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ORIGINAL

TRANSCRIPT OF PROCEEDINGS

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	
LONG ISLAND LIGHTING COMPANY	Docket No. 50-322-OL-3
(Shoreham Nuclear Power Station, Unit 1)	(Emergency Planning)

DEPOSITION OF STEVEN C. SHOLLY

Washington, D. C.

Thursday, April 21, 1988

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CORRECTIONS TO DEPOSITION

Page	Line	Correction:
28	14	".09S" to "0.95"
29	12	"They" to "I"
29	13	"segments" to "sequences"
30	1	add "and it's" between "," and "well"
30	2	". A" to "that a"
30	3	"service." to "purpose."
14	16	"boiled" to "boiling"

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Deposition of STEVEN C. SHOLLY, called for examination pursuant to notice of deposition, at the law offices of Hunton and Williams, 2000 Pennsylvania Avenue, N.W., Conference Room Two, Ninth Floor, at 11:08 a.m. before WENDY S. COX, a Notary Public within and for the District of Columbia, when were present on behalf of the respective parties:

LEE B. ZEUGIN, ESQ.
DAVID S. HARLOW, ESQ.
Hunton & Williams
707 East Main Street
P. O. Box 1535
Richmond, Virginia 23212
On behalf of Long Island Lighting Company.

-- continued --

APPEARANCES (Continued):

RONALD R. ROSS, ESQ.
Kirkpatrick & Lockhart
South Lobby, Ninth Floor
1800 M Street, N.W.
Washington, D. C. 20036-5891
On behalf of Suffolk County.

C O N T E N T S

E X H I B I T S

P R O C E E D I N G S

Whereupon,

STEVEN C. SHOLLY

was called as a witness and, having first been duly sworn, was examined and testified as follows:

EXAMINATION

BY MR. ZEUGIN:

Q Good morning, Mr. Sholly. My name is Lee Zeugin. With me is David Harlow. We are both from the law firm of Hunton & Williams. We are representing in the Shoreham proceeding Long Island Lighting Company. We have called this deposition today to discuss your upcoming testimony in the Shoreham proceeding on the realism contentions, and, more particularly, the so-called immateriality arguments that your counsel has represented to us are the areas in which you are testifying about.

If at any time during this deposition you don't understand my question, or I have been less than clear, please let me know and I will try to rephrase the question.

Let me begin by having you state your name and business address for the record.

A My name is Steven C. Sholly, MHB Technical

Associates, 1723 Hamilton Avenue, suite K, San Jose, California 95125.

Q Mr. Sholly, could you explain for me what is your understanding of the areas you have been asked to testify about in the upcoming Shoreham proceeding?

MR. ROSS: Are you asking him what he is testifying on?

MR. ZEUGIN: His understanding of the areas he is testifying about.

MR. ROSS: Is the question clear to you?

THE WITNESS: I will give it a shot. If it's not what he is looking for, I am sure he will tell me. Basically we are looking at whether the difference in controlled or uncontrolled evacuation makes a difference in terms of either reducing the amount of dose savings you get from emergency response, or precludes one or more emergency response options.

BY MR. ZEUGIN:

Q Mr. Sholly, I am sure I will get into more detail what that general comment means, as we go on.

Let me ask you, to try to make sure I completely understand, I take it, then, it is your understanding you are

going to be testifying only on contentions 1 and 2?

A That's my understanding, yes.

Q You are testifying about those two contentions only with regard to the immateriality argument?

A That's my understanding, yes.

Q Could I ask you, and I take it you are going to be testifying as an expert on those contentions; is that correct?

A Yes.

Q Let me ask you to briefly describe for me your understanding of LILCO's immateriality argument.

A My understanding of it is that it's your position, or LILCO's position that the difference in evacuation times between a controlled and uncontrolled evacuation is so short that the dose consequences will not be materially different.

Q All right. That's the extent of your understanding?

A That's the way I understand it. That's the way I read it.

Q The testimony you will be preparing on that issue -- could you describe for me how your expertise in the areas which you are going to cover may differ from those of

Mr. Minor, who is also at MHB?

MR. ROSS: Counsel, I want to clarify. Are you asking him to describe testimony he will prepare?

MR. ZEUGIN: I am asking him a more general question. I am just simply trying to figure out his areas of expertise in responding to LILCO's immateriality argument, versus those of Mr. Minor. I am trying to figure out whether their expertise is essentially identical or whether it's different.

MR. ROSS: I think the way to approach this, since you are going to depose Mr. Minor, is simply to ask him about his areas of expertise. When Mr. Minor is here this afternoon, you can ask him about his and make those determinations.

MR. ZEUGIN: I would like to have the witness tell me what he views as the difference between his own expertise and Mr. Minor's.

MR. ROSS: If he is able.

THE WITNESS: The area of expertise that I think I will bring to bear on this is background in risk assessment and emergency planning insofar as that is impacted by risk assessment perspectives. I think Mr. Minor's background is

probably broader, or his experience is broader on emergency planning generally than mine is.

BY MR. ZEUGIN:

Q When you talk about risk assessment, are you talking about the probability of accidents at the plant itself?

A Not just the probabilities of accidents, but the entire scope of a risk assessment. That would include the probability of accidents, the timing of accidents, the containment failure modes and resulting source terms, and the dose impacts of the source terms.

Q In terms of off-site consequence?

A Right.

Q Mr. Sholly, when were you first contacted to potentially be a witness on contentions 1 and 2?

A I think I learned about it the morning of the 7th of April.

Q At that time, were you told you were going to be a witness or asked to be a witness?

A Yes.

Q And you agreed at that particular time?

A Yes.

Q Since April 7, how much time have you spent, give me a rough estimate, preparing to file your testimony on these issues?

A Probably a day.

Q Have you begun to draft any testimony yet?

A Not yet.

Q Could you explain for me briefly what you did in that day, in particular, the documents you may have reviewed, the things you may have looked at?

