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UNITED STATES ATOMIC ENERGY COMMISSION

IN THE MATTER OF:

Place -

Date -

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UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

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In the matter of: :
:
CONSOLIDATED EDISON COMPANY :
OF NEW YORK, INC. : Docket No. 50-286
:
(Indian Point Unit No. 3) :
:
- -

Auditorium, Springvale Inn
Route 9A, Croton-on-Hudson, New York

Wednesday, 20 April 1966

Met, Pursuant to adjournment, at 10:00 a.m.

BEFORE:

SAMUEL W. JENSCH, Esq., Chairman, Atomic Safety and Licensing Board.

DR. THOMAS H. PIGFORD, Member.

DR. JOHN HENRY BUCK, Member.

APPEARANCES:

(As heretofore noted.)

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P R O C E E D I N G S

CHAIRMAN JENSCH: Please come to order.

Whereupon,

J. S. MOORE,

J. D. MC ADOO, JR.,

J. J. GROB, JR.,

W. J. CAHILL, JR.,

DR. C. R. MC CULLOUGH,

DR. M. E. WRINN, and

DR. JAMES HALITSKY,

and

JAMES B. HENDERSON,

IRWIN SPICKLER,

GORDON BURLEY,

DANIEL MULLER, and

JOSEPH A. MURPHY

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

CHAIRMAN JENSCH: I think at last evening's session Counsel for New York State Atomic Authority was interrogating.

Mr. Scinto.

MR. SCINTO: Shall I commence, Mr. Chairman?

CHAIRMAN JENSCH: Yes, proceed, please.

MR. SCINTO: Thank you.

These are questions for the applicant.

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CROSS-EXAMINATION

(Continued)

MR. SCINTO: In connection with yesterday's testimon -- I refer to transcript page 1047 -- there was an indication of the estimated gaseous release rate for all three plants operating would be less than 1200 curies a year. I also believe yesterday we discussed somewhere in the transcript that the predominant isotopes would be krypton 85 and xenon 133.

What other isotopes of any radiological significance would be anticipated in the airbourne, expected airbourne effluents?

And if you could give us some indication of the particulates associated with these other isotopes?

MR. GROH: The significant isotopes are the noble gases. Some particulate might be expected. The amount of particulate would be on the order of .17 millicuries per year from Unit 1. We would expect less from Units 2 or 3.

MR. SCINTO: What I think I'm getting at is that I believe in that connection that somewhere in Dr. Wrenn's testimony yesterday there was the suggestion that the major portion of fraction... MPC would be attributable to iodine I can't recall whether that was in water releases or gaseous releases.

I may be misquoting Dr. Wrenn. This is my recollection.

DR. GROB: He was discussing liquid releases at the time. He was discussing the isotope that would be -- well, the highest fraction of MPC in liquid releases, but not the gaseous releases.

MR. SCINTO: That is what I did not recollect. In connection with your answer just before this one, would we not anticipate airborne activity from isotopes other than the noble gases in excess of the amount you said might be due to particulates, which was .17 millicuries per year?

MR. GROB: No. We would not anticipate other isotopes in excess of that number.

MR. SCINTO: Thank you.

With respect to the concept, which is referred to in some parts of the application, of hot areas -- that is, peaking -- it is my understanding that this suggests or refers to the fact that there may be points in the core at which the heat flux is somewhat higher than the average core conditions. Is this correct?

MR. GROB: Well, yes.

MR. SCINTO: At this point would the heat flux -- or the potential of overheating at these points -- be limiting conditions on the power at which the core could be operated?

MR. GROB: Yes, they are. It is a basis of the core design to consider these points.

MR. SCINTO: How will you know when these points are deviating from the design operating conditions?

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MR. GROS: I will have Mr. Moore answer this question.

MR. MOORE: Calculations are performed prior to operation to insure that the expected mode of operation -- that you will not exceed these limits. And then these calculations are confirmed during pre-start-up, initial operation, and then periodically during operation detailed core flux maps are taken to assure the core limits are not exceeded.

MR. SCINTO: So you would then have, from this information you develop through design and pre-operational testing and testing at times during operation, adequate data for identifying from your available instrumentation of the core these peaking conditions?

In other words, you will have adequate knowledge to tell you from that available instrumentation how the core is operating and whether your peak conditions are what they should be for proper operation?

MR. MOORE: That is correct.

MR. SCINTO: Have you investigated the consequences of electrical fires occurring in the containment?

MR. MOORE: In the design careful consideration is given to insure that fires will not occur inside, in the plant, particularly inside the containment.

The electrical cables that are used are fire retardant materials, that is, they will not support combustion. So, if

there is any excitation which could create a fire, once this excitation is removed, the fire is self-extinguishing.

Also there are electrical safeguards which, should any electrical fault occur, which could lead to fire, this fault would be terminated with the protective devices.

In addition, the equipment that is required for safe shutdown of the plant is redundant equipment and is separated. The cables are run separately, and the equipment is separated, so in the highly unlikely event a fire would occur in the containment, it wouldn't affect more than one of these redundant components, and the plant could be safely shutdown.

MR. SCINTO: And in the highly unlikely situation of an electrical fire in the plant, I think what you indicated is that the fire would be self-extinguishing, and you would not anticipate such a fire would cause any damage, for example, to any components of the primary system?

MR. MOORE: That is correct. There would be no damage to the primary system.

MR. SCINTO: Or to the containment system?

MR. MOORE: That is right.

MR. SCINTO: Is there any likelihood of the occurrence of an electrical fire in the containment system as a result of a loss of coolant accident or any other reactor accident?

MR. MOORE: I see no causal relationship between

a loss of coolant accident and a fire.

MR. SCINTO: I was thinking of the operation of the spray system in the event of a loss of coolant accident.

MR. MOORE: Creating a fire?

MR. SCINTO: Creating an electrical short or other situation which might then contribute to an electrical fire. I wonder if any condition like this could lead to an electrical fire?

MR. MOORE: No, the electrical equipment is appropriately protected by insulation which is tested under the chemical environment associated with the spray, and this should not cause any fire.

MR. SCINTO: In the event of and during the course of a loss of coolant accident, the design basis accident, would there be a release of energy, steam, pressure, what have you, from the secondary coolant into the containment?

MR. MOORE: No, there would not, as a result of a loss of coolant accident, unless one considered that the operation was continuing with small leaks in the primary or secondary. This would serve as a possible path for energy. However, this is very small and well within the capability of the containment cooling systems.

MR. SCINTO: Would you briefly explain the reason why a major contribution from the secondary system is not anticipated resulting from a loss of coolant accident?

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MR. MOORE: Because the loss of coolant accident characterizes the design basis as a large double ended rupture of the primary piping and this does not affect the integrity of the secondary system.

Therefore, the secondary system is not breached and would not add any energy into the containment. It is a separate system.

MR. SCINTO: I was thinking, in the primary system you have a rapid depressurization.

MR. MOORE: That's right.

MR. SCINTO: And the secondary system is a high-pressure system.

MR. MOORE: That's right. These pressure differentials, including the transient effects, are included within the design to preclude that this differential pressure would cause any breach of the secondary system.

MR. SCINTO: As we understand the ACRS letter, on page 1 -- I want myself to get it so I don't misquote it, and I would appreciate it if you would get it so we are sure we are referring to the same thing -- as we understand the ACRS letter, on page 1, the ACRS -- from that we understand that the applicant is studying the possibility of vessel failure as a result of thermal shock. Is this correct?

MR. MOORE: Yes.

MR. SCINTO: As we further understand the letter on

page 2, it indicates that preventive measures such as designing the vessel annealing will be taken if this should be necessary. Is this correct?

MR. MOORE: Yes, the requirements for subsequent annealing of the vessel have been investigated, and it appears feasible to do this should this be required.

MR. SCINTO: Thank you. Is there a potential thermal shock from the emergency core cooling system of sufficient magnitude to rupture any other primary coolant piping? If so, how would this affect the course of the design basis accident?

MR. MOORE: No, there are no thermal shock considerations for the rest of the primary system, other than the reactor vessel, because the material of which the system is constructed is stainless steel, which is a ductile material and relatively thin walls, so the temperature gradients are quite small; so thermal shock is of no concern for the rest of the primary system.

MR. SCINTO: What method or device assures that emergency core cooling system does not permit the entry of lower temperature emergency coolant into the primary system unintentionally?

MR. MOORE: During normal operations the most important consideration is that the emergency core cooling system has a sufficient pressure or head to pump into the primary system at operating pressure, so even if the system

is activated accidentally at power, no water would come into the primary system.

In the course of a plant cool-down and depressurization, there are redundant interlocks provided to ensure there is no accidental actuation of these systems.

MR. SCINTO: What would be the effect of events following a rupture of a pipe connected to the top of the pressurizer or accidental failure in an open position of a pressurizer discharge valve?

MR. MOORE: As described, the entire range of a loss of coolant accident is considered in the design, from a small one up to and including the double-ended rupture of the primary system. The particular accident to which you refer would be categorized as a relatively small loss of coolant accident, and within the range of those analyzed, the course of the accident would be such that if this release from the pressurizer were to continue unabated, then eventually the emergency core cooling system would be actuated, and would add water to the system to continue to cool the core and maintain the integrity.

MR. SCINTO: During the course of a loss of coolant accident, is there a path through the containment spray system for leakage from the containment to the outside?

MR. MC ADOO: During the phase of the most of the loss of coolant accident period there will be pressure in the

containment spray system higher than that of the containment atmosphere, because the spray pumps are injecting water into the containment by way of those headers.

Following the period of spray injection, the valves isolating the containment spray headers from the external spray pumps will be closed manually and isolation valve seal water will be applied between the discs of the isolation valve at a pressure higher than that of the containment atmosphere, thus precluding any leakage path through those valves.

The answer to the question is no, there is not a leakage path at any time following the loss of coolant accident.

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MR. SCINTO: Mr. Chairman, I have one question for the staff.

CHAIRMAN JENSCH: Proceed.

MR. SCINTO: It is the same question I asked the applicant yesterday. That is, it is my understanding that the staff believes that the diffusion factors, dilution factors, whichever is the appropriate terminology, mentioned by the applicant yesterday in response to my question as to what was the diffusion factors associated with this plant, it is my understanding that the staff feels that those, the use of those factors would be adequately conservative. Is that correct?

MR. SPICKLER: Yes.

DR. PIGFORD: Excuse me. I'm not sure which ones you are speaking of. Mr. Scinto, could you identify which diffusion factors you are speaking of?

MR. SCINTO: Yes, Dr. Figford. I was referring to the particular diffusion factor of 6.1 times 10 to the fourth curie per second and I'm trying to find the transcript page on which that appears.

DR. PIGFORD: I think that answers my question, Mr. Scinto. I know nowwhich one you are referring to.

I gather this is the one the staff was referring to in their answer, too?

MR. SPICKLER: Yes.

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MR. SCINTO: I was not particularly referring to the diffusion factors in connection with Unit No. 1 which I hope was taken into account in that operating license.

CHAIRMAN JENSCH: I think the transcript page is 1145.

MR. SCINTO: Thank you, Mr. Chairman. That is the factor I was referring to.

I have no further questions for either the staff or the applicant.

CHAIRMAN JENSCH: Very well.

Is there any other cross-examination or redirect?

MR. BOGART: Mr. Chairman, I must apologize for not being more familiar with the rules of practice, but I had no knowledge that I would take any part in these proceedings except as a spectator until Monday morning. I may have been out of the room when Mr. Scinto's role in these proceedings was explained. May I ask a question about that?

CHAIRMAN JENSCH: Yes, surely. You may direct it to him.

MR. BOGART: Mr. Scinto, do you represent the Atomic Energy Council?

MR. SCINTO: Yes.

MR. BOGART: Is the Atomic Energy Council present?

MR. SCINTO: Yes, it is present in my appearance.

MR. BOGART: So you are in a dual role?

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MR. SCINTO: No, I am in no dual role. I represent the Atomic Energy Council in this proceeding.

MR. BOGART: You are the Atomic Energy Council as well as being counsel for the Atomic Energy Council?

MR. SCINTO: No, the Atomic Energy Council is a body. It has participated in this proceeding, it requested to participate in this proceeding as a body. They have appointed me as their counsel to represent them in this proceeding. I represent them as counsel.

MR. BOGART: According to the rules of practice, would it be possible, Mr. Chairman, for me to ask questions of this party?

CHAIRMAN JENSCH: Well, as Counsel Scinto has explained, he is appearing for the New York State Atomic Authority, but that does not make him a witness. He is a counsel and his participation has been as a counsel in the interrogation of some of the witnesses, but that does not make him a witness. He has not given testimony, he is not open for cross-examination.

MR. BOGART: Thank you.

I have the document I referred to yesterday. I think you reserved decision on whether that could be admitted, WASH-740.

CHAIRMAN JENSCH: WASH-740 is an Atomic Energy Commission publication I believe.

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MR. BOGART: Yes. It is entitled, "Theoretical Possibilities and Consequences of Major Accidents in Large Nuclear Plants, U. S. Atomic Energy Commission, March 1957."

I believe I had asked Mr. Cahill if he was aware of the provisions or the description of the accident that might take place under certain remote conditions.

CHAIRMAN JENSCH: Yes. Now if you were to make that an exhibit you would need to have several copies. If you request us to take official notice of a publication issued by the Commission, we may inquire if there is any objection by the parties to such a request. That may obviate the necessity of you getting additional copies.

MR. BOGART: I would like to introduce it as an exhibit, particularly the section where it mentions on page 7 "a leak in the pressure resistant containment building of the usual type is assumed to surround the reactor."

That was one of the assumptions used in the study and I believe when I asked Mr. Cahill, he didn't believe it was a contained reactor.

CHAIRMAN JENSCH: Would you undertake to secure copies and we will give this document an exhibit number. That is, unless the parties will waive the service of copies.

MR. BOGART: It will take some time to get copies.

CHAIRMAN JENSCH: First let us have the document identified.

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The so-called WASH-740 document to which Mr. Bogart of the Citizens Committee for the Protection of the Environment has just referred may be marked for identification as Citizens Exhibit No. 1.

(The document was marked Citizens Exhibit 1 for identification.)

CHAIRMAN JENSCH: And having thus been identified, and having been previously offered, is there any objection?

The regulatory staff?

MR. CONNER: Yes, sir. We object unless the purpose is clearly identified. Mr. Bogart has indicated that he has one sentence in mind. WASH-740 is, of course, a document of 105 pages, which has several assumptions, several different accidents analyzed and so forth.

There is no foundation at this point for any offering of this document in relation to any question asked of the witness, any witness in the proceeding.

So, no foundation has been established. Now, if he wishes, asyou suggested yesterday, to ask the witness a question in relation to a particular sentence in it, that would be a different matter.

But at this point there is no foundation for the rest of the document as such.

CHAIRMAN JENSCH: Let me inquire as to your objection in that regard. You say no foundation. Thereis no doubt in your mind that this document was issued under some auspices by the AEC? Is that correct?

MR. CONNER: I have no objection to the authenticity of the document. I have an objection as to the foundation.

CHAIRMAN JENSCH: What is the foundation, or is it materiality you refer to?

MR. CONNER: Foundation. To repeat my position, Mr.Bogart has not related anything in the document to any matter presently asked of any witness or related to any

matter in issue.

CHAIRMAN JENSCH: I understood his offer this morning was in reference to his interrogation yesterday wherein consideration was given to accident probabilities, improbable as they may be,and on that basis I understood the interrogation continued without objection.

Does the applicant have any objection?

MR. TROSTEN: I have no objection to the Board taking official notice of this entire document. I condur in the staff counsel's objectim that no proper foundation has been laid for the introduction of this document in evidence.

However, I have no objection to the Board taking official notice of the entire document.

CHAIRMAN JENSCH: Any objection by the New York State Atomic Energy Authority? Is that the correct title?

MR. SCINTO: It is the New York State Atomic Energy Council.

CHAIRMAN JENSCH: Excuse me.

MR. SCINTO: Mr. Chairman, are we introducing into evidence in absentia WASH-740, or do we have a particular piece of paper we are characterizing as WASH-740? I am not sure. I have seen quite often abridged versions of WASH-740. I don't know what we have before us right now.

CHAIRMAN JENSCH: If I understood the language

used, he is offering the entire WASH-740 document as received by the Atomic Energy Commission under some study authorized by the Commission and not anybody else's version. Is there any objection?

MR. SCINTO: I would have no objection.

CHAIRMAN JENSCH: Is there any on behalf of Intervenor Mary Weik?

MRS. WEIK: I don't think the only abridged edition is privately produced. I mean there are government abridged editions also.

CHAIRMAN JENSCH: Do you have any objection to WASH-740?

MRS. WEIK: No, I have not.

CHAIRMAN JENSCH: Very well. The objections are overruled and Citizen's Exhibit No. 1 is received in evidence upon the assumption that the Citizen's Committee for the Protection of the Environment will secure copies and make the necessary service upon the parties as well as on the Board. Will you do that?

MR. BOGART: Can we have a little time to do that?

CHAIRMAN JENSCH: Yes, how long?

MR. BOGART: Three days.

CHAIRMAN JENSCH: Very well.

(Citizens Exhibit No. 1, marked for identification, was received in evidence.)

CHAIRMAN JENSCH: You may proceed.

MR. BOGART: Then this being admitted as evidence, can the witness answer the question I asked yesterday.

CHAIRMAN JENSCH: You may proceed again with the document, and if you now have the document with you, I think you should tender it to the witness, so he may have precisely in mind the portion to which you are directing the question.

MR. BOGART: I just read the statement from page 7.

CHAIRMAN JENSCH: Will you give the document to him?

MR. BOGART: I want to refer to the material on page 12.

CHAIRMAN JENSCH: You may hand it back and forth, whatever is convenient, but I think the witness should have it.

MR. TROSTEN: Is a question being propounded to the witness now, Mr. Chairman?

CHAIRMAN JENSCH: I didn't understand that. I though first he was directing attention to some page, page 7. Will you further identify the portion to which you are directing his attention?

MR. BOGART: I read the portion which I believe is underlined on page 7, which says the assumption made in calculating the remote accident was based on the assumption that it was a containment of the usual kind.

MR. CONNER: If the Board please, could we have a more specific reference? The official copy of WASH-740 that we are looking at has no underlined section.

CHAIRMAN JENSCH: The witness has apparently the only copy. Would you give the page and column number.

MR. TROSTEN: Mr. Chairman, may I interject a comment? WASH-740 speaks for itself. Wouldn't it be simpler for Mr.Bogart to simply read the statement, and that would serve his purpose?

CHAIRMAN JENSCH: I would rather the witness have the document, after which if Mr. Bogart desires to read it, he can.

I think the witness should have an opportunity to review the contents.

MR. CAHILL: Should I review the contents or read the underlined portion.

MR. TROSTEN: I suggest, Mr. Cahill, that you read the underlined portion.

CHAIRMAN JENSCH: There is a question pending to the witness. Let that proceed, please, and then you may state your position. Would you give the page number and column, Mr. Cahill?

MR. CAHILL: I am looking at a page marked or headed "Part 2, Assumptions Used in the Damage Studies."

This is page 7. Underlined in the first column at the last sentence in the first column are the words, "This is due to an attempt to be on the safe side where uncertainties exist in present knowledge but no deliberate safety factors have been introduced."

Then in the second column, the first paragraph, there are underlined the words, "Assumed to surround the reactor."

Further down in another paragraph are underlined the words, "Iodine, and the latter ... are biologically most hazardous." Not underlined is "Strontium." Presumably that is the other one of those latter two.

Then underlined in another paragraph on location are the words, "30 miles from a major city."

Now, I have not read WASH-740 through its entirety for several years. I recall that the accident with the worst consequences in terms of harm to people and cost was based on a complete release of all of the fission products from the core which could only result, as I understand it, from an uncontained accident.

Now, I have to review this document much more thoroughly to draw conclusions from a single page with phrases and limited portions of paragraphs and sentences emphasized.

CHAIRMAN JENSCH: I think counsel for New York State Atomic Energy Council desired to make a statement.

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MR. SCINTO: Mr. Chairman, this just has to do with the same question I had before we had the documents admitted. I thought the document we admitted was WASH-740. If I recall correctly, I thought WASH-740 was a rather substantial document of 100 or so pages.

I am not sure exactly how long the document here is, it looks somewhat smaller, and I would like to find out from Mr. Cahill whether that document he has is a full and complete copy of WASH-740 as published by the Commission.

CHAIRMAN JENSCH: I am not so much concerned whether some portions of WASH-740 have been withdrawn from the entirety and used for the purpose of this examination. The offer was made of WASH-740 in its entirety and copies thereof will be served upon the parties.

Therefore, we are assuming this consideration relates to WASH-740 in its entirety. Now, the portions of the papers being used as the basis of this interrogation is something separate.

MR. SCINTO: Thank you, sir.

CHAIRMAN JENSCH: Will you proceed, Mr. Bogart?

MR. BOGART: Mr. Chairman, may I get a ruling from you? It seems that the intent of my question to the witness is not understood.

I again apologize for not being familiar with the language used in these proceedings, but I merely wanted to

point out that on the record the day before yesterday was the statement that the maximum amount of radiation that could be loosed by the dumping of the entire coolant in the river at Indian Point at the Chelsea intake, 22 miles north, would be only one-half of the MPC after a 20-day build-up period.

But if we assume that WASH-740 represents a valid, however remote conclusion, the material given in that document, even assuming a contained reactor, would cause a far greater concentration of waste there.

I am not concerned about Chelsea. I think that this is a very remote case where that emergency standby system would be working. I am concerned about the Croton system which is just five miles from the site, in the event of the accident postulated in WASH-740.

CHAIRMAN JENSCH: Isn't your position a matter of argument, either in brief or orally, in some manner other than arguing with the witness. As I understand the last answer of the witness, he stated he would stand according to whatever is in WASH-740.

He was giving his recollection as I understood it yesterday. And, of course, he has admitted his recollection was based on a review of the document some time ago.

MR. HOGART: Perhaps I am mistaken in trying to get this information from the witness. Perhaps I should just make a statement. Is that permitted?

CHAIRMAN JENSCH: Yes, I think if your statement is related to matters in evidence.

MR. BOGART: What I just said, can that be considered a statement?

CHAIRMAN JENSCH: It will be considered as your position, yes.

MR. BOGART: Thank you.

CHAIRMAN JENSCH: Did you have something further?

MR. BOGART: No, that is all. May I say at this time we had expected to have Dr. Kohl as one of the witnesses this afternoon. He has been over-committed and detained in California and cannot be here.

I would like to substitute for him Dr. Robert Beardsley of Manhattan College who can appear tomorrow morning, all day tomorrow.

CHAIRMAN JENSCH: Where is the gentleman, Dr. Squires, will he be here?

MR. BOGART: He will be here at two o'clock.

CHAIRMAN JENSCH: I think your selection of witnesses is a matter entirely of your choice. I think other considerations may be pertinent in reference to the evidence, but whomever you call will be arranged for, so we will proceed on the basis that Mr. Squires will be here this afternoon and Mr. Beardsley will be here tomorrow morning.

