NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF

CINCINNATI GAS AND ELECTRIC COMPANY, ET AL.

(William H. Zimmer Nuclear Power Plant,
Unit No. 1)

Place - Cincinnati, Ohio

Date - 20 June 1979

Pages 697 - 888

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of:	
CINCINNATI GAS AND ELECTRIC COMPANY, ET AL,	Docket No. 50-358
(William H. Zimmer Nuclear Power Plant, Unit No. 1)	

Courtroom 805
U.S. Post Office and
Courthouse,
Fifth and Walnut Streets,
Cincinnati, Ohio 45202

Wednesday, June 20, 1979

The hearing in the above-entitled matter was convened, pursuant to notice, at 9:00 a.m.

BEFORE:

CHARLES BECHHOEFER, Esq., Chairman,
Atomic Safety and Licensing Board.

DR. FRANK F. HOOPER, Member.

MR. GLENN O. BRIGHT, Member.

APPEARANCES:

(As heretofore noted)

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P R O C E E D I N G S

CHAIRMAN BECHHOEFER: The hearing will come to order. Are there any preliminary matters?

(No response.)

I think at this stage Dr. Fankhauser may present his witness -- or Mr. Woliver.

MR. WOLIVER: Should he sit here?

CHAIRMAN BECHHOEFER: That's fine.

MR. WOLIVER: Will you have a seat over there.

Whereupon,

David Fankhauser

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

DIRECT EXAMINATION

BY MR. WOLIVER:

Q State your name and address, please.

A My name is Dr. David B. Fankhauser; my address is 3569 Nine Mile Road, Cincinnati, Ohio.

Q Is that in Clermont County?

A That is in Clermont County.

Q Dr. Fankhauser, could you briefly describe your educational and occupational background?

MR. CONNER: Objection, your Honor; prepared testimony, which was the subject of a lot of debate yesterday afternoon and statement of professional qualifications is the

limit that this board ruled could be offered by Dr. Fankhauser in this proceeding, and you made very clear that there would be no opportunity to expand upon it except on cross examination.

Accordingly, any attempt to expand upon it by this type of questioning, in our judgment, is completely wrong and objectionable, and we would in fact object.

The transcript reference is at 695 and 696.

CHAIRMAN BECHHOEFER: I think Mr. Conner is correct; you should offer the prepared testimony and qualifications.

MR. BARTH: Mr. Chairman.

CHAIRMAN BECHHOEFER: Yes.

MR. BARTH: I'm reluctant to enter into a battle of someone else's; I think that the ruling is that the testimony may not be expanded.

I think that his stating his qualifications to offer the testimony may be something slightly different, and from the staff's point of view, I'm quite willing to have Mr. Fankhauser state his academic, professional, and work experience.

I do not think that goes to the --

CHAIRMAN BECHHOEFER: Actually, I think that is correct. I think on the testimony -- you have to offer the testimony. You should not -- you could -- you have a statement of qualifications which you should also enter into

the record.

MR. WOLIVER: That will be entered into the record, although I'm not sure that the rules require a statement of qualifications with the prepared testimony; we presented it, but I thought at this time we would only go over Dr. Fankhauser's academic qualifications.

MR. CONNER: Mr. Chairman, attached to the prepared testimony submitted by Mr. Woliver for Dr. Fankhauser is a page entitled, "Resume: Dr. David B. Fankhauser,"which gives his professional background and education.

I do not believe it is proper and certainly not expeditious to have Dr. Fankhauser read it; other than what is provided here, I submit nothing more can be offered.

CHAIRMAN BECHHOEFER: I think that on qualifications Mr. Barth is probably correct. The qualifications of Dr. Fankhauser are likely to be at issue, and if there are ones that he -- if there are items that he did not put on it, I think the board would want to know it before we rule on the validity or the weight to be given to Dr. Fankhauser's testimony.

MR. CONNER: May I note and excepttion for the record. I would like to then ask the board to direct Mr. Woliver to ask only questions not related to the prepared statement of qualifications and not to attempt to ask substantive questions of direct evidence in chief

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through -- of Dr. Fankhauser through this device.

MR. WOLIVER: I understand that, your Honor; we're not going to be [redacted] substantive questions concerning the prepared testimony. This is only academic and professional qualifications.

CHAIRMAN BECHHOEFER: I think with that understanding you can go ahead.

MR. WOLIVER: We probably could have been done with it by now.

BY MR. WOLIVER:

Q Dr. Fankhauser, could you briefly describe your academic and professional background?

A Yes, I have a bachlor's from Earlham College in Richmond, Indiana. I have a PhD in biology from the Johns Hopkins University in Baltimore, Maryland.

I have engaged in research at Cold Spring Habor Laboratory for quantitative biology -- Cold Spring Harbor, Long Island. And I engaged in research in the laboratory of Dr. Bruce Ames and -- at the University of California in Berkeley.

I have been teaching biology at the University of Cincinnati, Clermont College branch, for the last six or seven years.

Q Could you briefly describe the research that you stated you've been engaged in?

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A Certainly. My research was in molecular genetics; it was specifically research in which I induced mutations into bacteria using radiation.

These mutations were mutations in what are termed regulatory genes. Regulatory genes are those genes that control the expression and functioning of other genes in the cell and relate to the function of that cell.

Mutations in those genes include those mutations which cause uncontrolled expression of genes in the cell and have led -- these kinds of research have led to an increase in the understanding in the nature of cancer; particularly in my research in the laboratory of Dr. Bruce Ames, I engaged in the development of a system that is widely accepted as the most sensitive system for the detection of mutagens and carcinogens, what is widely known now in the scientific community as the Ames test.

And it is my experience with the damaging effects of --

MR. BARTH: Sir, this goes beyond describing the research; trying to describe what the research is, is fine; trying to give his conclusions of his paper is -- I object to the questions and the line of answer at this point.

MR. WOLIVER: Let me ask the question that I think --

MR. BARTH: May I ask the board to rule before --

CHAIRMAN BECHHOEFER: I think you can say -- you

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can identify the research, but the results --

WITNESS FANKHAUSER: What I was trying to do was give the correct nature of carcinogenesis, which is important to my position.

CHAIRMAN BECHHOEFER: I think that is substantive.

BY MR. WOLIVER:

Q Dr. Fankhauser, did any of your research involve work in the use of radiation?

A Yes, it did.

Q Could you briefly describe that?

A Certainly. We used X-rays to induce mutations in the experimental organism we were using, that is salmonella tytyphimurium --

CHAIRMAN BECHHOEFER: Do you want to do that as an exhibit or -- do you want to have it incorporated as if read?

Off the record for a minute.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: We'll go back on the record.

MR. WOLIVER: Okay. I'll offer Dr. Fankhauser's prepared testimony, styled -- titled, "Intervenor Fankhauser's testimony for June hearing" to be entered into the record as if read.

MR. CONNER: That is a document of seven pages

including the resume of Dr. Fankhauser.

MR. WOLIVER: That is true, which you were [illegible] with on June 1st.

MR. BARTH: Mr.Chairman, is this the document which is entitled "Notes for testimony on spent fuel pool"?

CHAIRMAN BECHHOEFER: I think the title is from the cover page.

MR. BARTH: That's the transmittal; I'm looking at the testimony itself, and I'm worrying about having the substance identified for the future. I couldn't care about title pages or substances or anything else. I want the substance identified so we can go back to the record and find this.

The piece of paper I have is dated 6/1/69; it says "Notes for testimony on spent fuel pool."

CHAIRMAN BECHHOEFER: I think the title Mr. Woliver read was that appearing on the transmittal page.

MR. WOLIVER: Dr. Fankhauser can be cross examined.

CHAIRMAN BECHHOEFER: Are there any objections to receiving this testimony, other than those that were ruled on yesterday?

MR. CONNER: Inasmuch as we made a motion to strike yesterday, we now object to the admission of the evidence on the basis previously stated, all of the seven pages.

MR. BARTH: Staff has not objections receiving the evidence of the doc-ment, the substance of which is entitled "Notes for testimony on the spent fuel pool," sir.

CHAIRMAN BECHHOEFER: Well, the board will receive this in the record. We believe from the standpoint of a hearsay objection that that goes to the weight rather than the admissibility of the document.

And we ruled that it had to be submitted in a form that could be circulated to the parties.

It has been, so we will accept this.

(The document referred to follows.)

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
CINCINNATI GAS AND ELECTRIC CO., et al.	)	Docket No. 50-358

INTERVENOR FANKHAUSER'S TESTIMONY FOR JUNE HEARING

The attached is a summary of Intervenor Fankhauser's prepared testimony concerning Contention No. 6.

John Woliver
Attorney for Intervenor Fankhauser
Legal Aid Society
P.O. Box 47 550 New Street
Batavia, Ohio 45103
513 732-2422

Certificate of Service

I hereby certify that copies of the foregoing were served upon the parties to this action by regular U.S. Mail this 1 day of June, 1979.

John Woliver

6/1/79

Notes for Testimony on Spent Fuel Pool of the Zimmer Nuclear Power Station, Moscow, Ohio

by

Dr. David B. Fankhauser
University of Cincinnati
Clermont College
Batavia, Ohio 45103

Moscow Elementary School, K through 6, only 800 meters from Spent Fuel Pool (SFP).

Sensitivity of humans to radiation varies by almost 10 fold, the younger the individual, the more sensitive. (1,2,3,4)

ALARA requires that exposures to population be kept to a minimum achievable, a requirement which will not be met if fuel is stored for extended periods of time.

Indeed, there will be no off site storage facilities in the foreseeable future, not before 1992, according to DOE officials. (5,6).

In the meantime, numerous plants have been faced with a variety of difficulties as a result of large accumulations of spent fuel:

1975, AEC said two plants would have to be closed due to inadequate storage space. (7)

1976, ERDA claimed five plants would have to be shut by 1978 without additional storage. (8).

1978, a nuclear plant in New England got permission for compaction, increasing # of fuel assemblies fr 880 to 2320 , using Boron carbide fuel racks. (9)

1978, Due to a leak in the recirculating system, the reactor had to be emptied of fuel assemblies, but could not do so due to inadequate space in SFP. (10)

1979, Requests were made by several utilities to shuffle around spent fuel assemblies from plants which were saturated to newer plants with some space to spare. (11, 12).

In each of these cases, crucial degrees of freedom have been sacrificed due to accumulation of spent fuel, limiting the ability of the stations in question to react to

(cont)
abnormal occurances.

Such inability to react in energency situations dramatically increases the probability that off site radiation levels will increase. Since adequate storage facilities off site would ease t is problem, ALARA requirements are clearly being violated, particularly since claims are repeatedly being ade that storage problems are solvable.

At the very least, Zimmer's license should be restricted such that at that point when the totol amount of fuel on site is equal to the capacity of the SFP, no additional fuel should be permitted to be shipped on site.

A consideration of the Zimmer SFP reveals a number of short comings:

Since radioactive decay continues to produce heat after removal from the core, cooling is crucial to the safe storage of SF.

Yet the cooling and clean-up functions of the SF handing system are considered non-essential, and have been subjected to no inspection or testing. (13)

The fuel racks in the Zimmer design are fabricated from alumin um, yet the recent developements in the field of spent fuel storage suggest that boron carbide is a more appropriate substance due to increased absorbtion of neutrons. (9)

Yeild mass curves show that Kr-85 and Xe-133 figure prominantly in the composition of spent fuel. (14) These two fission products are particularly difficult to control due to their non-reactivness.
early
According to AEC data, 99.9% of these fission products can be removed prior to release of gaseous waste. Indications are that the Zimmer design will not meet such retention criteria. (15)

These isotopes pose a problem in spent fuel because, although their formation doen not continue after removal from the reactor, their release from the fuel rods must be expected to continue.

Indeed, any releases of these gas es are generally traced to defects in the cladding. (16)

One ... ore expect that leakage of these gases fr... ent fuel stored will be proportional to the am... of spent fuel stored and the length of storage. "Some of the gaseous products diffuse out of (the) pellets and remain trapped in the plenum in in each fuel tube." (17)

Zimmer Spent Fuel Pool Considerations cont).

Once large numbers of fuel assemblies are in place, it will be impossible to determine which may be the source of any leakage into the pool.

While krypton is a Noble gas, there are indications that it can form associations with hemoglobin, and perhaps fatty tissues (18) and therefore cannot be entirely ruled out as an internal source.

Upon decay, it veilds beta, and occasionally gamma rays. Generally immersion is considered to be the prominant pathway of exposure (19).

Importance of storing Spent Fuel on site:

There is no argument that it is safer to store SF on site for a period of up to 6 months. Levels of radioactivity are significantly reduced during such a cooling period, (20) as indicated by the heat content decay curve.

Levels of short lived radionuclides will drop during such storage periods. (21)

Constipation of Nuclear Industry as result of difficulty in disposing of highly radioactive waste.

Each year 3 million lbs of spent fuel are being accumulated on site at the nations nuclear power plants. (22)

A total of 16 million lbs are presently being stored.

By 1992, when completion of the federal storage site might be realized, assuming any state will permit establishment of such a nuclear dump, there will be 24 to 30 million pounds. (6)

California has already passed a law which prevents new nuclear plants until adequate disposal techniqueshave been demonstrated.(23) Such laws are under consideration in a number of states, including Ohio (24).

Rather than slow down the front end of the cycle, the course of action being approved by the NRC is one of compaction, thereby exacerbating the problem, and increasing the danger of contamination at each plant site. (26) Obviously, the danger of spillage is proportional to the quantities of toxic substances being stored.

Furthermore, it is therefore clear that the danger of exposing Moscow, Ohio residents in general, and the Elementary School children in particular will be increased by the inevitable requests that will come from the Utility to allow compaction at Zimmer. Since it is <u>not</u> the function of the Utility to provide for storage, to allow such an accumulation of spent fuel on site would be in violation of the "As Low As Reasonably Acheivable" regulation.

Senator Gary Hart, Dem. from Colorado, and Chairman of the Senate Subcommittee on Nuclear Regulation, has labeled as"scandalous"the accumulation of two decades worth of nuclear waste in the absence of any means of safe disposal. He asks if we do not have a moral obligation to future generations. (25)

If a safety margin is preserved in the Zimmer operation such that no more fuel is permitted on site than a total of two core loads, then we must expect that operations there will have to be shut down in seven to eight years.

Since the demand for electricity has been dramatically slower in its yearly increase than the 10% sited by the utility in its early releases regarding the necessity of the Zimmer station, and since on the coldest day in the history of the region, only 44% of the generating capacity was being used, it is clear that this plant is not urgently needed at this current juncture.

A prudent course for the ASLB would be to disallow start-up of the Zimmer station until the need for additional electricity is clearly defined, thereby preserving that seven to eight years worth of electricity for a genuine emergency.

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22. State Journal (Lansing Mich.,) July 20, 1978.
23. San Deigo Union, July 12, 1978.
24. Ohio House Bill 527.
25. Sen. Gary Hart, in a speech before the National Press Club, May 8, 1979.
26. Robert Pollard, Union of Concerned Scientists, pers. comm., May 29, 1979.

Resume:

Dr. David B. Fankhauser

Born November 22, 1941.

Graduated high school from Olney Friends Boarding School, Barnesville, Ohio, 1959.

Graduated from Earlham College, Richmond, Indiana, in 1963 with a B.A. in Chemistry.

Worked as a research technician in the Dept. of Microbiology, U.C. Medical School from 1963 to 1965.

Participated in the Bacterial Viruses course at Cold Spring Harbor, L.I. during summer of 1967.

Conducted research in mutagenesis in the laboratory of Dr. Bruce Ames, Dept. of Biochemistry, University of California at Berkeley during the summer of 1969. (Dr. Ames has received widespread recognition for the development of the most sensitive test for mutagenesis/carcinogenesis to date.)

Received a PhD in Biology from the Johns Hopkins University, Baltimore, Maryland, in 1971. His thesis, "The Promotor-Operator Region of the his Operon in Salmonella typhimurium" was researched and written under the advisorship of Dr. Philip E. Hartman. It concerns the effect of mutations which alter the regulation of a set of genes responsible for the synthesis of the amino acid histidine.

Conducted research in human eco-biology relating to lifestyles which have minimum adverse effects on the environment from 1971 to present. This research was conducted on a small 11 acre farm in Clermont County. Key features of the experimentation involve heating with wood, selfsufficiency in milk (goat), and egg, and certain vegetable production, maximum nutrition from simple foodstuffs, reduction of dependance on utilities, etc. The Fankhausers have delivered all three of their children (Gabriel, Silvie Alice and Nadeen) at home. (He married Jill Munroe in 1968.)

Currently teaching Biology at Clermont College, University of Cincinnati, Batavia, Ohio, since 1973. Notable activites there include a study uncovering grossly inadequate sewage treatment facilites at at many of Clermont counties treatment plants, bio-gas generation, and intervention in licensing of the Zimmer Nuclear Power Station, located 11 miles from his home.

He has published papers in the following Journals and publications: Genetics, Journal of Bacteriology, Neurospora Newsletter, Health Forum, and the Earthenite.

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MR. WOLIVER: Dr. Fankhauser can be cross examined.

MR. CONNER: Mr. Chairman, inasmuch as this evidence of this material has been shown not to be reliable or probitive as evidence on contention six, on the basis of discussions yesterday , we have no cross examination.