A I will try to remember. I looked at the motion that LILCO made for a summary judgment on contentions 1, 2 and 9, the county's response to that motion. There were, I think, three board orders, the most recent of which was April 8, that related to the contentions. A little bit in the office on the 1983 full power risk assessment. That's all I have looked at so far. Of course the pleadings had affidavits attached to them, and I have looked at those as well.

Q So, for example, you have reviewed the affidavit of Mr. Minor that was attached to Suffolk County's response?

A I have looked at it, yes.

Q Before we really get into that, the more detailed

aspects of your testimony on contingents 1 and 2, let me just briefly cover your professional qualifications with you. Let me have marked as Sholly Exhibit 1 a statement of professional qualifications that I will represent for you were attached to your earlier testimony in the Shoreham proceeding on reception centers, which I believe occurred in the early part of 1987.

(Sholly Exhibit 1 identified.)

BY MR. ZEUGIN:

Q I would ask you if these are, in fact, your statement of professional qualifications?

A Yes. Of course, since early 1987, there might be a few additions to it. This is the document I am familiar with.

Q Could I ask you to briefly review it and tell me any new information that you may add to this statement?

A There would be some specific pieces of testimony that would have been filed on one or more rate cases.

Q Could you tell me what proceedings those may have been in?

A I am trying to think, Beaver Valley unit 2, the case before the Pennsylvania Public Utilities Commission,

filed testimony on behalf of the consumer advocates office there. In addition, another MHB employee and myself prepared some detailed comments on NUREG-1150, that's the NRC's reactor risk reference document, and that was done for the Illinois Department of Nuclear Safety.

Oh, yes, there's also testimony in the Diablo Canyon rate case on quality assurance. This was filed by myself and Mr. Hubbard. We have also filed comments on behalf of Suffolk County on, I think, NUREG-0956, source term report, and on NUREG-10 -- I forget the number -- [illegible]79, which was on the containment loads working group report. Those are the principal ones. There may be one or two others. But without having my updated list, it's hard to say.

Q That's fine, I didn't mean it as a quiz question. Mr. Sholly, have you prepared a more updated statement of professional qualifications than the one I have had marked as Sholly Exhibit 1?

A Yes, I think one has been prepared, in fact, relatively recently.

MR. ZEUGIN: Mr. Ross, I am not aware we have that, in which case I would request we be sent the most updated version of Mr. Sholly's statement of professional

qualifications.

MR. ROSS: I will go back and check our files.

MR. ZEUGIN: All right.

BY MR. ZEUGIN:

Q Mr. Sholly, as I understand it, you have only testified once previously in the Shoreham proceeding; is that correct?

A I think that's correct, yes.

Q And that involved the reception center issues; and, more specifically, the planning bases that were used to predict how many people would make use of those facilities?

A That was basically an assessment of how many people might be in the footprint of a plume.

Q Mr. Sholly, let me ask you to identify for me what aspects of your educational background you feel particularly qualify you to present expert testimony on contentions 1 and 2?

A Brief educational background is that of a broad background in science and interdisciplinary work, integrating efforts of various scientific disciplines into a unified position on a particular problem or solving a particular problem. I think that's the gist of it.

Q No particular educational training either in nuclear engineering or radiation health physics?

A Nothing that specific. There was some course work in college, I really did get into aspects of radio-ecology, but I am not an engineer.

Q Or a health physicist?

A Or a health physicist.

Q All right. Either in your preparation to date or the preparation that you envision between now and the date in which you file your written testimony on contentions 1 and 2, do you plan to look at any of the, I guess, 35 publications that you have listed in your statement of professional qualifications as perhaps relevant background that you may want to review before preparing that testimony?

A I will certainly be looking at the reports I prepared on the source term work, NUREG-0956, 1079 and 1150 reviews.

Q Could you give me the specific numbers of those reviews?

A Well, the 1079 and 1150 were two that I mentioned orally here this morning.

Q All right.

A The other items would be Number 32; I would also be looking at my Indian Point testimony. This would be items 17, 18 and 19. I think that's it.

Q Could I briefly have you describe for me in particular why it is that you have selected those six things as things you would like to review before preparing your testimony?

A Well, it's previous testimony or reports I have written in the general area dealing with risk assessment that may or may not be applicable here. I doubt that the Indian Point testimony will be terribly useful, but I plan to look at it.

Q That's fine.

A That's for a different type of plant. Indian Point is a pressurized water reactor, and of course Shoreham is a boiled water reactor. There may be something in there that may be useful to review.

Q Let me ask you one last general question about your resume, and then I will proceed on.

I had noticed that you have presented testimony in a number of NRC proceedings. Is it fair to characterize your prior testimony as, without exception, being testimony that

was not presented in support of an applicant's license application for that plant?

A Well, you should understand the difference between the two proceedings. Catawba was a licensing proceeding. The testimony I presented there was to expand the emergency planning zone to encompass, I think it was Charlotte, North Carolina.

The Indian Point proceeding was somewhat unique in that both of the units under question there were already licensed and had operated for several years, and that the case grew out of a shutdown petition filed by the Union of Concerned Scientists, and I think probably several other groups. That was the basic issues there were emergency planning, risk assessment.

Well, the testimony I prepared was to require installation of a filtered vented containment system for the plants, and to make revisions to the risk assessment that had been prepared for the licensees by their consultants to take into account some factors that hadn't been considered.

Q I take it those revisions of the risk assessments would basically suggest that there was a higher risk from operation of the plant than that predicted by the licensees'

earlier calculations?

A In most cases, that's true.

Q I take it those are the only two other NRC proceedings you have testified in other than Shoreham?

A That's correct. Those are the only ones I have testified on, and filed testimony in Seabrook.

Q Could you briefly describe for me that testimony and its purpose?

A It dealt with the emergency planning basis route in NUREG-0396 and WASH-1400. It was strictly a piece of testimony that was laying foundation for additional testimony by other witnesses.

Q I take it, Mr. Sholly, that you are familiar with both NUREG-0396 and WASH-1400?

A Yes.