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MR. TROSTEN: Mr. Chairman, I understand that Mr. Bogart's statement was just that, a statement. It was not testimony and not evidence.

After we review WASH-740, we may wish to make a similar statement.

CHAIRMAN JENSCH: Very well. That may be done. I think some of these matters to which Mr. Bogart referred are matters of argument that should appear in a brief or other forms, but insofar as the statement of his contention and intervention, it may be important to have it at this time.

Is there any other examination of these witnesses? Mrs. Weik, did you desire to interrogate the witnesses?

MRS. WEIK: No, Mr. Chairman.

CHAIRMAN JENSCH: Very well.

DR. PIGFORD: Mr. Scinto, I am trying to tidy up the record of the hearing. Do you happen to have information concerning the circumstances in Dr. Teller's letter?

MR. SCINTO: Dr. Pigford, I have here a letter from myself to the Board containing the information I believe you want. I can distribute this at this time to the Board and the other parties, and if you want, I will read it into the record.

CHAIRMAN JENSCH: I think counsel, Mr. Scinto, you indicated you would either read it into the record or some such -- would it be agreeable if it were marked as an exhibit, rather than adding to the transcript?

MR. SCINTO: Mr. Chairman, I would not like to have it marked as an exhibit. This is material in response to an inquiry raised by a member of the public which was not at that time evidence, and we have the information in response to the Commission's statement of the general practice of desiring all parties participating to assist in the clarification of questions raised by members of the public. And we don't believe it is relevant.

CHAIRMAN JENSCH: You were going to read it into the record --

MR. SCINTO: No, I asked the Board if they would like to have me read it for the public to hear it. That's all.

CHAIRMAN JENSCH: I see. As the applicant has done in many instances, they have answered on the record many of the concerns indicated by the public, so therefore it does not seem to be a material objection.

The parties have been responding on the record to the concerns indicated by the limited participants. Did you not so understand?

MR. SCINTO: Yes, Mr. Chairman. But I would not like to, myself, improperly offer material that is not particularly relevant and which is extremely hearsay, a response to an extremely hearsay allegation.

I will offer it if you desire.

CHAIRMAN JENSCH: Very well. The document, consisting of five sheets, the first of which has the letterhead, State of New York, Atomic Energy Council, Department of Commerce, 112 State Street, Albany, New York, this document will be marked for identification as Atomic Energy Council Exhibit number 1.

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(The document referred to was marked Atomic Energy Council Exhibit 1 for identification.)

CHAIRMAN JENSCH: Having thus been identified, and having been previously offered, is there objection by the applicant?

MR. TROSTEN: No objection.

CHAIRMAN JENSCH: Staff?

MR. CONNER: It is totally irrelevant to this proceeding, as Mr. Scinto pointed out. For the public to refer to it is fine, but it is truly not relevant to any issue in this proceeding.

It relates to air pollution, and as I read it very quickly, there is no question whatsoever about radiological matters.

CHAIRMAN JENSCH: As I understood it, one of the concerns expressed by a participant was that all nuclear reactors should be underground and I think this is in response, to indicate this is not Dr. Teller's view, and it therefore

does seem to be related to safety, and in order to make it available to the public, not only the public in this room, it should be in the public record of the proceeding.

Any objection by the Citizens Committee?

MR. BOGART: As it is written, I do.

CHAIRMAN JENSCH: What is your objection?

MR. BOGART: I don't think it discusses the question as to whether Dr. Teller was a consultant to Governor Nelson Rockefeller.

CHAIRMAN JENSCH: Is that your only objection?

MR. BOGART: Yes.

CHAIRMAN JENSCH: Any objection by Mary Hays Weik?

MRS. WEIK: No.

CHAIRMAN JENSCH: The objection is overruled. New York Atomic Energy Council Exhibit 1 is received in evidence.

(Whereupon, New York Atomic Energy Council Exhibit 1 for identification was received in evidence.)

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CHAIRMAN JENSCH: Does anybody desire to interrogate with respect to this matter? We don't have a witness here, but perhaps counsel for the Atomic Energy Council can respond.

MR. BOGART: Mr. Conner is correct. This has no bearing as I see it, unless the attachment, the letter of March 21, is in here -- which I don't see.

CHAIRMAN JENSCH: I understand that letter was read into the hearing previously. Is that your recollection?

MR. SCINTO: It was read partially into the record. The substantive portions of that letter is in the record. I did not read the address and the letterhead.

CHAIRMAN JENSCH: Otherwise you read it in its entirety?

MR. SCINTO: I believe so, Mr. Chairman.

CHAIRMAN JENSCH: Very well. We will accept your assurance. Does that answer your problem?

MR. BOGART: But does the record, or the excerpted portions of the letter, show that Dr. Teller does not recommend putting nuclear reactors underground?

CHAIRMAN JENSCH: You will have to turn to the record for your own impression of the document. I wouldn't undertake to interpret the letter.

The transcript shows it, and you may refer to it.

MR. TROSTEN: Mr. Chairman, since the letter has now been introduced into the record, I would suggest that counsel for the New York State Atomic Energy Council read the letter for the benefit of the public who are here in the room today.

CHAIRMAN JENSCH: This is about the time for our recess. I don't want to duplicate it in the record. I think it is a good suggestion, but let us take a recess and let

wei 6

Atomic Energy counsel read it during the recess.

At this time, let us recess to reconvene in this room at 10:25.

(Recess.)

end #6

CHAIRMAN JENSCH: Please come to order.

Have we concluded now in reference to WASH-740? Did applicant's counsel have something further about WASH-740?

MR. TROSTEN: I have nothing further on WASH-740, Mr. Chairman. I did have just one procedural point.

Yesterday there was introduced into evidence Applicant's Exhibit No. 5, and a copy was not served at that time on one of the intervenors, Mrs. Weik, since she was not present at that time. I would like to note on the record that I am handing a copy to Mrs. Weik -- I was about to hand a copy to Mrs. Weik.

CHAIRMAN JENSCH: It looks like we are no further ahead than we were yesterday. But we have your assurance you will give it to her when she comes in.

MR. TROSTEN: Thank you, Mr. Chairman.

I would like to call attention to the members of the public that there is here --

VOICE: Where are they? Where is the newspaper? I asked a question, I have the right to ask a question. I am paying a hundred dollar bill and I have the right. That's not fair.

CHAIRMAN JENSCH: We will have to permit applicant's counsel to continue his statement and the time for limited appearances was closed and we will have to proceed upon that basis.

feb2

Will you proceed?

MR. TROSTEN: Yes, Mr. Chairman.

There is a scale model of the Indian Point facility in the room directly above this room in the Springvale Inn. It shows the Indian Point 1, 2, and 3 facilities. I call the attention of the members of the public who are here to the location of this model and suggest they might want to look at it.

There is also information and material concerning the facilities located on the table.

A VOICE: Does that show the radiation? That is what I would like to see. I'm very upset, I'm sorry.

CHAIRMAN JENSCH: Very well, will you continue, please, applicant's counsel?

MR. TROSTEN: There is information and material concerning the Indian Point facilities located on a table next to the scale model.

Thank you, Mr. Chairman.

CHAIRMAN JENSCH: Very well.

Had we concluded in reference to WASH-740?

Is there any further interrogation by the parties? Staff counsel?

MR. CONNER: We have one matter on redirect.

CHAIRMAN JENSCH: Very well, proceed.

MR. CONNER: Thank you.

eb3

REDIRECT EXAMINATION

MR. CONNER: Mr. Muller, during some questions that were asked of you yesterday, some reference was made to an on-site radiation monitor used in connection with Indian Point 1. Do you recall the testimony?

MR. MULLER: Yes, I do.

MR. CONNER: Now with respect to this monitor, do you consider it necessary to the operation of Indian Point 1?

MR. MULLER: No, I do not.

MR. CONNER: Would you explain why, please?

MR. MULLER: In our judgment the radiation monitors that are included in the off-gas system are sufficient to monitor the releases of radioactive materials from the plant.

MR. CONNER: That is all we have, sir.

CHAIRMAN JENSCH: This is a subject that has been of some concern to me. I wonder if while we are on this monitor subject, we requested that the custodian of the building give us a tablec of paper and a crayon and I wondered if someone either from the staff or Mr. Muller or somebody from the applicant could give us a little sketch, as near to scale as he can, first the height of the building and then the location of the monitor to which you referred, which you said you didn't think was necessary.

Could anybody do that? Mr. Grob, are you familiar with that type of thing?

eb4

MR. GROB: The Indian Point Unit 3?

CHAIRMAN JENSCH: Indian Point 1. Go up to the chart and do it as near to scale as you can.

MR. GROB: All right. We will have somebody prepare a sketch. Just a moment.

MR. CONNER: If the Board please, couldn't we refer to one of the diagrams already in the record, in Joint Exhibit A?

CHAIRMAN JENSCH: I have some additional questions besides taking a look at the diagram. And this is done for purposes of illustration. It is understood it won't be completely accurate.

MR. GROB: Okay. Mr. Nelson is preparing a sketch showing the location of the site monitor relative to the buildings on the site.

MR. TROSTEN: Do I understand, Mr. Chairman, that this is intended to have no evidentiary value, but is really an assistance for the oral discussion?

CHAIRMAN JENSCH: We have to see what it looks like. We did a lot of this type of thing in Malibu and I think it is very helpful to have some illustrations of some of these things. If he can do it reasonably close to scale, we might consider it useful from an illustrative point of view. It will stand corrected according to the accurate measurements reflected in the PSAR.

MR. TROSTEN: Thank you, Mr. Chairman.

CHAIRMAN JENSCH: Will you proceed? What I have in mind is you give us the ground level and how high from the ground is the stack for Indian Point #1 and in relation to the height of that stack, where is this monitor that is on the site?

I think there are two, as I understood yesterday. Give us the general location of those.

(Mr. Nelson draws sketch.)

CHAIRMAN JENSCH: How tall is the stack? You have drawn the stack now. How tall is that?

MR. NELSON: As I recall, this is 470 feet above sea level.

CHAIRMAN JENSCH: And above ground level, approximately?

MR. GROB: Above mean ground level, approximately 372 feet.

CHAIRMAN JENSCH: Very well. Now, you have drawn a circle at the right?

MR. NELSON: This is one air monitor.

CHAIRMAN JENSCH: How far is that from the stack?

MR. TROSTEN: I should call attention to the fact that Mr. Nelson has not qualified as a backup witness. Do you wish to direct the questions to one of the witnesses?

CHAIRMAN JENSCH: We are interested in someone who is familiar with this thing, and if he is, that's good enough

for us. This is just illustrative. Will you proceed Mr. Nelson.

MR. NELSON: I have to be very approximate, because I don't have the exact measurements. This is something on the order of 1500 feet (indicating.)

There is another air monitor at a distance of approximately 400 feet, since it is not in the same plane as this one, this is not a correct location for it.

In other words, this one is off directly -- not directly, but more or less to the East, whereas the other one is towards the south.

This one would be toward the south and this one to the east. But in showing the distance from the stack, this will probably serve. And this, I would judge to be some 400 feet.

CHAIRMAN JENSCH: From the stack?

MR. NELSON: Yes.

CHAIRMAN JENSCH: Now before you leave, Mr. Nelson, let me ask Mr. Muller, what was the monitor to which you referred?

MR. MULLER: My understanding was there was one near the site boundary.

CHAIRMAN JENSCH: Nearer than this?

MR. MULLER: No, the one nearer the site boundary.

CHAIRMAN JENSCH: That is the one you say you do not

think is necessary?

MR. MULLER: Yes, sir.

CHAIRMAN JENSCH: There is one 400 feet and one 1500 feet. Which did you think was not necessary?

MR. MULLER: I don't think -- my response was that neither of them are necessary absolutely, for the safety of operation of the facility.

CHAIRMAN JENSCH: I see. Now, I wonder if some gentleman, maybe Mr. Grob, who is handling the evidence in reference to normal release, what would you envision to be the course of the stack effluent which would hit those monitors? Could you give us a sketch on that?

MR. GROB: What the --

CHAIRMAN JENSCH: What the path of the effluents would be in a normal release. Could you come up to Mr. Nelson's sketch and show us that?

Since you have been sworn, do you accept Mr. Nelson's sketch as approximately correct?

MR. GROB: I accept Mr. Nelson's sketch. The path of the plume depends on the meteorology and the wind direction.

CHAIRMAN JENSCH: What kind of a plume would hit those monitors? That's my problem.

MR. GROB: A plume which possibly might occur under breakup in the morning of an inversion condition and some portion of the effluents might hit these monitors.

CHAIRMAN JENSCH: What is the effective stack height? Do you know? I understand you have a 16 million curie release limit, annually for Indian Point #1. Is that correct?

MR. GROB: That is correct.

CHAIRMAN JENSCH: That is based, as I understand it, on Mr. Cahill's statement of superheaters being in there giving a heated column of air. What is that, do you know, approximately?

MR. GROB: The 16 million curie per year limit does not -- it is considered as a cold stack, based on cold stack conditions. In other words, the effective height being the 370 feet above ground level, which is the physical height above mean ground level.

CHAIRMAN JENSCH: Can you give a dotted line then, to show the plume you envision would hit your 415 foot monitors?

MR. GROB: I would expect that a plume which passes over these monitors would be the direct radiation, should it be of sufficient intensity in this plume, would be seen by these monitors.

CHAIRMAN JENSCH: Will you dot the line to show the path of that radioactivity to which you just referred?

MR. GROB: Say this is the plume (drawing) and the radiation emanation is coming from the plume down towards the monitor.

CHAIRMAN JENSCH: It would be a direct line from the middle of the plume after it had left the stack. Is that correct?

MR. GROB: That's correct.

CHAIRMAN JENSCH: In your envisioning these normal, routine releases, you do not envision any direct path from the top of the stack directly to, say, your 400 foot monitor?

MR. GROB: No, I do not.

CHAIRMAN JENSCH: What is the character of that radiation that comes from the middle of the plume to, say, the 400 foot monitor?

MR. GROB: The character of the normal radiation is primarily beta.

CHAIRMAN JENSCH: Where are your filters -- excuse me.

MR. GROB: As was mentioned this morning, the point 17 millecuries of particulate per year, one might see some fallout in this particulate. These monitors can measure particulate also.

CHAIRMAN JENSCH: Would you draw a line for the 1500 foot monitor, where you would expect it to get its source of radioactivity that would be reflected in that 1500 foot monitor?

In both instances then neither the 400 foot monitor nor the 1500 foot monitor would be within the path of the plume. Is that correct?

MR. GROB: That is correct.

CHAIRMAN JENSCH: Where are the filters which were discussed yesterday that permit you to get a reading of radioiodine?

MR. GROB: There are charcoal iodine filters in each of these two monitors. There is also in the stack monitor itself a sampling point for charcoal filters which are installed there and which would read iodine if it were present.

CHAIRMAN JENSCH: Do you regularly read those filters in the stack to ascertain the presence of radioiodine?

MR. GROB: The filter in the sample line from the stack is regularly read to ascertain the presence of radioactive iodine.

CHAIRMAN JENSCH: One other thing I think the record is a little confusing on to me, I think Mr. Cahill at one time said one release at Indian Point #1, and I understood there was something about a release every month. How often do you have normal releases from Indian Point #1, gaseous releases?

MR. GROB: My recollection is the same as -- the normal releases from the gas decay tanks have occurred as I understand it, my recollection is the same as Mr. Cahill's, about once. There would be, when the containment is ventilated for refueling, approximately once a year, any activity contained in the containment at that time would be ventilated.

CHAIRMAN JENSCH: Through the stack?

MR. GROB: Through the stack.

CHAIRMAN JENSCH: I think I understand Mr. Muller's testimony then that neither of those monitors is very helpful--you said "not necessary," I think -- I understand that better now, I believe.

DR. PIGFORD: Mr. Muller said not absolutely necessary. Was that a qualification that had some significance, Mr. Muller?

MR. MULLER: Frankly, I don't recall using the word "absolutely," so I guess it was not a qualification.

end #8

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DR. PIGFORD: Mr. Grob, you said the 16 million curies per year was based on a cold stack condition. But when you would release from the stack, would it be hot or cold?

MR. GROB: It would be hot.

DR. PIGFORD: Then Mr. Jensch was asking you what is the effective height of the plume during the release. Perhaps I don't remember his question. But even though you may have it designed for the cold stack condition, what is the effective height of the plume during a hot stack release? Would that modify your answer or sketch any?

MR. GROB: The effect of heat would be higher. by how many feet, I don't know.

DR. PIGFORD: Has that number been analyzed or calculated?

MR. GROB: In the record of Unit 1, accident cases were analyzed for releases considering both hot and cold stack conditions. This had to do with the core "B" analyzing documentation. I don't have that with me here.

DR. PIGFORD: But I gather that that is available in the record.

MR. GROB: That is available in the record, yes.

MRS. WEIK: May I ask something?

CHAIRMAN JENSCH: No, if you please, Ma'am, we inquired if all parties had concluded. I understood they had. And the Board would like to express their concerns. After

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everybody is finished, we will inquire again if the parties have any further interrogation, at which time we will call upon you.

MRS. WEIK: I was not here.

CHAIRMAN JENSCH: I'm sorry, we can't hold the proceedings until you arrive, Ma'am.

MRS. WEIK: What do you mean, hold the proceedings? I had to go downstairs for something that was lost. Wouldn't you do that?

CHAIRMAN JENSCH: May I ask if you would hold your questions until we have finished.

MRS. WEIK: Well, I hope I will be, because this is a very important question.

DR. PIGFORD: Mr. Grob, from this calculation do you calculate then an effective stack height for hot stock releases?

MR. GROB: Such would be used in the course of making the calculations, yes.

DR. PIGFORD: Would it be possible then for us to learn what the effective height is later on, when you have time?

MR. GROB: Yes.

DR. PIGFORD: On the monitors, we talked yesterday about these filters which allow them to measure iodine concentrations equal to or below the maximum permissible

eb3 concentration. I would like to know how long one of those monitors has to be exposed to air containing iodine 131 at the maximum permissible concentration in order to obtain a statistically significant reading on iodine 131 from that monitor.

MR. GROB: For sensitivity of MPC, approximately one hour.

DR. PIGFORD: Thank you.

Now have either of these two monitors ever indicated any radioactivity in the air?

MR. GROB: We have been able to detect weapon tests with these monitors.

DR. PIGFORD: Was that recorded someplace?

MR. GROB: It would be on the charts, yes.

DR. PIGFORD: Were these data obtained since Indian Point 1 went into operation?

MR. GROB: These monitors have only been here since Indian Point went into operation.

DR. PIGFORD: So it is your interpretation of the data that the reading came from weapon tests?

MR. GROB: Yes, by virtue of the ratio of the particulates seen and the testing that was announced some time subsequent based upon other monitoring areas, stations, we have been able to correlate the readings with weapon tests.

DR. PIGFORD: You stated that the 16 million curies

eb4 1 per year tech spec limit on Indian Point 1 is under cold stack
2 conditions. Now yesterday we learned that the yearly re-
3 lease from Indian Point 1, if it were to hypothetically re-
4 lease gas continuously at the maximum permissible concentra-
5 tion, would be 16 million curies per year.
6 We also learned that under the same assumption,
7 the maximum yearly release from Indian Point 3 would be only
8 570,000 curies per year. Now what is the reason that Indian
9 Point 3 would have such a smaller allowable -- "allowable"
10 is not the right word -- a smaller calculated maximum yearly
11 release than Indian Point 1?
12 MR. GROB: The vent, plant vent for Indian Point
13 Unit 3 extends approximately 10 feet or so above the contain-
14 ment structure. By virtue of this, one must consider the down-
15 draft and weigh dilution effects of this structure upon the
16 releases. In other words, the releases are considered as being
17 a ground type release as opposed to an elevated source re-
18 lease such as we have with Indian Point Unit 1.
19 DR. PIGFORD: We were told yesterday that the
20 yearly release from Indian Point 2 if calculated on the same
21 basis I described would be 570,000 curies per year.
22 MR. GROB: Did you say Unit 2? 2 is about 800,000
23 or some number larger, as far as allowable, some number larger
24 than 570,000.
25 MR. CAHILL: We use the 570,000 as an illustration.

eb5 1 The two units are of essentially duplicate design, but of
2 course Unit 2 is, or Unit 3 is the one that would be closest
3 to the site boundary, so there will be a difference when that
4 is developed.
5 DR. PIGFORD: Yes.
6 MR. CAHILL: They both are, as Mr. Grob described,
7 figures on a ground release basis.
8 DR. PIGFORD: I wouldn't be concerned with the
9 difference between 570,000 and 800,000. But the 800,000 num-
10 ber on Unit 2 is considerably smaller than the 16 million per
11 year on Unit 1. I would like to ask you why Unit 2 has such
12 a smaller yearly limit.
13 You just answered a similar question on Unit 3,
14 on the basis of the height of the stack I think. What is the
15 answer on Unit 2?
16 MR. GROB: The answer on Unit 2 is the same. Unit
17 2 and Unit 3 are essentially the same design plant.
18 DR. PIGFORD: As we drive here in the morning,
19 we see a stack being constructed out there, which has a sort
20 of a red top on it, which looks a great deal higher than the
21 containment vessel. Is that connected with Unit 2 or Unit 1?
22 It has some sort of crane near it right now.
23 MR. GROB: The stack with the red top?
24 DR. PIGFORD: Yes.
25 MR. GROB: That is the Unit 1 stack.

eb6 1 DR. PIGFORD: Thank you.

2 Now does any of your testimony from yesterday con-
3 cerning the reasons for these differences need to be amplified
4 or corrected?

5 MR. TROSTEN: I beg your pardon, Dr. Pigford?

6 DR. PIGFORD: That sounds like a very threatening
7 question, doesn't it? But I will repeat it.

8 MR. TROSTEN: It is just a very general question,
9 Dr. Pigford.

10 DR. PIGFORD: Yes, and that is not the kind I would
11 like to have posed.

12 Would you review the testimony on this same sub-
13 ject yesterday when you have an opportunity and see if any of
14 that needs to be corrected? It is possible that my memory
15 is wrong, and that the answer is no, it doesn't need to be
16 corrected. I will review it, too.

17 MR. TROSTEN: We will certainly, as we are already,
18 Dr. Pigford, look over the entire transcript. Do you have
19 any specific reference in mind?

20 DR. PIGFORD: Concerning the subject we have just
21 been talking about here. I don't know the transcript page
22 number and I won't take time to look for it now.

23 MR. CROB: Is that all?

24 MRS. WEIK: I would like to ask him a question.

25 CHAIRMAN JENSCH: Very well. Proceed.

eb7 1 MRS. WEIK: Since the figures that are reported to the public are not the figures, the Con Ed figures, but the ones from the plant at Standard Brands, where is the Standard Brands plant, how far is it from --

MR. GROB: You are talking about a monitoring station on the river, of which there are a number.

MRS. WEIK: Where is it located?

