  
14 the control room. As far as actual I&E people, or I&C rather, they  
15 may have been the ones doing the actual monitoring, both at the meteorological  
16 station or in the control room during the incident. But I have had  
17 absolutely no application of this procedure with control room data.

18  
19 ESSIG: Okay. Well let me ask then a little bit more of a -- maybe  
20 not get down to the actual specifics walking through this particular  
21 chart. What I would like to do then instead is to -- As I understand  
22 it using the wind range as described in this procedure is a method of  
23 calculating or estimating which stability class that we should consider  
24 in the calculation and the other way of doing it is as stated here in  
25 the procedures, to use the vertical temperature difference as measured

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1 between the 150 and the 50 foot levels on the meteorological tower.  
2 Now I believe in the particular instance here the method employed was  
3 in fact to use the wind range rather than the vertical temperature  
4 difference. Both of which were available in the control room. In  
5 your experience or given the background that you have, is it your  
6 opinion that the wind range in this case would have been an equally  
7 valid method of determining stability or would have been a better  
8 method of determining stability than would the vertical temperature  
9 difference?

10  
11 CARL: I would only have to say in my opinion. In my opinion and in  
12 my opinion alone, it would be -- the vertical temperature difference  
13 would probably be a better indication of stability. That's only in my  
14 opinion.

15  
16 ESSIG: Why would you say that, in your opinion?

17  
18 CARL: Because in all the work that I've done in my past education has  
19 used wind -- excuse me -- vertical temperature difference as an indication  
20 of stability class in selecting standard deviation  $s_y$  vertical and  
21 horizontal dispersion of pollutants. In this case radioactive release.

22  
23 ESSIG: So would it be a fair conclusion based on what you have said  
24 that, if you were to have done this procedure you would have likely  
25 recommended using the delta T as being the primary indicator of stability rather than the wind range?

1 CARL: Well, if I read the procedure where the actual implementation  
2 of the procedure does call for using wind range as a first choice.  
3 And if the procedure was approved and a valid revision, then that's  
4 the case that I would have followed. However, I have not used that in  
5 my previous experience or education.

6  
7 ESSIG: The statement in the procedure in paragraph 4.3.3, where it  
8 says to measure the average extremes of the wind direction for the  
9 previous 20 minute period. I'm trying to make a little bit of sense  
10 out of that statement. I'm trying to see exactly what it's telling  
11 me. It is followed by a parenthetical expression which says "do not  
12 consider single peaks in determining the range". Do you have any idea  
13 of what the writer of that statement really had in mind there? We're  
14 talking about -- well, I guess I'll have to just come back to this  
15 chart momentarily. Let's pretend for the moment that we're just  
16 talking about the wind variability on any old day, not necessarily the  
17 28th or the 30th. When it says don't use single peaks, if I'm looking  
18 at a section like is shown here on this chart from about 0940 to 10  
19 o'clock in the morning. It says don't use single peaks; then am I  
20 correct that the procedure is telling me to discard these two right  
21 here and to discard this one, would you say? I'm just trying to...

22  
23 CARL: In my opinion, yes.  
24  
25

1 ESSIG: Yeah, that's all I'm asking you for, is what...

2  
3 CARL: In my opinion that would be the correct way to interpret that  
4 statement. The reason for eliminating peaks is to more or less get a  
5 trending sort of thing as to what was the average fluctuation of wind  
6 direction. You would have, say sporadic blurbs here and there, perhaps;  
7 turbulence, whatever.

8  
9 ESSIG: These variations here, these peaks are in fact real? To the  
10 best of your knowledge, this type of thing would be expected to happen  
11 on occasion and particularly at low wind speeds, I gather?

12  
13 CARL: Yes.

14  
15 ESSIG: I'm wondering if the 20 minutes here, if that was selected  
16 mainly because the major divisions on the chart here on the time speed  
17 are at 20 minute intervals or if there is some technical bases for  
18 selecting 20 minutes. Could you shed any light on that?

19  
20 CARL: I really don't have a feeling for that because I didn't have  
21 an input to the actual writing of the procedure.

22  
23 ESSIG: Ok. I guess another question on the procedure: the wind range  
24 method, do you know off the top of your head if less than 45 degrees --  
25 is that a good definition of stable?

1 CARL: As I have said, my past or previous experience with

2  
3 ESSIG: Is all with delta T.