Q Do you intend to agree with the rulemaking that came out of those documents that essentially established emergency planning zones of 10 miles for plume exposure pathway and 50 for ingestion pathway?

MR. ROSS: Counsel, I am going to object to that as being irrelevant and outside the bounds of his testimony.

BY MR. ZEUGIN:

Q You can answer, Mr. Sholly.

A I think conceptually the rule makes sense. It's not clear to me that it optimizes emergency response. I think you are going to have -- and the WASH-1400 results tend to bear this out. While there is a spectrum of accident sequences covering very severe to very minor, the ones for which emergency response is most relevant are for the severe end of the spectrum, and in those cases the emergency responses may be necessary beyond the 10 mile plume zone and beyond the 50 mile ingestion zone.

As a practical matter, the plume zone is probably of greater significance because the ingestion planning tends to involve one or more states, and while the planning basis is limited to 50 miles, in effect you have the entire state; and frequently neighboring states involved. So it would be easier to expand the zone of response; where with a 10-mile EPZ you tend to quickly involve additional counties, additional jurisdictions, which, if they haven't had plans prepared, would make things difficult for them.

So, I think it's more likely, in my judgment, a larger plume zone would be justified, not specifically for

evacuation, but I think a sheltering zone ought to have been considered, perhaps out to the range of 15 to 20 miles.

Q I take it that conclusion is based on your technical -- basically your interpretation of the technical data that is presented in WASH-1400 and NUREG-0396?

A Yes, among other things, yes.

Q Mr. Sholly, in your prior work on the Shoreham proceeding, could you briefly describe for me any Shoreham specific documents you may have reviewed? And by this question, I really mean technical documents, things like risk assessments that may have been prepared, evacuation time estimates, emergency plan.

A I think the only Shoreham specific document I would have looked at would have been the 1983 risk assessment study.

Q You have never looked at any of the evacuation time estimates that have been prepared?

A Not the studies. Mr. Lieberman's affidavit summarized two different sets of estimates. All that was there was some summary data and some information as to how they were prepared. But I never looked in detail at the time evacuation estimate studies.

Q With regard to the Shoreham '83 risk assessment, could you give me some feel of how much time you spent examining that particular set of documents?

MR. ROSS: Counsel, are you asking him how much time he spent in preparation for this, or are you asking him how much time he spent on this document?

MR. ZEUGIN: Ever. I am just trying to find out how familiar he is with the document.

THE WITNESS: At least several weeks. Somewhere between a month or two, at various times, not all at once.

BY MR. ZEUGIN:

Q Have you reviewed any of the more recent risk assessments that have been done for the Shoreham plant; in particular, have you reviewed the risk assessments that have been prepared for operation of 25 percent power?

A I have read them. I have not spent a great deal of time with them.

Q Could you roughly approximate how much time you may have spent with him?

MR. ROSS: You are not required to speculate.

THE WITNESS: It would be in the order of days. How many, I am not sure.

BY MR. ZEUGIN:

Q Have you looked at any other risk assessments that you can remember for the Shoreham plant?

A There is a document prepared for IDCOR that summarizes the review of their individual plant examination, IPE, and just within the last few days, I have received the summary report of reassessments of risk at 100 percent power with and without the proposed settlement containment system. I spent one or two hours looking at that, maybe one or two.

Q Have you spent any time reviewing the Shoreham off-site emergency plan?

A Only to the extent that the emergency plan implementing procedures might interface with that, with the off-site plans.

Q How much time would you have spent looking at the off-site plan?

A None.

Q So, I take it you are not familiar at this time with the manner in which protective action recommendations are made by the off-site organization?

MR. ROSS: Counsel, I am willing to state for you here, Mr. Sholly is not being presented as an expert on the

procedures in the plan. He designated the subject matter of his testimony, and I think you should move on to that.

MR. ZEUGIN: Mr. Ross, I will conduct this deposition as I see fit. I believe it is very important as to whether or not he has any knowledge of how off-site protective action recommendations are made, because it is my understanding that his testimony may well include testimony concerning the fact that certain response options will be excluded because of longer evacuation times. I think, to be able to draw any conclusions about that, one needs some understanding of those procedures. That's the reason for my question.

MR. ROSS: Ask it.

THE WITNESS: I think I remember the pending question.

BY MR. ZEUGIN:

Q Okay.

A To the extent that is covered in the EPIPs, I have looked at that; that was probably a year ago. I don't know to the extent to which the EPIPs may have changed since then.

Q Do you plan to look at the off-site procedures or

the EPIPs; or, in other words, the on-site procedures prior to drafting your testimony on contentions 1 and 2?

A I may. I don't regard that as particularly necessary for this particular piece of testimony.

Q Can you explain why not?

A Certainly. What is important here is the general progression of accidents at full power and the ability of operators and emergency technical staff to interpret the accident progression as it goes forward. It's my view that that ability is rather limited. I think there's a fair chance they will understand what type of accident sequence they are in.

In other words, obviously, if you lose off-site power and your diesel generators all fail to start, and you don't have any AC power to operate systems, it's rather easy to figure out that you are in a station black-out sequence.

Similarly, if there's a transient of some sort, and the scram system doesn't work, there are indications in the control room that that has happened, and they will understand they are dealing with an ATWS, or an anticipated transient without scram sequence.

I think it's very unlikely that you will be able

to accurately predict, at the time an accident is in process, when a release is going to occur, where the release is going to occur from, and how large the release might be. As a result, the specific detailed procedures and mechanisms that are in place to make protective action decisions, aren't really important for this particular piece of testimony. We are only looking at the incremental effect of delay and evacuation. That's how the issue is presented, and what impact that might have on accident consequences or foreclosing other possible response options.

Q Could you explain to me how, in your view, extension of total evacuation time may affect or preclude certain response options?

A If it's recognized or concluded that you are dealing, let's say, with an uncontrolled evacuation, and have a general understanding of what evacuation times might result from that, that will certainly temper your choice of protective actions. There are some type of accident sequences that proceed rather quickly. ATWS is one of those, where you should -- the plant operators and staff should have an understanding that if they are in that type of sequence, it can proceed rather quickly.