CHAIRMAN BECHHOEFER: Staff?

MR. BARTH: Staff has no cross examination questions of Mr. Fankhauser.

CHAIRMAN BECHHOEFER: Miami Valley.

CROSS-EXAMINATION

BY MS. KOSIK:

Q Dr. Fankhauser, you stated that you did research at Johns Hopkins University; is that correct?

A That is correct.

Q Did you perform any research which might apply to the effects of radiation?

A I did.

Q Would you please explain that research?

MR. BARTH: I object to the question, sir. The contention is contention 6. Contention 6 is whether or not the plant will meet design objectives of Appendix I at the Moscow Elementary School. That is the scope of the contention and this question is irrelevant and immaterial. I move to strike the question.

MR. CONNER: We also object for the further ground of having an intervenor party closely identified with Dr. Fankhauser attempting to make evidence in chief in the guise of cross-examination and we will make this objection to any attempt to allow Dr. Fankhauser to recover from the errors he has made in submitting his evidence in this proceeding.

CHAIRMAN BECHHOEFER: Well, I think all Intervenors do have a right to cross-examine as per the decision of Prairie Island.

MR. CONNER: Cross-examine, but not evidence in chief,

not direct evidence, and this is clear from Prairie Island I believe. We are not here to try to have to fight six or seven attorneys trying to give evidence in chief from one witness.

CHAIRMAN BECHHOEFER: Well, the question should be limited to the scope of what is in the document supplied us.

MS. KOSIK: The document supplied deals with the effects of radiation which we were talking about and as I understand it Dr. Fankhauser's research dealt with the effects of radiation.

(Board conferring)

CHAIRMAN BECHHOEFER: Well, the contention itself relates to the doses at the school and I think you will have to connect it and show the Board how this testimony or these questions relate to the dosage at the school.

BY MS. KOSIK:

Q Dr. Fankhauser, do you believe that releases from Zimmer are as low as reasonably achievable to the Moscow Elementary School?

MR. CONNER: Objection.

CHAIRMAN BECHHOEFER: I think that's relevant.

MR. CONNER: It may be relevant, but it is also direct evidence. There has been no reliable, probative evidence put in the record on that point. Therefore, there is no basis for cross-examination.

CHAIRMAN BECHHOEFER: I think in paragraph three --

read paragraph three or sentence three.

MR. CONNER: That does not relate to Zimmer in any case. That is a generality which talks in terms of what the regulation itself says. So certainly that is not something that requires Ms. Kosik to try to ask a question about Zimmer on this generality stated in paragraph three.

CHAIRMAN BECHHOEFER: Well, I think the whole testimony must be read as applicable to Zimmer. Some of these have generalities that I think at the very least this says that this testimony seems to be somewhat related -- the second paragraph on the second page.

MR. CONNER: Mr. Chairman, on that paragraph three, that of course also talks about spent fuel stored for extended periods of time. I think the whole sentence has to be read. If you just take the word ALARA out of it, I suppose it's relevant, but the sentence read in its entire context has nothing to do with contention 6.

CHAIRMAN BECHHOEFER: Well, I think that, plus some of the later sentences, give a marginal applicability. Let's see where Ms. Kosik is going on that. I think the question she asked is within the scope of this testimony.

MR. BARTH: Sir, the question asked for a conclusion of law. It says is the dose as low as is reasonably achievable. It's asking a layman witness for a conclusion of law. We move to strike the legal conclusions. He's not qualified to state

what the law is.

MS. KOSIK: Mr. Chairman, I think from his background he's got the qualifications to state his opinions regarding releases of radiation.

MR. CONNER: So stated, that is further objectionable as an attack on Appendix I which of course states numerical values that the Commission has given and is not appropriate for the witness to give his opinion as to which Commission regulations are incorrect.

CHAIRMAN BECHHOEFER: Well, he's being asked, as I heard the question that he's being asked, as to whether the Zimmer plant complies with the regulation insofar as it affects somebody at the school. To that extent, I think the question is both relevant and material.

MS. KOSIK: Shall I restate the question or repeat the question?

CHAIRMAN BECHHOEFER: The question should be focused along the lines that I think your question was, but just t make sure -- the contention does say that the 10 CFR Part 50 Appendix I, which is the Commission's specification of what is allowable at the school, is not met at the school. So you question can be stated in that context and they must be.

MR. CONNER: In that case, as stated, we wish to object to this question because that would clearly be evidence in chief from this witness.

CHAIRMAN BECHHOEFER: Well, will you repeat the question?

MS. KOSIK: My question was: do you believe that releases from the Zimmer plant are as low as reasonably achievable for the Moscow Elementary School.

MR. CONNER: Same objections.

(Board conferring)

CHAIRMAN BECHHOEFER: I think if the words "as low as reasonably achievable" in your question are read as 10 CFR Appendix I, the question may be asked. Beyond that, we will have to see in terms of support. I think the answer to this is contained in this testimony so I think you may ask the question, construing the words ALARA as 10 CFR Part 50 Appendix I.

THE WITNESS: I think on a number of points the design of the plant and the plan for operations are clearly not as low as reasonably achievable as they relate to the Moscow Elementary School.

BY MS. KOSIK:

Q Well, in what manner could they be reduced?

MR. CONNER: Objection, Your Honor. Now that is -- certainly there's no basis in this document for so-called cross-examination on that point. I mean, that's just now clearly intent to put in evidence in chief through the device of so-called cross-examination and we think if the Board's ruling yesterday means anything this is totally improper and we object.

MR. BARTH: I would object to the question because it assumes facts not in evidence which is that the plant will not meet it. The case of Dow Chemical vs. Skagan 375 F2D 692 704 (1967) prohibits questions -- clearly states that questions may not be asked witnesses which assumes facts not in evidence. We have no evidence that the radiation releases from this plant will not conform with Appendix I. I object to the question because it assumes facts not in evidence, sir.

CHAIRMAN BECHHOEFER: Well, I see several statements in here which purport to give certain reasons why it will not conform to Appendix I.

MR. BARTH: Sir, I'm always leery to ask a judge to explain himself, but I do not find those statements in there, sir, and if you could direct me to --

CHAIRMAN BECHHOEFER: There's a whole list of alleged shortcomings, one, two, three, four. I think there eleven paragraphs of shortcomings -- eleven sentences.

MR. BARTH: Sir, I point out the first one says: "Since radioactive decay continues to produce heat after removal from the core, cooling is crucial to the safe storage of SF." I can state on behalf of the staff that this is true, but this has nothing to do with whether or not the plant will meet the design objectives of Appendix I at the Moscow Elementary School. You need to keep the spent fuel cool, but this has nothing to do with the question and has nothing to do with the contention.

CHAIRMAN BECHHOEFER: Well, the next two or three sentences -- I think reading these sentences as a whole, there is some basis given.

MR. BARTH: May I defer to your judgment with bad grace, sir.

CHAIRMAN BECHHOEFER: Yes. Well, it's up to us to decide whether the reasons are valid or not or should be given any weight. I think to the extent Ms. Kosik was trying to explore that, I think that's permissible.

MR. CONNER: Mr. Chairman, I would like to request that you rule specifically on my objection which has to go to this being not cross-examination but an attempt to put evidence in chief into the record, because none of these things relate to how it ucould be improved upon, whatever the question said, and I would request that the Board make specific rulings as sustained or denied because of the possibility that there will be a filing of exceptions.

MR. HEILE: Mr. Chairman, may I be heard?

CHAIRMAN BECHHOEFER: Yes.

MR. HEILE: I would simply like to hear what the witness has to say. I think we are taking more time bantering back and forth here as to whether or not his statement should be admissible. I feel the Board is adequately competent to make a determination as to whether these statements actually have any weight in this proceeding or not. We are in a quasi-judicial

administrative proceeding here. Perhaps if we could just carry on and if it gets too far afield I think the Board could quite easily say we've heard enough on this subject. So I would only like to hear what the witness has to say and ask that he be allowed --

MR. CONNER: May the record reflect that Mr. Heile was not here this morning and did not come in on the earlier colloquy on the admissibility of this evidence and the objections we have made on the basis of it. Since this is not evidence of Dr. Fankhauser at this point as Mr. Woliver submitted yesterday, that was the basis for our objection and Mr. Heile wasn't here at that time.

MR. HEILE: I would like to apologize to the Board but I had to arrange a meeting with counsel relative to the proceeding this morning. So perhaps he's correct, there was some ruling I was not familiar with.

CHAIRMAN BECHHOEFER: Concerning Mr. Conner's objection, I do read at the very least the last paragraph as a suggestion for improvement. I think the question could be asked, but it could only be answered in terms of what's in here, in your testimony.

MR. CONNER: I'm sorry, Mr. Chairman. Like Mr. Barth, I hesitate. The last paragraph underneath --

CHAIRMAN BECHHOEFER: The one that says if you don't start it you will cut the radioactivity. I would say that's a true statement.

MR. CONNER: I'm asking -- you're basing your rule upon a paragraph in Dr. Fankhauser's document and I just don't-- the last paragraph deals with need for power.

CHAIRMAN BECHHOEFER: Well, it also says to me if you don't start the plant you won't get the radiation. So I think the question can be answered, but only in terms of the particular suggestions that are in the testimony.

MR. CONNER: Mr. Chairman, I repeat again, this is a clear point on need for power, preserving the seven to eight years' worth of electricity for genuine emergency. It can't be taken out of context because that first part has nothing to do with radiation safety. It has to do with conserving electricity.

CHAIRMAN BECHHOEFER: Well, I think we would tend to read this testimony fairly broadly. Let's hear what the witness has to say, but limit your responses to what is actually included in your prepared testimony.

THE WITNESS: Well, I would like to ask the court a question or the Board a question. That is, I think that not only can points be made based upon my testimony, but based upon evidence that was submitted by the Applicant yesterday. Am I allowed to comment on and to draw conclusions based upon simple arithmetic which would clearly demonstrate that Appendix I is not being met for the Moscow Elementary School based upon evidence which has already been admitted by the court and which involves no complex computer code but merely addition and

calculation of percentages based upon evidence submitted by the Applicant yesterday.

MR. CONNER: Although that was asked in the guise of a question, I submit it was actually a substantive answer and move that it be stricken. It's certainly beyond the scope of the question asked.

MR. WOLIVER: Your Honor I think has made it clear that there also is a possibility here of providing rebuttal testimony. That would be in order and that would not have to be within the four corners of his prepared testimony.

CHAIRMAN BECHHOEFER: Well, that's correct. Rebuttal testimony may be offered. It must be within the scope of the testimony that has been put into the record. I think that any rebuttal should be kept separate from cross-examination on this testimony. Dr. Fankhauser may respond -- I think it should be kept separate -- he may respond to the testimony put in the record yesterday and later today, but he shouldn't do it in terms of cross-examination of his own testimony.

MR. WOLIVER: Okay.

MR. CONNER: May I inquire if the Board would ask Mr. Woliver if his question as to this being admissible as rebuttal indicates that he and Ms. Kosik are acting as co-counsel for Dr. Fankhauser?

MR. WOLIVER: Your Honor, this is ridiculous. You know there are separate parties here. Ms. Kosik is representing

the Miami Valley Power Project.

MS. KOSIK: Mr. Chairman, I would just like to agree with what Mr. Woliver said. We are certainly not co-counsel in any manner.

MR. WOLIVER: Our contentions are different in this hearing.

CHAIRMAN BECHHOEFER: Yes, I don't think Ms. Kosik and Mr. Woliver are acting as co-counsel, but we do see a different cross-examination on prepared testimony and the offering of rebuttal testimony. So I think we should keep them separate. It may be more appropriate for rebuttal type testimony for Dr. Fankhauser to come back after the Staff has put in its case and Dr. Fankhauser may be asked rebuttal questions then.

MS. KOSIK: Well, I'm not clear now if Dr. Fankhauser can answer the question I posed.

CHAIRMAN BECHHOEFER: I would say he can answer the question only to the extent that any so-called improvements are reflected in this direct testimony.

BY MS. KOSIK:

Q Dr. Fankhauser, can you answer the question: in what way the releases could reasonably be reduced?

A Yes. As stated in my testimony, there is wide agreement that there are no current means for disposal of spent fuel. The Department of Energy officials agree that the

earliest date that there will be a permanent depository for spent fuel -- the earliest date will be 1992.

MR. BARTH: I object to the answer, sir. We are not litigating waste management. I really would like to get back to contention 6. I will again stipulate on behalf of the Staff that it's possible to reduce the radiological releases from this plant. Counsel for the General Counsel's Office of the Nuclear Regulatory Commission stated that before the Court of Appeals yesterday. I will state it before this body now. They can be reduced.

The issue is not whether or not these radiation releases can be reduced at the Moscow Elementary School. I'm quite willing to stipulate somehow we can reduce the radiological releases. If they close the plant they can reduce the releases, but that's not what we're here about.

CHAIRMAN BECHHOEFER: That is made in the way of a suggestion?

MR. BARTH: I did not make a suggestion. You said that would be a possible solution and that, of course, is.

MS. KOSIK: Mr. Chairman, as I understand it, there are various factors that will affect the releases of radiation and spent fuel or waste material is certainly one of them.

CHAIRMAN BECHHOEFER: I think that's consistent with what we held yesterday. I think these questions have to have some connection with the school and the radiation dose at the

school.

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(Board conferring)

CHAIRMAN BECHHOEFER: I think there must be a connection between the school and the doses at the school, which is what the contention is all about. So you may explain what the connection is.

THE WITNESS: Certainly. That is what I am attempting to do. Maybe I can complete a sentence now. Even Mr. Barth is willing to stipulate that there are serious problems with the disposal of spent fuel.

MR. BARTH: I object to the characterization of my stipulation, sir. This is going a little far.

CHAIRMAN BECHHOEFER: I agree with that. I don't think Mr. Barth is willing to stipulate to that.

THE WITNESS: I understood that is what he said.

CHAIRMAN BECHHOEFER: I think he was willing to agree that radiation levels could be reduced. But that is not the same thing. He also stated what is in issue here is whether this plant meets the appendix I guidelines insofar as students at the school are concerned. So that is the scope of the contention. The answers have to be provided within that scope. But I agree with Mr. Barth, I think you are improperly characterizing what he earlier said.

THE WITNESS: I would be willing to agree that in order to draw a conclusion one has to provide a foundation from which to draw a conclusion. One can not draw a conclusion

out of thin air. What I am attempting to do is to lay the foundation from which this conclusion is drawn.

MR. CONNER: That, sir, is exactly the basis of our objection that this is improper evidence, because it was not submitted in proper form. Dr. Fankhauser himself admits there is no foundation for this so-called testimony.

THE WITNESS: I admitted no such thing.

MR. CONNER: I do not believe that the Board should reverse its ruling of yesterday in effect by allowing such evidance in chief to be admitted now in violation of the rules and its own order.

THE WITNESS: Sir, off the record, if we could. I think this is a transparent attempt to --

CHAIRMAN BECHHOEFER: No, we have to stay on the record.

THE WITNESS: THis seems a clear and transparent attempt to prevent me from presenting my testimony, and in effect muzzle what I consider to be a very serious problem with this plant, and leading to the ultimate exposure of elementary school children, which I would like, if given a chance, to show --

MR. BARTH: I move the Court direct the witness to quit arguing with the Court. Arguments should be made by counsel. I move to strike those remarks. If counsel wishes to make an objection, that is counsel's job, that is what lawyers are hired for. I do not like to see my profession

B3 taken lightly. This is how I make my living. I think counsel has to make the objections, not the witness. This is argumentive. I move to strike the comments by the witness, your Honor.

CHAIRMAN BECHHOEFER: I think the comments should be made by counsel, the objections should be made by counsel. Mr. Woliver, do you want to make a formal objection? I think the question that Dr. Fankhauser is being asked, the latest one, should be stricken, and if Mr. Woliver wants to file a motion or make a motion, you may do so.

MR. WOLIVER: I am not sure if a motion is in order. I think simply that another party wants to cross-examine Dr. Fankhauser as to the testimony presented, and hopefully that is what we will be able to achieve sometime this morning. I would make no motions right now.

CHAIRMAN BECHOEFER: Is there an objection to one of your questions at this stage?

MS. KOSIK: I don't know if there is an objection to one of my questions. I have asked it, but I haven't had an answer yet.

MR. WOLIVER: I think what happened, Mr. Barth objected to the characterization of his answer and that is where we were.

MS. KOSIK: Dr. Fankhauser had begun answering my question and I would ask Dr. Fankhauser, without referring to Mr. Barth's opinions, or whatever, would you please continue

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answering the question?

THE WITNESS: All right.

MR. CONNER: We have also objected on the grounds that Dr. Fankhauser states he is trying to lay a foundation for conclusions. We object to the answer on that basis and move that it be stricken.

CHAIRMAN BECHHOEFER: I think some foundation does appear here, at least in cross references. I think Dr. Fankhauser should be allowed to explain that. If it clearly goes beyond his direct testimony and the sources relied on, that will appear, and to that extent will not be permitted. But we have to find out first.

THE WITNESS: Excuse me. I am trying to find the direct testimony, so that perhaps --

CHAIRMAN BECHHOEFER: Off the record for a minute.