MR. GROB: Standard Brands is just to the north of Indian Point.

MRS. WEIK: How far?

MR. GROB: Oh, about a thousand meters, perhaps.

MRS. WEIK: That is about --

DR. BUCK: A half mile.

MRS. WEIK: A little over half, yes.

DR. BUCK: Excuse me, it is a mile.

MR. GROB: About three-quarters of a mile. Less than that.

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MRS. WEIK: It is above the plant, directly on the River?

MR. GROB: That is correct.

MRS. WEIK: Well, the figures -- they don't use any Consolidated Edison figures at all?

MR. GROB: I believe this is a state monitoring point. Yes, it is a state monitoring point.

MRS. WEIK: Well, the Con Edison figures don't go to the public then?

MR. GROB: The Con Ed figures are given to both the AEC and to New York State.

VOICE: We don't hear back here.

MR. GROB: Con Ed figures are reported,as I said, to the Atomic Energy Commission and to the State of New York. Those reported to the Commission are part of the public record.

MRS. WEIK: Where?

MR. GROB: In the public document room, Washington, D.C.

MRS. WEIK: I see. The ones that go to New York State, therefore, are received by New York State, but they only publish the figures from the Standard Brands Plant?

MR. GROB: I believe New York State will have to speak for itself.

MR. TROUTEN: Mr.Chairman, these questions should

be directed to the State. They are not properly addressed to this witness.

CHAIRMAN JENSCH: I think that is correct.

MR. SCINTO: May I respond?

CHAIRMAN JENSCH: Please do.

MR. SCINTO: The documents supplied New York State by Con Edison are physically located in Albany, New York, in about three places. One of these places is the Office of the Division of Industrial Sciences and Technology, The State Department of Commerce.

Those documents can be used at that point, and they often are used by members of the public who come in to look at them. We do not hide tose documents.

MRS. WEIK: But how do they enter --

CHAIRMAN JENSCH: Let him finish.

MR. SCINTO: The New York State radioactivity bulletins, however, do not incorporate figures from Con Ed's surveillance network or anyone else's. They incorporate the figures from the New York Sate radiological surveillance network, under the New York State Department of Health program.

MRS. WEIK: Why are the figures from a private plant accepted rather than from Con Edison?

MR. SCINTO: I don't understand you?

MRS. WEIK: Standard Brands is a private plant.

MR. SCINTO: If we are inquiring about how the

rms 3

figures for the New York State radiological surveillance network are taken, they are taken pursuant to and under the supervision of the New York State Department of Health. There is a station physically located on the property of a private company, Standard Brands. There is another station physically located on the property of the New York State Department of Correction at Sing Sing Prison in New York.

MRS. WEIK: So Standard Brands takes no part whatever in the collection?

MR. SCINTO: Mrs. Weik, I do not know whether they do. If you would like me to find that out, I shall.

MRS. WEIK: I would think you would know by this time.

MR. SCINTO: You believe I should?

MRS. WEIK: I am talking to Governor Rockefeller, let me say.

CHAIRMAN JENSCH: Would you get the answers from him rather than Mr. Scinto. Would that help?

MRS. WEIK: It might be more effective.

CHAIRMAN JENSCH: I think the inquiry here should be directed --

MRS. WEIK: I asked the question whether it is installed as a private company. I therefore asked if the collection was made by the company.

CHAIRMAN JENSCH: Do you have any further questions?

MRS. WEIK: No, I do not.

DR. PIGFORD: Mr.Grob, while we are on this subject, in the application there are some references I think to general environmental surveillance which I suppose must include air monitoring and although I do not recall the details, I am assuming, and I may not be correct, that there are occasional monitorings by Con Ed outside of the plant environment. Is that correct?

MR. GROB: That is correct.

DR. PIGFORD: Have you ever measured any radioactivity in the air from that monitoring?

MR. GROB: We have measured the activity from natural background radioactive substances. We have also measured weapons tests. We have measured direct radiation, natural background.

DR. PIGFORD: Is it correct that you identify particular nuclides so you can then deduce their sources?

MR. GROB: We have done this at times.

CHAIRMAN JENSCH: Very well. We thank both Mr. Nelson and Mr. Grob for their participation in this discussion.

DR. PIGFORD: Mr.Scinto, again to clear up things that have already been discussed and appear in the record, I think there was a question on transcript page 846, line 15 to 21, and also 852, line 12 to 13. Do you happen to have the information referred to there?

MR. SCINTO: I am trying to get the transcript.

DR. PIGFORD: I must say the references I have given you are not specific questions, but these I think will recall some discussion in which I had understood you were going to then clarify for us.

MR. SCINTO: May I have the pages again?

DR. PIGFORD: Page 846, lines 15 to 21, and page 852, lines 12 to 13.

If you would like me to ask a specific question on it, I will.

MR. SCINTO: The second reference was what?

DR. PIGFORD: 852, lines 12 to 13. I thought you would like to clear this one up for the record.

MR. TROSTEN: Mr. Chairman, as I have noted before, the matter of the state regulations pertaining to drinking water standards are not germane to this proceeding. They are not relevant to this proceeding.

Accordingly, I respectfully suggest this information is not pertinent and the subject should not be pursued further.

MR. CONNER: If the Board please, we were under the impression that that had been ruled on yesterday as being inappropriate for consideration.

CHAIRMAN JENSCH: Would you give us the transcript reference?

MR. CONNER: If we can find it.

CHAIRMAN JENSCH: I think in our previous considerations of the water situation we have referred to Part 20, Section 106, Subsection (e), which says that in addition to limiting concentration of effluents in streams, the Commission may limit quantities of radioactive material released in air or water during a specified period of time.

"If it appears the daily intake of radioactive material from air, water or food by a suitable sample of an exposed population group averaged over a period not exceeding one year would otherwise exceed the daily intake resulting from continuous exposure to air or water containing one-third the concentration of radioactive materials specified in Appendix B, table 2 of this part --"

First let me ask: When is it that the Commission would be informed in order to exercise the authority indicated in this part 20.106, subsection (e)?

When is it they would get the material, the evidence, in order to ascertain that the daily intake of water would exceed the daily intake of air or water containing one-third the concentration of radioactive materials in Appendix B?

First the time? What is your understanding of that section? I am asking for the applicants, because it is the applicant's operation that is involved.

MR. THOSTEN: Mr. Chairman, I believe that since

this question pertains to the application of Atomic Energy Commission regulations that the Atomic Energy Commission should respond to this question.

CHAIRMAN JENSCH: We will get their views. But I had not been under the impression that all regulations of the AEC are only interpreted by the staff of the Atomic Energy Commission. I am seeking your view of what you think that time would be.

When would it be a proper time to get the evidentiary matters set forth in that section?

MR. TROSTEN: Mr. Chairman, I don't know that there is any evidentiary matter to be presented by the applicant with respect to this particular section.

CHAIRMAN JENSCH: Aside from whether the applicant has the necessity of doing it, just in your understanding of that section, what is your understanding of when would it be likely in the operation of a nuclear facility that there would appear evidence upon which the Commission would make a finding or indicate a limitation of the quantities of radioactive materials released in air or water if the daily intake of water, for instance, would exceed the one-third concentration specified in Appendix B?

MR. TROSTEN: Mr. Chairman, I believe in the operation of a nuclear powerplant the Commission would not see any evidence that would lead them to believe that a suitable

portion of the population was being exposed to these limits for the simple reason that no such limits would be approached.

Mr. Conner, I believe, addressed himself to this point in the March hearing, in which he noted this has been up to now a theoretical section of the Atomic Energy Commission regulations rather than one that has been practically applied.

As far as what the applicant is required to do under the Atomic Energy Commission regulations, it is to show that they do not exceed the discharge limits set forth in 10 CFR, Part 20. And this, of course, the applicant has shown in its PSAR.

CHAIRMAN JENSCH: Yes. I think you are right. I think that we do look upon these things for their practical application. And I think this possibility, the discharge limit being one-third of the Part 20 limits, is something that may never arise. It may be like the incredible or design basis accident or hypothetical, unreal accident, which we talk about from time to time.

It is the kind of contingency that I understand might be a factor. I just wondered, assuming that premise, do you feel there is one certain time at which an inquiry would be made by the Commission, or would the evidence be available for procurement at any time?

MR. TROSTEN: If I understand your question, Mr. Chairman, I believe that the Commission would, apart from any particular facility licensing proceedings, come into possession of this information and it would be treated outside of the context of any facility licensing proceeding.

Mr. Chairman, I believe what I'm trying to say is this:

I believe this regulation, this section of the regulation, was used as a safety device to enable the Commission to enforce any necessary limitations which appear to be required if the Commission came into possession of any information through its general sources which indicated that special restrictions were required.

As Mr. Conner has indicated, this has been a totally hypothetical situation up to now, and hence there has been no occasion to apply it, at least in the context of nuclear reactor operations.

I hope that is responsive to your question.

CHAIRMAN JENSCH: I don't disagree with the fact that it is a remote contingency. I understand that is the purport of your statement.

Now, it is not hypothetical if there is a possibility of it coming at any moment. So my point is really this, that if, for instance, these water samples would be at a level equal to one-third the concentration of radioactive materials,

or if they would be greater than one-third the concentration of part 20 limits, then it might be a circumstance or a condition to which the Commission might like to give attention.

Would you not agree?

MR. TROSTEN: Yes, I would agree.

CHAIRMAN JENSCH: So I think that is the basis of the inquiry, to see if there is a basis of application or likely development. Let me raise this question:

Supposing the concentrations released exceeded the daily intake, resulting from continuous exposure to water containing one-third the concentration.

And supposing the State should urge the Atomic Energy Commission upon the basis of that evidence to close this reactor.

Are there safety considerations in connection with such a remote hypothetical, unexpected, unanticipated event of a closing of the reactor?

MR. TROSTEN: Well, Mr. Chairman, there could under these highly speculative conditions be a safety question that would have to be resolved. But I submit, Mr. Chairman, that these conditions are in no wise involved in this particular proceeding.

CHAIRMAN JENSCH: As I understood it, we have considered here Indian Point #3 in relation to the operations now pending and expected of Indian Point #1 and #2.

For instance, the normal releases from the three facilities, both gaseous and liquid, and there has been, in a sense, consideration of the environmental aspects of all three in order to determine the effect of Indian Point #3, which of course is the focus of the proceeding, but the interrelationship with the other two seems to be a pertinent consideration.

Would you not agree?

MR. TROSTEN: Yes, sir, I agree it is. However, the reason why I was objecting to the further consideration of the State drinking water standards was that it involved consideration of regulations which had no bearing upon the regulations which are applicable to this proceeding.

CHAIRMAN JENSCH: I think your position is well taken. We are not attempting in this proceeding to interfere, modify, change, affect or in any wise influence, the State standards for drinking water.

We have no concern, we are not trying to have the State raise the level of its drinking water standards in any respect.

Our concern must solely be with reference to Part 20 and Part 20 talks about a daily intake situation which may lead to a limitation by the Commission if the exposure to water will exceed one-third of the concentration of radioactive materials in Part 20.

I think that is really the question. I would ask

Dr. Pigford, perhaps, if he could modify the question so that it is clear to the record and to everybody, that the inquiry is not in any wise seeking to infringe upon or be guided by whatever the State is doing as to the radioactive level in drinking water.

With that understanding, do you agree the question might be proper?

MR. TROSTEN: I'm sorry, Mr. Chairman, but I still don't see exactly how Dr. Pigford's question would relate to Section 106.8. I agree that a question related to 10 CFR 20 is proper in this proceeding.

I'm sorry, sir. I don't see the relationship of Dr. Pigford's inquiry into the section we have been discussing.

CHAIRMAN JENSCH: Perhaps Dr. Pigford can modify the question and we can look at it again. Staff Counsel?

MR. CONNER: If the Board please, at one point in the past colloquy, you indicated you would ask the Staff's view on how Part 20, Section 105(c) would be interpreted.

I am ready to reply, if you wish.

CHAIRMAN JENSCH: Any comment you may have, we would appreciate.

MR. CONNER: It should be pointed out Part 20 itself requires an applicant to report any incidents that may release activity. The standard operating license condition requires that this be reported immediately.

CHAIRMAN JENSCH: He must report what?

MR. CONNER: If there is any untoward release, any incident, anything out of the ordinary, in general terms, he must report it immediately to the Commission.

CHAIRMAN JENSCH: Yes. What we have in mind is Section 106, which says that the Commission, in reference to intake --

MR. CONNER: May I comment?

CHAIRMAN JENSCH: Yes, indeed, but I would like to have you relate it to the intake.

MR. CONNER: Now the inspectors will be there all of the time, periodically checking to see if there are any indicated increases in release of materials long before the one-third level were even approached.

CHAIRMAN JENSCH: How would you be sure of that?

MR. CONNER: By reading the reports of the discharges. But then if there was any indicated increase, the inspector's job would be to report it so the Commission could take quick action, because long before releases ever reach anything resembling the one-third in the table of Appendix B, there would be an indication that something was wrong with the inside of one of the facilities, and you wouldn't wait until you approached one-third of the limits before you tried to see what is wrong with the reactor.

I think this is the point that is being overlooked.

end #1

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CHAIRMAN JENSCH: I think that is a good point to bear in mind. I think there might be some difficulty about the time aspect. But I think the inquiry here is not so much how soon would the compliance section of the AEC report it to the Commission, but I think the inquiry here is are these situations likely to develop, and what action is taken. We are not seeking to ascertain the action by the Commission.

MR. CONNER: As I understood the question, you wanted to know what mechanism existed so the Commission could take prompt action and how soon it would be notified.

CHAIRMAN JENSCH: Yes. The principal thing is how do we know whether the daily intake of water exceeds the one-third concentration set forth in Table B, and I think the inquiry is in reference to whether the State levels for instance would lead to a one-third, whether it would be a one-third exposure, in excess of the concentration.

Have you finished?

MR. CONNER: Well, the next step would be that in the event such levels were shown to exist in the effluents, then of course to apply 20.106 f a survey appropriate to the circumstances would be made as to your population sample. And this would be done by cooperation with the State and local authorities, and whatever was necessary at that time to determine if indeed such a one-third exposure were possible.

CHAIRMAN JENSCH: Yes. As I understand it, I think

eb2 what the question seeks is what is the cooperation betwee.. the State and the AEC, to which you referred, because it a: involve the State level over which the Commission of cou'se has no jurisdiction and this Board makes no inquiry to result in any conflict with the State.

State matters are supreme unto themselves and the AEC is exclusive of itself.

MR. CONNER: We have extremely close relations with the State of New York under the agreement for cooperation which has been negotiated. The reports that Con Ed submits, although on Indian Point 1 is not concerned here, but the qua.. .ly reports come in, they go to AEC, they go to the State. There is a continuing cooperation in this area. Our inspectors cooperate with the State as matters develop.

So the application of 20.106 in the event it ever becare necessary would have been something the State and Federal Government would have been working on form some time prior to the need for any action to be taken.

CHAIRMAN JENSCH: Yes. I think that is a good point. There is cooperation between the AEC and the State. I think the inquiryin on what are you cooperating. I think this is one subject in which there is cooperation. I think he is inquiring about that type of cooperation.

MR. TROSTEN: Mr. Chairman, I would like to make this comment: It is our position that the application or rather

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how this regulation might at some time in the future be applied, this section of the regulation, 106-E, how this section of the regulation might at some future time be applied is not an issue which is relevant to the issuance of a provisional construction permit for the Indian Point 3 facility.

CHAIRMAN JENSCH: Why not?

MR. TROSTEN: I believe that, sir, because it refers to a situation in which, first, the Commission might choose to impose these limits. There is no statement in here that the Commission will impose an additional limit. It is only a statement of authority in the Commission to impose an additional limit.

And I would say at the time that the application of this regulation would become relevant would be in a particular licensing proceeding, when the Commission, after having made the necessary determination called for by this section of the regulation determined that a particular limit were to be imposed. Then the particular section of the regulation would become relevant in a particular licensing proceeding.

I submit, sir, that the potential application of this section of the regulation is not relevant in this particular proceeding for the reasons I have just stated.

CHAIRMAN JENSCH: I think your analysis of the regulation is correct. I think the problem that I have is this: It is a question of the Commission not being able to

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act unless it has the evidence, and it won't act until there are data on which it can act. Now that was the basis of my original inquiry to you.

What is the time at which the Commission will get the data upon which it will act?

This proceeding here has some unusual aspects in this respect: This is not an instance of a single reactor. It is not a first-time approach. And I think as these considerations develop in proceedings where an applicant is already operating a facility, that then I think the operations of that facility may be pertinent to some extent on the proposed operation, bearing in mind the issue assigned by the Commission that as to Indian Point 3, can it be found that Indian Point 3 can be constructed and operated without undue risk to the health and safety of the public. And its operations may be affected in part by Indian Point 1.

Do you not agree?

MR. TROSTEN: Yes, I agree, Mr. Chairman, that the operations of Indian Point 3 are affected by the operations of Indian Point 1.

However, I might point out, Mr. Chairman, that I do not believe that the section of the regulation we have been discussing in principle has any greater applicability to a situation in which you have more than one facility located on a single site than it does to a situation in which there

eb5 1 is only one facility.

2 CHAIRMAN JENSCH: I agree. There is no question
3 about that.

4 Intervenor Weik, did you desire to make a statement?

5 MRS. WEIK: I would like to say I was surprised that
6 no consideration was given to the incidence of malfunctions
7 and minor mishaps which have stopped the Indian Point 1
8 reactor at many times, and of course sent certain effluents
9 into the air which are not figured in your normal amount.

10 As to the applicant's idea that you would prepare
11 reasonably for such an accident, I am reminded of an uncle
12 of mine who was the head of a fire department and issued
13 orders to clean out the hose two weeks before a fire.

14 CHAIRMAN JENSCH: He was a very far-sighted gentle-
15 man, I would say.

16 MRS. WEIK: This is in Indiana where they are awful-
17 ly smart.

18 CHAIRMAN JENSCH: New York State Atomic Energy
19 Council, do you have any comments to make?

20 MR. SCINTO: No, Mr. Chairman, I'm just waiting
21 for the question.

22 CHAIRMAN JENSCH: Citizens Committee for the
23 Protection of the Environment?

24 MR. BOGART: No.

25 CHAIRMAN JENSCH: Let us recess at this time to

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reconvene in this room at 11:50.

(Recess.)

CHAIRMAN JENSCH: The Board has given consideration to the question and the objection and comment, and Dr. Pigford will withdraw the question and rephrase the inquiry he has in mind.

DR. PIGFORD: First, Mr.Trosten, I do appreciate your bringing up this point, because as you know it is one that does trouble me. And I need to be comfortable as to how far we need to worry about considering this application in terms of local regulations.

But I would like to ask you one question on something that is related to this. In your application you mentioned at one point some guidelines which appear in some reports from the Federal Radiation Council.

I would like to know if you feel guidelines or suggestions, whatever you may call them, in the Federal Radiation Council reports are applicable here?

MR. TROSTEN: Dr. Pigford, I am not familiar with the particular reference, but I will attempt to answer your question in a general sense.

No, sir, the guidelines of the Federal Radiation Council are not pertinent or relevant to this proceeding. The Federal Radiation Council's guidelines, I might add, are fully reflected in the Atomic Energy Commission regulations, 10 CFR, Part 30, but the only relevant regulations with respect to this proceeding are those of the Atomic Energy Commission.

And in the context of our discussion I refer to 10 CFR, Part 20. So in summary the Federal Radiation Council guidelines are not pertinent to this proceeding.

DR. PIGFORD: Now, I would like to ask you more specifically, in Volume 2(b), page 12-65, section (e) talks about effects of rain-out after the hypothetical loss of coolant accident.

I know we are tending to get on the technical subject we were on before in which the applicant has calculated under those conditions possible doses and concentrations in water at two different reservoirs.

And then the applicant states, "A yardstick by which those doses can be assessed is given in Report No. 5 of the Federal Radiation Council which provides guidance --" and so forth and so on.

First, I don't see that in 10 CFR 20. And secondly, the applicant concludes on the following page that the consequences --

MR. TROSTEN: What page are you on?

DR. PIGFORD: The following page is 12-67.

"The consequences of of a continuous rain after the accident would thus be well below the dose at which the Federal Radiation Council recommends that preventative means be taken."

Now, I bring this up as a specific example as to

why I inquired should we really consider what is the effect of that in this hearing here?

MR. TROSTEN: Dr. Pigford, I would concede how in certain situations the guidelines of the Federal Radiation Council might serve as a reference point or a point which bears not in a legal sense upon this proceeding, but nevertheless provides guidance as to what the Atomic Energy Commission regulations reflect.

In other words, the Atomic Energy Commission regulations reflect guidance contained in the Federal Radiation Council guidlines and hence at times it may be that the Federal Radiation Council guidelines would serve as a point of reference, as I say, with respect to what the AEC's regulations mean.

CHAIRMAN JENSCH: While there is a pause, I think what he was saying then is if you used Federal Radiation Council guidelines for a reference to what the AEC regulations mean, would you not on someoccasions use the state regulations of what the Atomic Energy Commission regulations mean in reference to 20.106 (e) which talks about daily intakes, which as I understand it there are no measurements provided in the Atomic Energy Commission measurement of intakes.

Since that is covered in the same way, the Federal Radiation Council situation, is that not in the regulations?

MR. TROSTEN: The Federal Radiation Council is a

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statutorily established body which is given the responsibility for making recommendations to the President. The President then takes these recommendations and issues a memorandum to the agencies, and the agencies then, including the Atomic Energy Commission, acting pursuant to their statutory authority, establish and promulgate the regulations which are the legally effective regulations governing the particular field of activity.

In the case of nuclear powerplants, Indian Point 3 in particular, the regulations of the Atomic Energy Commission are the legally governing principles.

Now, the Federal Radiation Council has a special status under federal legislation which authorizes them to make these recommendations to the President, and they have that status.

This is an entirely different situation, I would say, than regulations promulgated by a state agency.

MR. TROSTEN: Or for that matter the Public Health Service.

CHAIRMAN JENSCH: They are both established by statute, the Radiation Council and the Board of Health of New York. Correct?

MR. TROSTEN: This is correct.

CHAIRMAN JENSCH: One makes a recommendation as the statute prescribes and the other perhaps makes a recommendation

as the statute prescribes. I am trying to find the difference you are pointing out. I find a similarity rather than a difference between the Federal Radiation Council and the State Board of Health, as far as the Atomic Energy Commission, which does have the authority to make the buiding regulations, controlling regulations.

MR. TROSTEN: The distinction is this, Mr. Chairman. The Atomic Energy Commission as a federal agency with statutory authority to promulgate regulations in its field is obligated to take into account the guidance of the President, the memoranda of the President concerning radiation standards which are issued on the advice of the Federal Radiation Council.

So the Federal Radiation Council has a different position in the establishment of the Atomic Energy Commission regulatory standards. The Atomic Energy Commission, however, is the legally responsible agency for establishing these regulations. However, they are, as a federal agency, required to take into account the guidance contained in the President's memoranda and the Federal Radiation Council's recommendations.