If the evacuation times are significantly longer than the time from the start of the accident to protective actions that were being made and the type that it takes to implement that protective action, that will limit your choice of options.

For instance, the accident may proceed so quickly, or have the potential to proceed so quickly, that evacuation might be precluded because of lengthy evacuation times. That's a hypothetical example. Now, generally, with severe accidents, for areas within 10 miles of the plant, and for those areas impacted by the plume, you are talking about radiation dose fields in the range of a few rem to perhaps as much as 100 rem per hour depending upon the severity of the release and the weather conditions, and the terrain.

It's that sort of general understanding that will form part of the background for the testimony, and the significance of an additional delay.

Q Let me ask you to look for a second at -- I will represent for you this is the affidavit that was attached to Suffolk County's response to LILCO's earlier summary disposition motion on contentions 1 and 2 of Mr. Minor.

In particular, what I am interested in doing at

this point is making sure we have a common vocabulary with which to talk about risk assessments, because I know it gets rather confusing very quickly.

I would particularly have you look at item 3 of Mr. Minor's affidavit. There he talks about fast-developing accidents. Is that a term that has some meaning to you?

A Yes, it's a general term, but if you were to say a fast-developing accident, to a person familiar with risk assessment, they would have an understanding of what is meant there. You are talking about accidents that would proceed from initiation to a release in the span of a few hours.

Q Can you be more specific, a few, two, three, four?

A Generally 1 to 10 is the area of significance. If you have a core melt accident and the containment is not breached for a period of roughly eight hours or so, and it tends to take on the order of an hour or two to get to core melt; if the containment holds for the order of 10 hours, you do get a substantial reduction in the release by various naturally proceeding mechanisms that would tend to deplete the airborne source term, particularly particulate sources. And so the release would tend to be less severe, and you would have more time in those scenarios to do something in

the way of emergency response. The fast-developing ones are the ones that proceed to a release to the environment within a few hours.

Q Now, in your earlier answer to me, you said that some accidents proceed rather quickly. When you said that, were you referring to a set of accidents that you would otherwise define as fast-breaking accidents?

A Yes. That's an acceptable term for defining it, yes.

Q Do you have a time bound that you would put on what is a fast-developing accident versus accidents of somewhat slower development?

A It's more of a conceptual bound, although there are times involved with it typically. I would characterize a fast-breaking accident as one which proceeds to a release and results in a release out through the environment in a time period before emergency response actions might be able to be fully completed.

For instance, let's say you have an accident that proceeds to core melt in two hours or so; it takes the order of an hour to an hour and a half to recognize the problem and decide that a protective action needs to be taken, take some

additional time to do the actual emergency alerting of the public, and it takes an additional increment then to complete that action.

If most of your dose can be delivered in that time or less, that's what I would characterize as a fast-developing accident, generally speaking, the ones that can develop much before you can get the response under way.

Q Mr. Sholly, let me ask you to explain for me or give me an example of an accident in which the difference in evacuation times -- and I will provide you two numbers which are the numbers you will find in Mr. Lieberman's affidavit -- that is a controlled evacuation that requires essentially five hours to complete, and an uncontrolled evacuation that requires five hours and 35 minutes to complete. Is it your testimony, or going to be your testimony, that there are a set of accidents which are so sensitive to that time difference that they will preclude, potentially preclude evacuation as a viable protective action recommendation?

MR. ROSS: Counsel, I am not sure that question is all that clear. If you want to ask him about the affidavit, perhaps it might be helpful to just provide him with a copy of that, so that he can see the figures that you are

referring to.

BY MR. ZEUGIN:

Q He can just accept my figures. Mr. Sholly, did you understand my question?

A I think so. I will try to answer. There will be some set of accident sequences where the additional 35 minutes you postulated might be quite significant. The most easily understood example is one which that extra 35 minutes results in some portion of the evacuating public being caught in their cars in the plume. Automobiles offer very little dose reduction in terms of a sheltering factor. If you conceive of a shelter factor of 1 meaning no protection, essentially standing out in the open, an automobile will give you sheltering factor of something like ~~.095~~ 0.95, very little shelter dose reduction. Consequently you get all of the dose that's going on at that time when you are caught in a vehicle.

Under that circumstance, a better response option may be shelter and then relocation from contaminated areas. You could wind up with a lower dose that way.

It's well recognized in accident consequence modeling, that if your population is caught in the tail of

the plume, as the plume proceeds out from the plant, that you can wind up with substantial consequences from that.

Q Have you attempted to in any way quantify the probability of accidents having the kind of time sequence that may have that type of effect in the 35-minute span that has been hypothesized?

A I haven't yet. I may try that. The problem with doing that is that there are substantial uncertainties involved with the risk assessment, due to a number of reasons, phenomenological factors, completeness questions about the suite of accident sequences that was examined, that sort of thing. ~~They~~ I may attempt to provide some perspective of that nature, what fraction of all core melt ~~segments~~ SEQUENCES might be in that class.

Q If you were to prepare such an analysis, can you describe for me what documents you would look at as you go in doing that?

MR. ROSS: I would object as calling for speculation. But he can answer if he can.

THE WITNESS: The only Shoreham specific document that is really available is the original of the 1983 risk assessment. The full report of the update has not been made

available. It's a summary report, and it's well recognized by people who have looked at risk assessments. That's a summary report is not too terribly useful for this purpose. So I would look to the '83 risk assessment study on Shoreham, also the more recent risk assessments that NRC has done, NUREG-1150 in particular and the related background documents for that.

BY MR. ZEUGIN:

Q And how, in particular, would you attempt to quantify this from those documents?

MR. ROSS: Same objection.

THE WITNESS: Generally one would have to look at the set of accident damage states, source terms, plant damage bins, however you want to characterize it, and their relative likelihoods, and take a look at those that would result in the plume catching up with population before it could evacuate under varying circumstances.