MR. CONNER: I am not sure the reporter got Dr. Fanhauser's statement while he was at counsel table.

THE WITNESS: There seems to be such a stringish adherence to what is and what is not included in my direct testimony --

MR. WOLIVER: Could we have Dr. Fankhauser refer to it, since it is entered as if read? It may help clear some of this up.

CHAIRMAN BECHHOEFER: Off the record.

(Discussion off the record.)

CHAIRMAN BECHHOEFER: On the record.

MR. WETTERHAHN: While there is a lull in the proceeding, let me give a reference I had promised to supply yesterday with regard to the fact that direct radiation was not a part of Appendix I.

The citation is 1 NRC 277, at 321, in the matter of Rule-making Hearing, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion As Low As Practicable for Radioactive Material in Light Water Cooled Nuclear Power Reactor Effluents. At page 321, referring to direct and scattered gamma radiation, the Commission stated: "It may be appropriate to issue in due course further guidance on levels as low as practicable from the radiation source, but we believe that such guidance should clearly be separate from Appendix I."

CHAIRMAN BECHHOEFER: That was on the record. We are on the record now for Dr. Fankhauser.

THE WITNESS: I believe in my testimony I have clearly documented that there are numerous problems facing the nuclear industry regarding the storage of spent fuel. And since the Applicant had no cross-examination on that matter, we presume since they had this in a timely matter that they have looked over it and have not found any errors in my summary.

MR. BARTH: That is not responsive to the question.

I object. I think personal comments by the witness regarding the conduct of Mr. Conner and myself are highly inappropriate. I realize there is some difference between this and a court litigation, I understand that, your Honor. But I think some kind of propriety should appertain. I object to the answer.

CHAIRMAN BECHHOEFER: Yes, stick to the substantive points, please.

THE WITNESS: As I have stated in my prepared testimony, Robert Morgan, the Office of Nuclear Waste Management, Department of Energy, has said that not before 1992 will offsite storage facilities be available. The result is that in all nuclear power plants, and there is no reason to believe that Zimmer will be an exception, that each and every nuclear power plant will be storing its own waste and in effect will be turned into a nuclear waste dump for the foreseeable future.

The result of that will be for the Zimmer spent fuel to become saturated with spent fuel in the period, by the Applicant's own admission, on the order of seven years. At that point in the event that there is any kind of untoward event which would require the unloading of the fuel from the Zimmer station in order to make repairs, such as an event that happened at the Duane Arnold nuclear power plant in Kansas, where due to a leak in the recirculating system, the

reactor required emptying, the reactor could not be emptied because the spent fuel pool was full. The only conclusion one can draw from such a situation as that would be that radiation levels would be unnecessarily high, compared to what they would be in the event that that spent fuel could be removed to a spent fuel pool. And certainly 1992 is a good 12 or 13 years from now, probably 12 years from the earliest time the Zimmer station might be licensed to operate. So we must anticipate that Zimmer station as well will be faced with nuclear constipation, as the whole industry is being faced now.

In that event, again, we must anticipate and in fact there is agreement, although disagreement about the extant of radiation released from spent fuel pools, that this radiation will be released into the refueling floor and will be vented directly out into the atmosphere. This will unavoidably result in radiation being delivered to the Moscow school and particularly according to which way the wind is blowing, and I have data which again is taken from the FES, which has been admitted and which I will be more than happy to show you, some of these wasts can be anticipated to be delivered to the school.

A major fraction of the radioactive releases from the spent fuel will be in the form of Crypton, Crypton 85. That is a noble gas. Noble gases, as the Board is probably

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aware, are chemically inert, or almost inert. Therefore they pose severe problems in filtering out these gases as they are released.

In fact, noble gases represent a major fraction of radioactivity released from all nuclear power plants, and there is no reason to believe that that will not be the case at Zimmer.

There are indications, as I have stated in my pre-submitted testimony, that although they are inert and can not be captured by ordinary chemical means at the plant, that these gases do form complexes with hemoglobin. In that event, Crypton 85, a radioactive isotope, would be absorbed into the blood stream and would constitute more than just an immersion problem, which is how it was characterized by the Applicant. It would then deliver radiation internally.

MR. CONNER: If Dr. Fankhauser is finished, we want to move to strike that answer on the grounds that it was evidence in chief improperly submitted, that it is irrelevant and immaterial to contention 6, particularly with regard to the fuel pool waste which was based entirely upon speculation that something might go wrong. And that the last part about affecting hemoglobin is an attack on Appendix I, which gives the numerical values.

MS. KOSIK: I would simply object to counsel's objection on the grounds that Dr. Fankhauser is still

attempting to answer the question that was put to him.

CHAIRMAN BECHHOFER: Well, I think the first objection we already overruled. We allowed the testimony to come in. I realize some of it was just reading back what is already in the record. That is not desirable from the point of view of building a large record, but it is not objectionable either.

I think we will deny the objection and allow the answer to stand.

MS. KOSIK: We have no more questions at this time.

CHAIRMAN BECHHOEFER: Mr. Heile?

MR. HEILE: Mr. Chairman, I have no questions of this witness.

CHAIRMAN BECHHOEFER: Mr. Wolfver, do you have anything else?

MR. WOLIVER: Would the Board have questions? I don't have any redirect at this time.

CHAIRMAN BECHHOEFER: The Board will have some questions, yes.

MR. WOLIVER: Okay. No redirect.

EXAMINATION BY THE BOARD

BY CHAIRMAN BECHHOEFER:

Q Dr. Fankhauser, the second sentence of your testimony states: "Sensitivity of humans to radiation varies by almost 10 fold the younger the individual, the more

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sensitive," and one of the sources you cite for that is Dr. Sagan. Are you aware of what else Dr. Sagan said in the same text?

A I am aware that Dr. Sagan is a pro-nuclear individual and for that reason I included that reference, because of the fact that that is an extremely, as I am sure you are aware, the characterization as a tenfold variation in sensitivity is an extremely conservative characterization and that is his characterization. I have the text here if you would like me to refer to it.

Q Are you aware of the sentence following the one you cited?

A Not offhand.

Q It is on page 487. It says: "This information has been at the disposal of the standards setting boards for a number of years and was carefully considered in establishing the standards at the current level."

Do you have a comment on that?

MR. WOLIVER: Here is the test you referred to. (Handing to witness.)

MR. BARTH: May I see the book to which you are referring?

CHAIRMAN BECHHOEFER: It is Dr. Sagan's book that was referred to in the testimony.

MR. BARTH: I am not as familiar, or have the

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expertise the Board has.

MR. CONNER: COuld we have the page reference again?

CHAIRMAN BECHHOEFER: Page 487.

MR. BARTH: Thank you, Mr. Chairman.

THE WITNESS: I would say that again the reason that I included this reference is that even an individual who is staunchly pro-nuclear admits that there is a tenfold, at a very minimum, tenfold difference in sensitivity, that the younger an individual is, the more sensitive that individual is to radiation.

I would, in addition, suggest that the recent evidence --

MR. BARTH: I object to the answer, sir. I realize it is the Board's question, not mine. I would like an answer to the Board's question, which is important. If he wants to soap box at some other time, fine, but I would like an answer to the Board's question, whether or not he considered the next sentance. I think the Board's question is real and appropriate and I would like an answer, sir.

CHAIRMAN BECHHOEFER: Yes, I would like an answer to my question.

THE WITNESS: I can assure you that I read not only the next sentance, but I have read much of this text.

CHAIRMAN BECHHOEFER: Dr. Sagan considers the

greater sensitivity that you mention as taken care of by theregulations. I don't know whether Dr. Sagan is referring to part 20 or Appendix I, but --

THE WITNESS: This text was written in 1974. I believe Appendix I is dated since then.

CHAIRMAN BECHHOEFER: I believe that is correct. So that is true, isn't it, that Dr. Sagan believes that the greater sensitivity is adequately taken care of by the then existing regulations?

THE WITNESS: Yes, I think that is probably correct. If you will note, I have a number of other references there that relate to the sensitivity of --

MR. CONNER: I object, your Honor. That is not responsive to the Board's question.

I would also submit that the answers are tending to question whether the Commission's Appendix I is validly drawn or not. I submit that is improper.

CHAIRMAN BECHHOEFER: What I wanted to find out is, first, were you aware of these views, and secondly, do you believe that the extra sensitivity of children is taken into account by Appendix I, or whether this plant will meet Appendix I.

THE WITNESS: As I have stated before, I do believe that the extra sensitivity of elementary school children is not adequately considered in the design and proposed operation of this plant.

BY CHAIRMAN BECHHOEFER:

Q You're not objecting to, I take it -- assuming Appendix I, you're not challenging Appendix I, I take it.

A I would know better than to do that at an NRC hearing.

Q Now, in terms of meeting Appendix I, the major reason why you seem to have assigned for not meeting Appendix I is the spent fuel storage.

Now, your next sentence seems to indicate that as spent fuel is stored on-site for an extended period of time that the radiation releases will be greater.

Now, I would like to see if that's what you do believe and what your basis for that is.

A I think that there is no question that anybody argues that the more spent fuel that is stored on-site the greater would be the of radiation from the plant.

Q This doesn't say that; this sentence here says that the longer spent fuel is stored, the greater the releases were.

Now, I read that as saying in some way you were trying to establish the releases become greater given the amount of spent fuel the longer that it is stored.

A No, that is a misinterpretation. Obviously, the longer a given spent fuel assembly is stored, the lower will be its releases. The point that I was trying to make was that the longer you accumulate spent fuel -- in other words, if you continue to add fresh spent fuel and you fill up the spent

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fuel pool that as time proceeds, the amount of radioactivity will increase. I do not mean to imply that one spent fuel assumbly would increase its radioactivity; obviously the opposite is the case.

Q Do you have any reason to believe that if the spent fuel pool were full, the current spent fuel pool, the one to which the license is being applied, do ylu have any reason to believe that the amount of radiation coming from that amount of spent fuel would exceed the applicable guidelines?

A It depends a great deal upon the integrity of the cladding of the spent fuel, and I think that that is a condition that is not directly predictable.

Once one has a spent fuel pool that is full, in the event that there is substantial failure of a cladding, it will be exceedingly difficult to figure out which spent fuel assemblies are contributing that radioactivity and will increase the difficulty in reducing radioactive releases from the plant.

Such difficulty would not obtain in the event that we have any idea about what we would do with spent fuel. As it now stands, it will have to sit there and I think the unavoidable conclusion is -- is that the radioactivity will be released in excess of what would be achievable if we had any idea of how to dispose of the spent fuel.

Q I'm asking in terms of what the applicant is seeking,

and that is known as being the spent fuel. I'm assuming now that the spent fuel pool is full.

Do you have any reason to believe -- well, you gave me the -- the question of the failed cladding; do you have any reason to doubt Mr. Rooney's assumption, I think it was, that 1 percent of the spent fuel would have damaged cladding? He spoke to that yesterday.

A I think all of us have experience -- I know the NRC has had some rather traumatic recent experience with computer programs that were improperly put together.

I am not an expert in the computer programs and I cannot judge whether the computer program used to make those calculations is correct. We tried to get out how those calculations were made yesterday, but were prevented from doing so by applicant; so to answer your question, I have no direct evidence that that computer program was inadequate.

But I think we must remember that the computer program -- it's not carved in rock. In fact, the NRC's experience is that computer programs have occasionally been shown to be improperly put together.

Q Do you have any idea -- I'm not sure all of this came from computer programming; I think some of this came from past experience also, but you -- do you have any experience to show the 1 percent assumption is incorrect.

A No, I do not.

(Board conferring.)

CHAIRMAN BECHHOEFER: I think that's all the questions I have. Mr. Woliver, do you have anything further?

MR. WOLIVER: No further redirect.

CHAIRMAN BECHHOEFER: Does any party want to ask further questions about the board's cross examination, the questions and answers by --

MR. BARTH: Staff has no questions based upon the board's questions.

MR. CONNER: No, sir.

CHAIRMAN BECHHOEFER: I guess you're excused.

(Witness excused.)

Mr. Barth, are you ready for your witness?

MR. BARTH: We are, your Honor. At this time we would call Mr. Wayne Britz to the stand.

Your Honor, as a technical matter of procedure, as you know, in the procedure in which we have hearings, the staff is to put in its FES, and I would -- prior to putting on Mr. Britz who will specifically testify to contention six, we will have the final environmental statement which sets forth basic staff evidence in respect to contention six.

CHAIRMAN BECHHOEFER: I'd like to ask if you plan to put into evidence the safety evaluation report as well?

MR. BARTH: At this time we're not planning to put it into evidence, the safety evaluation report. If you

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want an explanation, I'd be glad to give it at this time. It will be a little bit out of sequence, but I'd be glad to do so.

CHAIRMAN BECHHOEFER: I'd be glad to have you do so.

MR. BARTH: Page 22-1, the safety evaluation report, the Nuclear Regulatory Commission, paragraph 5, sets forth the conclusion that the staff finds that the applicants are technically qualified to design, construct, andoperate the facility for the purposes under the license.

At the present time, the staff does not intend to offer the safety evaluation report for the specific reason that we reserve our conclusion, which is set forth in paragraph f of page 22-1 of the safety evaluation report; I would like to inform the board that no odium may attach to the Cincinnati Gas & Electric as a result of our reservation at this time.

Three Mile Island was a very large accident -- a very large situation. There are professional committees investigating this thing; the commission has set up a special task force.

The staff is undergoing a review of our view of what is properly required for management control, operators, operating procedures for a plant, and this line here, reexamining all of our previous conclusions as to what may

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be required -- just as an example, we may come to the conclusions that we need three NRC inspectors at the plant and two more years of experience for the senior operating license.

This kind of thing has not yet been determined. The staff wants to reevaluate how Three Mile Island was managed and whether or not we should make different standards for managment at the present time.

Therefore, we cannot reach a conclusion today as to the technical qualifications to operate the plant. But again, no odium, I think, should attach to applicant.

Secondly, sir, in addition to Three Mile Island, we are undertaking a review of the entire inspection history of the construction facility. This review is not yet complete. I have great hopes that boty of these matters will be completely cleared up by the time we can come back to hearing; I hope November. Mr. Conner hopes we will come back sooner, which is reasonable.

At this time --

CHAIRMAN BECHHOEFER: Mr. Barth, I have one question, a series of questions about this subject. The direct witnesses -- and I guess some cross examination involved several sections of the -- the safety evaluation; certain portions were involved.

Is it your recommendation that this board not issue a ruling on the issue of the hearing today; the board before

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it rules on all of these issues would like certain information that I think was referred to by cross reference yesterday.

MR. BARTH: I believe that you're referring to the applicant's witness from Sergeant Lundy that made some reference to wind conditions in the SER, is that correct?

CHAIRMAN BECHHOEFER: I believe so.

MR. BARTH: Well, no operation can be granted without the board making a decision; no decision can be made without a full finding on these matters, on contention six at the present time; so I think we could possibly avoid the issue, sir.

CHAIRMAN BECHHOEFER: Okay, well --

MR. BARTH: We'll put the SER in of course prior to the conclusion of the hearing. I'm not certain of course that the agency regulations require it, because there are not contentions involving the SER, and in an operating license proceeding, the director of nuclear reactor regulations is authorized to make proposed findings which are upon matters no in contention.

But be that as it may, we will put in the SER.

CHAIRMAN BECHHOEFER: At some point prior to the conclusion of the hearing, the board does expect at least the portions of the SER that some of the witnesses referred to -- I think these should be put into the record.

MR. BARTH: I stipulate that they will, sir.

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CHAIRMAN BECHHOEFER: Thank you.

MR. WOLIVER: Your Honr, I would have a problem with that. You are correct that questionshave been aked based on the SER, but we would assume questions would be also asked of the NRC's witnesses today based on the SER.

And if I understand Mr. Barth, the SER will be potentially updated or reevaluated and submitted as evidence. At that time there won't be an opportunity to cross examine witnesses based on the SER.

CHAIRMAN BECHHOEFER: Well, if there's any changes in the SER, theportions that were relied on by witnesses yesterday, there might well be a further chance to cross examine on those portions to the extent the SER doesn't relate to the contentions or wasn't used in developing the contentions at issue, it won't be relevant.

But to the extent it relates to the contentions and to the extent that the witnesses relied on it referred to it, we can expect those portions, at least, to be in the record, and we have a commitment from Mr. Barth that they will be.

MR. WOLIVER: Your Honor, the problem is this is going to hamper our ability to continue on the case now without knowing what -- what the SER will be.

CHAIRMAN BECHHOEFER: I think you can assume it will be what you have, and if it's changed, we'll work out

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a way to take account of the changes.

MR. WOLIVER: I'm not sure --

CHAIRMAN BECHHOEFER: If it's changed in the areas that are at issue. We are going to have later hearings, and some of these witnesses might be recalled on the conclusions of the SER and particularly the sections which they relied. If that's changed, it changes --

MR. WOLIVER: Am I to assume there will be no ruling on contention six until after the later hearings? That would give us an opportunity to evaluate what's in the SER and conduct additional cross examination of the NRC's witnesses.

CHAIRMAN BECHHOEFER: I think that's correct, but we will discuss that more later.

I had personally thought the question was open; the record is not going to be complete and I don't think we would want to try to issue a partial initial decision early on contention six as well as the other three that we have here today.