4  
5 CARL: Right. Evaluating stability has been with delta T's.

6  
7 ESSIG: One other area that I'd like to ask you a question about on  
8 this procedure. And I recognize that you're not familiar with it but  
9 this is more of a generic question than anything else. The...

10  
11 SHACKLETON: Tom you'd better hold right now and put your question on  
12 the other side of the tape if we may. The time is now 11:30 a.m.  
13 eastern daylight time and we'll cut the tape at this point and change  
14 the cassette. This is a continuation of the interview of Mr. David C.  
15 Carl. The time is now 11:39 a.m. eastern daylight time May 18, 1979.  
16 Please continue Mr. Essig.

17  
18 ESSIG: Dave I'd like to ask you just a question or two about the page  
19 to which I'm now referring, procedure 1670.4 again. And the particular  
20 page is Enclosure 3, titled "Offsite Dose Calculation Sheet." I guess  
21 really there's only one question that I wanted to ask you on this. In  
22 this procedure it takes a step wise determination of the release rate,  
23 the source term in the terms of curies per second; the X/Q value in  
24 terms of seconds per cubic meter and then the two are multiplied and  
25 the concentration in terms of microcuries per CC in air is determined.



1 And then it lists a space to put down the wind speed and then the  
2 concentration then is to be divided by the wind speed to obtain a new  
3 concentration in terms of microcuries per CC. My question that I have  
4 for you is, once we determine a -- we go through, we have a X/Q value,  
5 we have a Q and that enables us to determine the air concentration  
6 chi. But I guess this question is more for my own edification to  
7 understand how this procedure is being implemented, but it seems to me  
8 then we are dividing by the wind speed and we are still ending up with  
9 a concentration... Besides that, I have a problem with the units  
10 because now we've got microcuries per CC divided by miles per hour and  
11 according to this procedure we're still ending up with microcuries per  
12 CC. But in your training and background with making X/Q calculations,  
13 is this particular calculation here one that's -- is it proper to  
14 employ to take the airborne concentration and divide by the windspeed  
15 to come up with another airborne concentration?

16  
17 CARL: If I'm not mistaken, as I say I haven't had an intimate chance  
18 more or less to review and implement the procedure; but If I'm not  
19 mistaken, I believe the X/Q values that are pulled either from tables  
20 or computers are assuming a wind speed of one meter per second? I'm  
21 not sure about that, but in order to convert it to the actual X/Q with  
22 the actual wind speed there would have to be some sort of conversion  
23 using the actual wind speed. Perhaps if the data sheets were reviewed,  
24 there would be a conversion there which make the units work out.  
25

1 ESSIG: Okay. That may explain then why it may be perhaps one meter  
2 per second rather than one mile per hour? To make the..

3  
4 CARL: Like you first said it would be one meter per second and undoubtedly,  
5 at first glance that does not on -- what is this, Enclosure 3 of the  
6 same procedure -- it does not look like the units work out. But  
7 undoubtedly there's probably some sort of conversion on the actual  
8 data sheet per se.

9  
10 ESSIG: I'll see if I can't track down the author of this procedure  
11 and see if that's what he intended. You stated that during your  
12 involvement you liaison with Pickard, Lowe and Garrett and with the  
13 emergency control station. When you received the X/Q values, wind  
14 direction and speed and so forth from Pickard, Lowe and Garrett roughly  
15 at the end of each day and transmitted it to the emergency control  
16 station, did you just transmit that to the emergency control station  
17 or did you give them the instructions as to what you thought they  
18 should do with it or did you assume they knew what was to be done with  
19 it? Did they have any questions of you regarding the data?

20  
21 CARL: Ok. No, they didn't have any questions for me regarding the  
22 data. I assumed that the people working in health physics, in imple-  
23 menting this actual procedure 1670.4, did have a working knowledge of  
24 what to do with meteorological conditions and X/Q data as it came in.  
25 That was my impression. After receiving the data, it was in a form

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1 more or less rough not rough -- but a computer printout type of form --  
2 and I wasn't sure whether or not people receiving it in health physics  
3 at the island could interpret the data as printed out. For example,  
4 there were decimal points missing and I had spoken with Pickard and  
5 Lowe and they had said in the actual format of the printout you have  
6 to divide the wind speed by 10 in order to obtain the real value and  
7 you have to divide the delta T figure by 10 in order to obtain the  
8 true value. Instead of attaching an explanation to every piece of  
9 data that went to the island and in order to make it more clearly, in  
10 fact, some of the telecopy didn't come through very well, I transposed  
11 the data. I took the actual computer print outs and made forms on my  
12 own and either telecopied those to the island or sent them directly to  
13 the island. That way I felt comfortable sending data to the island  
14 that I felt everyone could pick up, read and understand as opposed to  
15 somebody picking it up, seeing a wind speed of 100 when in actuality  
16 it would be 10, thinking "oh my word, we have a hurricane going on  
17 here." But more or less as far as sending data, I did assume that  
18 people receiving the meteorological and X/Q data on the island were  
19 familiar with it's use.