CHAIRMAN JENSCH: Under this agreement of cooperation to which reference was made and the continuing cooperation between the Atomic Energy Commission and the State of New York, are you suggesting that the Atomic Energy Commission would not give credence and reliability to a recommendation

of the StateBoard of Health of New York since it is measuring the intakes, as I understand it, and the Atomic Energy Commission is not measuring the intakes.

MR. TROSTEN: Mr. Chairman, I think the AEC representatives could best speak to the point you raised.

I might add, however, that there is no requirement, no statutory requirement, that the Atomic Energy Commission taken into account recommendations of state agencies which is equivalent to the statutory requirement that the Atomic Energy Commission take into account the recommendations of the Federal Radiation Council.

CHAIRMAN JENSCH: Well, taking into account and being guided by the Federal Radiation Council is a different thing. You can take into account state recommendations as well as take into account Federal Radiation Council recommendations.

As I understand it, there is no mandatory requirement on the Atomic Energy Commission to comply with the recommendation as if it were a direction from the Federal Radiation Council. Is that your understanding?

MR. TROSTEN: Are you directing that question to me, Mr. Chairman?

CHAIRMAN JENSCH: Yes, I am.

MR. TROSTEN: I can give you my personal understanding, but I would respectfully defer the definitive answer

to Mr. Conner.

I believe the Atomic Energy Commission is not legally required to set its regulations based on the Federal Radiation Council recommendations. But I would respectfully defer thr answer to that question to Mr. Comer.

CHAIRMAN JENSCH: We will be glad to hear from Mr. Conner, bit we will take a look at the statute too. Attorney's statements are helpful to us. We want your statement and we want to have counsel's statement. And we want to look at the statute.

DR. PIGFORD: Before we go to Mr. Conner, it is still my question and I would like to know, Mr. Trosten, if this excerpt I quoted from your application then, from the Federal Radiation Council, isn't reflected in 10 CFR 20?

MR. TROSTEN: Dr. Pigford, I really will have to ask for clarification of this point from the Atomic Energy Commission representatives. I do not know all of the considerations that went into the establishment of 10 CFR 20. I suggest they would be in a much better position to respond to your question, sir.

DR. PIGFORD: We will get their response in a moment. Would you like to leave the answer at that, then?

MR. TROSTEN: Yes, sir, I would.

DR. PIGFORD: Then I would like to ask you one more thing. The Federal Radiation Cancil does obviously talk about

other aspects of radiation. Would you also be guided by other reports they have or recommendations? I don't know how to categorize them. Publications of the Federal Radiation Council?

MR. TROSTEN: Mr. Chairman, Dr. Pigford, the applicant would be guided -- pardon me.

The applicant in determining those actions which are permissible would look to the Atomic Energy Commission regulations for determination of what are legally permissible actions that may be taken.

The Federal Radiation Council has published a number of memoranda and other reports. The applicant in determining those actions which it might take, which are within the scope of the Atomic Energy Commission regulations, which are permissible under the Atomic Energy Commission regulations, might take into account the guidance contained in the Federal Radiation Council memoranda or reports.

These memoranda and reports are part of the general literature, Dr. Pigford, concerning radiation safety. I assume, therefore, the applicant would take these and other matters concerning radiation safety into account.

DR. PIGFORD: I gather from your earlier answer to my question you still feel the Federal Radiation Council reports, whatever we call them, are really not governing in this situation?

MR. TROSTEN: Very definitely they are not governing, Dr. Pigford.

CHAIRMAN JENSCH: Mr. Conner?

MR. CONNER: I'm trying to summarize this general discussion. I would say absolutely and unequivocally the Federal Radiation Council standards are of course considered by the Atomic Energy Commission and in the last general revision, when the last general revision of Part 20 was made, I believe in about 1960, it was on the recommendations of the FRC.

The FRC is established in the Atomic Energy Commission Act and of course the Commission considers its recommendations and has, in fact, implemented those recommendations in Part 20.

The Commission reviews Part 20 on a continuing basis. And as things develop, amendments are made. Part 20 has been reviewed by the Atomic Energy Commission as the standard by which the safety of a reactor in terms of routine releases of effluents is governed and it is the sole and only standard by which this Board should measure the safety of the plant in such terms.

CHAIRMAN JENSCH: I think our problem, Mr. Conner -- I appreciate your comment -- where do we get the data of daily intake that is set forth in 20.106(e)?

MR. CONNER: I thought I answered that, sir, by indicating we have a system well-established for reports and inspections which will uncover such a problem that existed long before that was ever reached.

CHAIRMAN JENSCH: Are they taking water intake samples up and down the Hudson today?

MR. CONNER: Are you suggesting the AEC must do this?

CHAIRMAN JENSCH: I'm asking where we would get the data for daily intakes as required under 20.106(e). I understood your answer to say that you have a continuing surveillance program. I want to ask specifically, are you measuring water intake samples up and down the Hudson River and in the reservoirs?

MR. CONNER: The Atomic Energy Commission at the moment, as far as I know, does not have anyone out taking samples in the Hudson River. We rely on material received from the applicant, under its license, sources from the State and also Public Health Service sampling and so forth.

If there were a need, the AEC would, of course, take samples, as it has done in cases where this was considered necessary, such as on the Columbia River, the Anamous River,

in connection with some of the uranium mines.

The Commission is well equipped to do this if it were necessary, and will do so if it ever becomes necessary.

CHAIRMAN JENSCH: We understand that. The real question is, are there data that establish the need now?

MR. CONNER: No, sir. There are not. There are data, but the data do not establish the need.

CHAIRMAN JENSCH: I think our question is what are the measurements of the daily intake that would lead to a continuous exposure from water containing one-third the concentration of radioactive materials specified in Table 2?

MR. TROSTEN: Mr. Chairman, I respectfully suggest that a determination of how the Atomic Energy Commission might at some future time apply 10 CFR Section 106(e) is beyond the jurisdiction of this Atomic Safety Analyzing Board, and hence there is no need for an inquiry by this Board into the matters that the Chairman has just been discussing.

CHAIRMAN JENSCH: I thought we agreed the premise of our discussion was there was an interrelationship among Indian Point #1, to #2 and #3, and that the operation of #3 might be affected by the existing operations at Indian Point #1.

Did we not agree to that?

MR. TROSTEN: We did, Mr. Chairman. And the basis for this understanding is that these three facilities are

located on one site, and the discharges of radioactive material from all three facilities must meet the standards of 10 CFR Part 20, and the tables attached as appendices to this part.

However, I reiterate my point that how the Commission might at some future time apply this particular section of the regulations is beyond the jurisdiction of this Atomic Safety Analyzing Board.

DR. PIGFORD: Mr. Trosten --

MR. TROSTEN: Mr. Chairman, I would supplement my remarks by saying that the determination of how this particular section would be applied, is a discretionary function with the Atomic Energy Commission, which has not been delegated to this Atomic Safety Analyzing Board.

CHAIRMAN JENSCH: I think the whole matter must be related to safety. If it is not related to safety, we have no jurisdiction.

The question is, are there data and do those data affect safety determinations for Indian Point #3? That's all we are concerned with.

Now, the question is, what are the facts? And if the facts exist, then all regulations of the Commission may be applied or may not be applied. It isn't a question of the data are there and you disregard the regulations. The question is, are the data there and when is the proper time to get the data and if not now, when is the time?

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DR. PIGFORD: Mr. Trosten, I hear these lawyers words in a way perhaps they are not intended, but isn't it true that all of the parts of CFR are always applicable? They are always applicable, aren't they, to this plant?

MR. TROSTEN: Are all sections of CFR Part 20 -- 10 CFR Part 20 is applicable to this plant. However, this particular section of Part 20 addresses itself to a situation in the future in which the Commission as a matter of discretion might determine to take certain action. The Commission has never determined to take such action because the facts haven't warranted it.

DR. PIGFORD: It is not a matter of deciding as to whether they will later make that a governing regulation or not. It is now a governing regulation, isn't it, Section 106?

MR. TROSTEN: Section 106 E is a governing regulation in the sense that it states that the Commission may at a future time take some action, Dr. Pigford. But it is not a governing regulation in the sense that it applies any regulatory standard to this plant at this time.

DR. PIGFORD: I understand.

I am also interested in this because in the Applicant's Summary and also I believe in one of the opening statements by the applicant this section was referred to and it seems to me in the context of one of the additional

eb2 safeguards to the public that this Board and all others reviewing this proceeding should consider. It was volunteered and mentioned in that context.

MR. TROSTEN: Yes, sir. It was contained in the staff's Safety Evaluation. And it reflects a reservation of power which the Commission has expressed in 10 CFR 20, and serves just as that, as a reservation of power.

DR. PIGFORD: Mr. Scinto, is the State monitoring intake water at the Hudson River near the Chelsea Station?

MR. SCINTO: I don't believe we have a station in the vicinity of Chelsea itself. We have stations in accordance with the material you received subject to the subpena. We have a station up-stream of this plant and we have a station down-stream of this plant.

DR. PIGFORD: Where up-stream?

MR. SCINTO: One up-stream station is located at Standard Brands in Peekskill, New York. Another station is located down-stream from the plant at the Sing Sing Prison in Ossining, New York.

DR. PIGFORD: Are you monitoring water in the reservoirs near this plant?

MR. SCINTO: Yes. Some of the reservoirs. Do you have a list of the stations?

Mr. Chairman, may I comment on one point?

The New York State Radioactivity Bulletins resulting

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from the New York State Radiological Surveillance Program are submitted to the Commission regularly. We have had annual or periodic summary surveys which were referred to in the record at the hearing. So this material from the New York State Surveillance network has been made available to Boards in past cases, it is part of the public record in the Commission's Public Document Room.

DR. PIGFORD: Mr. Scinto, on a document which was submitted to the Board by the New York State Atomic Energy Council which contains a resolution of that Council at its meeting March 17th, 1969, there is attached a report of the Department of Health which goes on to say, "In connection with the application of Consolidated Edison Company" for this particular plant.

Now on that attached report, on the first page of that report, in the last paragraph it says:

"The Department has monitored for external radiation levels and radioactivity in air, water, milk and vegetation in the vicinity of the Indian Point site since 1958."

Is it correct that the water monitoring is that which you have just described?

MR. SCINTO: Mr. Chairman, I have a small problem in this connection: This document has not yet been introduced in evidence by us. And we are referring to a

eb4 1 non-evidentiary document thus far.

2 CHAIRMAN JENSCH: What is your objection to con-
3 sideration of it? I didn't quite understand you.

4 MR. SCINTO: We are discussing a document which we
5 have not yet introduced into evidence.

6 CHAIRMAN JENSCH: I understood the question was are
7 you monitoring, without regard-- He was using that as, as
8 I think the term is commonly used, as a point of reference.
9 Therefore you can disregard whether the document is or is
10 not in evidence. Just consider it as a point of reference or
11 a guideline for the question he asked.

12 MR. SCINTO: The State Surveillance Program moni-
13 tors air, milk, and water in the vicinity of this facility.
14 I am trying to find the station map to identify what other
15 stations we have in this area.

16 MRS. WEIK: He misunderstood the question. He
17 gave the answer for Indian Point and he asked about Chelsea.

18 MR. SCINTO: Mr. Chairman, I am referring to a
19 document which is in the Commission's Docket of 50-3. I am
20 referring to Consolidated Edison's environmental and post-
21 operational surveys reports, a series of five of them. The
22 one in my hand is July '68, which I think was the latest
23 total summary report produced.

24 In that, on page 23, there is a map of the area
25 around here showing by name survey stations lettered from A

eb5 to T, which is some 20 stations, and a legend on the side numbered from 1 to 8 giving the type of sample taken at each of these stations.

There are a number of them and they are clustered closely around this area. Within a five-mile radius there are stations at Hampfield, there is a station-- At that station the samples taken are air, fall-out, water, vegetation.

There is a station at Peekskill Bay in which the materials taken is fish and mud. There is a station at Iona Island, where the material taken is algae, fish, mud.

There is a station at Standard Brands in which the sample taken is water. There is a station at Stoney Point, where the sample taken is mud.

Those are the stations I can read within a five-mile radius. There are a number outside of the five-mine radius.

DR. PIGFORD: Mr. Scinto, I understand that sometimes the State takes over some responsibility of monitoring certain plants that are licensed by the Commission. Is there any such arrangement for Indian Point 3?

MR. SCINTO: Mr. Chairman, if you refer to the provisions of Section 274 -- I don't recall the subsection -- which provides the specific agreement for this purpose, there is no such agreement between the Atomic Energy Commission and the State of New York.

This program by the State of New York is undertaken on its own behalf for its own reasons for having a statewide -- this is a small portion of a statewide radiological surveillance network which was established by the State for statewide assurance and control of the radiological impact on our people from all sources of radiation, including, and predominantly, fallout.

DR. PIGFORD: You do send your reports to the Commission, I gather?

MR. SCINTO: Yes, sir, regularly. We sent them to the Commission and the U.S. Public Health Service. We send them to Mrs. Welk regularly too. And we have supplied to the Board in this case a small portion of the -- the 25

pages are a small portion of the material which we have reported since 1962 for all of the stations,and they are only in response to the issue of gross beta activity in the water samples at two stations.

DR. PIGFORD: In our discussion you quoted measurements on gross beta activity. I am afraid this question is going to be improper, but I will ask it anyway. Does the state have any limit on gross beta activity?

MR. SCINTO: We have different limits for different purposes. We have our own New York State regulatory control program, and one of the questions is this related to that program, under which we license and regulate pursuant to an agreement under Section 274 with the Commission.

We license and regulate uses of by-products, source and special nuclear materials and quantities. In addition to that, we regulate the uses of other non-atomic energy radioactive materials.

DR. PIGFORD: What is the answer to the question I asked. Is the answer yes?

MR. SCINTO: In connection with that program, in connection with our licensing program, we have part 16, which has a complete table of limitations which should be identical to Part 20. Sometimes there is a transcription error. There is no limit in that table on gross beta. The limitation in that table is on isotopic -- by isotope --or in accordance with

the various notes, various limiting conditions by known missing isotopes.

DR. PIGFORD: Apparently, the state uses gross beta measurements as some indication of radioactivity?

MR. SCINTO: Oh, yes.

DR. PIGFORD: Does the state have any plans to do surveillance or measurements of radioactivity in the water intake at Chelsea?

MR. SCINTO: The New York City Department of Water Supply has indicated that they regularly take water quality samples and they also regularly look at radioactivity measurements in connection with these samples. This is New York City water. Whether the State would duplicate New York City work, whether we would keep and supplement New York City work or whether we would rely upon New York City work I think would be something that we would work out in the future.

DR. PIGFORD: You do not know what that program is?

MR. SCINTO: As Commissioner Feldman indicated, they are not using the water. While we have jurisdictional distinctions among various state agencies, all of our state agencies are interested at least, whether it is within their jurisdiction or not, they are interested in the protection of all of the people in the State.

DR. PIGFORD: I am a little lost on the answer. On the question do you have any plans for measuring radioactivity

in water at Chelsea intake, what was the answer? I remember your elaboration. I just forgot the answer.

MR. SCINTO: The question is do we have an existing plan for a definitive time at which we can project as to taking samples at Chelsea, this specific location? I do not believe there is such an existing plan.

DR. PIGFORD: I believe you said you may develop a plan perhaps in coordination with the City.

MR. SCINTO: In coordination with the City and perhaps as a part of the entire program.

The radiological surveillance program is a fluid program throughout the year. We increase or decrease it as the need appears.

DR. PIGFORD: Do you have any data on the radioactivity measurements in air at the Indian Point site?

MR. SCINTO: We have data on radioactivity measurements in air at our stations by the site.

DR. PIGFORD: I meant in the vicinity of the Indian Point site.

MR. SCINTO: I am now referring to the 1966 summary report for convenience. This data is also reported in the monthly periodic reports.

DR. PIGFORD: It might save some time if you just let us look at the data in the report.

MR. SCINTO: Let me check if we have any extras.

rms 5

MR. TROSTEN: Mr.Chairman, what is the purpose of furnishing the report?

CHAIRMAN JENSCH: I infer it is related to the daily intake of air and water. If I recall the document, it was filed in the Indian Point 2 proceeding. I think he just wants to review it at this time. It is just like looking at a public record, as I understand it.

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MR. TROSTEN: All right, sir.

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MR. SCINTO: We don't have copies, but I can make this one copy available to you.

CHAIRMAN JENSCH: Is this something that was filed in Indian Point #2?

MR. SCINTO: Yes. However, I believe at the Indian Point #2, it went with all of the others in Docket 50-3, rather than the other docket.

CHAIRMAN JENSCH: We are looking solely at a public record.

DR. PIGFORD: I'm going to look at it a little later, if I can borrow it for awhile, Mr. Scinto.

Now, on page 2 of this document, this report from the State Department of Health which I happen to have a copy of, in the second paragraph, the third sentence says, "We endorse the Atomic Energy Commission statement that they would impose additional restrictions in accordance with 10 CFR Part 20, 106(e) to limit discharges if it appears to be required in view of total intake considerations."

I would like to know, intake of what and where the State people had in mind when they wrote this?

MR. SCINTO: The intake that was had in mind there, Dr. Pigford, was the intake that we believe that 20.106 refers to, and that is intake by human beings in a suitable sampling of the exposed population group.

DR. PIGFORD: You said if it appears to be required,

in view of total intake considerations, does the State staff have a way of knowing when it will be required?

MR. SCINTO: The State staff has expert radiological personnel on this staff for our own control programs, and we gather original data in this connection. We review data supplied by other people. And we report it to the Commission.

DR. PIGFORD: I gather in effect you are saying you would depend upon measurements your people would take and also their review of measurements other people take. Is that right?

MR. SCINTO: Yes, Dr. Pigford.

DR. PIGFORD: Will. To know --

MR. SCINTO: We rely on all of the data we can get our hands on.

DR. PIGFORD: -- to know when such limitations would be required?

MR. SCINTO: Yes, sir. When we felt such limitations would be required and then at that point, of course, we would strongly bring that to the attention of the Commission.

DR. PIGFORD: Yes. Maybe we can lay a tough one to rest here. Page 3 says, "In summary, we believe the discharges of radioactivity from the proposed facility can be maintained within appropriate limits."

Which ones did they have in mind?

MR. SCINTO: We are aware of the capacity of this

plant to operate at extremely low discharges. It is patent, from the material we have reviewed, patently capable of discharging well within the Atomic Energy Commission standards.

The Atomic Energy Commission Part 20 limits. And well within all of the limits generally considered.

DR. PIGFORD: Including the New York State limits?

MR. SCINTO: Including all recommendations, guidances and everyone else's suggestions, except perhaps Mr. Bogart's. We, I think, would feel that we would like to work very closely with the applicants and the staff in deciding at such time as the release limits are specified what are in fact appropriate limits for this plant.

DR. PIGFORD: I think I have just asked a question which is probably out of bounds, and I won't press for the answer.

Maybe this question would help. Is there some other place or proceeding or hearing where the question of to what extent this operation meets your own State limits is considered?

MR. SCINTO: The limitations on the operating characteristics of this plant are not New York State limits, they are Atomic Energy Commission limits. We do not exercise the jurisdiction over the operation of this plant. We participate in the Commission's exercise of jurisdiction over this plant.

end #17

DR. PIGFORD: I think the answer is no, isn't it?

MR. SCINTO: I think the answer is No.

MR. UPTON: May I ask a clarifying question, Mr. Chairman?

I wonder if Dr. Pigford is familiar with the recent opinion of the AEC General Counsel on the question of jurisdiction over nuclear facilities? I think a reading of that opinion might help a little bit in understanding why it is that although New York State has an interest in many of these things, and participates closely with the Atomic Energy Commission in the exercise of the jurisdiction by that Commission, New York State does not assert any legal jurisdiction to regulate the construction or operation of nuclear power facilities.

CHAIRMAN JENSCH: I don't think the question was directed to that subject. I really think the question was this:

Does this New York State statutory regulatory scheme provide for a hearing by New York residents before the New York State Board of Health, where the levels of water standards are established? As I understand it, the answer is No.

MR. SCINTO: That is not what I understood. I understood it was as to the operating characteristics of this facility, Mr. Chairman.

CHAIRMAN JENSCH: Let me ask that question:

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Do you have proceedings or procedures under your New York State regulatory program for a public hearing in establishing water level standards for drinking water?

MR. CONNER: I object to the question. If the Board please, the conduct of New York State in its own activities I don't believe is an appropriate subject to AEC consideration.

CHAIRMAN JENSCH: I understood it was the basis of recommendations they would make to the Commission.

MR. CONNER: I don't believe that was the point at all. They were talking about a specific thing relating to Indian Point 3. I think your question relates to the rule-making procedures of the State of New York as a general proposition.

CHAIRMAN JENSCH: I wasn't asking about rule-making procedures. And this is legal interpretation, it is not evidence, and if you will excuse us for trying to get an understanding of the New York program, because there have been mentions of 274 agreement arrangements, as well as Counsel's statement here.

And as I pointed out, there is no infringement of the AEC upon State procedure. But I think the question is how would they develop the recommendation to which Mr. Scinto referred when they determine that a situation like 20.106-E might arise.

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So I am asking about that procedure out of which they would make that recommendation. I wondered whether the statute indicated a hearing procedure to establish those water levels for drinking water. Do they?

MR. SCINTO: Mr. Chairman, I am quite confused by your question. I don't understand that the statutes relating to drinking water levels, whatever they may be, relate to how we participate in the Commission's regulatory program.

CHAIRMAN JENSCH: That is not the issue. If you would just answer the question --

MR. SCINTO: I don't understand the question.

CHAIRMAN JENSCH: Do you have hearing procedures for establishing water level standards in New York?

MR. SCINTO: The standards for drinking water levels in New York? Radiological levels, or all drinking water?

CHAIRMAN JENSCH: Radiological.

MR. SCINTO: I do not know whether we have such standards, laws, rules or jurisdiction. I mentioned the other day that this is a complex legal question.

CHAIRMAN JENSCH: That's what I was asking for -- a legal answer.

MR. SCINTO: I'm afraid I have not had access to documents to find out what the jurisdiction is in this respect. With respect generally to drinking water quality standards, we do have public hearing procedures in some or many of the agencies involved.

CHAIRMAN JENSCH: I think that is the important thing. You do have some type of procedure for some type of levels, do you?

MR. SCINTO: Subject to our jurisdiction, and our exercise of jurisdiction.

CHAIRMAN JENSCH: That is all I was asking for. Did you have something, applicant's counsel?

MR. UPTON: I wish to point out the impact of the AEC general counsel's opinion which I referred to is not simply that the AEC does not infringe upon state procedures or that

the State does not infringe upon AEC procedures. The impact is that the AEC has exclusive jurisdiction over the regulations of nuclear facilities and the use of nuclear materials except to the extent that it has been assigned to the States pursuant to these various agreements, such as Section 274.

CHAIRMAN JENSCH: That is correct. We are glad to have that statement. Is this a convenient time to recess?