So at least until the record is complete, we will not do so.

MR. WOLIVER: The other question would be whether or not we would be able to bring in rebuttal witnesses, if at a later date this would be brought in for evidence.

CHAIRMAN BECHHOEFER: Only on points relating to the contention.

MR. WOLIVER: Precisely, but as long as that opportunity is open, I'd like that to be stated on the record and made clear.

CHAIRMAN BECHHOEFER: It will be open to the extent that there's changes also; to the extent that there are changes in the parts affecting your contention.

MR. WOLIVER: The problem is I'm not sure whether we should bring in evidence on this right now if it may or may not be changed because we don't know what will be changed.

So it would seem more appropriate to wait until the final SER is out in the --

CHAIRMAN BECHHOEFER: Well, we're told the SER is being held up because of Three Mile Island, and we've already determined that the basic contentions we are considering now are not going to be affected by Three Mile Island.

If it should turn out they are, we'll reopen the record, but I think testimony may be introduced at this time.

Just a minute.

(Board conferring.)

CHAIRMAN BECHHOEFER: I think before we start on your witness, let's take a break of about 10 or 15 minutes until 25 of 11:00.

(Brief recess.)

CHAIRMAN BECHHOEFER: Mr. Barth, are you ready to go?

MR. BARTH: Yes, I am, Your Honor.

At this time we will call to the stand Mr. Richard Cleveland. Mr. Cleveland, will you please take the witness stand.

Whereupon,

RICHARD S. CLEVELAND

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

DIRECT EXAMINATION

BY MR. BARTH:

Q Mr. Cleveland, will you please state your name for the record?

A My name is Richard S. Cleveland.

Q Will you please state your present place of employment and your occupation, sir?

A I'm an employee of the United States Nuclear Regulatory Commission, Washington, D. C., 20555. I serve in the Office of Nuclear Reactor Regulation as a senior environmental project manager.

Q Sir, I show you a document and ask that you identify it for the record if you would, sir.

A This is a statement of my professional background.

Q Was this document prepared by you, sir?

A Yes.

Q Is the document true and correct to the best of your knowledge and ability, sir?

A Yes.

Q Will you briefly summarize your educational and professional background both for the purpose of the record and for the purpose of the parties who do not have copies of the document, sir?

A I graduated from St. Lawrence University in 1952 with a B.S. in physics. From 1952 to 1971 I was employed in various functions in the field of radiological health and health physics. In 1971, while working for the United States Atomic Energy Commission, I was assigned to the environmental projects group of that agency to serve as an environmental project manager responsible for managing the review, analysis and evaluation of environmental reports and preparation of environmental statements, pursuant to 10 CFR 50 Appendix D which was later changed to 10 CFR Part 1051 which relates to the requirements of the National Environmental Policy Act.

MR. BARTH: Mr. Chairman, I have distributed copies of the exhibit entitled "Professional Background of Mr. Cleveland" to the parties. I have provided the reporter with three copies. I ask that this be admitted into evidence as Staff Exhibit No. 1 in evidence, sir and that the document be made an exhibit to the record.

CHAIRMAN BECHHOEFER: Do any parties have any objection?

CHAIRMAN BECHHOEFER: The document will be admitted into evidence as Staff Exhibit No. 1.

(Whereupon, the document referred to was marked as Staff Exhibit No. 1 and received)

BY MR. BARTH:

Q Mr. Cleveland, I show you another document and ask you to identify it for the record if you will, please, sir.

A This is the Final Environmental Statement related to the operation of the William H. Zimmer Nuclear Power Station prepared by the United States Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation. It's dated June 1977 and it's identified as NUREG 0265, Docket No. 50-358.

Q Mr. Cleveland, does this document represent the staff's environmental assessment of the probable effects of the operation of the Zimmer facility?

A (Pause) Yes.

Q Was the pause in your answer because there are certain corrections and additions to the document, sir?

A There are several small corrections which should be made.

Q Mr. Cleveland, would you tell us what corrections and changes should be made to the text of the document which you have in your hand which is now an exhibit only?

A On page 3-18 there is a typographical error. In paragraph 3.2.6.4 on the first line of the text, a number is given for the curies per year as 1.9. This number should be

0.19. This number is a summarization or a carry-forward of the value from the second previous page and it was incorrectly carried forward and the correct value does appear on the previous page on page 3-16.

Q Mr. Cleveland, the parties are making corrections as you recite them, so please recite the corrections loudly, distinctly and slowly so they may make corrections in their copies, sir.

Will you please continue with the changes?

A Yes. On page 10-4 in Table 10.1, approximately the middle of the table for entry 2.3.2, the value is quoted as 15 millirem per year. The value should be 11 millirem per year. Once again, this table is a summarization of information presented earlier in the document and the correct value is given earlier and it was incorrectly carried forward to this table.

On page 5-24 in Table 5.11, the first entry in the table is given ain the right-hand column under calculated dose. The entry is given as 0.95 millirem per year. The correct value should be 2.7 millirem per year. Once again, this is a value carried forward from the previous discussion in the text where the correct value is given.

On page 5-25, the same error also appears in the second entry on Table 5.12 in the right-hand column. The value is entered as 0.95 millirem per year and the correct value is 2.7 millirem per year.

These tables are indicating the maximum dose which might have occurred to any organ for which the assessment was made and the incorrect figure was taken from the previous presentation of that information. The 2.7 was the maximal dose.

Q Are there any other changes or corrections to the text itself, Mr. Cleveland?

A No. There is some supplemental information which is in addition to the information presented in the document.

MR. WOLIVER: I didn't hear that.

MR. BARTH: Will the reporter please read the reply?

(Whereupon, the previous answer was read by the reporter)

BY MR. BARTH:

Q Mr. Cleveland, I show you a document and ask that you identify it for the record if you would, please, sir.

A This is entitled "NRC Staff Supplement to the Final Environmental Statement, William H. Zimmer Nuclear Power Station Docket No. 50-358, Radiological Impact of Radon 222 Releases."

Q Would you briefly summarize what this document is and why the Staff feels it necessary to supplement the Final Environmental Statement with this document?

A In a September 1977 memorandum to James Yore, chairman of the Atomic Safety and Licensing Board Panel, Dr. Walter Jordan pointed out that the value in Table S-3 of the Radon 222 releases does not accurately represent all sources of

radon related from the uranium fuel cycle. The information presented in this document presents a fuller discussion of the releases of radon 222 and modifies the presentation which had previously been given in Table S-3.

Table S-3 is shown in the Final Environmental Statement on page 5-29. The value for radon which is referred to in this supplemental document appears about two-thirds of the way down on this table under the entry "Effluents, Radiological, Gases, including Entrainment," and the first entry under that is radon 222. This document discusses the revised evaluations of the releases of radon 222.

Q Mr. Cleveland, will you please summarize a conclusion what the import of this document is you have your hand that you have identified as a radiological impact of radon 222 releases?

A The impacts of the uranium fuel cycle are summarized on page 10-2 of the Final Environmental Statement. The additional information presented in the supplemental discussion of the impacts of radon 222 do not revise that conclusion. The conclusion remains the same. The conclusion is that these impacts are sufficiently small so that when they are superimposed upon the other environmental impacts assessed with respect to construction and operation of the plant they do not affect significantly the conclusion of the benefit-cost balance.

Mr. Cleveland, I show you another document and ask

Q Mr. Cleveland, I show you anothar document and ask that you identify it for the record if you will, sir.

A This document is entitled "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives." It is issued by the Office of Nuclear Reactor Regulation of the U.S. Nuclear REgulatory Commission and identified as NUREG 0332. The date of issuance is September 1977.

MR. BARTH: This is a matter of law, Mr. Chairman, and I will offer as a matter of law that the Appeal Board has directed the Staff to assess more than just the cost aspects of the nuclear and coal fuel cycles. This document is a Staff assessment in response to the Appeal Board direction.

BY MR. BARTH:

Q Mr. Cleveland, that's a statement of law that you understand as a layman that this is the Staff's performance of a legal mandate of the Appeal Board to assess the relative health effects of coal and nuclear fuel cycles, sir?

A Yes.

Q Now, Mr. Cleveland, in the blue document that you have that you have identified there are several pieces of paper; is that correct, sir?

A Yes.

Q For a matter of a clear record, would you read the first several lines of each of the two loose documents so that the record will be able to identify these documents in the future?

A There's a one-page insert which begins, "In July 1977 the NRC organized the independent Risk Assessment Review Group to: (1) clarify the achievements and limitations of the Reactor Safety Study (RSS), (2) assess the peer comments thereon, and the responses to those comments, (3) study the present state of such risk assessment methodology, and (4) recommend to the Commission how and whether such methodology can be used in the regulatory and licensing process. The results of this study were issued in September 1978."

Q Does this one sheet of paper addition to NUREG 0332 update that NUREG as to the Commission's consideration of the US NRC Risk Assessment Review Group Report, NUREG/CR-0400 which in common terms is called the Lewis Report, sir?

A Yes.

Q Now would you identify for the record the second insert to NUREG 0332?

A The second insert consists of six pages, several pages of text and several pages of tables. It begins, "Since publication of the draft NUREG in September , the Commission directed the staff to reevaluate the long-term impact of radon-222 from the uranium fuel cycle. The reevaluations have been included in the Perkins, Pebble Springs and Black Fox Hearings records in May and June, 1978. Health effects estimates from radon have been conservatively extended into an admittedly uncertain future to incorporate periods ranging from

100 to 1,000 years. Similarly, the staff also extended health effects estimates of carbon-14 releases for 100 to 1,000 years into the future.

"These estimates have now been incorporated into the comparison of health effects for the coal and nuclear fuel cycles. The revised tables and Summary and Conclusion sections of the draft NUREG are attached."

Q Mr. Cleveland, does the Final Environmental Statement as supplemented by the document entitled "Radiological Impact of Radon-222 Releases", as supplemented by the NUREG 0332 "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives" which document has two additional supplements in it which you have just identified, represent the staff's present assessment of the probable environmental effects of the Zimmer facility upon the environment?

A Yes.

MR. BARTH: Your Honor, I have provided the reporter with three copies of these documents. I have provided copies of the documents to the parties. I request and move that the Board admit the Final Environmental Statement NUREG 0265, as supplemented by the document entitled "Radiological Impact of Radon-222 Releases", as further supplemented by NUREG 0332 entitled "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives" which document itself has two supplements, into evidence as Staff Exhibit No. 2.

I point out, Your Honor, that 10 CFR Part 51.52(e)(1) requires that in any licensing proceeding in which a hearing is held that the staff's Final Environmental Statement be offered in evidence. I so do so now and move that Your Honor accept it in evidence as Exhibit No. 2 as supplemented according to the testimony of Mr. Cleveland as the documents have been given to the reporter.

CHAIRMAN BECHHOEFER: I have one question myself first. Would it be easier for later references to separate some of these exhibits?

MR. BARTH: Your Honor, it seems that great minds in opposition run in channels. My co-counsel, Mr. Brenner, made the same suggestion. I turned him down. I would never turn down the Board's suggestion. Therefore, I will take the Board's suggestion and offer the Final Environmental Statement as Exhibit No. 2; the Radiological Impact Supplement as Exhibit No. 3; the NUREG 0332 Health Effects as Exhibit No. 4; the supplement which begins "Since publication of draft NUREG" as Exhibit No. 5; and the supplement pertaining to the Lewis Report, a one-page document beginning "In July 1977" as Exhibit No. 6.

CHAIRMAN BECHHOEFER: Does any party have an objection to our admitting Staff Exhibits 2 through 6?

MR. CONNER: We have no objection to No. 2 and no objections to 3, 4, 5 and 6, subject to reviewing them which we

have not yet had an opportunity to complete.

CHAIRMAN BECHHOEFER: Mr. Wolfver?

MR. WOLIVER: At this time I think Mr. Barth is purporting to make Exhibits 3, 4, 5 and 6 -- let me get my numbers straight here. The Final Environmental Statement would be Exhibit 2; is that correct?

CHAIRMAN BECHHOEFER: That's correct.

MR. WOLIVER: What is 3 and 4?

MR. BARTH: Exhibit 3 is a document of Radiological Impact. Exhibit 4 is Health Effects, the blue document you have in your hand, sir. 5 and 6 are the two supplements to the blue document you have in your hand, sir.

MR. WOLIVER: I would object, Your Honor, if Exhibits 3 through 6 are purported to be part of the Final Environmental Impact Statement. I believe that the staff would be required to at least distribute these 15 days prior to a hearing and if we get them today that is not sufficient time. That's a violation of 10 CFR Part 51.52.

MR. BARTH: May I respond to this, Your Honor?

CHAIRMAN BECHHOEFER: Yes.

MR. BARTH: First of all, this is not Staff prefiled testimony; therefore it does not come within the purview of the rule cited by counsel. These are staff positions which are mandated to be introduced by the Commission, 10 CFR 51.52(b)(1). If counsel does not like the Commission's regulations, he has an independent avenue to challenge those regulations. This

proceeding is not the place to do it. This is done in compliance with the Commission's regulations. This is not prefiled testimony and, third, there are no contentions in this area and he has no standing to object. This is my position, sir.

CHAIRMAN BECHHOEFER: The Commission regulations require that we receive this material into evidence. The supplements do not appear other than Exhibit 2 to relate to any of the contentions, and they are not being offered with respect to any of them. So the Board will receive these exhibits in accordance with the Commission's rules and the supplements at least are not to be used to augment the staff testimony on any of the admitted contentions and will not be so used by the Board.

MR. WOLIVER: I would ask that my exceptions be noted for the record.

fols (Whereupon, Staff Exhibits Nos. 2 thru 6 were received into evidence.)

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MR. HEILE: Mr. Chairman, on behalf of the City, may I ask Mr. Barth to help clear this up. The document identified as exhibit 4, entitled "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives," I assume the Nuclear Regulatory Commission would require this document be prepared by the Staff? I am just trying to -- Mr. Barth, would you answer that?

MR. BARTH: Would you read the question back, Miss Reporter?

(Question of Mr. Heile read)

MR. BARTH: The answer, Mr. Heile, is no. The NRC speaks for the Commission and the Commission did not make such a direction. This was done in compliance with the Appeal Board's instruction. This is probably just a play on words, but I do wish to be careful to separate what the Commission mandates and what various organs of the Commission mandate.

MR. HEILE: Did the Appeal Board require that type of information be put in in licensing a plant? It seems it is rather generalized as to the health effects attributable to coal and our business today and throughout this hearing is to determine whether this particular plant will function within certain criteria established by the Nuclear Regulatory Commission. So I had some question as to what effect this has on this Board as far as coal goes.

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MR. BARTH: If the Board will pardon my impropriety in engaging with counsel, which I understand is improper, Mr. Heile, the Appeal Board instructed that the Staff assess the effects of coal on health and nuclear fuel cycle alternatives. The courts have in a number of decisions stated that the assessment made by the Nuclear Regulatory Commission may be made on a gneeric basis, without regard to any individual particular plant. Actually, the courts prefer that these assessments be made on a generic basis rather than one by one.

This is in response to the Appeal Board, in compliance with the rulings of the Federal Court of Appeals.

MR. HEILE: Well, our objection, our only objection would be insofar as we are talking about the effects of coal, I don't see the pertinence to this case, or the health effects attributable to nuclear activities on the whole. In fact, I am sure I would be prohibited from putting information in the record as to what effects nuclear power has on the population of the City of Cincinnati.

CHAIRMAN BECHHOEFER: Yes. When I accepted those exhibits, it was not for the purpose of augmenting any evidentiary presentations on any issues. The Board will not be making findings on those issues either, unless we find out that there is something in those documents that warrants further exploration, in which case all parties will

DB3

have a chance to address the issue.

The document is not being admitted at this time for purposes of any contentions.

MR. HEILE: Is it being admitted though into the record and will it become a part of the record in this proceeding?

CHAIRMAN BECHHOEFER: Yes, it will. But as I say, for the limited purpose of showing that the Commission Staff prepared the document required by the Commission and the Appeal Board determinations under NEPA, which this one was.

MR. HEILE: So it is not being admitted --

CHAIRMAN BECHHOEFER: The Final Environmental Statement itself does contain a comparison between nuclear and coal. This is a supplement to that. If this FES had been prepared after the Appeal Board's decision, I would think it would not be a supplement, it would be part of the discussion of alternatives, which does appear in the FES, in every FES.

MR. HEILE: So the action of the Board in admitting it doesn't go to the truth or falsehood of whether or not coal, or the special effects on the population of coal?

CHAIRMAN BECHHOEFER: That is correct. As of the moment, we have no issue before us realting to that. If we should decide to raise such an issue, then we would ask the parties to further address it.

MR. HEILE: Fine. I think that cleared up my questions. Thank you.

CHAIRMAN BECHHOEFER: The exhibits 2 through 6 will be admitted.

BY MR. BARTH:

Q Mr. Cleveland, may I direct your attention to page iii of the Final Environmental Statement.

Does the Staff of the NRC have a position on what environmental conditions shall be imposed upon the Zimmer license in order to assure adequate protection of the environment under the National Environmental Policy Act?

A Yes.

Q Will you please, one by one, set forth what conditions upon the license the Staff wants the Board to recommend in order to assure adequate protection of the environment?