20  
21 ESSIG: Now the actual data that you sent, and you may have said and I  
22 don't recall, were they hourly X/Q values?

23 CARL: Yes.  
24  
25

1 ESSIG: So these would be then  $\bar{x}$ , if I'm not mistaken, a Q/X value is  
2 usually, is it not, the average X/Q value for a certain time interval?  
3

4 CARL: Well that Pickard, Lowe and Garrett had done for me via Mark  
5 Abrams, had a huge table, so to speak, which included the hour, the wind  
6 direction, wind speed, the delta temperature indication, a few status  
7 computer codes and as far as X/Q data there was X/Q ground centerline  
8 values, X/Q ground averages, deposition and depletion values that they  
9 sent up, that I forwarded to the island. As far as the nitty gritty as  
10 to time periods used to calculate each of those values, I'm not extremely  
11 familiar with that.  
12

13 ESSIG: Okay. Have you during the course of your work with the corporate  
14 office, have you been involved in the calibrations and maintenance of  
15 the meteorological tower?  
16

17 CARL: I have not to date been involved with the actual engineering so  
18 to speak, the actual hands-on maintenance of the meteorological equipment.  
19 I am responsible for coordinating the setup between TMI people meeting  
20 with and acting as liaison to Pickard, Lowe and Garrett who do come in  
21 and perform the meteorological instrument calibrations.  
22

23 ESSIG: Okay. Did you on any occasion during the first three days  
24 perform or feel a need to perform any spot checks of the X/Q values  
25 being provided to you by Pickard, Lowe and Garrett?

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1 CARL: As far as a first glance type of review meaning for the most part  
2 my attention was on the actual meteorological conditions did...just out  
3 of common sense feel for things and in my past experience...did the  
4 temperature difference and the wind speed more or less agree; were low  
5 wind speeds associated with a variable wind direction type of thing.  
6 That's sort of what I would consider common sense meteorology. As far  
7 as the actual values for X/Q, naturally you'll have a smaller exponent  
8 when you have a more stable condition and a larger exponent when you  
9 have more unstable conditions. Common sense things like that I did pick  
10 up along the way and in fact reviewed everything, but as far as intense  
11 technical review of their calculations and the values they forwarded, no  
12 I do not perform that.

13  
14 ESSIG: You indicated that you did -- one of the things that you were  
15 attempting to perform during the three days was to try to make sense out  
16 of the wind -- just what the stability was. To make sure that we were,  
17 or that the people in the control room were interpreting the data properly  
18 and in terms of the context of a very low wind speed and extreme variability,  
19 did you end up satisfying yourself that indeed that was the case that  
20 we're having low wind speeds and that the wind was as variable as the  
21 offsite measurements seemed to indicate that it was?

22  
23 CARL: As far as comparing meteorological data available on paper and  
24 familiarizing myself with the outside conditions in Reading, which were  
25 very very similar to what is actually onsite here at TMI, yes I was

1 satisfied with what I read and compared and the assessment that I had  
2 made. And Pickard, Lowe and Garrett had made. I was satisfied with what  
3 I was reading.

4  
5 ESSIG: Could you state...I guess I should have asked you this probably  
6 near the beginning of the interview...who your immediate supervisor is?

7  
8 CARL: My immediate supervisor is James E. Mudge. Jim Mudge.

9  
10 ESSIG: And his title?

11  
12 CARL: Supervisor, Radiation Safety and Environmental Engineering Section

13  
14 ESSIG: There are in the procedure that I have in front of me which is a  
15 portion of the procedure 1670.9, it details a training program for  
16 division support personnel and it indicates that support personnel will  
17 include the following job classifications. Supervisor of Radiation  
18 Safety and Environmental Engineering. That would be Dr. Mudge?