I would also look to NUREG-1150 for more recent perspectives on various types of containment failure modes, and their likelihoods, as a more recent analysis that takes into account more factors than the original Shoreham PRA.

BY MR. ZEUGIN:

Q Let me pursue with you a few minutes the

incremental effects that the length end evacuation times may have on total population dose. Could you describe for me your views on that particular issue?

A There are two populations one needs to consider in looking at the effectiveness of emergency response in reducing total population dose. It's well recognized that total population dose is largely -- this is for the entire population of the world, is going to be driven by emergency response actions that take place beyond the 10-mile plume emergency planning zone, and those actions are dealt with and ingestion planning would involve things like interdiction of crops before they reach market, destruction of contaminated crops, decontamination of land, decontamination of water, that sort of thing. That's one population of concern.

Q I take it that population is not going to be affected significantly one way or the other as a result of longer evacuation times; is that correct?

A They wouldn't be affected at all, because they are not in the area which is being evacuated.

Q All right.

A And the type of exposure and mode of exposure you are concerned with there are more chronic long-term

exposures. The area within the emergency planning zone, and perhaps somewhat outside it is an area of concern for acute exposures, early exposures that might result in various health effects, radiation injuries and that sort of thing. That is the population for which sheltering, relocation, evacuation are at issue. That's the population for which the effectiveness of those actions can be evaluated. I mean, that dichotomy is recognized by the emergency planning rule and the underlying technical basis as well.

Q As part of your testimony on contentions 1 and 2, do you expect to quantify the potential difference in dose that may result to that second population you described for me as a result of the lengthened evacuation times?

MR. ROSS: I am going to object to that question. Again, you are asking for speculation. You are entitled to ask him what he knows. We are not going to get into discussions of future testimony that he may or may not present.

MR. ZEUGIN: Are you instructing the witness not to answer?

MR. ROSS: No. He can answer the question.

THE WITNESS: The question loses me at the

moment. Could you repeat it.

BY MR. ZEUGIN:

Q Yes. Let me try again.

Do you envision attempting to quantify the increase in population dose that may occur to the second population you have described for me that would be affected by an evacuation order as a result --

MR. ROSS: I am not sure I understand the question now.

MR. ZEUGIN: If you would let me complete the question. It's really up to your witness to decide whether or not he understands my question or not.

BY MR. ZEUGIN:

Q Let me start over again.

Do you intend to attempt to quantify the change or increase in population dose that may result to the population that would be affected by increases in total evacuation time?

A Not very precisely, given the time that is available and the resources available for the testimony, I think it will be possible only to provide a -- shall I say, a semiquantitative perspective on what the increased times might result in in terms of dose. And in order to really do

a detailed analysis, one would have to have a set of release categories or source terms which confidently represented the accident, and run comparison risk calculations at the time and compare the results. We do not plan to do that.

MR. ZEUGIN: Ron, why don't we take a break for five minutes. I may be nearing the end of what I want to ask Mr. Sholly. And if I could have a few minutes with my colleague, we may be able to wrap this up.

(Recess.)

BY MR. ZEUGIN:

Q Let's go back on the record. I think I have just a few more questions, Mr. Sholly. Just so I am perfectly clear, I take it you do not envision your testimony in contentions 1 and 2 to deal in any way with the accuracy of the controlled and uncontrolled evacuation time estimates that currently appear in the LILCO plan?

A No, I don't envision dealing with that.

Q Let me ask you, you have described for me in some detail this morning your views about the potential differences in terms of doses that may be experienced as a result of longer evacuation times, potential preclusion of certain response options. What I would like to know is

whether you feel expert to take, essentially, those technical views and apply them to the NRC regulations to draw some kind of conclusions about whether or not the longer evacuation times meet those regulations or not?

A I think I could do that. I don't think that's the issue presented by the contentions in that part of it that we will be testifying on. We have a limited role in responding to these two contentions. There's going to be other pieces of testimony, and we will be simply, as I nderstand it, expressing a conclusion about whether or not the difference in evacuation times hypothesized by Mr. Lieberman could make a material difference to the dose reduction that could be achieved by evacuation, and whether or not that difference may lead to precluding one or more response options. I don't think we are going to get to a regulatory compliance issue in the testimony.

Q I just want to make sure, when you talked about materiality, that word can have several meanings. One could be material in a technical sense, which I take it your testimony, you envision your testimony to cover that particular issue, whether or not it will be material technically in terms of the increase in dose or limitation of

response options; is that correct?

MR. ROSS: Counsel, perhaps you will define your terms. You are making some distinction in the definition of materiality. Perhaps you ought to define what you have in mind.

MR. ZEUGIN: I am just trying to understand how Mr. Sholly just used that word, because he talked about materiality. All I am really trying to figure out is whether Mr. Sholly feels expert to take his, essentially, views of what would happen technically as a result of longer evacuation time and apply those conclusions to the NRC's regulations.

MR. ROSS: Regardless of what Mr. Sholly used as technical expertise, I think that's a board determination. If you would like to know what Mr. Sholly knows, why don't you ask him to tell you. Otherwise we are wasting time on this.

MR. ZEUGIN: I am asking him if he drew those conclusions.

THE WITNESS: If I were to make that testimony, yes.

BY MR. ZEUGIN:

Q What would be these conclusions?

MR. ROSS: Are you asking him to draw them?

MR. ZEUGIN: He said he could draw them, yes.

THE WITNESS: We are sitting here hypothesizing what the analysis might look like and the conclusions might look like. I haven't done it yet.

BY MR. ZEUGIN:

Q Could you quantify for me the total dose savings that you would find unacceptable from a regulatory point of view?

A It all gets back to the objective of emergency planning. The objective of emergency planning is to provide dose savings for a spectrum of accidents that could yield doses in excess of the EPA protective action guideline doses. For whole body exposure, we are talking about a range of 1 to 5 rem whole body dose. If the increase in evacuation time between controlled and uncontrolled would yield doses in the range of 1 to 5 rem under the planning basis, the objective or emergency planning, that could be characterized as a material difference.