Mr. Bogart?

MR. BOGART: Mr. Chairman, may I just get a further explanation from Mr. Sinto?

CHAIRMAN JENSCH: Yes. Could this wait until after lunch?

MR. BOGART: Yes.

CHAIRMAN JENSCH: Very well. At this time, let us recess to reconvene in this room this afternoon at two o'clock.

(Whereupon, at 12:35 p.m., the hearing was recessed, to reconvene at two o'clock p.m., this same day.)

end #19

AFTERNOON SESSION

(2:00 p.m.)

CHAIRMAN JENSCH: Please come to order.

For this afternoon session, as we arranged yesterday, there will be evidence presented on behalf of the Citizen's Committee for the Portection of the Environment.

Before we proceed to that however and leave Mr. Scinto, the Board would like to express on the record its appreciation of the courtesy rendered by Mr. Scinto to the Board through the arrangement that I hope wasn't really thrust upon him but which he did voluntarily or willingly undertake of arranging the presence of witnesses.

That courtesy was helpful to the Board. Secondly, in giving us some of the answers which may be related in part to many of the concerns expressed by the limited participant people here.

I am sure his answers concerning what remedies they have available before the New York State jurisdictions will be helpful to the limited participants. Without further ado, let me inquire of the Citizen's Committee: Are you ready to proceed?

MR. BOGART: I believe we had one question you deferred at the time of the luncheon recess that I would like to ask Mr. Scinto.

CHAIRMAN JENSCH: Proceed.

MR. BOGART: Mr. Scinto, are any of the New York State monitoring stations concerned with the Indian Point locations now monitoring any gross beta activity in wells within five miles of the nuclear plant?

MR. SCINTO: May I have a moment, Mr. Chairman?

CHAIRMAN JENSCH: Oh, yes, indeed.

MR. SCINTO: Mr. Chairman, may I defer answering that question until tomorrow morning? We would like to get the verified data from Albany.

CHAIRMAN JENSCH: Yes. Supply it when you have the information, if you will. Do you have any additional questions?

MR. BOGART: One other question. You mentioned at several locations I believe that mud was analyzed. Is that surface mud or sediment from the bottom of the River?

MR. SCINTO: It is my understanding that it is mud from the bottom of the River.

CHAIRMAN JENSCH: Does that complete your questions?

MR. BOGART: Thank you. No further questions.

CHAIRMAN JENSCH: Very well. We will proceed with the presentation of evidence.

MR. BOGART: At this time I would like to present a witness, Dr. Arthur Squires.

CHAIRMAN JENSCH: Will Dr. Squires come forward please and be sworn.

Whereupon,

ARTHUR M. SQUIRES

was called as a witness on behalf of the Citizen's Committee for the Protection of the Environment and, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BOHART:

Q Dr. Squires, could you give the Board a brief statement of your professional background, qualifications and present interests?

CHAIRMAN JENSCH: May we have his full name and address, please?

THE WITNESS: Arthur M. Squires, 245 W. 104th Street, New York, New York 10025.

CHAIRMAN JENSCH: Thank you. Will you proceed?

THE WITNESS: I am a graduate in chemistry of the University of Missouri. I took my Ph.D. in Physical Chemistry with John Kirkwood at Cornell.

I was Manson Benedict's assistant in the process design of the gaseous diffusion plant at Oak Ridge beginning in June, 1942 through June of 1946.

I joined Hydrocarbon Research, Incorporated, at that time, an architect engineering firm catering primarily to the petroleum and petrochemical industry.

I participated in development and plant design of

rms 4

many petroleum and petrochemical processes over the years. I became an expert in gas solids processing. I am an expert in fluidized solids techniques, for example.

During those years I participated in two major developments in the area of coal gasification and one major development in the area of fuel oil gasification.

I am an expert in gasifying and converting coal and in gas cleaning and gas purification processes. In 1959 I went on my own as a consultant and in September of 1967 I joined the faculty of chemical engineering at City College.

My interest since 1969 has been primarily revolving around ideas for sulphur oxide abatement for fossil fuel-fired power stations. This is presently my principal interest.

I am glad to be able to say I have just been awarded a $140,000 grant at the College for some work on this subject. This just came through the other day.

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BY MR. BOGART:

Q Thank you, Dr. Squires.

In the March hearings, Dr. Roger McCullough, consultant for Consolidated Edison, made a statement on the benefits of nuclear power. Are you familiar with the philosophy, the concept of risk versus benefit in nuclear power?

A Well, I believe I know what you are getting at. Should I just answer that question by saying Yes or do you want me to enlarge upon this?

Q Speak as you will.

A I guess what I'm asking is: You would like me to talk for a while now?

(Laughter.)

Is it a question for the short answer or should I launch into my act?

(Laughter.)

Q You will have an opportunity in just a moment. I did want to try to relate this to the issue under discussion, which is, as I understand it, the Safety and Licensing Board is charged with examining the application and the material submitted by the Regulatory Staff in order to determine whether a license to construct a nuclear plant at Indian Point No. 3, a 965 megawatt pressurized water reactor, should be granted. They will have to take into account whether the applicant has provided reasonable assurance that the proposed facility can be operated without undue

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risk to the health and safety of the public.

In other words, we are not determining that there are no risks here. The testimony has brought out the degree of risk in connection with the use of nuclear materials. But there is against the risk presumably an overriding benefit which the Atomic Energy Commission uses in order to advance this technology.

Do you understand that concept?

A Yes.

MR. CONNER: If the Board please, I didn't object to the previous question because it was in the nature of a preliminary question but I think staff should object at this time to any testimony which in some way would attempt to add an element of benefit versus risk to this proceeding.

The Congress of the United States, in adopting the Atomic Energy Act and establishing -- has established the benefit to the American people from nuclear power and has so done in the Act. The question of benefit versus risk is not an issue in this proceeding. This has already been stablished as national policy.

The only matters before this Board and indeed properly considered by the Commission in these proceedings is whether the plant can be constructed and operated without undue risk to the public. It doesn't go to the further step that Mr. Degart naturally would like to bring it into as to

eb31 some particular benefit to be derived.

CHAIRMAN JENSCH: Well, I think that, as you indicated, some of these questions are preliminary to the main inquiry. I wonder whether the enactment of the legislation ipso facto established a benefit. I think it depends upon the particular design of the specific facility and whether the question is related to the specific facility. That I think becomes a question of proper inquiry, do you not agree?

MR. CONNER: No, sir, I don't agree.

CHAIRMAN JENSCH: We will have to disagree.

MR. CONNER: If the Board please, may I make one general objection to this line so I won't have to interrupt? I don't want to interfere with Dr. Squires' act and I would be happy to let him say what he wants but I have to note the fact I consider this quite beyond this Board's jurisdiction.

CHAIRMAN JENSCH: I don't quite understand your position since you didn't object to Dr. McCullough's presentation of the risk and benefit consideration.

MR. CONNER: The fact that I didn't object at one point doesn't preclude me from objecting now.

CHAIRMAN JENSCH: I'm trying to find out whether -- this witness gives you the objection or whether it's the nature of the testimony.

MR. CONNER: If you like, I will move to strike Dr. McCullough's testimony on risk versus benefit.

CHAIRMAN JENSCH: At this time let us consider this witness and we will take up motions at a later time, whatever would be your position in that regard.

MR. TROSTEN: May I address myself to this point? I concur in the staff counsel's objection to the introduction of the issue of risk versus benefit in this proceeding. I consider that particular issue beyond the scope of the issues and beyond the jurisdiction of this Board.

I might note that Dr. McCullough didn't introduce testimony on the issue of risk versus benefit. His testimony was not intended to be addressed to that point. He was addressing himself as a technical witness. He was explaining his understanding of the term undue risk and was not addressing himself to the question of risk versus benefit as a legal issue in this proceeding.

CHAIRMAN JENSCH: Well, perhaps there has been a misunderstanding. I understood that the question was related to the same undue risk definition to which Dr. McCullough directed his attention, and in which he said undue risk means the activity concerned does not unreasonably increase the risks to which the public and environment are normally subjected in our modern industrial society.

What is reasonable or unreasonable depends in large part upon whether the benefits to the public outweigh any risk resulting from the activity. I use "outweigh" as testing the seriousness and substantiality of both benefit and risk. The benefits here to the public of cleaner air and cheaper power are surely substantial.

On the other hand, I can't in my judgment attribute any such substantiality to the risk if the design is carried out as planned and if the operating procedure similar to those employed in other nuclear plants are put into effect.

I consider the risk to the public from nuclear hazards to be so low in the scale of probability as to be meaningless and unimportant.

Were your questions within the scope of that type of definition?

MR. BOGART: Yes. In fact, we wanted to introduce Dr. Squires largely because of Dr. McCullough's testimony, which we felt was in a sense partisan rather than as objective

as it would be desirable to have. That's why I thought if Dr. Squires were here he might give the Board a different view of the situation.

CHAIRMAN JENSCH: The objection is overruled. The witness may answer. Will you proceed please, Mr. Witness.

DR. SQUIRES: Yes. I am aware of these considerations. I am certainly aware that one of the major arguments that one finds in the press over a number of years has been that nuclear power plants are clean, specifically they don't have the sulphur oxides problem of fossile-fuel fired plants, and specifically I am aware that this is an argument that Con Edison has advanced in its publicity for going toward nuclear powered plants, rather than fossile fuel plants for future construction.

I am aware of this. If you would like for me to enlarge on what I think of this, I will be happy to do so.

BY MR. BOGART:

Q Would this apply, in your opinion, to Indian Point #3, a plant which is now proposed to be built at the same site as Indian Point #2 and Indian Point #1?

A Well, I have to answer that question very carefully, and I want the Board here to understand my position. I am not an expert in nuclear power. I am not an expert in the effects of radiation that may get into the environment. I am a member of the AAA's committee on Environmental Alteration,

and we are studying these matters now, and I intend t become an expert in the course of the next six to twelve months, at least to the extent that our committee's studies will allow me to do so.

However, at the moment, if I say anything with regard to my judgment of the wisdom of Con Edison's selecting a nuclear plant versus an oil-fired or coal-fired plant for Indian Point #3, I think the Board must recognize this is my judgment.

Maybe it's a gut judgment of an engineer who has been around for some long time with development and putting into production new processes. That is one aspect to which I can address myself with the Board if it wishes to hear my opinions in this regard. I am an expert, and I think perhaps as much as anyone, as to what down-the-road the solutions may be for the fossile-fired plant problems, and it does seem to me that my expert opinion in this area is of some relevance to the matters before the Board; but that, of course is for the Board to decide.

Is that an answer to your question?

Q Yes, I think a partial answer, or as much as one might expect. You are aware that to the extent that there has been no operating experience with a large pressurized water of the sizes contemplated for Indian Point #3, a plant of this sort must be considered experimental?

A In my judgment this is an experimental plant. That is a judgment just as an engineer, simply reading what I read in the newspapers. A plant of this size has not been operated anywhere to my knowledge.

Q I believe the members of Con Edison's expert panel include representatives of the manufacturer, Westinghouse. The Westinghouse Company made a number of light water reactors of the pressurized water type, including Indian Point #2, which is now under construction.

Dr. James H. Wright, senior consultant, Nuclear Energy Systems, Westinghouse Electric Corporation, spoke at the Governor's conference on Natural Resources in New Hampshire last week -- a two-day conference called to consider nuclear power, costs and benefits -- and at that conference Dr. Wright said:

"Today's nuclear power plant is probably the safest of all man's complex machines."

He also declared that, "Operating nuclear plants have demonstrated a lower forced outage rate than fossile-fuel plants. This is an important consideration in obtaining utility systems reliability," Dr. Wright said

In a presentation stressing the benefits of nuclear power Dr. Wright said, "Nuclear plants are more economic than fossile-fuel plants, especially in New England. By 1980 the annual savings in power costs due to nuclear power energy will

be more than one billion dollars if present economics prevail. In all liklihood, the cost of coal, oil and gas will continue their upward trend while nuclear fuel costs will be 15 to 20 percent lower by then."

Dr. Wright concluded with a statement that "Nuclear Energy does less damage to the environment than any other power source, and far less damage than coal-burning plants. This is the principal benefit of nuclear power," he said.

In the light of our personal judgment that Indian Point #3 is an experimental plant, do you agree with Dr. Wright's statements?

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MR. CONNER: If the Board please, I note an objection. In the quoted speech --

CHAIRMAN JENSCH: Talk louder, please.

MR. CONNER: There are many things in that statement that would not be relevant here, such as the cost of plant.

I would also note this calls for an opinion from the witness who by his own terms has stated he does not consider himself an expert in the areas covered and I of course am constrained to note that opinion testimony can only be derived from a person who is qualified as an expert. In this area, Dr. Squires himself states that he is not an expert.

CHAIRMAN JENSCH: I think that the question of who is an expert is a troublesome one. I think the real inquiry is: Is the person technically qualified in the field? I think that it doesn't make any difference whether the man says he isn't an expert. Perhaps in modesty he might not reach that conclusion.

But I think the question is: Is he technically qualified, either from training or experience or educational background, to speak on opinion matters in this field?

We have had opinions from staff, for instance, and we have accepted the opinions on the basis of their training and experience and I think those are the considerations that determine whether an opinion should be rendered in the field.

Now the premise for the opinion -- I do agree, as

eb21 you have suggested -- involves several matters related to fossil fuel plants. As I recall Dr. McCullough's discussion about what is reasonable or unreasonable depends in large part upon the benefit to the public outweighing any risk from the activity and I think he spoke about cleaner air and other factors.

I think sometimes the premise can be a limitation on the opinion.

MR. TROSTEN: Mr. Chairman, Dr. McCullough was qualified as an expert witness and was discussing the foundation or premise for an expert opinion which he had given, namely that this plant could be constructed and operated without undue risk to the public health and safety.

Dr. Squires, on the contrary, has not been qualified as an expert with respect to any issue in this proceeding and I submit that his testimony is inadmissible and not relevant for that reason.

MRS. WEIK: Mr. Chairman, does no one here realize this is a man who helped design some of the most important machinery at Oak Ridge -- I can't understand this -- where most of the research has been done, the fundamental research of the country and that this is a man that helped design the biggest plants there? It's ridiculous to say whether he has any qualifications as an expert.

CHAIRMAN JENSCH: I wonder if the Reporter would

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re-read the question, please--

Do you recall the question?

MR. BOGART: I wondered if Dr. Squires agreed with Dr. Wright's statement -- Dr. Wright of Westinghouse -- in the light of Dr. Squires' estimation that Unit 3 is an experimental plant.

CHAIRMAN JENSCH: Well, the Board is a little concerned about the foundation situation of this witness and perhaps we don't have an understanding of the estimates that have been made by the witness.

Let me inquire, Mr. Witness, you are a graduate in chemical engineering, is that correct?

THE WITNESS: Physical chemistry.

CHAIRMAN JENSCH: What did you do at Oak Ridge in reference to gaseous diffusion plants in this respect? Did you have anything to do with critical masses, radioactivity?

THE WITNESS: I was Mason Benedict's assistant in the process design of the plant which is really a chemical engineering operation.

If you are familiar with this process, I became at that time an expert on multistage fractionation where one has a small enrichment factor and has several thousand stages. At the time I was certainly the world's expert on the unsteady state behavior of such equipment.

I think I can say that I was the brains behind the

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start-up of that plant. If there was any operations research involved, I did it. I was in effect in charge of the opening campaign of production from that plant but I'm not an expert in what happens to uranium 235 in reactors or booms or anything else.

Does this answer your question?

CHAIRMAN JENSCH: Well, I get a little confused when you characterize yourself as either an expert or not. Will you tell us what you did? Have you had experience with nuclear reactors?

THE WITNESS: No, sir.

CHAIRMAN JENSCH: Have you studied them at any time?

THE WITNESS: Yes. As an interested and technically trained person I have done a tremendous amount of reading on nuclear reactors.

CHAIRMAN JENSCH: Have you ever participated in the design or review of designs for --

THE WITNESS: No, sir.

CHAIRMAN JENSCH: Have you ever been associated with any construction project related to nuclear reactors?

THE WITNESS: No, Mr. Jensch.

CHAIRMAN JENSCH: Are you familiar at all with the pressurized water concept of the --

THE WITNESS: Oh, yes, I know what we are talking about when we-- I know the fundamentals. I know the ABC's.

eb5 1 I give my students two or three lecutres on it. And I feel
2 I am qualified to do so.
3 CHAIRMAN JENSCH: What gives you that qualification
4 to deal with reactors? Give us your background if you will,
5 please, in dealing with nuclear reactors.
6 THE WITNESS: I can't tell you what I read but I
7 remember many, many articles and books in power magazines and
8 nucleonics and the rest over the years. This is just not my
9 field.
10 CHAIRMAN JENSCH: Have you ever studied reactor
11 systems?
12 THE WITNESS: No, not professionally.
13 CHAIRMAN JENSCH: I am having difficulty with your
14 doing it professionally or not professionally. Have you
15 done studies or research or participated with people who have?
16 THE WITNESS: I have not worked in this area.
17 Since leaving the Oak Ridge Gaseous Diffusion Project my
18 professional life has revolved around fossil fuels.
19 MR. PIGFORD: Dr. Squires, under process design
20 of diffusion plants were you also involved in the process
21 design of the feed preparation facility?
22 THE WITNESS: No.
23 DR. PIGFORD: You weren't?
24 THE WITNESS: I am familiar with that design but
25 only just through having read reports.

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DR. PIGFORD: Were you involved to an extend in the design of tecnniques for recovering uranium hexaflouride from gas involving simultaneous heat transfer or mass transfer?

THE WITNESS: Only peripherally. I was in meetings where this kind of thing was discussed and I made contributions but this was not my prime responsibility. My prime responsibility was the diffusion per se.

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DR. PIGFORD: Would you consider yourself technically qualified in the area of gas absorption or spray cooling or absorption of gas and liquid droplets -- those areas?

THE WITNESS: Certainly. In the broad sense that a chemical engineer acquires competence in such fields, one has a wide range of experience, yes. I am trying to be as precise as I can.

CHAIRMAN JENSCH: TheBoard has considered the objection. The objection is sustained. Will you proceed.

MR. BOCART: I can't ask the witness a question about the document of Dr. Wright's?

CHAIRMAN JENSCH: We have made a ruling solely in reference to the last question. What you do next you will have to propound and consider in the light of any statements that have been made.

MR. BOCART: It just seems to me that this is part of the information that is spread abroad without any refutation, and it is outright promotion of power which convinces the public and I daresay even has some peripheral impression on the Board with no facts to bear it out.

I though it would be profitable for the Board to see if there is another side to this from an expert in the field of fossil fuel generation and what steps have been made countering the discharges from fossil fuel plants. I thought this was a unique opportunity because the qualifications

of this witness are quite rare.

THE WITNESS: May I make a comment without being asked a question, or is that out of order?

CHAIRMAN JENSCH: Try it and see if you get a motion to strike.

(Laughter.)

THE WITNESS: I certainly didn't plan to answer the last question in the way it was phrased, but it does see to me that Dr. Wright's statement and much of what I understand about McCullough's testimony insofar as I am able to understand what was said from the short little resume that I saw, so much of this reflects a climate of opinion that poor old coal, there is nothing that can be done about it. This problem of coal is insoluble, and it seems to me it is relevant to Indian Point 3 and certainly relevant to the direction in which our nuclear program is taking us for more light to be shed on what the opportunities are for coal.

And I came here hoping that the Board would like to hear from me, someone who thought about this, some professional judgment as to what the future for coal power might be where the coal-fired power station is placed under a categorical order not to release particular amounts of sulphur oxides or particulates.

CHAIRMAN JENSCH: Dr. McCullough referred to cleaner air. Is that the portion of the statement to which your

answer is directed?

THE WITNESS: That is correct. If the Board cares to, I am prepared to give a general sort of philosophical discussion as to why this climate of opinion has developed with respect to the hopelessness of coal-fired stations.

Certainly, the public feels there is no answer to this problem. I have a feeling that the Board may feel this. I think I am prepared to disabuse the Board of this myth.

MR. TROSTEN: Mr. Chairman, I submit that the information which Dr. Squires may have, while it may be of great interest, should probably be presented through an entirely different forum than this. There are Congressional hearings and hearings before state agencies which properly have jurisdiction over matters of this sort.

I submit this Atomic Safety and Licensing Board hearing is an entirely inappropriate place for Dr. Squires to discuss information in his possession concerning coal-fired plants.

CHAIRMAN JENSCH: Anybody else care to speak to the matter?

MR. COMEN: If the Board please, I am sorry I can't agree that Dr. Squires should give us a lecture in this area, but I believe the only issue before this Board is the safety of the Indian Point 2 plant. Coal plant considerations are simply not a matter that can be considered here.

And I speak as a West Virginian.

(Laughter.)

CHAIRMAN JENSCH: It is that last statement that lessens the force of your objection, it seems to me.

(Laughter.)

MR. CONNIR: It only proves my dedication.

(Laughter.)

CHAIRMAN JENSCH: I do think staff counsel is correct. Radioactivity is the concern in reference to safety of this plant and its likely effect, if any, upon the public during the course of its operation. It is true that Dr. McCullough has spoken of cleaner air.

I don't know whether he meant lesser radioactivity or what the situation is.

It seems to me there was a statement somewhere, I think it came in Indian Point 2 if it is not too far afield to recall, Didn't Dr. Eisenbud suggest that fossil fuel plants emitted a certain amount of radioactivity?

MR. BOGART: I think the witness would like to answer that question.

CHAIRMAN JENSCH: I think it has to be related, as staff counsel indicated, to a question of radioactivity.

MRS. WEIR: Dr. Eisenbud's article had to do with a very rare kind of coal which is your inferrous lignite(?) which is only found in very small spots out in the West and

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is very seldom burned. Some of the poor Indians unfortunately do, but you can't speak of coal in general, as I understand that.

MR. MORTLOCK: Mr. Chairman, I don't know what the order of procedure is, but I have been very disturbed to find I am going to die of cancer. I live in this area in the vicinity of Indian Point. My qualifications to speak -- I am the founder of the Westchester Cancer Committee. I established it in 1944 to 1948. I brought it out of a little hole in Brownsville and put it into every community in Westchester County.

Forgive me, I am a little disturbed. But I think the scare headlines and radio things should be met and fought down. I think it is destructive because a lot of people don't understand the condition. You say cancer, it is a dirty word. I have a wife who had a breast removed for cancer three years ago. She never worked at Indian Point or close to it. I would like to have this person coming out of New York meet head-on with these scare radio pronouncements and newspaper pronouncements about the destructive cancer incidents arising from nuclear emission or whatever it is.

I am not a technical man, so I can't give technical information, but I do know that this is a destructive thing and shouldn't be allowed. There should be something said in opposition to a person coming up and spouting the

people to get them disturbed unnecessarily. There is no doctor in the world who can tellyou where cancer comes from. Is that correct, Dr. Squires?

(Laughter.)