19  
20 CARL: That's correct.

21  
22 ESSIG: And then (b) Radiation Protection Specialist. Do you know to  
23 whom that would apply? Would that be Mr. Buring?

1 CARL: I believe Mike's actual title is a Technical Analyst. As far as  
2 a Radiation Protection Specialist, he would probably fit into that  
3 category if in fact that's what the procedure had indicated.

4  
5 ESSIG: Okay. By this procedure you personally don't appear to -- there  
6 is no requirement that you be trained in the accident and assessment ...  
7 If your title was Radiation Protection Specialist you would be required  
8 to be given the same training as the accident assessment personnel  
9 Group II. That includes training in such things as meteorological and  
10 radiation monitoring instrumentation, use of isopleths; offsite dose  
11 calculations, protective action guides; onsite and offsite radiological  
12 controls. I recognize that you don't have a requirement to have been  
13 trained in any of those. The question that I have of you at this time  
14 is, have you had any training in those or...? And I guess I recognize  
15 that by virtue of your background you have training in, obviously in the  
16 meteorological monitoring. Has Met Ed provided you training in any of  
17 these other areas?

18  
19 CARL: As far as ... Ok, I have a question, excuse me. The number of  
20 the procedure you are referencing is 1670.9?

21  
22 ESSIG: That was 1670.9 and the procedure details training programs for  
23 various plant people and in one paragraph refers to training for so-  
24 called division support personnel. Now there are only two positions  
25 listed as needing that training. That would be your immediate supervisor,

1 Dr. Mudge, and the other one would be apparently Mr. Buring. Well, I'm  
2 just curious if even though not required if such training was provided  
3 to you. For example, have you participated in an emergency plan drill  
4 during -- since your employment here of August 1978?

5  
6 CARL: No I haven't. I believe Beverly Good was working more or less  
7 with Mike Buring. As far as implementation of emergency plans and that  
8 sort of thing. And I believe she received all the training necessary to  
9 implement those plans and your question is, have I received...

10  
11 ESSIG: Did you receive, and I'm not saying that you were supposed to  
12 have, but did you receive any formal training from Met Ed in those  
13 areas?

14  
15 CARL: Other than indoctrination as far as a meteorological tower and a  
16 little bit about what was available in the control room. No I haven't  
17 received any formalized training in that.

18  
19 ESSIG: Have you...this may sound like a sort of a silly question...you've  
20 been out to see out to see the met tower, have you not?

21  
22 CARL: That's correct. Let me clarify one thing. There is a basic  
23 health physics course that everyone must take to get onto the island and  
24 get issued special identification. That involves three hours of training  
25 as far as emergency signals, that sort of thing, evacuations. That I



1 have received. That was part of my initial training program. I don't  
2 know if that specifically references back to 1604.9, that procedure, but  
3 I did receive that.

4  
5 ESSIG: Okay. I believe that's probably all we --- I appear to be at  
6 the end of my list of questions that I had for you. I just want to  
7 quickly glance over and see if there are any additional areas where I  
8 might have any more questions.

9  
10 ESSIG: Just one last area did you receive any input from the various  
11 federal agencies that were here assisting with various types of asses-  
12 sments, performing offsite surveys; for example, the Lawrence Livermore  
13 group was here running their large computer program...which they can do  
14 essentially plume tracking with. Were you made aware of the results of  
15 the calculations that they were doing?

16  
17 CARL: No I wasn't.

18  
19 ESSIG: Was any of this provided to you?

20  
21 CARL: No it wasn't. In fact most of the information that I was mailing  
22 or telecopying to the island was a source of a lot of regulatory agencies  
23 assessments of what was going on. In fact, it worked in reverse. I was  
24 the source as opposed to a sink of information.

1 ESSIG: I don't believe you stated -- but do you have any direct capability  
2 in Reading for readout of Met data or do you obtain this information  
3 through Pickard, Lowe and Garrett; or can you get it directly from the  
4 site?

5  
6 CARL: As far as real-time output of data, I have no mechanism for  
7 obtaining that in Reading for the actual TMI site. I can get it from  
8 Pickard and Lowe essentially as I had been, say, for the last few hours.  
9 There was a system that Met Ed was to implement at the end of this year  
10 called, "The Environmental Monitoring and Control System," acronym EMACS  
11 that was supposedly to come on-line and to monitor...hook into, in other  
12 words...TMI both plant and meteorological tower information and would  
13 provide a real-time output of both plant parameters, such as environmental  
14 discharge, that sort of thing and meteorological information. That, in  
15 light of the TMI incident, that installation of EMACS has been postponed  
16 roughly until 1981.