Q You are talking about the difference to some

individuals, is that right, when you talk about 1 to 5 rem? You are nodding.

A Yes.

Q Are you able to quantify, again, in terms of regulatory importance, the amount of response options that would need to be precluded, in order to not find regulatory compliance?

MR. ROSS: Counsel, I am going to object to the question as being vague. Can you identify the regulations that you are trying to get him to respond concerning?

MR. ZEUGIN: I think the witness has been responding just fine. He seems to understand my questions very well. If he can answer this, I would like to have him answer.

MR. ROSS: If you can answer. Do you know what regulations he is talking about?

THE WITNESS: If you have a specific one in mind, that would make answering easier. But just generally speaking, there are only a limited number of response actions that one can take. One can evacuate -- and here I am thinking of whole body exposures. I am not concerned with thyroid, potassium iodide, that sort of thing. One can

evacuate; one can shelter, for varying lengths of times; one can shelter and relocate, and one can shelter or evacuate and implement some sort of ad hoc respiratory protection; for example, one might take several thicknesses of cotton cloth, place it over the mouth and nose to cut down on inhalation dose.

There really are a limited number of options that one can implement. You would need to look at what options would be available under the circumstances of a particular set of evacuation times and reach a judgment about whether that is acceptable or not.

BY MR. ZEUGIN:

Q Let me give you a hypothetical. Assume with me whatever set of -- whatever universe of protective action recommendations you want to for, essentially, an evacuation time of five hours. Let me then ask you to assume that I have an uncontrolled evacuation that takes some greater length of time, and, let's say, that in one case, in one accident sequence, that prevents me or precludes me from basically recommending an evacuation, in that particular evacuation sequence and only that sequence. Would you find that one exception to be sufficient to not meet regulatory

requirements?

A I would want to look at what the nature of the sequence was, how big the release was, how fast it proceeded, and what the difference in population dose would be, contrasting evacuation under those circumstances with other strategies, sheltering and relocation or what have you.

Q Do you have any number in mind in terms of additional dose that you would find unacceptable?

MR. ROSS: Objection, asked and answered.

BY MR. ZEUGIN:

Q Go ahead, you can answer.

A No.

MR. ZEUGIN: I have no further questions.

MR. ROSS: Thank you.

(Whereupon, at 12:15 p.m., the deposition was concluded.)

Steven C. Sholly

STEVEN C. SHOLLY

OFFICIAL SEAL
MYRNA L BARRY
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My comm. expires JUN 24, 1991

Subscribed and sworn to before me this 5th day of May, 1988.

Myrna L. Barry
Notary Public

My Commission Expires 6/24/91

CERTIFICATE OF NOTARY PUBLIC & REPORTER

I, WENDY S. COX, the officer before whom the foregoing deposition was taken, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was taken in shorthand and thereafter reduced to typewriting by me or under my direction; that said deposition is a true record of the testimony given by said witness; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken; and, further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

Wendy S Cox

Notary Public in and for the
District of Columbia

My Commission Expires NOVEMBER 14, 1992

Exhibit

Shelly Ex 1
4/12/88

PROFESSIONAL QUALIFICATIONS OF STEVEN C. SHOLLY

STEVEN C. SHOLLY
MHB Technical Associates
1723 Hamilton Avenue
Suite K
San Jose, California 95125
(408) 266-2716

EXPERIENCE:

September 1985 - PRESENT

Associate - MHB Technical Associates, San Jose, California

Associate in energy consulting firm that specializes in technical and economic assessments of energy production facilities, especially nuclear, for local, state, and federal governments and private organizations. MHB is extensively involved in regulatory proceedings and the preparation of studies and reports. Conduct research, write reports, participate in discovery process in regulatory proceedings, develop testimony and other documents for regulatory proceedings, and respond to client inquiries. Clients have included: State of California, State of New York, State of Illinois.

February 1981 - September 1985

Technical Research Associate and Risk Analyst - Union of Concerned Scientists, Washington, D.C.

Research associate and risk analyst for public interest group based in Cambridge, Massachusetts, that specializes in examining the impact of advanced technologies on society, principally in the areas of arms control and energy. Technical work focused on nuclear power plant safety, with emphasis on probabilistic risk assessment, radiological emergency planning and preparedness, and generic safety issues. Conducted research, prepared reports and studies, participated in administrative proceedings before the U.S. Nuclear Regulatory Commission, developed testimony, anlayzed NRC rule-making proposals and draft reports and prepared comments thereon, and responded to inquiries from sponsors, the general public, and the media. Participated as a member of the Panel on ACRS Effectiveness (1985), the Panel on Regulatory Uses of Probabilistic Risk Assessment (Peer Review of NUREG-1050; 1984), Invited Observer to NRC Peer Review meetings on the source term reassessment (BMI-2104; 1983-1984), and the Independent Advi-sory Committee on Nuclear Risk for the Nuclear Risk Task Force of the National Association of Insurance Commissioners (1984).

January 1980 - January 1981

Project Director and Research Coordinator - Three Mile Island Public Interest Resource Center, Harrisburg, Pennsylvania

Provided administrative direction and coordinated research projects for a public interest group based in Harrisburg, Pennsylvania, centered around issues related to the Three Mile Island Nuclear Power Plant. Prepared fundraising proposals, tracked progress of U.S. Nuclear Regulatory Commission, U.S. Department of Energy, and General Public Utilities activities concerning cleanup of Three Mile Island Unit 2 and preparation for restart of Three Mile Island Unit 1, and monitored developments related to emergency planning, the financial health of General Public Utilities, and NRC rulemaking actions related to Three Mile Island.