CHAIRMAN JENSCH: I am sorry I have to suggest to you, sir, that the Commission did invite the presentation of statements from persons making limited appearances in the course of this proceeding. And we endeavored to accommodate everybody at the outset of the proceeding. Right now we are trying to have a presentation of evidence.

MR. MORTLOCK: I know you have an order and procedure, and I am out of order. All right. But I wanted to get on the record this woman coming out in New York and upsetting all our local residents is out of order too.

CHAIRMAN JENSCH: Have you concluded? Will you give us your name and address and we will let it go at that.

MR. MORTLOCK: Is it necessary? Part of the record?

CHAIRMAN JENSCH: Your statement has been taken down. It is not evidentiary matter.

MR. MORTLOCK: I will give you my name.

CHAIRMAN JENSCH: As long as your statement is on the record, either that or we will have to expunge it from the record.

MR. MORTLOCK: If I get my name in, it goes on the

record? Stanley M-o-r-t-l-o-c-k.

CHAIRMAN JENSCH: What is your address?

MR. MORTLOCK: Allen Road, Town of Phillipstown, but my postal address is Peekskill.

CHAIRMAN JENSCH: Very well.

MR. MORTLOCK: I hope I have not disturbed too many people, but I am disturbed.

CHAIRMAN JENSCH: We were just considering some of the objections that have been made here. The Board is concerned that we can get easily away from the subject of safety insofar as it may be affected by radioactivity in the area. That is a primary concern in this proceeding.

Now, the statement is on the record as evidence from a witness from Consolidated Edison that there is cleaner air from a nuclear plant. Since the inquiries are limited to a refutation of that assertion, it may bear on the radioactive considerations that have been advanced.

Beyond that, the Board does not believe that the inquiry should get into a discussion of matters that are not pertinent before the Board.

Dr. McCullough says that he was well aware of the pollution that comes from fossil fuel plants and then he said, "I am aware that nuclear plants don't pollute the air." We have evidentiary matters dealing with this subject of cleaner air and to that extent we believe the question is

rms 8

proper. But it should be limited to that subject.

The objection is overruled to the extent indicated.

Can you proceed?

BY MR. BOGART:

Q You can go into your act now.

A You will have to stop me if I stray over the boundary that you have set. I feel that what I'm going to say is relevant, but to some people present I'm sure it will seem far afield.

I think it is important, certainly it's important for the public to understand why this climate of opinion has developed with respect to coal and why we are in the position where Con Edison feels that this is the only way it can provide power without emissions of sulphur oxide, for example.

Before I discuss the sulphur oxides question, I would just like to confirm what Mrs. Weik's -- what I understand of Mrs. Weik's remark earlier.

I have in my hands a paper, and I may be jumping the gun a bit -- it will be presented at the AECAG meeting in Cleveland next week, and the average uranium content of coal in the east, bituminous coals of the east, is one part per million of uranium. The coals in the lignite belt of North Dakota run sometimes as high as 5,000 parts per million.

I haven't tried to translate those numbers into curies or millecuries or microcuries of radium, but I think any reasonable person will see emissions of radium from a bitiminous coal-fired plant in the east is certainly quite small if it's equipped with an electrostatic precipitator such

as they have at Ravenswood, which is the last time my friends at Con Edison were bragging to me before that was running 99.7 percent efficiency.

If this is not good enough, the bag filterhouse that is being tested at the Los Alinitos station of Southern California Edison can always be supplied to a power station in which case the particulate emission is essentially nil.

There certainly are reasonable solutions to any emission of radioactivity by a fossil-fired station and I regard the Eisenbud article as a complete red herring in this whole question.

If I may be permitted to speak for a little while about the sulphur oxides question, and why we have gotten ourselves into the almost state of crisis with regard to the solution of this problem from the fossil-fired stations, I would like to cite to the Board a little piece of history.

During the 1850's, the alkali industry of the north of England was emitting very large quantities of hydrogen chloride gas into the atmosphere. If you go back to the issues of the engineer from that decade you will find many outcrys from the public complaining about this pollutant entering the atmosphere. You found complete dissent on the part of the alkali industry and it took something in the neighborhood of 20 years for the pressure to develop and finally in 1863 the Parliament of England passed the Alkali

Act, the first air pollution act I know anything about, calling for 90 percent suppression of hydrogen chloride gas emissions.

I find it most fascinating that in 1866 and 1868 patents were applied for, first by Weldon and second by Deacon, for processes which immediately went commercial and by the early 1870's were making money converting this hydrogen chloride gas into chlorine.

This is the kind of response that the technical community nearly always makes to a categorical imparity to do something. Here was a nuisance. We were told to get rid of it. They found out out to make money from it.

There has been almost complete dissent on the part of the power industry in the sulphur oxides question until quite recently. If one looks at the testimony before the Muskie Committee of -- I believe this testimony was in May of 1967 -- but at any rate, it was testimony leading up to the passage of the Clean Air Act in the summer of 1967, the theme of the power industry in all of their testimony before that Muskie Committee was the tall stacks were the only answer needed.

At that time, surely there was very little interest on the part of the power companies in almost anything. Surely in anything radical by way of a solution to the sulphur oxides question.

The penny has now dropped. The power industry has perhapr just in the last six months realized that something has to be done.

The Swedes have testified or have stated their belief that there is a million tons a year of sulphuric acid in the rain falling on Sweden and they are making a big stink about this in the United Nations.

A Congress called for 1972 to look into this matter among others and I think that any executive of the power company who imagines that he will still be emitting large tonnages of sulphur oxides, say around 1975 or 1976 or 1977, is just dreaming.

Because the boom is certainly going to be lowered on this gas.

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Now this of course provides one explanation for why almost nothing has been done as yet in the way of research and development. Well, I shouldn't say "nothing" but far too little.

I have here with me and I would be happy to go into it, the recently issued Rouss Subcommittee report on sulphur oxides abatement research and development. It is a most interesting report in providing insight into the anatomy of what the Government is now doing about this problem. I would be happy to go into that.

But I want to make a broad point first. So much depends upon the budget and how much is being spent. If one has a budget where the Atomic Energy Commission can spend on the order of $1 million on almost any idea that comes along for a nuclear reactor and spend $5 million on many, many ideas that still look good after the $1 million had been spent and finally spend hundreds of millions on ideas, a few of which then finally make the grade, one does then in the course of 15-odd years arrive at a commercial solution to the problem.

One doesn't have this kind of climate, one hasn't had it for a long, long time, with respect to any kind of novel approach to the combustion of coal. I can give you two examples that illustrate this, and this is an illustration of a climate of opinion, an attitude on the part of the

eb2 technical community.

I can give you two examples which are not even drawn from my own ideas. I don't want to sit up here and promote my own investigations in this area.

There are at least two combustion techniques which I find exciting in commercial operation in Europe, one of which has been in commercial operation since about 1940 and the other one since the late '50's, and these new approaches to the combustion of coal have not yet been tried in this country.

One of them is operating on a scale of 60 megawatts. I don't know the scale of the second. One of them, the technique of Albert Godell of France of a fluidized bed approach to combustion, I personally find very exciting. I have dug into it. I think it has tremendous potential, tremendous potential as a possible step in a combustion system where sulphur oxides are suppressed.

The other approach, the Szikla-Rozinek, a couple of Hungarians, I have not personally had the time or energy to dig into the details of this myself but Professor Beer, at Sheffield University in England and also Professor Eissenhigh at Penn State University both have strongly advocated this approach and this has been true since 1960, and any idea in the nuclear field that had been sponsored by two such distinguished men would surely have been tried.

eb31

What I'm trying to point out is that there are ideas in the air, there are even ideas that get used in foreign countries and we don't have among our utilities and among the coal research people in the Government here, the kind of go ahead to at least give it a whirl. Give it a million dollars and see what it can do for us.

So the first thing needed to solve the sulphur oxides problem is something like the kind of money that the Atomic Energy Commission has had. I think it can probably be solved for far less than the Atomic Energy has spent in bringing the technology of nuclear power to the point where we are talking now about Indian Point 3, but even 10 percent of this money would be a sum in the hundreds of millions of dollars.

CHAIRMAN JENSCH: I wonder, while there is a pause, if you would relate your testimony to what is here today. As I understand it, you are addressing yourself to the question of cleaner air. I inferred from your statement so far that things were as bad now as they were but you expect they would be better if we spent money to find out how, is that right?

THE WITNESS: Well, I can probably bring this around a full circle and relate it as I see it to the subject of this hearing.

Let me talk as a development engineer, quite

independently of my work, my own work on coal.

I think, from where I sit, that the kind of gamble, commercial gamble, which Con Edison and the other power companies are taking on these very large plants before getting going with Indian Point 3 before Indian Point 2 has operated is not in the country's interest --

Yes?

MR. TROSTEN: I'm sorry to interrupt. On the other hand I believe that again he is expressing an opinion with respect to a matter on which he is not qualified as an expert. The Board I believe has already ruled that Dr. Squires is not an expert in the nuclear field.

THE WITNESS: Forgive me, I'm an expert on processes that have flopped. In that sense I have experience. I'm speaking as an experienced person in taking processes that have failed and I think you are taking an enormous risk.

MR. TROSTEN: As I understand the Board's ruling Dr. Squires was to limit his testimony to matters pertaining to cleaner air from fossil fuel plants versus nuclear plants. He has wandered considerably afield from that.

THE WITNESS: I wandered in the last few seconds because I was trying to tie the thing together. If you permit me to continue just for another minute I think I will wrap this thing up.

CHAIRMAN JENSCH: Proceed and we will see what it

eb5 1 looks like later.

2 THE WITNESS: When I look at the uranium research
3 and the picture that the country faces after about 1980 for
4 supplying these plants with uranium 235 which they will need,
5 I in my own mind wonder if the country wouldn't make a
6 tremendous investment for itself by spending several hundred
7 million dollars almost immediately on the sulphur oxides
8 problem from fossil fuel simply to preserve our supplies of
9 uranium 235, the cheap uranium 235, in case the breeder
10 doesn't come along as soon as people assure us that it will.
11 I think we are not only gambling on the technical
12 performance of Indian Point 3 before Indian Point 2 is
13 operated but we are taking a terrible gamble with our energy
14 supplies, our energy resources for 1990 or the year 2000.
15 When one considers the relative efficiency of Indian -- I
16 am speaking now as an engineer -- the relative efficiency,
17 the ratio of the efficiency of Indian Point 3 and a breeder
18 is a smaller ratio than the ratio of efficiency of the watt
19 steam engine and Ravenswood. The latter ratio is about .1.
20 The former is more like 1/50th to 1/30th and I wonder why
21 we are going ahead so fast.
22 I think there are other answers. There are other
23 answers to the clean air problem. In my judgment, -- I am
24 speaking now as a development man who has seen processes
25 fail when they move ahead too fast. In my judgment the power

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industry is asking for trouble in building these plants, so many of them so quickly, and I think there are other answers. But we have to get cracking and spend the money.

MR. CONNER: I'm sorry, Dr. Squires, had you completed?

THE WITNESS: Yes.

MR. CONNER: I found your talk very interesting. I nevertheless feel constrained to move to strike because I don't believe Dr. Squires' testimony related to any subject matter concerning this Board with respect to Indian Point 3.

CHAIRMAN JENSCH: Would you care to speak to that matter, Mr.Bogart?

MR. BOGART: From what I know of the law and the way a hearing of this kind is conducted, I think on a technicality staff counsel is right.

But again and again we find ourselves hung up with incomplete technology and perhaps this Board is not the place for this to be aired, but if it isn't, I don't kno w what is.

The State of New York has completely flopped on its face in terms of protecting the public interest, in terms of hearings on Indian Point 3.

The only thing that stands between the public --

MR. SCINTO: Mr. Chairman --

CHAIRMAN JENSCH: Let him finish.

MR. BOGART: -- is the Safety and Licensing Board sitting here today, the public has other friends. Therefore, while according to previous precedent in a matter of this sort it might not be strictly proper for the Board, but in the larger sense they have an obligation to hear what the public has to say.

CHAIRMAN JENSCH: Does the applicant care to speak to this matter?

MR. TROSTEN: Yes, Mr. Chairman. I was quite interested in hearing what Dr. Squires had to say as a citizen.

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And I think there are probably a number of congressional committees and other organizations that probably would be quite interested in hearing what he had to say too.

However, I am constrained to move to strike everything that Dr. Squires has said in response to the last question as being totally inadmissible, irrelevant and immaterial with respect to this proceeding.

CHAIRMAN JENSCH: Does any other party care to speak?

Intervenor Weik?

MRS. WEIK: Well, I think that it is about time that the issue is weighed for its value to the citizen. I don't think the final determination should come within the industry or within the profession because it is going to be very bad for industry if it does go along at this pace. There is going to be a great discontent in having this sort of thing bottled up. We are supposed to be meeting in a rather informal atmosphere.

Just as we are not using parliamentary procedure or anything of that sort, this is supposed to get information for the public. A transcript of a Commission report such as this can be very interesting and instructive, and that is the purpose for which the hearing is held, to provide information to the public and I don't think that it can be held up by parliamentary rules.

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CHAIRMAN JENSCH: I don't think there was any thought of parliamentary rules. I think both counsel or all counsel have indicated and Mr. Bogart himself recognized the issue that has been assigned to this Board by the Atomic Energy Commission. Under its jurisdiction, under the Atomic Energy Act, the Congress has limited the Commission -- and therefore this Board is limited -- in the scope of the matters that are available for determination and thus consideration by both thisBoard and the Commission.

There may be many matters which are worthy of public concern, but this proceeding is one dealing with radioactivity and as to whether there is any undue risk to the health and safety of the public if this project is permitted to be authorized for construction and later on eventual operation.

Now, just as we have observed in so many of these cases in reference to thermal effects in waterways, the people are, throughout the land in many areas at least, are much concerned that there may be some effect. The Commission has reported its view of tis jurisdiction to the Joint Committee of Congress, to the Court of Appeals for the First Circuit, has considered the scope of the jurisdiction, so to that extent there is both a legislative and judicial determination that the Atomic Energy Commission does not have jurisdiction over thermal effects.

That is one illustration. And the question of

fossil fuel is likewise unrelated to radioactivity. Maybe the citizens wish the Congress had granted a different or more expanded jurisdiction to the Commission. The Congress has not done that. It has been reported back to Congress. The Court of Appeals has agreed that the Commission's view of its jurisdiction on thermal effects id correct under this stage of the law. And therefore these proceedings, while they are public proceedings, are necessarily confined to the issues which the Congress -- it is not the Commission not considering matters within thescope of its jurisdiction -- the Congress has not granted this authority to the Commission.

MRS. WEIK: I understand that. I think you have been very patient, particularly to me, perhaps, in allowing a great deal of informality, but I can't help being struck by the fact that there is not only objection to these remarks but there is continually a request to strike them from the record. This I don't quite see.

I think this is leaning a little backwards to make the case to put the reactor through. I don't think it fits in with the rest of the objective attitude. I don't think that all witnesses testify in the same way. You must realize that also.

If this is a public meeting where the citizens are supposed to be here --

CHAIRMAN JENSCH: They are and they are invited to

ms 5

attend.

MRS. WEIK: I realize that. It just seems to me it might be looked at a little bit from the matter of its use as an informational medium and that perhaps the thing that does not keep strictly to the line, there might be a slight latitude, but I am not trying to ask for any special concessions.

CHAIRMAN JENSCH: You make a very persuasive argument though in that regard.

(Laughter.)

MRS. WEIK: Well, I didn't mean that.

THE WITNESS: If you are considering striking my remarks, I am sure you don't want to strike my puff for the Ravenswood electrostatic precipitator that I started out with.

CHAIRMAN JENSCH: We won't make any commitments in that regard. At this time let's recess to reconvene in this room at 3:25.

(Recess.)

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CHAIRMAN JENSCH: Please come to order.

The Board has given consideration to the testimony advanced by witness Squires together with the objections made and the motions to strike which have been interposed.

The Board reasserts its concern concerning the qualifications of -- that is the foundation -- of this witness. It is true that he has indicated that he has studied in the field of chemical engineering and has professional degrees in that field. He indicated that he is familiar with heat transfer problems and heat absorption problems with sprays.

Whether this is a fair characterization or not, a great many of the problems that seem to be present respecting Indian Point #3 may be related in large part to chemical engineering problems.

Witness McCullough is a chemical engineer. In addition, however, he has had extensive experience in the nuclear field. Many of the witnesses offered by both the applicant and the staff have mechanical and chemical engineering backgrounds, but they have worked, of course, in the nuclear field.

Dr. McCullough, at transcript page 434, said that he had followed the literature on air pollution from fossil-fuel plants and he expressed the opinion that there were many proposals to clean up gases from the fossil-fuel plants, but

expressed the further opinion there were no practical systems which clean up the flue gases completely. Witness Squires has had chemical engineering experience on matters that are involved to some degree, at least, with the nuclear plant under consideration here.

I don't know whether this is a fair statement, but most of the problems involved in this plant are chemical engineering problems in one form or another.

But there are nuclear physics problems too. Numerically it might work out that way. I don't know whether that is a correct statement or not.

We are concerned with the testimony given by witness Squires concerning the possible patent developments that might lead to a certain result. Insofar as that evidence is concerned we don't feel it relates to an existing mechanism which will be related to the clean air concern which was a predicate for his presentation.

The witness, however, has spoken of some existing facilities dealing with cleaner air for fossil-fuel plants. We have expressions then from two chemical engineers, witness McCullough and witness Squires, in reference to flue gases from fossil-fuel plants.

The Board is of the opinion that the motion to strike is granted in reference to the stated description of patented processes that might lead to some improvement in the

removal of fossil-fuel gases but that the motion to strike is denied insofar as it relates to existing facilities which do accomplish cleanup or substantial cleanup of flue gases from fossil-fuel plants.

Is there further interrogation by Citizens Committee of this witness?

MR. BOGART: The witness would like to make a few more remarks.

CHAIRMAN JENSCH: Will you state the subject of your inquiry so the parties may be apprised as to whether in their opinion it is within the scope of the jurisdiction of this consideration?

MR. BOGART: Yes.

BY MR. BOGART:

Q Dr. Squires, would you care to expand on that segment of the matter before the Board which the Chairman has indicated is a valid concern?

A I am not sure whether the additional remark that it has occurred to me to make comes within that province or not, but may I try, sir?

CHAIRMAN JENSCH: It will be subject to a motion to strike again.

THE WITNESS: There has been some discussion here of my credentials, and I think I need to defend myself a little bit with respect to some remarks that I made which I believe

now are striken from the record, but let me try again from a different approach. You can always strike them again if they are not relevant.

I said in an exchange that I had with one of the counsel here -- I don't know who he represents -- that I had experience in taking novel processes to the field.

It does seem to me that the record of this hearing might show my considered judgment as a development engineer that the pace at which Con Edison and the power industry is moving toward these large nuclear power plants is, in my judgment, quicker than prudence would dictate.

Now, let me back up my qualifications to speak to that point.

I think it is relevant to the safety question, because obviously if something is untried, one can't be as certain that it is safe as if it has been tried.

I think I have as rich an experience as a person of my age is apt to ever acquire in either directly working on projects through the bench scale pilot plant scale and field application thereof -- I'm not sure just how I began that sentence, but you get the idea -- and let me just cite as an example a recent historical example, the direction which the ammonia industry has taken.

Here is an industry with a rich technology going back to the first harbor plant which I believe operated in

about 1912 or 1913. One could in no sense call this an untried process. Yet, in roughly the year 1968, the middle of last year, there were many executives of large petrochemical concerns who were desperately unhappy with the ammonia plants which they had purchased and which came on stream.

M. W. Kellogg Company built something in the neighborhood of 18 to 20 of these plants. I think for the ammonia industry hindsight from the calendar 1975 may say, "Yes, this was the right thing to have done."

However, there were many executives desperately unhappy with these plants a year ago because there were statistically a few of these plants that simply weren't functioning. They had things wrong with them. Here was a technology that had been pushed a little too fast a little too soon, and this was merely a scale-up of size.

The ammonia synthesis plant in 1963 of 600 tons a day was considered a giant. Today it's a baby. There will be no more ammonia synthesis plants built by anyone smaller than about 600 tons a day except under very peculiar circumstances. It is not economical.

The plants built since about 1963 -- this is a matter of record -- have been invariably 600, 800, 1,000, 1200, 1500 tons a day. There is a generation of these plants that came onstream in 1967 and 1968, and there were many, many troubles, and the M. W. Kellogg Company and Bechtel, and some of the

other companies who built these plants weren't incompetent, they weren't fools, but there were just many things about this scale-up of size that created many, many problems, and I sit here realizing that -- I don't know how many score of these very large plants are not under construction in the 800, 1,000, 1100 megawatt size.

But I find myself astonished that the power industr moves this fast into a size scale before they operate a few and see what the problems are. That is an opinion I feel I am competent to make, or an estimate I am competent to make. It is a gut opinion. It is based on my broad experience. It is not based on detailed experience of having worked actually on nuclear plants myself.

DR. PIGFORD: Dr. Squires, I am very much interested in your opinions on the ammonia plants, and I guess maybe there is some technology in common. I suppose the ammonia systhesis plants are high-pressure, are they not?

THE WITNESS: That's right.

DR. PIGFORD: They involve large circulating systems

THE WITNESS: Right.

DR. PIGFORD: Aren't your comments so far related to the economic judgments of building certain ammonia plants?

THE WITNESS: Oh, these plants failed in some quite horrible ways. Reforming tubes burst, compressors didn't work, things happened that knocked plants out for weeks and months.

I should have done my homework on this, but my recollection is that there was one plant that they had been struggling with for well over a year. When I read the newspapers about the Fermi incident and when I read the technical press about the delays at Oyster Creek, I just wondered if there aren't going to be problems some of which may create hazards indeed, as these new, very large nuclear plants come upstream.

We are moving into an unknown technical area in my opinion.

MR. TROSTEN: Mr. Chairman, I reiterate my objection to the testimony that Dr. Squires just offered on the ground that he is not qualified to express an opinion on the subject of nuclear power plant safety, in general, and in particular whether the Indian Point #3 facility can be constructed and operated without undue risk to the public health and safety.

On that basis, I move to strike his testimony.

end #9

MR. CONNER: I was going to suggest I think a motion to strike is appropriate and we join in that motion.

CHAIRMAN JENSCH: Would anybody else care to speak to this motion?

Intervenor Weik?

MRS. WEIK: It seems to me extremely relevant and most appropriate because he is talking about one of the main dangers to the present plants of going into a larger size before the technology is really ready for it.

CHAIRMAN JENSCH: Well, I understand that was his statement.

MRS. WEIK: This was one of the things we were very much worrked about.

CHAIRMAN JENSCH: To what effect do you-- Of what significance do you consider the evidence in this record that Indian Point 2 is in a sequence of other reactors of smaller sizes and different locations operated by different organizations but each of which, as I understand or recall the testimony, is intended to provide background technology before the evidence shows Indian Point 3 would be ready to operate if it were authorized to be constructed?