A As stated in their Final Environmental Statement, the Staff concludes that the action called for under NEPA and 10 CFR 51 is the issuance of an operating license for Unit 1 of the William H. Zimmer nuclear power station subject to the following conditions for the protection of the environment. That is on the bottom of page 11. On page iii these conditions are set forth.

Starting off with iii, the environmental technical specifications will include requirements in the following areas, and then there are listed eight requirements. The current Staff position is that conditions of the license

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should include environmental technical specifications and spearately identified from the environmental technical specifications, conditions 1 and 3, which are set forth in this listing.

In addition, on page 5-9 of the text of the Final Enviornmental Statement are a number of conditions or commitments which the Applicant had indicated that they were planning to adhere to and the Staff has also regarded these commitments as they should be included in the conditions of the license.

Q Mr. Cleveland, you referred to the technical specifications. I show you a document and ask you to identify it for the record, if you would, sir?

A This document is a letter from the United States Nuclear Regulatory Commission to the Cincinnati Gas and Electric Company dated June 5, 1979. It discusses the Staff review of the Draft Environmental Technical Specifications which was submitted by the Applicant on December 14, 1978. It goes on to discuss the results of our view of the draft and that the Staff has proposed some modifications to the -e technical specifications as proposed by the Applicant. It discusses the revised or the draft specifications as revised by the Staff, which were provided to the Applicant.

Attached to this letter is a document dated May 16, 1979, entitled "William H. Zimmer Nuclear Power Station

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Unit 1, Environmental Technical Specifications, Non-radiological."

Q Sir, are they the environmental technical specifications which the Staff intends to have imposed upon the license for the Zimmer facility, if such license is ever granted?

A Yes.

MR. BARTH: Mr. Chairman, counsel for the Staff was a bit inaccurate in his statement of law. We will, that is, the Director of Nuclear Reactor Regulation, will impose as conditions to the license, if the license is ever granted, condition 1 on page iii, condition 3 on page iii of the Final Environmental Statement, the transmission line practices set forth on page 5-9 of the Final Environmental Statement, and the environmental technical specifications which accompanied the letter dated June 5, 1979, signed by Ronald Ballard, Cincinnati Gas & Electric.

All of these documents are an exhibit except for the June 5, 1979 letter, which imposes the environmental technical specifications. I request that the Board accept into evidence the letter of June 5, 1979, signed by Ronald Ballard, as the Staff exhibit number 7 in evidence.

These are the environmental technical specifications, accompanied by a transmittal letter which explains the variations between the Final Environmental Statement as it

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was issued in 1977, and the Staff's present position, sir. As you will note by the transmittal letter, copies of the environmental technical specifications have been served upon all of the parties.

CHAIRMAN BECHHOEFER: I would like to ask the Intervenors, and the Applicant also, whether they ever received copies of the attachment to that letter. The Board's first communication did not have attachments with it.

MR. CONNER: If I can respond to that, your Honor, I don't know if it was attached to the letter, but we of course know what they are and we accept them.

MR. WOLIVER: To my knowledge, I can state definitely we have not received the attachments.

CHAIRMAN BECHHOEFER: The certificate of service says that you were sent the attachments, but as I mentioned, the Board's copies didn't have the attachments attached. We had to get them subsequently. Ms. Kosik?

MS. KOSIK: I don't believe I received the attachments.

MR. BARTH: Mr. Chairman, served or unserved, this has no relation to any --

CHAIRMAN BECHHOEFER: That is what I was going to ask you, is there anything in the tech specs that would affect any of the, or that could be changed as a result of any of the particular issues under consideration here today?

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MR. BARTH: No, sir.

CHAIRMAN BECHHOEFER: I realize these are non-radiological.

MR. BARTH: That is correct. The radiological matters will be taken up in the radiological tech specs which are separate and not part of the environmental technical specifications.

CHAIRMAN BECHHOEFER: With that in mind, does anybody object to the admission of this document? This will be Staff exhibit 6?

MR. BARTH: 7, sir.

CHAIRMAN BECHHOEFFER: Hearing no objection, that document will be admitted as Staff exhibit 7.

(The document was marked Staff exhibit 7 for identification and was received in evidence.)

MR. BARTH: Thank you.

BY MR. BARTH:

Q Mr. CLeveland, has the Staff deleted from its previously desired environmental conditions conditions relating to the water quality and water monitoring?

A Yes.

Q Did the Staff delete these as a result of the Appeal Board's decision in Yellow Creek, which said that EPA has paramount jurisdiction in the water area according to

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the Water Pollution Control amendments of 1972?

A Yes.

MR. BARTH: Your Honor, as a matter of law, the Appeal Board directed in the Yellow Creek decision that the NRC should get out of the business of interferring with water quality. The Federal Water Pollution Control Act amendments kof 1972 said the Environmental Protection Agency had paramount jurisdiction and supervision. As a result, as a matter of law, we have withdrawn from this area, and the technical specifications and requirements relating to water quality and water monitoring we feel are beyond the jurisdiction of the Nuclear Regulatory Commission. That is why we have deleted the requirements regarding water monitoring and water quality, sir.

One further matter I would like to bring up in the environmental area.

BY MR. BARTH:

Q Mr. Cleveland, I show you a document and ask that you identify it for the record, please, sir.

A This is a letter dated February 28, 1978, from Stephen M. Schinki, counsel for the NRC staff, addressed to Samuel Jensch, Chairman, Atomic Safety and Licensing Board in the matter of Cincinnati Gas and Electric Company, William H. Zimmer Nuclear Power station.

MR. BARTH: Sir, I only have two copies. I ask your indulgence. I ask the witness to read the text, which

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consists of two sentences.

THE WITNESS: "Gentlemen: Enclosed are copies of a letter from the United States Environmental Protection Agency (EPA), which contains comments regarding the Staff's Final Environmental Statement in the captioned proceeding. The Staff will prepare a response to EPA's comments, and we will provide the Board and the parties with copies of that response as soon as it is completed."

BY MR. BARTH:

Q Mr. Cleveland, has the Staff, in compliance with this letter, provided the Board and the parties with a response?

A Not to my knowledge.

Q Is the factual reason for not responding that these matters are now covered in the 402 discharge permits issued to Cincinnati Gas and Electric for the facility and covered in the comments to the Final Environmental Statement, and our comments to EPA's comments to our Final Environmental Statement?

A Yes.

Q As a matter of counsel, your Honor, I do not intend to reply to the EPA as we have previously stated to the Board in our letter of February 28, 1978.

This completes our environmental case and we would then proceed to address contention number 6, sir, with the Board's permission.

CHAIRMAN BECHHOEFER: Yes, go ahead.

MR. BARTH: May the witness be excused?

CHAIRMAN BECHHOEFER: Yes, this witness is excused.

(Witness excused)

MR. BARTH: At this time we would call Mr. Wayne Britz to the stand, your Honor.

Thereupon

WAYNE BRITZ

was called as a witness on behalf of the Staff, and having been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BARTH:

Q Will you please state your name for the record?

A Wayne Britz.

Q And please inform us where you are employed and what is your position of employment?

A I am employed with the Radiological Assessment Branch of the Nuclear Regulatory Commission.

Q And what is your present occupation in that position, sir? Tell us in layman's language what you do for the Commission.

A I am an environmental physicist. I make sure that power plants, that the treatment of -- treatment systems for the power plants are adequate to protect the people and the environment.

That is, to make sure that effluents from the power plant conform with our regulations.

Q Sir, in the normal course of your business, do you make assessments of the radiological impact of proposed facilities.

A Yes, I do.

Q Is that the business of your Branch, sir?

A Yes, it is.

Q Mr. Britz, have you reviewed the radiological impact assessment in the Final Environmental Statement?

A Yes, I have.

Q Sir, have you looked at Dr. Fankhauser's contantion number 6?

A Yes, I have.

Q COuld you identify what the contantion says, sir?

A Yes.

Q We have the contantion. Would you summarize what the contantion's import is?

A The contention was that children at the Moscow Elementary School would receive more radiation than is permitted by Appendix I to 10 CFR part 50.

Q Mr. Britz, have you reviewed an affidavit of Harry E. Krug, Jr., which has been pre-filed upon the parties and the Board in this proceeding?

A Yes, I have.

DB13

MR. BARTH: Your Honor, we do not intend to introduce Mr. Krug's affidavit as our direct case.

BY MR. BARTH:

Q Mr. Britz, will you please identify what is the Staff's direct testimony in response to contention number 6?

A I would like to refer to our evaluation in the Final Environmental Statement. Also I have made additional ... calculations for the children at the Moscow School and who live in the Moscow town area.

Q Could we do this one step at a time, sir? For the record, what pages or what paragraphs of the Final Environmental Statement address contention number 6, sir?

A Section 5.4 addresses the radiological assessment. I would like to in particular refer to tables 5.6, 5.9, and 5.12.

Q Sir, is the entire Section 5.4, Radiological Impacts, which begins on page 5-15 part of the Staff's direct case on contention 6?

A Yes.

Q Are there other pages in the Final Environmental Statement, sir, that address contention number 6 of Dr. Faulkhauser?

A Yes. Page 11-8 has responses to comments on the Draft Environmental Statement, in particular items 11.5.9 and 11.5.10.

DB14 1 Q Does the Staff assessment in your professional
2 judgement demonstrate that the present design of the facility
3 will meet the Appendix I, 10 CFR part 50 limits at the
4 Moscow School?
5 A Yes, it does.
6 Q Mr. Britz, I show you a document and ask that you
7 identify it for the record, if you would, sir?
8 A It is a transcript of the hearings from yesterday.
9 Q I direct your attention, sir, to page 674.
10 A Yes.
11 MT. WOLIVER: Your Honor, could we have a copy of
12 that?
13 CHAIRMAN BECHHOEFER: We will lend you a copy.
14 MR. BARTH: Mr. Chairman, for the lack of copies and
15 the clarity of the record, may I ask that Mr. Britz read
16 from line 17 on page 673 through line 3, page 675? This is
17 two pages, but I think it will make the matter clearer at
18 this time.
19 (After pause) I am waiting for the Board's ruling.
20 CHAIRMAN BECHHOEFER: I am sorry. He may read that.
21 BY MR. BARTH:
22 Q Mr. Britz, the Board has granted permission. Will
23 you read the words so that we may understand the situation,
24 sir?
25 A Yes. "Mr. Wetterhahn: Perhaps I can explain.

DB15

Appendix I refers to doses due to releases of radioactive materials. Shine dose does not involve the release of a material from the site, and that is the distinction that the Commission made in RM-50-2.

"That was addressed in the rulemaking proceeding and the Commission chose to exclude it from the final Appendix I. I don't think there's any mention of direct radiation other than from radioactive materials once they have left the site.

"Chairman Bechhoefer: All right, is the exclusion on the basis that it doesn't leave the site or --

"Mr. Wetterhahn: I don't remember the factors that led up to it, but the Commission felt that it should not be included in Appendix I and which, as I said, speaks to materials leaving the site in doses due to that material.

"Overnight we will try to provide the reference to the particular part of the Commission's decision in the Appendix I matter.

"Chairman Bechhoefer: Okay, that would be fine.

"Dr. Hooper: I'd like to ask Mr. Rooney -- I know this isn't in Appendix I, but if the person were standing on the site boundary, this would be a source of radiation, wouldn't it?

"Witness Rooney: Yes, sir.

"Mr. Barth: Mr. Bechhoefer?

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"Chairman Bechhoefer: yes

"Mr. Barth: You may be aware in December the

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Environmental Protection Agency will promulgate 40 CFR part 190, which would control radioactivity from reactors. Thus proposed shine radiation and the discussion of shine radiation, which of course is not in Appendix I -- Appendix I as it is written determines releases of radioactive material; this by its definition excludes shine radiation from it.

"However, the EPA has picked this up in 40 CFR part 190, which is proposed to be published in December. We will address this in our presentation on this topic.

"Chairman Bechhoefer: Okay, fine."

BY MR. BARTH:

Q Mr. Britz, in view of this dialogue or polylogue, will the proposed radiological technical specifications for the Aimmer facility include shine radiation as well as radiation emitting from releases from the plant of radiocative material?

A Yes, they will.

Q Now I ask you to bear in mind the Board's concern and I wish you would address a reply to the Board to explain to the Board and to me how the proposed radiological technical specifications will be meshed with the proposed regulations of the Environmental Protection Agency and how this has varied in the past from NRC's regulations, which only relate to radioactive releases from a plant of radioactive material?

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17 A Yes. The NRC is in the process of changing the radiological effluent technical specifications for all plants. These are to be effective December first, when 40 CFR part 190, the EPA regulation, becomes effective. This power plant will come under those regulations as it will be licensed after that time.

So under their technical specifications they will comply with Appendix I to 10 CRF part 50, which specifies doses to individuals and distinguishes between noble gases, particulates and the liquid pathway, whereas 40 CFR part 190 incorporates all pathways, including direct shine.

MR. BARTH: Mr. Chairman, I think it would be appropriate to cut out at this time from the contention 6 the direct material which we have already responded to. If the Board has questions in this regard, I think it would be appropriate for you to ask Mr. Britz while we are still on the subject.

CHAIRMAN BECHHOEFER: I think the parties should be given an opportunity to cross-examine before we ask questions.

MR. BARTH: This presents some problems, sir. This was a Board question, and we were trying to dissuade the Board of its concerns.

CHAIRMAN BECHHOEFER: Well, we have some questions, but I think we should wait until Mr. Britz is through and

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ask them at that time.

(Board conferring)

CHAIRMAN BECHHOEFER: At this time I think the Board would like to have one clarification. I know that we can look it up, but what does 40 CFR 190 require in terms of exposure or doses?

THE WITNESS: It rquires that the whole body radiation dose and dose to any organ except the thyroid be 25 millirem per year or less. And the thyroid dose 75 millirem or less.

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BY CHAIRMAN BECHOEFER:

Q Okay, you said those would actually become effective December 1?

A That's right.

(Board conferring.)

CHAIRMAN BECHHOEFER: I think we'll withhold our further questions until after cross examination.

MR. BARTH: Sir, this closes the staff's presentation on contention six; pages 5-15 through 5-30 and page 11-8, section 1115.9 to 1115.10 in the staff's view adequately address contention number six. Those are already in evidence in staff's exhibit number 2 in evidence.

We have nofurther direct of Mr. Britz.

(Board conferring.)

CHAIRMAN BECHOEFER: Mr. Britz, I did have one further question.

BY CHAIRMAN BECHHOEFER:

Q Where -- what is the location, if any, of the doses that is specified? Is that at the site boundary or is that anyplace?

A The ones in the FES?

Q No, the 25 millirem or the 75 millirem.

A Oh, I don't have the exact wording with me, but the idea is that it will be at the site boundary.

CHAIRMAN BECHHOEFER: I see. Okay, I think Mr. Britz can be cross examined. I think Mr. Woliver should

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go first.

MR. WOLIVER: If you'll give us a moment, your Honor.

(Pause.)

CROSS EXAMINATION

BY MR. WOLIVER:

Q Mr. Britz, directing your attention to page 5-17 of the final environmental impact statement, referred to as the FES --

MR. BRENNER: Mr. Woliver, I'm sorry, but I'm having a little bit of trouble hearing you.

BY MR. WOLIVER:

Q Directing your attention to page 5-17, table 5.5 --

A Yes.

Q In the calculations on table 5.5, it suggests there are three different -- three sources of radiation -- radiation dosage coming from the plant; is that correct?

A No, these present the chi over Q, the meteorological parameters that were used in calculating the locations of the maximum exposures.

They are not doses.

Q No, I'm not suggesting the chi over Qs are doses; I'm suggesting what is referred to as sources A, B, and C are three different sources of radiation.

A Yes, there are three sources.

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Q Are there three different sources or are there three sources --

A There are three different sources.

Q And the percentages of the sources A, B, and C are referred to in what table? Is it table 3.7 on page 317? Excuse me. What would be -- did you calculate the percentages --

A I -- no, because the dry well purge, source C, is contained in the reactor building amount. In other words, you've got both the continuous and the purge amount in that one column.

The mechanical vacuum pump can be singled out in the one column there; that would be source B from table 5.

Q I see, and that would be the second to the last column on table 3.7, is that correct?

A Yes, yes.

Q And that -- when you go down that column, you could arrive at a figure which would presumably indicate the amount of radiation by the mechanical vacuum pump.

A Yes.

Q Okay, then the percentage of radiation coming from the mechanical vacuum pump could be computed by adding the total -- the final column which is the total column; is that correct?

A That's correct.

Q Do you know whether or not there are any plans as

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to -- let me direct your attention back to table 5.5; describe source B, the mechanical vacuum pump, four times a year for 24 hours.

Just for clarification, were you to assume that this would operate four days, 24 hours, four times a year, when -- what stage would that be?

Is that during refueling or --

A It's during startup.

Q Presumably on those four days, would it be correct to assume that the releases from the Zimmer plant would be higher than average?

A Yes.

Q Would you be able to estimate how much higher percentage-wise the releases would be on those four days?

A Just as a percentage of the total it appears that mechnical vacuum pump -- I'm talking about the total of the four days.

The total appears to be about 40 percent of the total, based on total number of curies per year, that is.