17  
18 ESSIG: I see. Okay, Mr. Carl. I think I've gotten through my list of  
19 questions and I'd like at this time, if you wish to do so, give you the  
20 opportunity to make any observations, any personal opinions that you may  
21 have with respect to -- now that the incident is, at least the three day  
22 period that we're looking at is long since past and the actions taken  
23 and so on are over. Are there any things that you care to look back on  
24 and -- say anything in the way of additional capability that you wish  
25 you had; additional training; background; additional people that you

1 wish you had; any observations of that nature that you care to make at  
2 this time.

3  
4 CARL: Personally, an opinion that I had which was brought out in the  
5 course of the interview. There should be perhaps in my area more overlap  
6 between the corporate technical support people or person, myself with  
7 the Island meteorological collection, that sort of thing. I have not  
8 been in the past required to actually give technical support for dose  
9 calculations or actual reading of strip charts, that sort of hands-on  
10 experience. I sort of have a feeling that that will be the case in the  
11 near future. That there will be a closer relationship between the  
12 corporate technical support staff and the actual plant staff. As far as  
13 impressions go, for the first three days...obviously because this is  
14 more or less a one of a kind, first of a kind sort of thing...there were  
15 many, many possibilities for disorganization or confusion. And that  
16 runs the whole spectrum all the way from Met Ed to every regulatory  
17 agency that exists. Just because the people involved with this sort of  
18 thing don't do it every day or every week and it did materialize to the  
19 large scale that it did. But putting all of that aside I can't express  
20 how impressed I was with the efforts put forth by the people at Met Ed  
21 working late, late into the night which was necessary, of course. But  
22 the cool-headedness, the professionalism that came across in my mind  
23 being there less than a year, the professionalism with which I was  
24 treated and the professionalism which the people exhibited at Met Ed  
25 during the whole initial phases of the incident. That will stick in my  
mind for a long time to come.

1 ESSIG: I would like to just draw for a moment on a couple of points  
2 that you sort of triggered in my mind as you were giving your observa-  
3 tions. First of all I believe you stated that one of the things that  
4 was in your opinion might ought to be considered as having a closer  
5 working relationship between the corporate support people and the site  
6 people. Have you experienced an atmosphere on the part of the corporate  
7 office where you've been discouraged from establishing such a relationship?  
8 You say you are not required to do it but I guess what I'm trying to  
9 determine is have you been prevented from doing so?

10  
11 CARL: No I don't think that's been the case at all as far as discouraged.  
12 No, in fact you are encouraged to make contacts with the Island people  
13 that do the functions that you are supposed to be familiar with. As far  
14 as what I would suggest, there aren't super formalized training procedures.  
15 This would go perhaps on a supervisory level saying, okay, here's your  
16 counterpart. This is The supervisory people at the island saying to  
17 their staff, here's your counterpart in Reading and it would be to both  
18 of your advantages to get together every now and then and familiarize  
19 yourself with each other's functions. I think there is a need to do  
20 that. I may have a little bit of a bias there because I am fairly new  
21 working with Met Ed and as far as practical experience with the plant,  
22 etc., I don't have a great deal of it at this time. But I think there  
23 is a need to do that. To formalize contacts via management at both  
24 sites, both the corporate and the operating facility, to say "these are  
25 your contacts."

1 ESSIG: Okay. Just one last question very quickly. On Friday morning,  
2 the 30th, at about 8:00 there was a radiation measurement performed in a  
3 helicopter about elevation of roughly 300 feet above containment, at an  
4 elevation of 600 feet. The radiation level measured was 1200 mr per  
5 hour. Were you -- and that that particular measurement caused a fair  
6 stir both -- well primarily at NRC headquarters and it ended up that  
7 there was an evacuation recommended based largely on that number because  
8 it apparently supported some other calculations that were being made --  
9 did you get at all involved in any follow-on calculations that day with  
10 that particular survey result? Were you asked to do any evaluation?

11  
12 CARL: No I did not. No.

13  
14 ESSIG: Okay. I think that's the end of my questions.

15  
16 SHACKLETON: Also the end of the tape. Thank you very much Mr. Carl on  
17 behalf of the .....