MRS. WEIK: It has often been said by very good authorities that the size at which these reactors are now being constructed does not have quite the base of experience to predict whether they will be safe or not. Since this

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hearing is supposed to be about the safety of very large plants such as Indian Point 3 it seems to be extremely relevant.

CHAIRMAN JENSCH: My question to you was: Did you hear the testimony of some of these witnesses -- I believe the design witness from Westinghouse -- that they are expecting to not only prepare their final design but formulate their intended operation based upon, in part at least, the operating experience of smaller reactors that have been authorized heretofore and are a part of a sequence to lead to the power level proposed by Indian Point 3?

The fact that Con Edison has not had, say, intermediate ranges from Indian Point 1 to 3 is unrelated to the evidence, as I understand it, that other companies have reactors of a power level intermediate between Indian Point 1 and Indian Point 3.

Upon that basis, do you feel that this gradual development is thereby occurring as Witness Squires indicates should be done?

MRS. WEIK: It is a perfectly logical development as far as laboratory technique but as a technique practices in a community it seems to me rather questionable since the Oyster Bay, for instance, has brought many -- the Onyter Creek plant has brought up a great many questions of metal and the fuel elements and many things that have happened and

eb3

that of course is a much larger plant, but you come back of course to the question of whether a laboratory experiment,-- If each reactor is to prove what will happen to the next reactor, this seems a little bit strange.

CHAIRMAN JENSCH: I thought that was what Dr. Squires was urging, that there should be gradual development, and the technological information supports that.

What do you think of his opinion?

MRS. WEIK: He has a right to his opinion. When you see reactors shut down that were even larger than Indian Point, you feel there are some questions within the industry. When you spend-- For instance, even if you start at $17 million when you get up to $100 million or so this is a very expensive experiment but it also physically is an extremely expensive one.

I think that the people in general are beginning to feel that it deserves a little bit of thought or perhaps confining these reactors to reservations where they won't be quite so apt to have unpredictable effects.

CHAIRMAN JENSCH: Well, I think some of the premises for your statement have been carefully analyzed. The fact that some reactors have been shut down does not have safety implications of any kind, do you so understand?

MRS. WEIK: The helium?

CHAIRMAN JENSCH: I understand no one was injured.

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MRS. WEIK: It doesn't usually come in the public record. The man who owns the complete newspaper system in Nebraska was the contractor of the helium plant and that has been carefully handled. The Fermi reactor in Michigan was handled with gloves. The fact remains the Piqua plant has been closed. The BONUS plant is not in such good condition. The plant in Carolina, the Parr plant, also.

CHAIRMAN JENSCH: There have been no safety problems with any of those.

MRS. WEIK: There never are safety problems because you have a good public relations department that takes it over.

I didn't say "you" personally. I meant "you" as a general statement.

CHAIRMAN JENSCH: I talked about public records --

MRS. WEIK: Do we have much in the way of public records as far as this hearing is concerned?

CHAIRMAN JENSCH: If you don't have public records of this hearing it isn't because we haven't tried to drag them out.

(Laughter.)

MRS. WEIK: If you will pardon me, it isn't your job.

CHAIRMAN JENSCH: We are trying to get all the evidence that would bear upon this.

eb5

MRS. WEIK: It is up to the newspapers. If they had any kind of energy it usually goes back into something very much more important than that.

CHAIRMAN JENSCH: We are dealing with a different kind of public record. We are dealing with that which is available to be examined by the public at a public agency.

MRS. WEIK: You are turning out probably one of the most beautiful stories newspaper-wise that has happened anywhere around for quite a long while but the newspapers have not chosen to take it up. You have the kind of story that would make a front-page story for Life Magazine.

CHAIRMAN JENSCH: Can we postpone that phase of it for a while?

(Laughter.)

MRS. WEIK: You asked why they never have any record of any safety trouble.

MR. CONNER: If the Board please, recognizing Mrs. Weik's statement was given sort of as argument, I would like to note on the record there were no radiation injuries at any one of the plants she named, all of which were part of the Commission's second round demonstration progeam which were demonstration reactors which are being phased out.

All radiation injuries which might occur must be reported to the AEC. These are placed in the Commission's Public Document Room where they are available for public

eb6

inspection by anyone who cares to look at it.

MRS.WEIK: Do you have their history for the next ten years?

MR. CONNER: History is written after the fact.

MRS. WEIK: No attention is paid-- You don't have people injured by radiation just drop dead.

MR. BOGART: Mr. Chairman, may I comment on the matter here?

CHAIRMAN JENSCH: Yes.

MR. BOGART: It seems to me we don't have to imagine that there are things wrong which the Board should be quite concerned about taking into account. We all heard about the late arising problem of emergency core cooling.

Earlier today we had one of our members bring in the ORNL report on emergency core cooling, and I don't think in any way this has been contradicted since it was published last November. But there is a very distinct warning in this, that in going to large reactors the problem of containment can't be guaranteed.

It seems to me perfectly frightful to propose putting a 965 megawatt reactor next to an 873 megawatt reactor in an area where if you draw a circle around Indian Point for 55 miles there are 18 million people.

Now, if the government isn't sure that the containment is going to contain in the event of a major meltdown, I think the presumption is we should deny a license.

CHAIRMAN JENSCH: The Board has been giving consideration to the testimony most recently adduced by witness Squires as well as the motions to strike. We are again concerned concerning foundation matters. This last testimony seems to inject a new aspect that we hadn't had presented to us before. That is, that he has indicated his experience as a development engineer.

Dr. Pigford, would you like to inquire concerning witness Squires' foundation in these several fields before a ruling is made.

DR. PIGFORD: Dr. Squires, you put in in a certain way earlier that you had expertise on putting new plants into initial construction. How did you put that?

THE WITNESS: Well, starting really from my very first professional experience, I don't think that anyone who lived through the process of design of the gaseous diffusion plant right through to the operation of that plant, something like 23 months later -- quicker than that -- 24 months later, I don't think that this particular experience could be beaten by almost anyone, by almost any other experience of this kind.

This was truly a phenomenal performance in terms of taking the tiniest bent scale information into a tremendously successful enterprise. I can't claim personal credit for this, but it was a highly enriching experience. Hydrocarbon researched there very shortly after that. I had the opposite experience, seeing the catalog of errors that can be made in taking a process from inadequate pilot planning to the field, and I was involved with the loss of something in the neighborhood of $50 million, maybe 80 or 100.

I am not sure of the exact figure, when Hydrocarbon Research, the firm I was employed by and I was personally

involved in this. And I again deny taking any personal blame for what happened, I was part of a team. But we pulled a howler trying to take a gasoline synthesis process to the field in Texas.

This was a classic flop of the early 50's and taught us all a lot about fluidized beds. Since that time both at Hydrocarbon Research and later working as a consultant for clients, I have been involved in taking a number of processes out to the field or from one stage of operation to a higher level of output.

DR. PIGFORD: Did these involve construction and simultaneous research and development to achieve a goal by both processes?

THE WITNESS: This was certainly true in the case of the Oak Ridge gaseous diffusion plant. We were still getting vitally necessary answers within almost a month of the time that the plant operated.

I don't think that anyone was really sure that that plant would work -- I hesitate to name a time figure, but it was certainly only a very few months before the plant actually operated that all of us got real confidence that it would work.

The same can be said of the flop at Brownsville, Texas, but there we weren't good enough and you know I think one almost learns more from failure than from success. I think I did.

rms 4

DR. PIGFORD: So, your responsibility in those plants involved questions of systems testing prior to operation testing to see if the plant is working according to specifications?

THE WITNESS: I am not absolutely sure I understand the implications of your question. There was, of course, systems testing at Oak Ridge to the extent --

DR. PIGFORD: I will try to make the question clearer. Do you want me to clarify my question?

THE WITNESS: All right.

end 11

DR. PIGFORD: Were you involved in your responsibilities with these plants to an extent with defining these systems tests or carrying them out?

THE WITNESS: What kind of phrase was not fashionable in the 40's or probably even in the 50's, but I would say that what we did in getting ready for the operation, what my personal assistant, Leon Hencken and I did, was systems research, operation research in the best sense.

We didn't have a high speed computer but 8 girls were sitting there knocking out the answers to the mathematical questions we were putting to them.

Of course, we were viewing this as a system. We had to. That was the only wayt to think about it.

DR. PIGFORD: What about quality assurance?

THE WITNESS: I was personally in charge of the data gathering at the start up of the plant -- I don't mean I was personally responsible for the actual labor -- I organized for Union Carbide a group of at that time about 25 people -- no, probably more than that, probably closer to 40 -- and I had a section under me. I believe at the outset it was headed by Cooper Daniel, but that is not important. It involved about 10 people who did the statistical analysis of the data from the plant as it was coming through. And we very quickly, again through our room of 8 gals at the Frieden, fed this back in the plant in the form of improved

operations. That was a good show, the start up of the Oak Ridge plant.

If anybody wants to dig into the history of it, and also one of the very valuable things that the statistical group under me did was very quickly establish materials accountability at the Oak Ridge plant far far ahead of anything of the kind at Y-12 or Hanford. We had quite good material balances, and I think you can appreciate what this means as early as mid-47 with a pretty good idea of the uncertainty, a pretty good idea of the reliability of these figures.

I am not sure whether I am addressing myself to your question but --

DR. PICFORD: When you were at Hydrocarbon Research were you involved in the design of a hydrogen deterium(?) isotopic exchange plant?

THE WITNESS: No. That was done a little bit before my time. Mason Benedict was director of process development at the time I joined Hydrocarbon, and I was assistant director, but I was on other subjects. That work was done by Mason and published in '51 or something like that.

He departed for MIT in March of '51 and I succeeded him as director of process development. I did work at Hydrocarbon Research on low temperature processes but that

was not among them.

DR. PIGFORD: So the isotopic exchange experience is on the Oak Ridge plant?

THE WITNESS: Yes. I have not worked on the deterium isotopic exchange project that you referred to.

DR. PIGFORD: Now, have you been involved in quality assurance problems in connection with the Hydrocarbon Research projects?

THE WITNESS: Not very much. My title there was director of process development, and in that capacity I was far more concerned with the output from our pilot plants. We had a budget of something like $1 million a year at our Trenton Laboratory, and it was my main responsibility to fight like hell to get what I wanted.

If you had any experience with pilot plant people, you know it is a tough job because they like to make things easy for themselves rather than get the data one needs to design a large scale plant.

My main concern in Hydrocarbon Research was to see the data that came from the pilot plant was something I could use and having got it used it.

DR. PIGFORD: At the time of the design of the plant I understand there was a group concerned with criticality problems.

THE WITNESS: Yes. I was keenly aware of that.

Dr. Teller visited our offices at the Woolworth Building many times, and I met the gentleman, but I was not in the meetings were this was discussed.

DR. PIGFORD: And in your work at Hydrocarbon Research were you involved in the questions of design or evaluation of designs or high pressure equipment.

THE WITNESS: Yes. Not as a mechanical engineer. Again, I was often the man that would sit with the mechanical engineer to make sure he gave us what we wanted from a process standpoint.

Often he would tell me I couldn't have it, and we would have to go back and thing again because maybe what I was asking for was something that was either impossible or far too costly for him to give me.

In this sense I had a good deal of experience in sitting with mechanical engineers and finding out what the facts of life are so that I, as a process man, can be sure I am getting what I want, but obviously he isn't violating the codes.

DR. PIGFORD: Have you read the application for this case?

THE WITNESS: I wish that I could say I have read it carefully. I have skimmed it, but that was all the time I had. I can't really address myself to the details in the application.

DR. PIGFORD: Now, I am not seeking your evaluation of any part of the application.

THE WITNESS: I am no epared to give it because I haven't studied it.

DR. PIGFORD: That s ies my problem. Have you read Chapter 3 on engineer eguards? Do you have a copy?

THE WITNESS: I don' e a copy here. I can tell you if I read it it was in last night at a late your and with only half an eye o . I have to be honest.

CHAIRMAN JENSCH: Was s befo e or after the game?

(Laugh er.)

THE WITNESS: What sport do you follow that I don't?

(Laughter.)

CHAIRMAN JENSCH: I was referring to the Boston Celtics.

(Laughter.)

THE WITNESS: That is why my brother insisted we get off the phone at 8 o'clock. No, I don't follow baseball.

MR. CONNER: If the Board please, while Dr. Pigford is looking for his reference, we would like to note an objection to any exploration of this witness' attitude toward

the application on the basis that he clearly shows he is not an expert in the area and has stated quite honestly and candidly that he has barely skimmed it. And the area of engineering safeguards is nothing that the witness touched on in his evidence in chief, so any examination here would go well beyond any matter the witness was tendered for.

THE WITNESS: I would concur with that. I would feel embarrassed to make any positive statement about anything in these documents because even if I were to read them carefully, anything I could say would only have very general applicability to the details of the design.

CHAIRMAN JENSCH: Excuse me a moment, I don't know that the staff counsel was inviting a response at the moment. I think he was stating his position, and I don't think the questions so far have asked for any opinions. I think it is merely foundation inquiries to the extent of the review to see whether there is any basis for an opinion.

The opinions have not been requested.

The Board has given consideration to the testimony adduced through this witness, Squires, as well as the motions to strike and the objections thereto. The motions are granted insofar as reference has been made to the ammonia plants and the experiences thereunder.

The motions are denied insofar as the expressions of opinion have been based upon the experience of this witness

as a development engineer.

Did you have further questions of the witness?

MR. BOGART: No, sir.

CHAIRMAN JENSCH: Cross examination by the applicant.

MR. TROSTEN: We have no cross examination of this witness.

CHAIRMAN JENSCH: Regulatory staff?

MR. CONNER: We stand on our motions to strike.

CHAIRMAN JENSCH: Will you answer the question? Do you have any cross examination?

MR. CONNER: Specifically, none.

CHAIRMAN JENSCH: New York State Atomic Energy Council?

MR. SCINTO: No cross examination.

CHAIRMAN JENSCH: Intervenor Weik.

MRS. WEIK: No, thank you. I found it very interesting.

CHAIRMAN JENSCH: Thank you, witness Squires. You are excused.

(Witness excused.)

CHAIRMAN JENSCH: Do you have an additional witness, Citizen's Committee, at this time?

MR. BOGART: Not at this time, Mr. Chairman. We will early tomorrow morning if the Board can accommodate the witness.

CHAIRMAN JENSCH: Very well.

MR. CONNER: If the Board please, could I bring up a procedural point?

CHAIRMAN JENSCH: Yes.

MR. CONNER: During the noon recess I discussed with all of the parties the question of having a night session in order that we might be able perhaps to get more of the questions in. The Board has already, of course, indicated it has many questions to ask, and we did hope that perhaps it would expedite the total hearing if we could have a night session perhaps to get some of this evidence in.

end 12

CHAIRMAN JENSCH: The Board has given consideration to the hours of this proceeding, and indicated at the March hearings there is a certain burden that the Board has in proceeding in this manner, and can be burdened further with extra hours.

This is a matter with which the Board has not had the familiarity that the applicant and staff have had in their year or so review. We are not disposed to have any night sessions, and furthermore we are giving consideration to resuming more regular hours in view of the fact that there is a certain limit to the efficiency that is available in the review of a complex technology such as this.

Are we ready to give further consideration to an order to utilize the balance of the time, concerns by the Board respecting the several responses made by both the applicant and the staff?

MR. BOCART: Mr. Chairman, I hesitate to bring this up, but I believe your remarks with reference to the jurisdiction of the Board, and the AEC may have conveyed the impression that the appellate court held that the Atomic Energy Commission may not be responsible for thermal effects.

To update that view, the State of New Hampshire has filed a brief in the Supreme Court of the United States, April term, seeking a determination by the Court on that opinion of the appellate court. The matter is not closed.

CHAIRMAN JENSCH: Very well. We have that notation in the record. At the present time we are guided by existing decisions.

DR. BUCK: We have awhile to go this afternoon, and I would like to get a few of the questions answered that I have. Most of these, at least in the beginning, concern answers already given to questions we had concerning the R&D program, and the quality assurance program. I will take the questions on Exhibit 3, second supplement.

On page 13-9, this is under the general heading of the core stability, particularly the part of it re power capability and the last paragraph on that page which concerns the X,Y power peaking and the margin of safety that was expected in that power peaking in Indian Point #2.

It goes on concerning this and some of the things that are needed in Indian Point #3, and as I read this paragraph, I would like to know whether I'm right or wrong. I take this paragraph to mean that the applicant is making a commitment here, that the power to which this Indian Point #3 will be operated will depend upon the safety margin that exists after the XY power peaking has been checked out at Indian Point #2, and as the power is increased in Indian Point #3.

Am I correct in this? In other words, if there is a question of the margin in the Indian Point #3 at the rated

power level, this will be held until the questions of that margin are cleared up; am I correct in this?

MR. TROSTEN: Mr. Moore will respond to that question.

MR. MOORE: That is correct.

DR. BUCK: I wanted just to be sure that was the commitment as I understand it. On the same exhibit, page 13-24, this concerns a test made in the so-called rod burst program. There is a table at the bottom of the page which lists figures and I wanted to be sure my understanding is correct of the way this experiment is run.

Am I correct in assuming all these experiments were made with four-inch length rods?

MR. TROSTEN: I believe that is correct.

DR. BUCK: As far as I can find in the statement it is, but I want to be sure I didn't miss something.

MR. TROSTEN: I believe that is correct.

DR. BUCK. If you turn over to 2-4, you will notice that on the two pictures shown on figure 2-4, the left-hand one shows the burst with a protrusion out on the left-hand side. The right-hand picture looks headon into the split in the tube. On the right-hand side of the picture there is apparently a bulge in the tube. On the left-hand side it would appear on the photograph there is an indentation.

This is also true to a lesser extent on figure 2-3. My question is: In a burst of this nature, does this tend to

cause forces such that the tube would be bent?

MR. MOORE: Dr. Buck, the tubes that were tested here weren't bent, if I understand your question.

DR. BUCK: This is only a four-inch tube. If you take a long tube and had such a burst with similar courses causing a burst on one side and a bulge on the other, would this burst a long tube?

MR. MOORE: I believe no. The particular tests shown here were with empty tubes. Similar tests have been done with pellets inside which more represent the actual conditions.

DR. BUCK: Was there similar indentation and protrusion on those or not?

MR. MOORE: No, I believe not. When the pellets were in the tube being tested, --

DR. BUCK: My question of course concerned the large one with the bow, there would be a different situation?

MR. MOORE: That's right. There was no bowing observed in the tests with pellets either.

DR. BUCK: Is staff satisfied with these tests by the way, as far as the bowing question is concerned?

MR. MULLEN: Dr. Buck, as far as the tests have gone so far, we are satisfied with their results.

DR. BUCK: They are still in progress as I understand from this.

MR. MULLER: That's right.

DR. BUCK: Thank you. Now, let's go back to -- let me take a moment to get my notes straightened out here.

On the transcript of the hearing, on page 992, in answer to a question concerning the pressurized well channels, which was stated on line 5 and 6, there was an answer by Mr. Cahill: "The pressurized well channels and pressurized containment penetrations are under continuous pressure, and are continuously monitored to indicate the flow of dehumidified spaces to assure that any leakage at wells or penetrations would be into containment rather than out of it."

As I read this, this is under normal operations; is this correct?

MR. CAHILL: Yes.

DR. BUCK: What happens in the case of what we have been calling at least a maximum credible accident where there is a large pressure increase within the containment itself? What is the operation at that point?

MR. CAHILL: The containment penetrations and the containment well channels continue to be pressurized.

DR. BUCK: Above the pressure inside the containment?

MR. CAHILL: Above the pressure inside the containment, yes, sir. So that even under the hypothetical accident containment pressure conditions, the leakage would be inward to containment protecting possible leakage from well seams or in the penetrations.

wel 6

DR. BUCK: The pressurizing systems for these things are outside?

MR. CAHILL: Yes, sir.

DR. BUCK: Outside the containment, I mean?

MR. CAHILL: Yes.

DR. BUCK: On page 994, we are talking in the first part of page 994 on the effect of environmental testing of such things as the fan motors, cables, and so on and so forth.

Down on line 18, the statement was made:

"This includes the fan cooler motors. Radiation tests will include tests of the motor coils and bearing greases to verify their continued operability. The total dose assumed will be two times ten to the eighth rad over a period of a year."

My question is: I had always thought over the last two or three years a great deal of work had already been done on the radiation effect on greases, insulation and this sort of thing. Is this sort of thing being repeated, or is this just being double-checked for these fan motors and cableing and so on?

end #13

MR. MOORE: I would characterize this as more of a double check. We are aware of a great deal of information.

DR. BUCK: You are starting out with greases and this sort of thing that you assume are --

MR. MOORE: Radiation resistant.

DR. BUCK: Thank you.

CHAIRMAN JENSCH: Are you going to another subject?

DR. BUCK: I'm going right through some of these questions-- Yes, I'm going to another subject.

CHAIRMAN JENSCH: I wonder-- Can you give us some of the data which reflect the capability of these fans and motors to operate under simulated accident conditions? If this is a doublecheck that is being undertaken.

MR. MOORE: The radiation tests referred to have not been completed yet. They are in progress. Tests have been completed on the other environment effects, the pressure, temperature, humidity, and chemical environment. These tests are now in progress.

CHAIRMAN JENSCH: When were they started?

MR. MOORE: Several months ago, two to three months ago.

CHAIRMAN JENSCH: Aren't there several reactors that have problems of motors and blowers within the containment that would be subject to possible accident conditions of temperature, pressure, humidity and radiation?

MR. MOORE: Yes.

CHAIRMAN JENSCH: Those had largely been completed before these radiation tests had been completed, is that the sequence of time?

MR. MOORE: Before these confirmatory tests, that's right.

CHAIRMAN JENSCH: Well, the confirmatory test, you must have some basic tests. What are the data from the basic tests embracing these four elements?

MR. MOORE: Mr. Chairman, the specific information that you might desire I don't have right now. It would be a question of getting information on the exact kind of cables we are using. I have references that I could get on the behavior of these materials after irradiation. I don't have them right now. I would have to get them.

CHAIRMAN JENSCH: My reaction from the pre-hearing conference was that we were seeking data which would show -- and I don't mean to get into this other subject because I think Dr. Buck will get into it later on, systems testing -- but it says combination of component testing, and I wonder if you have any data that would show these fans and motors and blowers will operate under conditions of high humidity, high pressure, and high temperature and radiation to the levels expected under MCA conditions.

If they are confirmatory, I will take the basic

eb3

evidence you must have to be confirmed, as I understand it.

MR. MOORE: That's correct.

I'm afraid I would have to get those references in good shape so I could present them later.

CHAIRMAN JENSCH: At some time during the hearing but I would very much like to have the evidence so there won't be any misunderstanding. I thought maybe our pre-hearing inquiry may not have been clear. Something that will show component and system testing of these fans, motors and blowers under expected accident conditions of temperature, pressure, humidity, and radiation. Is that clear?

MR. MOORE: Yes.

CHAIRMAN JENSCH: Thank you.