Q So, were -- we could assume that four days -- or on those four days at least 40 percent of the total predicted releases would be released?

A I'm sorry; I really should take a better look if you want a percentage.

Q Sure.

A It looks more like on the order of 25 percent of the total.

Q Okay, on those four days, 25 percent of the total releases for the other 365 or 366 days will be released from the Zimmer plant; is that correct?

A Right.

Q Are you aware of any special provisions thathave been made by the applicants concerning those particular days when releases will also come from the mechanical vacuum pump?

A Would you repeat the question, please.

Q Okay. Are you aware of any special provisions that the applicants have made or plan to make concerning the particular days when the mechanical vacuum pump will be operating and releasing the radiation?

A No, I'm not.

Q Let me ask you a hypothetical question: if the applicants had special provisions to assure that the wind was blowing in a certain direction, say away from the direction of the Moscow School or another potential plant -- if these -- this plant -- the pump were operating on a day when the school was not in session and therefore no children were in the school building, would that present -- presumably reduce the total annual dosage of radiation received by the school children?

A Yes, it would.

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Q But to your knowledge no such plans have been made.

MR. BARTH: The question has been asked and answered, sir.

MR. WOLIVER: Okay.

THE WITNESS: I'd like to qualify my response; I'm assuming that the children when they're out of school remain in the Moscow area, in the area of the plant, and of course that was in line -- it would reduce the radiation.

BY MR. WOLIVER:

Q Assuming the days that the mechnical vacuum pump was operating, the children at the Moscow school were maybe a block or two away in their home, it wouldn't make that much difference, is that what you're saying?

It wouldn't reduce the amount of radiation exposure of the children?

A It would reduce it then.

Q Okay, could you clarify then what you've said before?

A Yes. You asked if the wind was blowing away from the school -- in other words, blowing in a northerly direction -- would the children in the Moscow area at the Moscow School receive less radiation.

I said yes. The answer is: that is correct. But that is assuming that when the children are out of school

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they remain in the Moscow area.

In other words, if the children when they're not in school were to move north of the plant, they would be in the path of the radiation plume.

Q I understand.

A Okay.

Q Do you believe that with the -- strike that.

In light of the proximity of the school to the reactor -- are you familiar with how close the school is to the reactor?

A Yes, I am.

Q Do you believe that it would be more prudent to assure that the school would not occupy -- or that the wind was blowing, at least if not in a southerly direction, which would presumably take the wind over the school site -- would it be prudent for the applicant to make plans that such would be the case when the mechanical vacuum pump was operating?

A As long as they were in compliance with our technical specifications which specify the amount of the cumulative doses that may be released we would have no objection to it, and would not tell the applicant to do otherwise.

Q However, it's true that the applicant could reduce the amount of radioactivity -- radiation exposure to the school children, presumably by operating the mechanical

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vacuum pump when the children were not in school or the wind were blowing in another direction.

A And the children remained at the school, yes, that would be true.

Q Okay.

Do you feel it would be reasonable for the applicant to make such plans?

MR. BARTH: Objection to the question, sir. The contention is whether or not the plant meets the Appendix I level for the school. The Commission is faced with this kind of objection all the time, and as I informed the board earlier, we argued the matter at the court of appeals yesterday.

I would stipulate again that equipment can be put on to reduce doses. The contention is whether or not the doses are in compliance with Appendix I for Moscow Elementary School and not relative to something else. We could-- I object to the question.

CHAIRMAN BECHHOEFER: I think your question should be in terms of Appendix I.

MR. WOLIVER: The purpose of putting on this evidence is two-fold: first, in the board's prehearing order, when the board mentioned its special concern and special consideration to contention six because of the school -- proximity of the school children to the reactor site -- I'm

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mindful of the mandates of Appendix I. We would like to show that it would be -- there would be a lower dose possible by a certain reasonable action that could be taken.

Also, we're mindful of the figures, the guidelines of Appendix I. I'm not sure whether or not the board would entertain a showing that there would be a lower than reasonable -- well, a more low and reasonably achievable dosage than what's been stated by the applicant.

CHAIRMAN BECHHOEFER: The regulations limited the types of conditions; now, at this point I would like -- maybe I could ask Mr. Britz one question: do you know what the date the application for the construction permit in this case was filed?

THE WITNESS: No, I don't know the exact date.

MR. BARTH: Sir, it's in the record; I recited it the other day. It was the 15th of June 1972.

My staff corrects me. I have the wrong year.

MR. CONNER: April of 1970.

MR. BARTH: April of 1970.

CHAIRMAN BECHHOEFER: I want to inquire of Mr. Britz how -- how the staff is evaluating -- just a minute.

(Pause.)

How the staff is evaluating the requirements of Appendix I, section 2, paragraph D?

THE WITNESS: That is the section which provides

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for a manrem calculation; the applicant has elected not to show a cost benefit analysis with a calculation for manrems around the plant, but to conform with RM 50-2; that exclusion is allowed later on in that ruling.

CHAIRMAN BECHHOEFER: I also see the dates it applies to. This application apparently was filed earlier than those dates. I'm again asking how the staff is evaluating compliance with that section.

MR. BENNER: Mr. Chairman, I think we're somewhat into a legal area. Further on in Appendix I in section 4, paragraph B, there is a provision that applies to applications for construction permits which would fit within the time of the operating licesne, which would fit within the time at issue here; that is, for each lightwater cooled power nuclear reactor constructed pursuant to a permit for which application was filed prior to January 2, 1971.

The holder of the permit or license authorizing operation of the reactor shall, within a period of 12 months, from June 4 1975, file with the commission and in effect the following paragraphs request the applicant to file information as to how they are going to keep the emissions as low as reasonably achievable.

Some people have read this, so that older vintage plants might be allowed to have releases over and above the appendix I releases that would apply to later plants.

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However, in this case, as in many other cases, the applicant has come in and committed to comply with the appendix I standards, not withstanding the possibility of an argument based on this paragraph that they didn't have to. It's been the staff's position that we'd like to see that kind of commitment and therefore it is being evaluated against the Appendix I requirements.

CHAIRMAN BECHHOEFER: Why couldn't that paragraph be read to require more than appendix I -- not more than Appendix I, but appendix I with its cost benefit paragraph. Nothing there I could see excludes that.

MR. BRENNER: It could be read to apply to Appendix I with the cost benefit paragraph; however, when you get into the cost benefit paragraph, as Mr. Britz, I believe, had started to explain.

That paragraph does permit the option of complying --

CHAIRMAN BECHHOEFER: I don't believe it does to these plants. And I think on that theory -- on that ground Mr. Woliver's questions are entirely appropriate.

MR. BRENNER: Do I understand your interpretation being that reactors that are of an older vintage could be required to have lower releases than the newer vintage reactors?

CHAIRMAN BECHHOEFER: I think that may be a crack through which something could slip, but I think that's the

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way the regulations work.

MR. BRENNER: I think I would disagree and say that would have to be an incorrect interpretation for this reason: reading within paragraph D of section two, which you had previously referred to, that paragraph starts out by providing the option of doing the detailed cost benefit analysis or simply complying with the proposed guidelines for the newer vintage reactors.

The paragraph then goes on to state that the older vintage reactors don't have to comply with any of that, and it leaves it up in the air at that point.

Then when you get to section four, which I did refer to, that --

CHAIRMAN BECHHOEFER: It's my impression that the older vintage reactors -- the contention that an applicant had to leave zero emission was an acceptable level; appendix I was designed to alleviate that problem and to take out of every case the cost benefit analysis. The ALARA just has it as a general statement, and unless the specific guidelines are provided, I don't believe there's any limitation to our considering on any costs, whether a low release might be --

MR. BRENNER: Mr. Chairman, I think you're referring to case law that talks about the lowest practicable standard for the Commission's rule making decision, and it is correct that cases litigated under the lowest practicable standard

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prior to the rule making decision didn't permit litigation in individual proceedings of what releases -- perhaps even down to zero -- might be as low as practicable.

However, the paragraph we've been referring to that applies to the older vintage -- I shouldn't say "older vintage reactors." It's really older vintage applications.

Thatis the Roman numeral IV, paragraph B, and it asks those applicants to provide such information as is necessary to evaluate the means employed for keeping levels of radioactivity in affluents to unrestricted areas as low as is reasonably achievable

I will submit that that is not a general term, like "as low as practicable" wasbecause 50-34(a) of 10 CFR has in fact defined "as low as is reasonably achievable" as being the requirement set forth in the Commission's rule making decision.

The definition set forth in the rule making decision and implemented through Appendix I are, among other things -- they even meet the proposed staff rule making design objectives, which is the path that Cincinnati Gas & Electric has chosen to go, or to the cost benefit manrem analysis.

CHAIRMAN BECHHOEFER: And I was suggesting that that path is not open to this applicant, and that the analysis in section D may be gone into, and I think the questions that have been asked would relate to that type of an analysis, part

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II-B.

MR. BRENNER: I guess I would respectfully disagree with an interpretation that would permit a reading that the releases --

CHAIRMAN BECHHOEFER: I didn't write the rules. I think that that's what they say.

MR. BRENNER: I believe the rule reference, as I said, is as low as is reasonably achievable, and that term is defined --

CHAIRMAN BECHHOEFER: That's part of it, though. The other exclusion from that is very specific. It relates to applications filed within a designated time period, which this was not.

This is -- I think on that ground I'd like to hear from Mr. Conner, but I think the question as asked is appropriate.

MR. CONNER: Mr. Chairman, in view of your statement, we request the right to submit a brief on this; this is so long ago that I don't remember, but I want to make two points: one, I do not believe the Commission adopted the concept of allowing new technology to release more activity than it would require of the existing plant releases at that time.

If that had been the case, you would have shut down all of the original plants, starting with Yankee, and so

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forth, if your interpretation were correct.

Secondly, I think this matter -- I have to check it -- is res adjudicata, because it is my recollection -- and I would have checked it if I'd known this was coming up -- that our commitment to comply with Appendix I values is incorporated in the construction permit hearing, but we'll check that and get back to you on that point.

But certainly our commitment to meet Appendix I was intended to provide the maximum safety to the public, and that is of course what we abide by.

CHAIRMAN BECHHOEFER: All I'm saying is I think the questions along the line about whether potential reductions for perhaps scheduling the releases that can be scheduled, that you should be required perhaps to do it on a Saturday or on a Sunday or something like that, four times a year, something like that; I would allow you to put in cost information on that.

But I would also allow you, the parties, to submit briefs.

Before we rule on it, I'd like to have briefs, but I think while we're here and while the witnesses are here, I --

MR. CONNER: I would like to state our position so there will be no question about it. We believe that the values stated in Appendix I are the applicable ones here, and

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that I suppose the best way to reduce the exposure of the children to these very, very low amounts of radioactivity would be to take them out of the school houses and teach classes inside the reactor.

CHAIRMAN BECHHOEFER: The point I was making is that if it does not cost the applicant very much to do these releases on a Sunday, for instance, maybe they should be required to do it that way, under the D paragraph, section 2-D paragraph.

MR. BARTH: Mr. Chairman?

CHAIRMAN BECHHOEFER: We could figure out with the $1000 per manrem which we're designated to use.

MR. CONNER: Sir, that would be impossible to operate the reactor on only Saturdays, Sundays, and holidays; it would take three days to get it up to power.

CHAIRMAN BECHHOEFER: I didn't say that. The releases in that table show that they come up four times a year, 24 hours. It is very possible to fit 24 hours into Saturdays and Sundays.

MR. BARTH: Mr. Chairman, I objected to the question: what would it be prudent for the applicant to do. In view of the discu sion, the staff very clearly, the legal staff takes the position that Zimmer is required to meet the Commission's most recent requirements, those that are as low as reasonably achievable as set forth in Appendix I; we

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differ and we will submit a legal memorandum of our position.

CHAIRMAN BECHHOEFER: I might add -- I'll repeat again, it's paragraph II-D. It's in there and there are exclusions for specific plants.

MR. BARTH: I understand, sir; I don't wish to engage in argument. I wish to state our position which is that numercial values are those which we feel apply to the plant. That's the way we -- I suppose at this point it would be easiest to overrule my objection and continue the questions, sir.

CHAIRMAN BECHHOEFER: Yes, we will permit the parties to file a brief on this matter. We will establish a schedule for that, and it will be a long time before we rule on it. So we'll be able to take into account the legal view.

You may answer the question.

MR. BARTH: I know the question, sir, to save the reporter trying to find it. The question is: would it be prodent for the applicantto consider whether the children were at the school.

MR. WOLIVER: We first said "prudent" and then we said "reasonable" afterwards. Prudent -- reasonable --

MR. BARTH: In that case, there are two questions and we shoudl have answers to each of them.

CHAIRMAN BECHHOEFER: He can answer both of them if he wants to.

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THE WITNESS: Before I answer that, I would like to take a look at Appendix I. My answer will depend on the meaning of that exclusion. Could I read that?

MR. BARTH: Sir, I think that in this case the board should instruct the witness to answer out of his own judgment. He did not ask for legal opinion or professional opinion. He asked if he thought it was prudent, and I think the -- for the witness to try and make a legal determination is improper. They're asking for a matter of judgment.

You've ruled that he can answer the question, and I'll accept that with my usual bad grace, and I would ask you to instruct the witness to answer the question as asked.

MR. WOLIVER: In asking it, I did not ask the question to have the witness make a legal judgment.

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THE WITNESS: The analysis was done on the basis that RM 50-2 applied to this plant. On that basis, as long as the effluent releases are able to be maintained within the design objectives of Appendix I Part (c), (d) and (a), I would not say that the doses need be reduced further.

BY MR. WOLIVER:

Q Do you believe there would be some advantage in reducing the doses below what are now the stated expected doses?

MR. BARTH: Sir, the word "advantage" is comparative. If you say compared to what, I would understand whether or not to impose an objection.

CHAIRMAN BECHHOEFER: Can you clarify that?

MR. WOLIVER: By advantage, I'm meaning potential health benefits or benefits to the safety and health of the Moscow Elementary School children.

MR. CONNER: Objection, Your Honor. That goes to the foundation. That goes to the wisdom of Appendix I as the Commission regulation. It's a direct attack on the regulation itself now.

MR. BARTH: Secondly, sir, I object because the witness clearly is not an expert in the possible health effects of doses of radiation which is what the question is.

CHAIRMAN BECHHOEFER: If he's not an expert on that he may so state and that will take care of it.

MR. BARTH: The determination of expertise is not

one for the witness to make, Your Honor. It's a matter of law. Clearly it's your decision whether he's an expert in this area, not his.

CHAIRMAN BECHHOEFER: Well, I'll have to look at his background here. I think it would be easier if he's not an expert in this field he can so state and that will be the end of that.

MR. BARTH: Except that some time I may have a witness on the other side who says he's an expert and I would prefer the Board to rule whether he's an expert or not. He has no background, sir, in the possible effects of cancer or other semantic or genetic effects of low level radiation.

CHAIRMAN BECHHOEFER: Does he have any background in the Commission's enforcement of paragraph 2(b)?

MR. BARTH: The question was whether it would be an advantage to the health of the people in reducing the dose.

CHAIRMAN BECHHOEFER: Well, I presume that 2(b) would only be imposed if there was some advantage to it.

MR. BARTH: I'm worried about the question, not the regulation, sir. So we have an objection by Mr. Conner and an objection by me that he's not qualified to determine health effects of increases or decreases of low level radiation.

CHAIRMAN BECHHOEFER: Well, if he isn't an expert in the area he isn't the right witness to answer the question. If he considers himself an expert in that field he may -- or put it

this way -- if in an analysis in the past of Commission's enforcement of Section 2(b) he has participated in that, he must have become familiar with some of the aspects involved in enforcing that paragraph. So he can answer on that basis. If he hasn't, he can so state.

With that in mind, you may answer the question.

THE WITNESS: May I have the question once again, please?

MR. WOLIVER: Would you repeat the question?

(Whereupon, the question was read by the reporter)

THE WITNESS: I do not believe there would be any significant advantage. In my personal opinion, there would be no significant advantage.

BY MR. WOLIVER:

Q Mr. Britz, do you feel that your area of expertise encompasses the effects of low level radiation on living organisms?

MR. BARTH: Your Honor, I object to the question. Very clearly, Moran vs. Ford Motor, which is 476 F2D 89, 1972-- I hate to belabor the point -- clearly states that his expertise is a matter of law. If you want to establish the foundation -- not meaning you, but if the counsel does -- he's going to have to start out with have you had courses on effects and studies and so forth and ask the witness. He's going to have to prove whether the witness' background and experience -- whether the

witness has special knowledge which demonstrates knowledge of the subject matter beyond that obtained by the general public. It's not a matter of the witness' judgment. That's a matter of law.

Now I think that to qualify this witness as an expert so we can play with Mancuso and Stewart and the National Council of Radiation Protection and the standards and the BEIR III is a waste of time, but the way to do it is not to ask the witness "Are you an expert." I object to the question.

MR. WOLIVER: I understand. What I'm trying to do is --

CHAIRMAN BECHHOEFER: I think he's trying to frame the questions to establish that.

MR. WOLIVER: Yes. I'm doing this so that we can establish whether or not my line of questioning starting with the preceding question concerning his opinion of an advantage should be relevant or not.