July 1978 - January 1980

Chief Biological Process Operator - Wastewater Treatment Plant, Derry Township Municipal Authority, Hershey, Pennsylvania

Chief Biological Process Operator at a 2.5 million gallon per day tertiary, activated sludge, wastewater treatment plant. Responsible for biological process monitoring and control, including analysis of physical, chemical, and biological test results, procees fluid and mass flow management, micro-biological analysis of activiated sludge, and maintenance of detailed process logs for input into state and federal reports on treatment process and effluent quality. Received certification from the Commonwealth of Pennsylvania as a wastewater treatment plant operator. Member of Water Pollution Control Association of Pennsylvania, Central Section, 1980.

July 1977 - July 1978

Wastewater Treatment Plant Operator - Borough of Lemoyne, Lemoyne, Pennsylvania

Wastewater treatment plant operator at 2.0 million gallon per day secondary, activated sludge, wastewater treatment plant. Performed tasks as assigned by supervisors, including simple physical and chemical tests on wastewater streams, maintenance and operation of plant equipment, and maintenance of the collection system.

September 1976 - June 1977

Science Teacher - West Shore School District, Camp Hill, Pennsylvania

Taught Earth and Space Science at ninth grade level. Developed and implemented new course materials on plate tectonics, environmental geology, and space science. Served as Assistant Coach of the district gymnastics team.

September 1975 - June 1976

Science Teacher - Carlisle Area School District, Carlisle, Pennsylvania

Taught Earth and Space Science and Environmental Science at ninth grade level. Developed and implemented new course materials on plate tectonics, environmental geology, noise pollution, water pollution, and energy. Served as Advisor to the Science Projects Club.

EDUCATION:

B.S., Education, majors in Earth and Space Science and General Science, minor in Environmental Education, Shippensburg State College, Shippensburg, Pennsylvania, 1975.

Graduate coursework in Land Use Planning, Shippensburg State College, Shippensburg, Pennsylvania, 1977-1978.

PUBLICATIONS:

1. "Determining Mercalli Intensities from Newspaper Reports," Journal of Geological Education, Vol. 25, 1977.

2. A Critique of: An Independent Assessment of Evacuation Times for Three Mile Island Nuclear Power Plant, Three Mile Island Public Interest Resource Center, Harrisburg, Pennsylvania, January 1981.

3. A Brief Review and Critique of the Rockland County Radiological Emergency Preparedness Plan, Union of Concerned Scientists, prepared for Rockland County Emergency Planning Personnel and the Chairman of the County Legislature, Washington, D.C., August 17, 1981.

4. The Necessity for a Prompt Public Alerting Capability in the Plume Exposure Pathway EPZ at Nuclear Power Plant Sites, Union of Concerned Scientists, Critical Mass Energy Project, Nuclear Information and Resource Service, Environmental Action, and New York Public Interest Research Group, Washington, D.C., August 27, 1931. *

5. "Union of Concerned Scientists, Inc., Comments on Notice of Proposed Rulemaking, Amendment to 10 CFR 50, Appendix E, Section IV.D.3," Union of Concerned Scientists, Washington, D.C., October 21, 1981. *

6. "The Evolution of Emergency Planning Rules," in The Indian Point Book: A Briefing on the Safety Investigation of the Indian Point Nuclear Power Plants, Anne Witte, editor, Union of Concerned Scientists (Washington, D.C.) and New York Public Interest Research Group (New York, NY), 1982.

7. "Union of Concerned Scientists Comments, Proposed Rule, 10 CFR Part 50, Emergency Planning and Preparedness: Exercises, Clarification of Regulations, 46 F.R. 61134," Union of Concerned Scientists, Washington, D.C., January 15, 1982. *

8. Testimony of Robert D. Pollard and Steven C. Sholly before the Subcommittee on Energy and the Environment, Committee on Interior and Insular Affairs, U.S. House of Representatives, Middletown, Pennsylvania, March 29, 1982, available from the Union of Concerned Scientists.

9. "Union of Concerned Scientists Detailed Comments on Petition for Rulemaking by Citizen's Task Force, Emergency Planning, 10 CFR Parts 50 and 70, Docket No. PRM-50-31, 47 F.R. 12639," Union of Concerned Scientists, Washington, D.C., May 24, 1982.

10. Supplements to the Testimony of Ellyn R. Weiss, Esq., General Counsel, Union of Concerned Scientists, before the Subcommittee on Energy Conservation and Power, Committee on Energy and Commerce, U.S. House of Representatives, Union of Concerned Scientists, Washington, D.C., August 16, 1982.

11. Testimony of Steven C. Sholly, Union of Concerned Scientists, Washington, D.C., on behalf of the New York Public Interest Research Group, Inc., before the Special Committee on Nuclear Power Safety of the Assembly of the State of New York, hearings on Legislative Oversight of the Emergency Radiologic Preparedness Act, Chapter 708, Laws of 1981, September 2, 1982.

12. "Comments on 'Draft Supplement to Final Environmental Statement Related to Construction and Operation of Clinch River Breeder Reactor Plant'," Docket No. 50-537, Union of Concerned Scientists, Washington, D.C., September 13, 1982. *

13. "Union of Concerned Scientists Comments on 'Report to the County Commissioners', by the Advisory Committee on Radiological Emergency Plan for Columbia County, Pennsylvania," Union of Concerned Scientists, Washington, D.C., September 15, 1982.

14. "Radiological Emergency Planning for Nuclear Reactor Accidents," presented to Kernenergie Ontmanteld Congress, Rotterdam, The Netherlands, Union of Concerned Scientists, Washington, D.C., October 8, 1982.

15. "Nuclear Reactor Accident Consequences: Implications for Radiological Emergency Planning," presented to the Citizen's Advisory Committee to Review Rockland County's Own Nuclear Evacuation and Preparedness Plan and General Disaster Preparedness Plan, Union of Concerned Scientists, Washington, D.C., November 19, 1982.

16. Testimony of Steven C. Sholly before the Subcommittee on Oversight and Investigations, Committee on Interior and Insular Affairs, U.S. House of Representatives, Washington, D.C., Union of Concerned Scientists, December 13, 1982.