MR. BUCK: On page 1008, in answer to a question concerning how the sodium hydroxide gets into the spray additive system, the answer given on page 1008, line 8:

"Sodium hydroxide flows from the spray additive storage tank, under the influence of pressure applied to that tank by the discharge of the spray pumps themselves.

"This creates, in effect, a bypass stream flowing from the discharge of the supply pumps through the sodium hydroxide tank back to the suction of the spray pumps."

I still don't understand how this system works.

eb4

I would like to know how you control the amount of sodium hydroxide in the system. I would like to know how much sodium hydroxide you got in there, how long it will last if the spray system is on for a very long period of time.

If necessary we can refer to drawings or we can draw something up here again but I would like to get some real good explanation of how you get the sodium hydroxide into the system.

CHAIRMAN JENSCH: May I push that sketching a program? Mr. McAdoo, could you draw us a sketch on the map like this map here? We have a crayon up here, Mr. McAdoo.

MR. MC ADOO: This will represent the tank in which the concentrated sodium hydroxide is stored. I will indicate over here the tank which is in fact much larger containing the refueling water which is the bulk of the liquid delivered by the containment spray system. I won't try to indicate all of the valving.

If we get into the redundancy question I will have to refer to the flow diagram. But in principle, water is pumped from the refueling water storage tank to the containment vessel and the spray headers are installed inside the containment vessel. A portion of the flow from this pump is diverted to the top of this storage tank and liquid is returned from the bottom of that storage tank to a point on the suction side of these pumps.

eb5 1 Now initially this tank is filled with 30 percent
2 concentration sodium hydroxide and the proportion of the flow
3 of this pump diverted in this fashion is approximately 10
4 percent of that flow. Therefore, one can expect approximately
5 one gallon of concentrated sodium hydroxide entering this
6 system for each nine gallons of refueling water passing this
7 point.
8 This is a very approximate estimation in terms of
9 which I am giving it here and in fact it is not at all criti-
10 cal that this flow ratio be maintained precisely. What we
11 are trying to do is displace the contents of this tank into
12 this system during an interval of approximately one half hour
13 during which water will be flowing through this pump.
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MR. MC ADOO: As we indicated, the desired effect is to produce enough alkalinity in the water inside the containment vessel to retain the iodine which has been absorbed by the spray and this can be bracketed over quite a range of PH alkalinity ranging from about PH8 up to about PH10.

This represents a lot of tolerance for knowing precisely the concentration of sodium hydroxide entering at a given time.

DR. BUCK: I believe there is quite a large amount of tolerance in there but I think you have two possibilities. One, that you empty the tank much faster and had a high concentration to begin with and nothing later on in the spray, or the other - that something happens and you get very, very little salt in there and, therefore, have little effect.

How do you prevent this?

MR. MC ADOO: The system is checked out so we know the proportionality of the flow when the system is actuated. We have to allow for several possibilities, namely, when we realize it or, in fact, there are two of these pumps and either one or both pumps may operate; that there are other pumps drawing water from this tank as well as the spray pumps, this being the supply source for the emergency core cooling system and, therefore, we must allow for the full range of uncertainty as to the number of pumps operating and the time required to drain this tank down.

Therefore, it is a matter of operational analysis, if I can use that term, to plan for the extremes in every respect, of the numbers of pumps operating and the time required to deliver this system and to make sure that the quantity of sodium hydroxide is delivered during the shortest interval of time.

DR. BUCK: This started up due to either pressure or temperature irradiation load. There are several detectors or sensors that can start this whole system up, is that right?

MR. MC ADOO: I believe this system is actuated on containment pressure signals.

DR. BUCK: Containment pressure, primarily. What does that do? That starts up the pumps, opens up the valves to the sodium hydroxide tank?

MR. MC ADOO: Yes, and it opened up valves which deliver the mixed solution to the containment.

DR. BUCK: You brought up a topic I was going to go into later but I might as well start now. How do you test what you call the system here?

MR. MC ADOO: Well, we have other lines which I haven't shown on this diagram.

At the point nearest to the containment, where there is an isolation valve -- and let me show it here to you schematically --

DR. BUCK: That goes off to the spray headers.

MR. MC ADOO: Yes.

We have a bypass line which comes back to the refueling water tank, so by maintaining this valve in a closed position -- these valves in closed positions -- we can circulate refueling water through these pumps to make sure that the lines are open and that the response of the system is as it would be predicted.

We can also test the operability of all the valves in the system without turning pumps on it, thereby showing that each valve will reposition when it is called upon to do so by the automatic initiation signals.

We can also sample the liquids in both tanks to make sure that they are free of residue which might be deleterious to the system. We check each function as we can without operating the system in its entirety.

MR. BLOCK: Do I understand from this that you can check basically the entire system except the actual water going to the spray headers?

MR. MC ADOO: We can check, in a flow situation, the entire system up to this point. We also check the continuity of the system beyond this point by using air as the testing fluid instead of water.

MR. BLOCK: Are there more valves beyond that one and the spray headers?

MR. MC ADOO: I believe there is one maintenance

lrw4

valve inside which is locked open and could not be operated.

DR. BUCK: Do you have pickup points in your return lane to test salinity of the water? How do you know you are getting ten percent or five percent or fifteen percent or whatever?

MR. MC ADOO: I should not imply in this that we test the mixing of the two solutions or any of this in-service type manipulation which I have talked about. This is done prior to startup by measuring the flow ratio, which is achieved by operating the pumps, but we do not, for example, mix sodium hydroxide with boric acid in the refueling water tank as a part of that test.

DR. BUCK: So that you have fresh water in the salt tank when you open these valves up and check the pumps?

MR. MC ADOO: It would normally be functionally tested with water. I'm not sure what grade of water but it would be essentially pure water.

DR. BUCK: So that I understand how you check out the probability that you are going to have anywhere near the right amount of salinity in the water --

MR. MC ADOO: Well, I'm perhaps not familiar enough with the test specifications which are used when this system is tested.

DR. BUCK: I just had the indication that everything was being tested. This is what I am trying to find out.

lrw52 1

MR. MC ADOO: I think the best answer would be that in comparing performance of the system under actual salinity conditions with those of the test, one can make use of the relative properties of the two solutions. The refueling water solution had essentially the same property as water. The thirty percent sodium hydroxide solution has known characteristics of viscosity and density and one can determine how much in error one could be predicting the flow through this system with thirty percent caustic as compared with the water.

DR. BUCH: I hate to see anybody say this because I have seen components tested, and I am sure you have, too. I have also seen two very good components put together and fail. This, to me, is a very critical point because you do have to have -- if there is an accident, this thing has to work and we must know that it will work.

I was wondering if a system check could be put on to show when the valve opened up you would get a reasonable mixture of sodium hydroxide and water.

MR. MC ADOO: I feel this can be done. I would only point again that the rather enormous margins that we have, we can test the alkalinity requirements here if only about twenty-five percent of the contents of that tank are delivered instead of one hundred percent. This gives a great deal of --

DR. BUCH: I'm afraid of the whole tank coming up

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in one gush.

MR. MC ADOO: I see.

DR. BUCK: I think this would be a dangerous situation because then you would have a flood of salt water and after that you don't have any sodium hydroxide.

MR. MC ADOO: This would certainly be a violation of the design basis. We will have to satisfy the reviewers on this, that the test which is done satisfactorily insures against that possibility.

DR. BUCK: Does the staff have any comment on this?

MR. MULLER: No, Dr. Buck. The system as Mr. McAdoo described it is the system that we reviewed.

DR. BUCK: Have there been tests on other systems for other reactors -- I am not talking about individual components or subsystems checks; I am talking about the whole spray system check. Has there been any check on any of the operating reactors or the ones close to operation? What I call a systems check.

MR. MULLER: I know of none.

DR. BUCK: I just have to feel this sort of thing is possible somewhere along the line.

As I said before, with all due respect to the theorization, calculations and everything else, I would put them closer to that and see that they check up beforehand. This, to me, is a vital part of the whole setup if we should have an

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accident of any kind.

Does anybody else have any comments on this?

MR. HAUGE: I think it should be pointed out there is a double control valve arrangement below that tank followed by a flow measurement readable on the control panel so the operator can control the amount of sodium hydroxide leaving that 5,000 gallon tank. That line is a 3-inch line that enters into a line which is 8 inches in diameter.

The refueling water storage tank contains about 350,000 gallons of water in comparison to the 5,000 gallons in that smaller sodium hydroxide tank. Once you have introduced the sodium hydroxide into the containment building you then have the capability through the internal recirculation system to continue to recycle that water through the spray headers.

DR. BUCK: That goes into the spray headers, you mean?

MR. HAUGE: No. Recycle of the solution into a bypass arrangement into the spray headers so you continue to get spray solution throughout the containment atmosphere.

DR. BUCK: This I recognize. The problem I am having to face up to here is all right, somebody opens up those valves and the calculations are wrong. There is for the most of the sodium hydroxide gets mixed into the first five minutes of the spray system. From that point on we have no sodium hydroxide. You still have a tank full of water here supplying the sump. You don't know you don't have

eb21 sodium hydroxide.

So you are spraying out there with the anticipation the spray header is not only cooling but also-- I'm trying to find out do we have a check on the system that makes sure we have sodium hydroxide over a much longer period of time?

MR. HAUGE: Right now the indication would be through the flow indicator downstream of that sodium hydrogen tank.

DR. BUCK: This flow indicator can be operated by any power of that at all? Can you open those valves more to give a forward in redundancy of those valaves or not?

MR. HAUGE: Two parallel valves motor operated we can control.

DR. BUCK: This flow indicator is in the line coming down from the sodium hydroxide tank?

MR. HAUGE: Yes, sir.

DR. BUCK: To the intake of the motors themselves?

MR. HAUGE: Yes, sir.

DR. BUCK: That makes me feel a little bit better.

Now as far as the sodium hydroxide content to begin with, this can be checked or is planned to be checked on a periodic basis for sodium hydroxide content?

MR. HAUGE: That's right.

DR. BUCK: Tom, did you have a question?

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DR. PIGFORD: Yes. It looks like a chemical engineering problem.

(Laughter.)

I had always thought if you had a problem of adding a relatively small amount of material to mix with a relatively large amount, you want to be sure it mixes right. Don't they use proportioning pumps-- Well, that is not a good question. Have you considered proportioning pumps for this?

MR. MC ADOO: Yes.

DR. PIGFORD: Thank you.

Now Mr. McAdoo, this is a good example-- I have an area of questioning which we touched on before. If you turn to Supplement 5, the same area, sodium hydroxide in water, and Supplement 5, Section 6, the fourth page of that-- The pages aren't numbered in that section unfortunately, but the fourth sentence-- Let me read the sentence.

"A criterion has been established which places the minimum containment sump pH at 8.5 when the iodine is to attain the maximum pH of sprayed solution at 10.5 from material exposure. The spray chemical addition program will be designed to meet these criteria."

Who does a design target and design-- That is not the question yet. Is this statement a design of target or a design requirement in the sense of the words you used

eb41 earlier in this hearing?

MR. MC ADOO: Dr. Pigford, as stated here it is a criterion and unless a definite change is warranted and presented to the staff for their concurrence, we would meet these stipulations. That is, we would not accept the pH less than this figure under conditions when we require iodine be retained in the liquid nor would we accept a pH greater than 10 under consitions for which materials exposure is evaluated.

DR. PIGFORD: That is certainly helpful. If you will go one step further it will help me understand a lot of the other statements.

Is it a design target or a design commitment in the sense you have used those words?

MR. MC ADOO: In this sense it would be a commitment.

DR. PIGFORD: So is this your understanding, Mr. Muller?

MR. MULLER: Well --

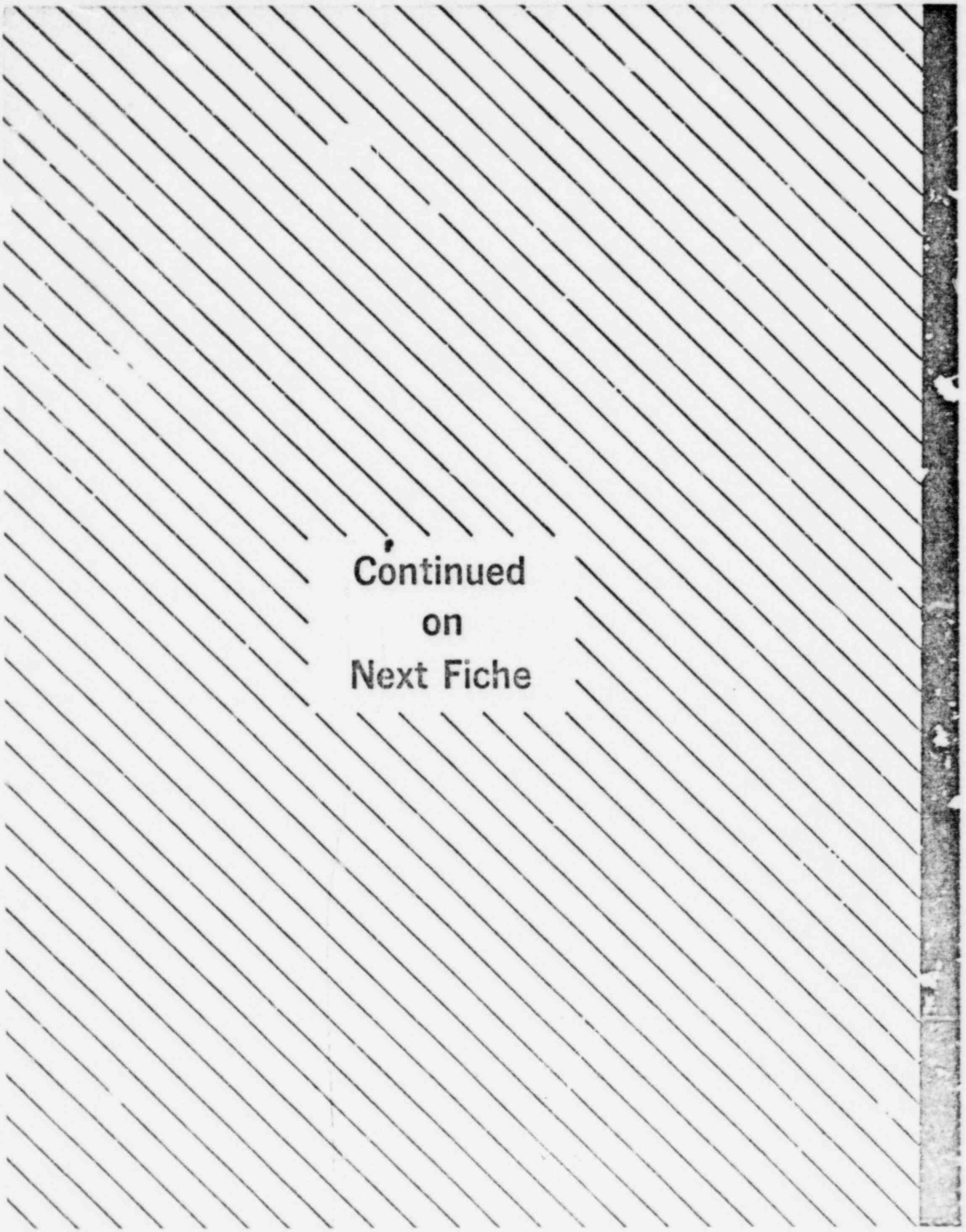
DR. PIGFORD: I'm using it as an example to define some words that have been used before.

MR. MULLER: Yes.

DR. PIGFORD: So I gather that if no new information comes up, that suggests on the grounds of safety a change is necessary then a compliance inspector will at some later date when he is checking to see if the plant had been constructed according to the way described in whatever document he is supposed to read, will look for core test or other documentation that these data are ascribed here; is that correct?

MR. MC ADOO: It may be introducing another element into this discussion, namely the technical specification, which is something which the compliance inspector can physically get in the plant or obtain evidence on.

DR. PIGFORD: I would hope to avoid technical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specifications, that is, that legal document we have been referring to which occurs at the operating license stage.

Mr. Muller, could you give an answer to the question?

MR. MULLER: As I recall the wording of your question you said the compliance inspector would witness some test or other -- I missed the next word --

DR. PIGFORD: Demonstration.

MR. MULLER: Demonstration. With those words I think the answer is yes, Dr. Pigford.

DR. PIGFORD: This doesn't have to be tied with technical specifications, does it? At least one of the things I'm looking for is: Is it right then to conclude, Mr. Muller, that in the absence of any need to change this on the grounds of safety that your compliance man will look for an item like this before he signs his name to say that the plant is constructed according to the described documents to the Commission: is that correct?

MR. MULLER: That's right. What you are describing is a pre-operational check of the plant or inspection of the plant.

DR. PIGFORD: Will he use this document?

MR. MULLER: He will use this or the FSAR, which usually supersedes the PSAR.

DR. PIGFORD: I don't know what that is.

MR. MULLER: Final safety analysis report as opposed

to this document, preliminary safety analysis report.

DR. PIGFORD: This commitment, as we now define it, will appear in the final one unless some change comes out that warrants reconsideration in your approval on the grounds of safety; is that right?

MR. MULLER: That's right.

DR. PIGFORD: That's all I have on that. That defines commitments I think.

DR. DUCK: A couple of other points on this. You have a flow meter coming up under the small tank. Do you have one under the large one or anywhere else to see we are not just pumping concentrated sodium hydroxide?

MR. MC ADOO: There is no other flow meter in the system.

DR. DUCK: Is there a possibility that one could be pumping straight sodium hydroxide out to the spray headers?

MR. HUGER: We might be able to calibrate flow by the level indication in the sodium hydroxide tank and calibrate that against the flow indicator which is in the line downstream in the sodium hydroxide tank.

MR. MC ADOO: I would point out that these pumps will be designed in their functional checkout to be shown to be capable of delivering about 2600 GPM through each pump when they are turned on, and this line is a quite small line, two inch diameter, and would not carry that flow. So it's

difficult to see how one could, first of all, drain the contents of this tank into this system when it has no --

DR. BUCK: Is there a valve back here between the big tank and the pumps?

MR. MC ADOO: Yes, but I point out this is a closed system. This is not vented in the atmosphere so one could not empty this tank.

As the sodium hydroxide flows out it is replaced with water.

DR. BUCK: All right. Turning over to page -- do you have anything more on sodium hydroxide?

DR. PIGFORD: I would like to be sure we are understanding the present situation correctly.

We understand from Mr. Muller that such a system has not undergone final testing in any nuclear power plants reviewed by the Commission.

MR. MULLER: To my knowledge the answer is no.

DR. BUCK: A minor question of wording -- page 1013 --

CHAIRMAN HIGGS: If I may, I didn't quite understand there had been an answer from Mr. McAdoo. You say you had been considering proportioning pumps. Do you have them here or not?

MR. MC ADOO: No. We decided against the use of proportioning pumps since they were an added mechanical device which -- whose reliability would have to be added to that of

the existing pumps. We felt this system being essentially simpler we would have a higher reliability.

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CHAIRMAN JENSEN: I didn't understand what the conclusion was of your consideration. Thank you.

DR. PIGFORD: I do have one more question.

You have emphasized that the water and sodium hydroxide and boric acid sort of gets mixed around in several passes here. If we take for example your performance during the first minute, which as I gather is the only time this really has to function as long as your seal injection system works, doesn't it mean you have to have sodium hydroxide in that spray during that first minute?

MR. MC ADOO: No, sir. I believe in the cases which were analyzed in which the containment seal system was effective at the end of one minute, no credit was taken for action of the spray during that minute.

Doses were quite low owing to the fact that leakage was terminated at that point.

DR. PIGFORD: What is the circulation time for a given particle here? How long does it take it to plot around the loop?

MR. MC ADOO: Are you referring to --

DR. PIGFORD: By the loop I mean through the entire system, fall through the containment, absorb the iodine, cool the containment, be gathered in the sump and appear back at the same place at the previous level. About how long would you say?

MR. MC ADOO: That is a very complex question because the emergency core cooling system is also circulating that water and it would have a different cycle time flowing through that loop. Perhaps we can arrive at this if we disregard the core cooling system and look only at the spray.

DR. PIGFORD: It sounds like a good idea, but first is the emergency core cooling system circulating caustic water, sodium hydroxide water?

MR. MC ADOO: After completion of the injection phase, that is defined as the time when the refueling water storage tank supply is exhausted, then recirculation of the water from the sump of the containment begins. That water in the sump is that which results from mixing of the containment spray in the refueling water which has entered the system by way of the core cooling system. It will be alkaline to the extent of the PH limits which we were discussing.

DR. PIGFORD: And the air cooling does?

MR. MC ADOO: Yes.

DR. PIGFORD: All right. You suggest an approach to establish the cycle time. Is there something you can do quickly or would you prefer to come up with a number later on? I don't want to take time.

MR. MC ADOO: Let me give it to you roughly, and we will see if that is close enough. One of these pumps has

capacity, as I said, of about 2600 gallons per minute. Total quantity of water in the system is on the order of 300,000 gallons. So it would be approximately 100 minutes, I believe. Approximately two hours.

DR. PIGFORD: So, during the first two hours what we see falling through the containment is what occurs due to initial mixing then, in this system you described here? Is that right?

MR. MC ADOO: No, sir. The two hours would be the average cycle time after recirculation has begun. The period of time during which water is injected into the containment system will vary from about 20 minutes to 45 minutes, depending on the size of the loss of coolant accident because this determines how much water or how fast the water will be injected by the cooling system.

DR. PIGFORD: It means you don't do any recirculation until that time you just described is over with?

MR. MC ADOO: That is correct.

DR. PIGFORD: During that period, that latter period the composition is determined by the function of these primary components here, is that correct?

MR. MC ADOO: Yes.

DR. PIGFORD: Thank you.

DR. EBERT: I want to ask one short question. On page 1010, in addition, provisions have been made by installation

of a backup deflating system. What is this?

MR. TROSTEN: That is a typographical error. It is a back up cavity flooding system -- cavity flooding system.

DR. BUCK: All right. I couldn't figure out that word. Thank you. I am reminded it is five o'clock.

CHAIRMAN JENSCH: Is there any matter to be considered of a procedural nature before we recess?

MRS. WEIK: I won't be here again. I would like to make a very, very short --

CHAIRMAN JENSCH: Very well. Proceed.

MRS. WEIK: It won't take a minute. I understand that yesterday there was an answer, an interesting answer, made to the statement I had made about conditions in Montrose. And I just wanted to point out one fact. I believe a percentage was given about the number rendered to the population of Montrose.

I wanted to point out that the count that I brought, the deaths in this area represented a very small fraction of the town of Montrose, and therefore the relation is not quite exact. It is quite far from the actual percentage that was alleged yesterday.

The other thing that I wanted to point out was that I have just learned of three more deaths in this area, two of them have brain cancer.

CHAIRMAN JENSCH: If there is nothing further at this time, I'd like to recess to reconvene in this room at 9:00

tomorrow morning.

(Whereupon, at 5:00 p.m., the hearing was adjourned to reconvene at 9:30 a.m. the next day.)

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