BY MR. WOLIVER:

Q Mr. Britz, does your professional background or academic background include knowledge of the effects of low level radiation on living organisms?

A Yes, it does.

Q Could you expand upon that?

A My courses include radiobiology and general health physics courses which of course discuss or includes the area of

effects of radiation at different dose levels.

Q And it's your professional opinion that reducing the radiation exposure levels below what they are already stated expected to be would be of no safety advantage for the children of Moscow School?

MR. BARTH: I object to the question. It assumes facts not in evidence. The answer was: "It's my personal opinion," not "my professional opinion," sir; and here we have a misconstruction of the witness' testimony and I think that it's difficult to understand what we're trying to prove. The witness professed a personal opinion, not a professional opinion. We haven't qualified him as a professional opinion in this area.

CHAIRMAN BECHHOEFER: Well, we'll leave it at that. He has a professional background and is expressing a personal opinion.

MR. BARTH: Sir, this is not a tort case in which we have testimony of people who saw it. We have expert testimony and we have lay testimony. This is the basic reason why there was no objection by the Staff in the admission of previous evidence which showed no expertise because the evidence was not substantial. In this case the witness testified to a personal opinion in compliance with the Board's ruling, but that has been misconstrued now that this is a professional opinion. These go to the weight of the evidence which the Board will

evaluate. They are substantial matters. If the Board rules, much against my desire, that a witness can answer personal questions, I have to take it; but those cannot then be construed later to be professional answers. There's a difference in weight of the evidence, sir.

CHAIRMAN BECHHOEFER: I recognize that, but I think the information which might affect the weight we might give to the answers should be as lucid as possible so I think the latest question -- I don't remember it precisely, but it sounded all right to me.

BY MR. WOLIVER:

Q Could you answer that?

A Restate it again, please. Let me state that I am giving my opinion and not a Commission opinion. The opinion of the Commission is that the plant must meet Appendix I levels which we have determined that they do. I am now answering in my personal opinion, whether you call it professional or personal -- it is my opinion that to reduce these releases further as, for example, from a mechanical vacuum pump, to levels which are fashions of the Appendix I or lower than the Appendix I levels would not provide a significant health benefit to the people.

Q I think you have read in another word and that is "significant." Would it provide some health benefit in your professional opinion?

A Not in my professional -- in my personal opinion. The reason is that this area is under a great deal of controversy right now. My interpretation of the readings from the BEIR Report and from other authorities in this field are that at these levels there would be no significant or what I would call a significant advantage.

Q Would there be some advantage?

A I don't know. I have read nothing and seen nothing that gives concrete evidence to that.

CHAIRMAN BECHHOEFER: Mr. Wolfver, would this be a good point in your cross-examination to break for lunch? It is getting close to lunch time.

MR. WOLIVER: For me it would be. I'm hungry.

CHAIRMAN BECHHOEFER: You have enough left so we could break now?

MR. WOLIVER: This would be a good point to break.

CHAIRMAN BECHHOEFER: Okay. I think we will break for lunch at this stage. We have quite a bit of material still to go over. Let's set it for a quarter to two.

(Luncheon Recess)

AFTERNOON SESSION (1:55 p.m.)

CHAIRMAN BECHHOEFER: Back on the record. I guess we are ready to proceed with Mr. Britz.

Thereupon,

WAYNE BRITZ

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

CROSS-EXAMINATION (Resumed)

BY MR. WOLIVER:

Q Mr. Britz, before lunch we were discussing whether or not the Applicant had considered any special provisions to be implemented when the mechanical vacuum pumps would be emitting radiation from the plant, four times during the year. And is it not true that you stated to your knowledge the Applicant did not consider any special provisions?

A Yes.

Q Let me ask you this: Has your staff at any time considered the necessity of implementing any type of special provisions with respect to Source B, the mechanical vacuum pump when it is operating?

A Yes, we have. And our decision was that if the plant is meeting our requirements as stated in Appendix I to 10 CFR 50, they are then as low as reasonably achievable. We will be issuing plant technical specifications when the plant is operating. They must follow these regulations,

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which will contain Appendix I to 10 CFR 50 and 40 CFR part 190. As long as they are within those guidelines, we determine them to be as low as reasonably achievable.

Q Therefore it is the Staff's position that as long as the Applicant is within the guidelines, you would not consider the imposition of any provisions which may reduce exposure to say a group of persons, such as the elementary school children?

A There might be some consideration that would occur. It would be on a specific basis. But generically we have nothing in mind.

Q Also prior to lunch you stated that you didn't see any significant health difference that could result from reducing the radiation exposure as it is outlined now to the Moscow elementary school children?

A That is right.

Q Do you know -- and I am asking you this in your professional opinion -- is any segment of the population more susceptible than the average population to the effects of radiation?

A Yes.

Q What is that?

A Well, there are several factors. It depends on the person's size, make-up of the person. One of the biggest examples in this plant here, or one of the biggest examples

in the evaluation here was the consideration of the infant drinking milk versus an adult. This is detailed in our section 5.4, when we consider the requirement meeting the 15 millirem dose for iodine and particulates. In that particular case the infant is much more susceptible to drinking one liter of milk a day than an adult is. So we consider the most critical person.

Q Therefore could we assume that age is a factor in susceptibility to radiation?

A Yes.

Q Are you aware of any studies done by Dr. Alice Stewart on fetal exposure to radiation?

A Yes.

MR. CONNER: Objection, your Honor. That line of questioning on fetal exposure certainly has nothing to do with the school children in the Moscow school, which is all contention 6 is involved with.

MR. BARTH: I also object, sir. We know of no school age children that are still in fetals.

CHAIRMAN BECHHOEFER: I think that is correct. The exposure is to school-age children.

MR. WOLIVER: It is possible the teacher could be pregnant.

CHAIRMAN BECHHOEFER: Well, I think the likelihood of that happening is small.

BY MR.WOLIVER:

Q Do you have your FES there?

A Yes, I do.

Q On page 11-8, section 11.5.9, you discuss the measure of radiation at Moscow Elementary School.

A Yes.

Q Now 11.5.9 is essentially a conclusion, is that right?

A Yes.

MR. BARTH: Sir, the document speaks for itself.

MR. WOLIVER: I am just leading up to something.

BY MR. WOLIVER:

Q That conclusion would be based on the tables you cited previously in chapter 5. Or could you say which tables this conclusion would be based upon?

A Well, this conclusion really refers to table 5.5 and 5.12. What we are trying to state is that when we analyze the site, we take the areas where the maximum exposure to an individual would result. We determine these locations to be 1.05 miles northeast on the site boundary for the noble gases, and for the nearest residence with a garden, we state it in table 5.5 to be in the north sector at .82 miles. These were the maximums. In arriving at those locations, we had also considered all locations around the power plant, including the Moscow school area and the town of Moscow. Those areas, however, were not the maximum exposure levels. So

DB5

what we have presented in tables 5.5 and 5.12 are the maximum locations for individual exposure. What we explain later on in chapter 11 is that the Moscow school area receives less dose and was therefore also acceptable.

Q From table 5.5 we can assume that the nearest land boundary site from the plant where the maximum exposure would be is 1.05 miles northeast of the plant?

A Right.

Q Are you familiar with the distance of the Moscow elementary school to the plant site?

A Yes, I am.

Q What is the distance, sir?

A Just a little over 800 meters.

Q Approximately .5 miles?

A Right.

Q Is it correct to assume that your statement here on table 5.5 that the nearest site is the land boundary where the maximum critical exposure is is northeast 1.05 miles is based upon assumptions concerning wind direction?

A Yes, it is.

Q Is it bas. upon any other assumptions besides wind direction?

A Well, in arriving at the values in the table, the meteorological staff has relied on the two years of plant data which was collected at the meteorological tower. After

analyzing that data, these chi over Qs were developed. These chi over Qs were the reason for our dose calculation equations to determine the location of the maximum exposed individual.

Q Are you referring to the data described on page 2-10?

A That is one form of summarizing the data, yes. The data that the meteorological staff uses is much more complicated than that, much more involved than just that one diagram.

Q COuld you describe that? Was the more complicated data that you are talking about, was that also obtained as a result of the two-year study?

A Yes.

Q The description on page 2-10 is one pictorial description of that study?

A Right.

Q Could you describe what other data you are talking about?

A It is the data that was described yesterday by Mr. Rooney. He summarized it very well.

Q I have a very short memory.

A That was a combination of temperature, wind direction and wind speed, which were collected over a two-year period.

Q Just for my own clarification here, on page 2-10 it is described as the Zimmer site wind rose for a period from

March 1972 through February 1974?

A Yes.

Q I believe Mr. Rooney yesterday testified that the study was made making hourly measurements over the two-year period?

A Yes.

Q And there were approximately 17,000 measurements made?

A Yes.

Q Just for my own clarification, the description of I think it is 16 vectors from the center point are the various wind rose directions?

A Yes.

Q The vector to the south, directly south, states 10.29 and 10.61. Is that the direction the wind is blowing to or blowing from?

A That is the direction the wind is coming from.

Q Therefore looking at that the maximum exposure based upon the wind blowing in that direction would be north of the plant?

A That's right. The wind is blowing from the south to the north.

Q As I understand it, the studies as described on page 2-10 were done by your Staff, is that correct?

A Yes.

Q Is it true that a two-year study would be

statistically significant to predict meteorological factors at a particular location?

A I am not a qualified meteorologist, but I will just state that I am quite sure that our meteorological staff would not use data that was not statistically significant. I would assume that their two-year period of data they considered significant to make their evaluation from. I don't want to state that as a meteorologist, of course.

Q You are not a meteorologist?

A That's right.

Q And could not speak to the methods used or the sufficiency of the methods used in this study?

A Right.

Q However, your conclusions in table 5.5 rely upon the study on page 2-10?

A Not 2-10. It relies on the type of data that is on table 5.5. And we had, of course, the tyep of data we have on page 5.5 we had for all sectors and all radiuses from the plant.

Q I am sorry, I may have mischaracterized that in my last question. The table 5.5 describes among other things the nearest site land boundary and again that is northeast 1.05 miles. That particular point, that particular fact, relies upon the study that was indicated on page 2-10. Is that correct?

A No.

Q What does that fact rely upon?

A Table 5.5 relies on the data that was collected at the plant over the two-year period. From that data chi over Qs were developed for all sectors and radiuses from the plant. And a portion of that data is presented here in table 5.5. It is not from page 2-10.

DR. HOOPER: Can I have a clarification? I can't hear you, sir. What was the last answer to the question? Would you please speak louder so I can hear your answers to the questions.

THE WITNESS: Certainly, sir.

(Answer read)

DR. HOOPER: I am not clear as to that answer. Are you saying that you did not use data similar to the ones in 2-10 in order to calculate the chi over Qs?

THE WITNESS: No, 2-10 just presents the wind rose.

DR. HOOPER: You used the direction over a year's period, didn't you, wind direction?

THE WITNESS: Yes.

DR. HOOPER: So in that sense you did use something within 2-10, did you not?

THE WITNESS: I was referring directly to my dose calculations.

DR. HOOPER: All right. You used directions represented there?

THE WITNESS: Certainly.

MR. WOLIVER: I think that calrifies my point, too.

DR. HOOPER: You were very vague on that, that was the reason neither one of us understood your answer.

BY MR. WOLIVER:

Q Would it be correct to say, Mr. Britz, that the conclusions that the maximum critical site land boundary determination is based upon the two-year wind study, wind rose study? Excuse me, the meteorological study?

A The meteorological study is based on the two years of data? Was that the question?

Q The finding in table 5.5 of the nearest site land boundary is 1.5 miles to the northeast may rely on other factors, but it does rely upon the two-year meteorological study?

A Yes, it does.

Q Let me ask you a hypothetical question, Mr. Britz. Getting back to table 5.5 and again to source B, which is the mechanical vacuum pump operated four times a year for 24 hours and operated prior or at the time of start-up of the plant, if all start-ups of the plant occurred with the wind blowing from the north towards the Moscow Elementary School, how would that affect the radiological doses at the Moscow School?

MR. BARTH: I object to the question, sir. The data source is the Davis versus Lower Bucks, 56 FRD 21, 1972, prhibits hypothetical questions based on facts not of record.

There is not fact in this record that the wind would all of the time blow in one particular direction. Therefore I object to the question and move it be stricken. It is not a proper hypothetical, not even under the new rules of Federal evidence, sir.

MR. WOLIVER: I would take exception to Mr. Barth. Under the new rules of evidence, it clearly would be acceptable. We are not assuming the wind blows one hundred percent in one direction. The table on 2-10 does indicate the winds blow at certain times in the direction of the school.

MR. BARTH: Mr. Woliver may be right. Maybe I misunderstood the question. Could I have the question repeated?

MR. WOLIVER: I said for the four times --

MR. BARTH: I think the question the reporter has is probably the question that was asked.

CHAIRMAN BECHHOEFER: Could you read the question?

(Question read.)

CHAIRMAN BECHHOEFER: I think that is all right.

THE WITNESS: That would be higher and that is why we have a higher chi over Q number for source B. It is to account for the fact that it is not happening on an annual basis, but on a portion of the year. If you will notice at the nearest site boundary source A is 5.9 E to the minus 7, whereas source B is 3.6 E to the minus 6. It is a factor,

nearly an order of magnitude higher than source A. The reason for that is bedause it is released intermittently. So we have build into the dose calculation a higher number for that reason.

BY MR. WOLIVER:

Q The higher number's built in. What percentage? I assume you are saying there is a conservatism factor here?

A Yes. Source B, the chi over Q is about a factor of 6 higher than source A chi over Q. That means if we took one curie of xenon 133, that that curie would give six times more the dose from source B than it would from source A. And all of those individual sources are matched up with their respective chi over Qs, and result in our final dose calculation.

DR. HOOPER: Excuse me, I am not sure I understand your answer here either. Those figures are on an annual basis, is that correct?

THE WITNESS: Source A is.

DR. HOOPER: I think what I understand the question to be is say that we took one-365th of the yearly figure and on a particular day with the wind blowing in that direction, is what I understood him to say, not that it is a yearly average, but there would be a higher dose with that particular wind condition for a given day.

THE WITNESS: That is true.

DR. HOOPER: But if it did continue for 365 days, obviously you would come back to the average you calculated?

THE WITNESS: Right.

BY MR. WOLIVER:

Q Getting back to the hypothetical question with the wind blowing from the north just the four times during the year, when the releases from the mechanical vacuum pump would occur, how would that affect your calculations listed under source B in your narrow site land boundary -- excuse me -- strike that -- your calculations as it affects the Moscow Elementary School?

A They would be higher.

Q Could you state by what amount?

A No, I can't right now. I could run it through our formulas with just that source term, but we put all the sources together and did one end result. I have not separated each individual source to get a dose.

MR. WOLIVER: If the Board will give us one moment here, we're seeing if we have any further questions.

BY MR. WOLIVER:

Q Mr. Britz, referring your attention to Table 512 on page 5-25, that's the comparison of calculated doses to a maximum individual from Zimmer operation with Appendix I design objectives. Again, I'd like to ask you whether in your assumption of what is the maximum individual one factor considered was the two-year metecrological study performed between 1972 and 1974?

A Yes.

Q Mr. Britz, in your conclusions concerning the maximum

dosage to the Moscow Elementary School children and teachers, did you consider occupancy factor?

A Yes, I considered that they were living there all the time.

Q Where would that be? How would that be stated and is that on any charts in the FES?

A No, it's not in the FES. In the FES I just discussed the maximum exposed individual and then a separate calculation for the Moscow area. It's lower than what is presented in Table 512.

Q Are these your own calculations that you have made or is this of record in the hearing somewhere?

A These were performed by our branch, the branch that I work in. These were not performed by myself.

Q I'm not talking about the occupancy assumptions calculations on a 100 percent occupancy.

A Those are mine.

Q Those are your own calculations?

A Right.

Q When were those made?

A Monday.

Q Those calculations also were based on the meteorological data in the two year study?

A Yes. Now actually I should correct that. Those doses were done at the time the evaluation was performed. I

did some refining on them on Monday but -- that's all.

Q Okay. But they also consider the meteorological study report by the NRC?

A Yes.

Q Directing your attention to page 11-8 again, in sections 11.5.9 and section 11.5.10 and section 11.5.10 describes predicted shine dose rates at the Moscow Elementary School and in that it was assumed that the children would be at the school one-fourth of the time during nine months of the year; is that true?

A Yes.

Q Was that assumption used in the preceding section, 11.5.9?

A No.

Q Were any occupancy assumptions made in 11.5.9?

A It was assumed that they were there all the time.

Q And therefore your assumption is based on the fact that Moscow Elementary School was not the maximum pathway or critical pathway?

A That's right.

MR. WOLIVER: I think we're done. Let me just check. We are done asking questions for Mr. Britz.

MR. HEILE: Mr. Chairman, we may have some questions to ask and insofar as I may have to leave to attend a city council proceeding I wonder if the Intervenor would not object

to my taking cross-examination out of order. I'm not sure who would follow Mr. Woliver anyway.

CHAIRMAN BECHHOEFER: The Board has no objection.

MS. KOSIK: We have no questions.

CHAIRMAN BECHHOEFER: Okay. So you're in order.

MR. HEILE: Thank you.