17. Testimony of Gordon R. Thompson and Steven C. Sholly on Commission Question Two, Contentions 2.1(a) and 2.1(d), Union of Concerned Scientists and New York Public Interest Research Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Consolidated Edison Company of New York (Indian Point Unit 2) and the Power Authority of the State of New York (Indian Point Unit 3), Docket Nos. 50-247-SP and 50-236-SP, December 28, 1982. *

18. Testimony of Steven C. Sholly on the Consequences of Accidents at Indian Point (Commission Question One and Board Question 1.1, Union of Concerned Scientists and New York Public Interest Research Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Consolidated Edison Company of New York (Indian Point Unit 2) and the Power Authority of the State of New York (Indian Point Unit 3), Docket Nos. 50-247-SP and 50-286-SP, February 7, 1983, as corrected February 16, 1983. *

19. Testimony of Steven C. Sholly on Commission Question Five, Union of Concerned Scientists and New York Public Interest Research Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Consolidated Edison Company of New York (Indian Point Unit 2) and the Power Authority of the State of New York (Indian Point Unit 3), Docket Nos. 50-247-SP and 50-286-SP, March 22, 1983. *

20. "Nuclear Reactor Accidents and Accident Consequences: Planning for the Worst," Union of Concerned Scientists, Washington, D.C., presented at Critical Mass '83, March 26, 1983.

21. Testimony of Steven C. Sholly on Emergency Planning and Preparedness at Commercial Nuclear Power Plants, Union of Concerned Scientists, Washington, D.C., before the Subcommittee on Nuclear Regulation, Committee on Environment and Public Works, U.S. Senate, April 15, 1983, (with "Union of Concerned Scientists' Response to Questions for the Record from Senator Alan K. Simpson," Steven C. Sholly and Michael E. Faden).

22. "PRA: What Can it Really Tell Us About Public Risk from Nuclear Accidents?," Union of Concerned Scientists, Washington, D.C., presentation to the 14th Annual Meeting, Seacoast Anti-Pollution League, May 4, 1983.

23. "Probabilistic Risk Assessment: The Impact of Uncertainties on Radiological Emergency Planning and Preparedness Considerations," Union of Concerned Scientists, Washington, D.C., June 28, 1983.

24. "Response to GAO Questions on NRC's Use of PRA," Union of Concerned Scientists, Washington, D.C., October 6, 1983, attachment to letter dated October 6, 1983, from Steven C. Sholly to John E. Bagnulo (GAO, Washington, D.C.).

25. The Impact of "External Events" on Radiological Emergency Response Planning Considerations, Union of Concerned Scientists, Washington, D.C., December 22, 1983, attachment to letter dated December 22, 1983, from Steven C. Sholly to NRC Commissioner James K. Asselstine.

26. Sizewell 'B' Public Inquiry, Proof of Evidence on: Safety and Waste Management Implications of the Sizewell PWR, Gordon Thompson, with supporting evidence by Steven Sholly, on behalf of the Town and Country Planning Association, February 1984, including Annex G, "A review of Probabilistic Risk Analysis and its Application to the Sizewell PWR," Steven Sholly and Gordon Thompson, (August 11, 1983), and Annex O, "Emergency Planning in the UK and the US: A Comparison," Steven Sholly and Gordon Thompson (October 24, 1983).

27. Testimony of Steven C. Sholly on Emergency Planning Contention Number Eleven, Union of Concerned Scientists, Washington, D.C., on behalf of the Palmetto Alliance and the Carolina Environmental Study Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Duke Power Company, et. al. (Catawba Nuclear Station, Units 1 and 2), Docket Nos. 50-413 and 50-414, April 16, 1984. *

28. "Risk Indicators Relevant to Assessing Nuclear Accident Liability Premiums," in Preliminary Report to the Independent Advisory Committee to the NAIC Nuclear Risk Task Force, December 11, 1984, Steven C. Sholly, Union of Concerned Scientists, Washington, D.C.

29. "Union of Concerned Scientists' and Nuclear Information and Resource Service's Joint Comments on NRC's Proposal to Bar from Licensing Proceedings the Consideration of Earthquake Effects on Emergency Planning," Union of Concerned Scientists and Nuclear Information and Resource Service, Washington, D.C., Diane Curran and Ellyn R. Weiss (with input from Steven C. Sholly), February 28, 1985. *

30. "Severe Accident Source Terms: A Presentation to the Commissioners on the Status of a Review of the NRC's Source Term Reassessment Study by the Union of Concerned Scientists," Union of Concerned Scientists, Washington, D.C., April 3, 1985. *

31. "Severe Accident Source Terms for Light Water Nuclear Power Plants: A Presentation to the Illinois Department of Nuclear Safety on the Status of a Review of the NRC's Source Term Reassessment Study (STRS) by the Union of Concerned Scientists," Union of Concerned Scientists, Washington, D.C., May 13, 1985.

32. The Source Term Debate: A Review of the Current Basis for Predicting Severe Accident Source Terms with Special Emphasis on the NRC Source Term Reassessment Program (NUREG-0956), Union of Concerned Scientists, Cambridge, Massachusetts, Steven C. Sholly and Gordon Thompson, January 1986.

33. Direct Testimony of Dale G. Bridenbaugh, Gregory C. Minor, Lynn K. Price, and Steven C. Sholly on behalf of State of Connecticut Department of Public Utility Control, Prosecutorial Division and Division of Consumer Counsel, regarding the prudence of expenditures on Millstone Unit III, February 18, 1986.

34. Implications of the Chernobyl-4 Accident for Nuclear Emergency Planning for the State of New York, prepared for the State of New York Consumer Protection Board, by MHB Technical Associates, June 1986.

35. Review of Vermont Yankee Containment Safety Study and Analysis of Containment Venting Issues for the Vermont Yankee Nuclear Power Plant, prepared for New England Coalition on Nuclear Pollution, Inc., December 16, 1986.

* Available from the U.S. Nuclear Regulatory Commission, Public Document Room, Lobby, 1717 H Street, N.W., Washington, D.C.