BY MR. HEILE:

Q Mr. Britz, I'll try to come around a little so I can see you. When you first came on the stand today you updated the testimony in the FES. One of your updates involved the table on page 5-25. The table is entitled 5.12. Under that table there's a section devoted to liquid effluents from the plant and if I'm not mistaken the calculated doses to the total body from all pathways was originally .30 millirems per year and that has been changed by your correction in today's proceeding to 2.7 millirems per year; is that right?

A No. It was the next one, .95, that was changed to 2.7.

Q All right. I can only assume that the numbers seem so different that perhaps you could tell me -- I assume that's not a typographical error.

A No. If you will turn to Table 5.9 on page 5-21, if you look under the location column, you see nearest fish production and going across in that row you will see a 2.7 for the bone and a .95 for the thyroid. It was just a transmittal

of the wrong number to the other table. They should have transmitted the 2.7 instead of the .95.

Q Okay. We discussed earlier with Mr. Rooney on the stand the methodology for calculating the Appendix I levels at the location of the school. Involved in that was a computer mechanism. I suppose you tried to determine what your design releases are going to be and then you used the meteorological data and so forth. I wonder for my benefit if you could describe that process a little bit in more detail.

A Yes. We have dose calculational codes that are described in regulatory guide 1.109. We factor in site specific data such as location of the nearest cow, wind direction and meteorological data, fraction of the year the cow is going to be in pasture and so forth, and then arrive at those calculations. The rest of the methodology is described in 1.109, but it's a combination of the standard codes and site specific parameters which we feed into the codes that we generate these numbers from.

Q So it's safe to say that the function is really to make a determination of an annual dose and not for any particular given day?

A No, we do take into account short periods of time too. That's why we listed three meteorological factors on table 5-5. That accounts for releases over shorter periods of time and we assign them higher chi over Q values.

Q But in taking into account a shorter period of time, that is also calculated to elicit a response in terms of an annual dose?

A That's right.

Q So it's conceivable that on a given day you may have a level which could compromise or consist of -- you answered this question perhaps -- could consist of as much as half of the total yearly dose? Is that possible?

A Yes, it is possible. The purpose of these calculations are just to determine if the plant will meet -- is able to meet Appendix I type design objectives. Actually, these may not bear any resemblance to the actual plant effluents and plant calculated doses during operation. The governing factor there will be the plant's technical specifications which will incorporate Appendix I in 10 CFR 50 and the EPA regulations 40 CFR Part 190. Those regulations must be met. These calculations are to show that the plant is capable of meeting those type of regulations.

Q So this doesn't tell us whether in fact the plant will meet it or not?

A What it will tell you it will meet is the plant technical specifications and the enforcement of those regulations.

Q Then we can assume that there may be a substantial difference at the full operational levels of the plant between

the doses of those school children after the plant's operational and the doses that are calculated in this document?

A That's true, but they must be under Appendix I, 10 CFR 50. They will be regulated by that in their plant license.

Q You mentioned in your cross-examination from Mr. Woliver there was a question concerning certain health effects. Mr. Woliver, if I'm not mistaken, asked you a question that perhaps something could be done to operate that vent -- I don't know if I have it right -- I guess I'd better use the right terminology -- I think it's the mechanical vacuum pump -- on a day the wind was blowing in the other direction, if that wouldn't reduce the amount of exposure to the school children and the question was asked if you thought that would be of any health benefit to your children and your opinion -- correct me if I'm wrong -- was that you didn't believe it would significantly affect it.

A That was my opinion, yes.

Q Do you know of anybody personally on the staff of the NRC that may disagree with that?

A I don't believe so, not right now. I can't think of anybody right now.

Q You haven't actually discussed that particular matter with anybody else on the staff?

A Yes, we have.

Q You have?

A Yes.

Q The matter of whether or not it might be of some benefit to operate that vacuum on a different day -- that's been discussed?

A Not specifically --

MR. BARTH: I object to the question. He's arguing with the witness' answer. He asked the question and the witness answered the question.

THE WITNESS: I have not discussed this mechanical vacuum pump in particular with regard to low level effects of radiation, just generic talks about it.

BY MR. HEILE:

Q Would you be familiar with anybody on the staff, for instance, that might feel that the proximity of the school to the plant because of the children involved, let's say within a three-mile radius, even causes a dangerous situation?

A I'd rather not answer for somebody else. I'm not aware of anybody right now.

Q Nobody has come forward to you and explained to you that they felt that could be a health hazard for children?

A No.

Q Mr. Britz, have you, yourself, conducted any experiments relating to the effects of low level radiation upon the human?

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A No, I have not.

Q Or animals?

A No, I have not.

Q So your familiarity is based upon the data that you reviewed?

A That's correct.

Q Are you aware that there's a significant body of professional opinion which is divergent from your view as to the low level effects?

A Yes, I am.

MR. HEILE: I think that's all. Thank you.

CHAIRMAN BECHHOEFER: Mr. Conner.

BY MR. CONNER:

Q Mr. Britz, isn't it a fact that the technical specifications for all nuclear power plants provide a technical specification that in the event the formula would indicate that there was anything approaching releases close to Appendix I levels that corrective action would have to be taken?

A That's correct.

MR. CONNER: No further questions.

(Board conferring)

DR. HOOPER: I have a couple questions about meteorology. I realize you're not a meteorologist, but you are supporting the staff's information here and I would like to go as far as I can with you on this.

MR. CONNER: I'm sorry, Dr. Hooper. We can't hear you at all.

DR. HOOPER: I don't have a microphone. I'm just about yelling as loud as I can.

MR. CONNER: I don't want to object, but I think I ought to hear it.

BOARD EXAMINATION

BY DR. HOOPER:

Q I was just curious about some other meteorological matters which I'm not familiar with and I realize you're not a meteorologist but you're representing the testimony in this area. I was wondering whether or not the staff considered other topographic effects in your meteorological calculations. Are there such things that would influence the chi over Q values, dispersion values, that are strictly topographical? You have a river valley there which has several tributaries and I'm interested if the staff did consider this sort of thing in their calculations.

A Yes, they do. One of the effects is the rise of the bluff farther back from the river. Another one is the wind direction tends to go up and down the river and you will have a recirculation effect. Those numbers are included in the values.

Q The predominant north-south axis of the river is significant influence on wind direction, is it not?

A Yes.

Q I was wondering whether there would be any -- thinking about concentration effect in the absence of a certain very good dispersal of materials with the river bluff effect.

Did you find any situations at which this would occur in the core dispersion? There may be some very high stability, but I'm not sure, near the ground.

A Yes, various locations from -- along the path --

Q You have taken this into account.

A Yes.

DR. HOOPER: Thank you.

BY MR. BRIGHT:

Q Do you know anything about the operations of plants?

A Not this plant in particular, but I am familiar with plant operations.

Q I was looking at the mechanical vacuum pump, that one that has to run 24 hours 4 times a year, and it appears to be that the principal thing that it pumps is the xenon 133.

A Yes.

Q Where does that come from?

A The mechanical vacuum pump is used to draw a vacuum on the condensor after the plant has been shut down. You need a vacuum on the condensor in order to get the whole plant system in operation. So what this pump does is draw a quick vacuum on the main condensor so the xenon and iodine 131 are exhausted out during that time.

MR. WOLIVER: Could you read that answer back?

(The record was read as requested.)

CHAIRMAN BECHHOEFER: Who was it that wanted it read back?

MR. WOLIVER: We did. He read it back.

BY CHAIRMAN BECHHOEFER:

Q Mr. Britz, in your general duties have you had occasion to analyze proposals to reduce the radiation in accordance with section II-D of Appendix I?

A Yes, I have.

Q Are -- among the various devices that may have been utilized, have scheduling devices been one that you're aware of?

A I believe -- not to my knowledge, not as far as the license regulations go, no.

Q And you said before that you are not aware usually of any technical specifications governing the periods of time when the vacuum pumps may be used?

A No, sir.

Q Would it be difficult to your knowledge to schedule vacuum pumps for particular days or particular hours and days; take a 24 hour period, so I guess I'd say a particular day.

A No, it wouldn't be difficult. You'd just be holding up plant operations during that time, but it's certainly not difficult to wait, just wait.

Q Could plant shutdowns be geared to projected tie

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of startup so that it would be possible to start up on a Saturday or a Sunday?

A No, my experience has been that it's very hard to project when a plant would start up: there are so many last minute things that could occur.

You generally don't meet a schedule that's set up even a week ahead of time. It's usually just proceed as soon as you can. But as far as following a schedule goes, that would be pretty hard.

What it probably amount to is the plant is ready to go and then you wait until that time.

(Board conferring.)

Q Is there any possibility that a vacuum pump in a system like this may hold up a release? By "hold up," I mean the operating would take place, but the release would be held up for a period of time.

A It's possible to do, yes.

Q Is it difficult?

A It's quite expensive; it requires deep bed charcoal filters, the same type of filters that you have -- that you have on the offgas system for this plant.

BY DR. HOOPER:

Q Why would you need a charcoal filter just to hold the gas and release it another time?

A Iodine 131 --

id4

Q We're not talking about that. I thought we were talking about noble gases.

A Well, this would be released from the condensor to the mechnical drafting pump; the iodides could be held up in a relatively think charcoal bed, but the noble gases require a large charcoal bed to hold them up. They don't adhere to charcoal as quickly as the iodine does.

(Board conferring.)

BY CHAIRMAN BECHHOEFER:

Q In terms of your table 5.5, turning for a moment to the other, the source C, the drywell purge, when -- it says 24 times a year for two hours; when is that normally done or could that be done, for instance, in the evening or at a time when school children weren't around?

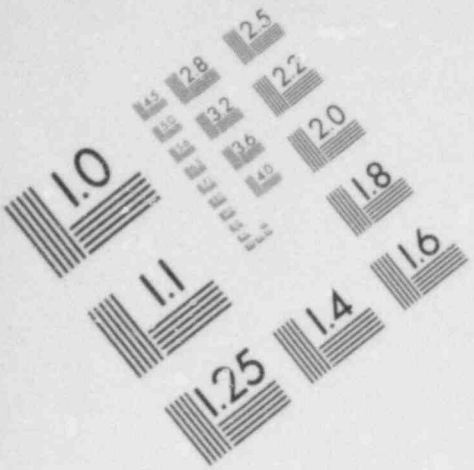
A I'm not familiar with all the reasons for drywell purging. I would imagine some could be scheduled, but I'm not sure if they all could.

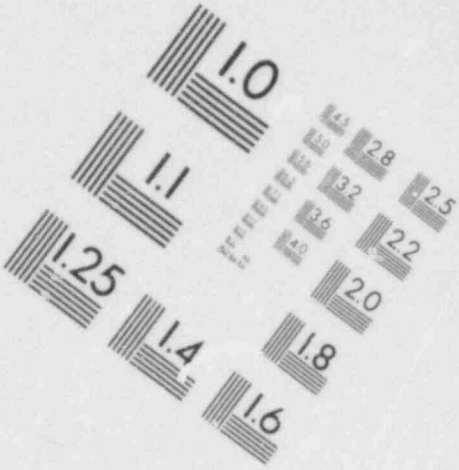
(Pause.)

Q Am I correct in saying that the drywell purge is a substantial forcing of the release during the period that happens, substantial portion of the release from the plant?

A Looking back at table 3.7 on page 3-17, the drywell purge would be part of the reactor building column, and it would be a portion of that.

In looking at that and comparing it with the total column, I would say it would be a small portion of the





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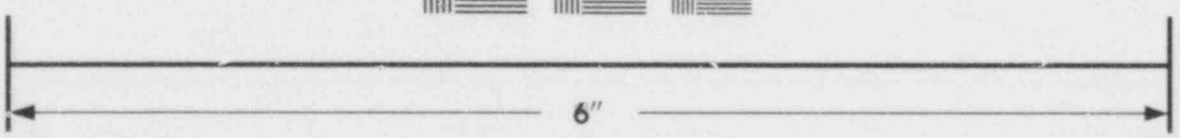

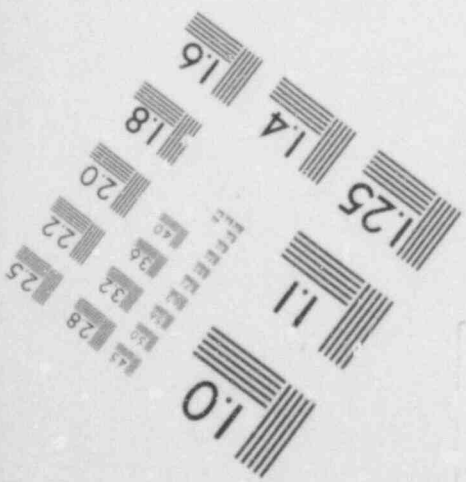

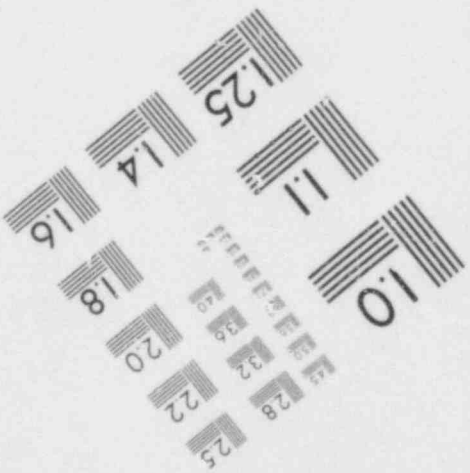

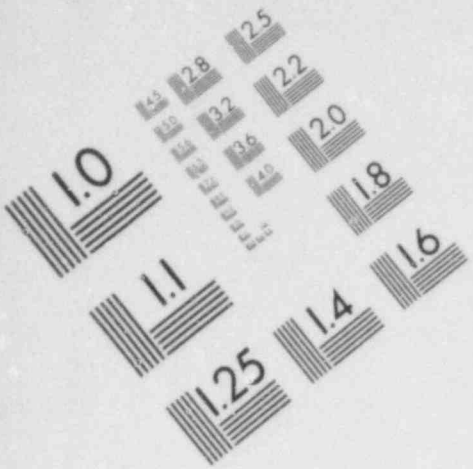

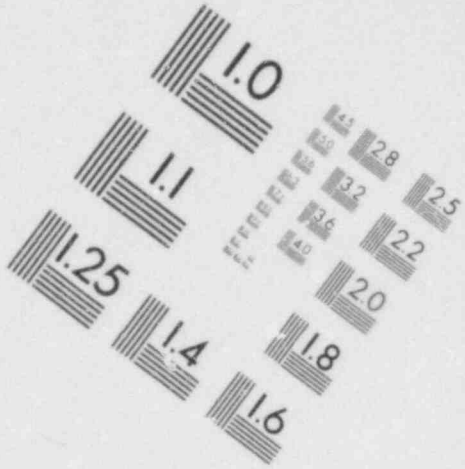

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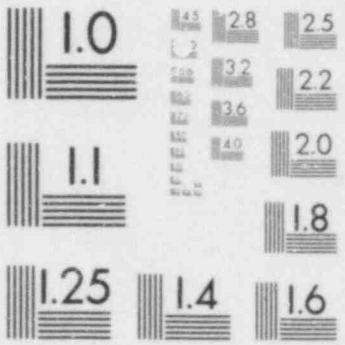

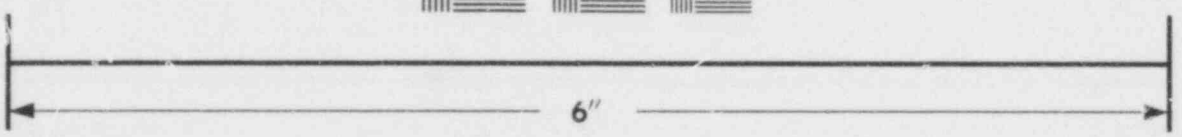

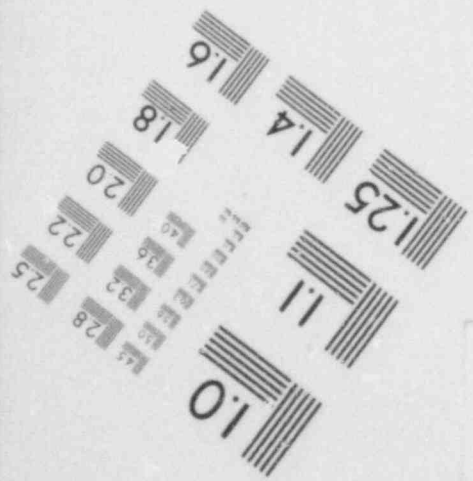

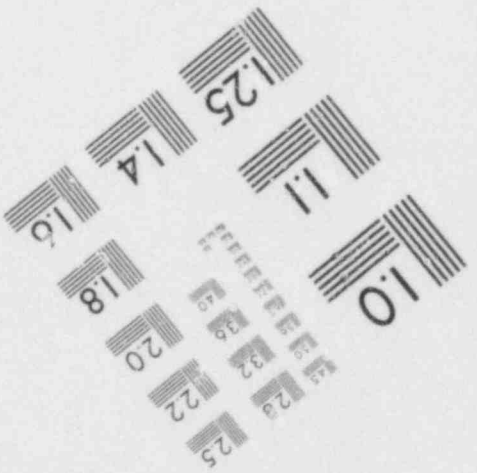

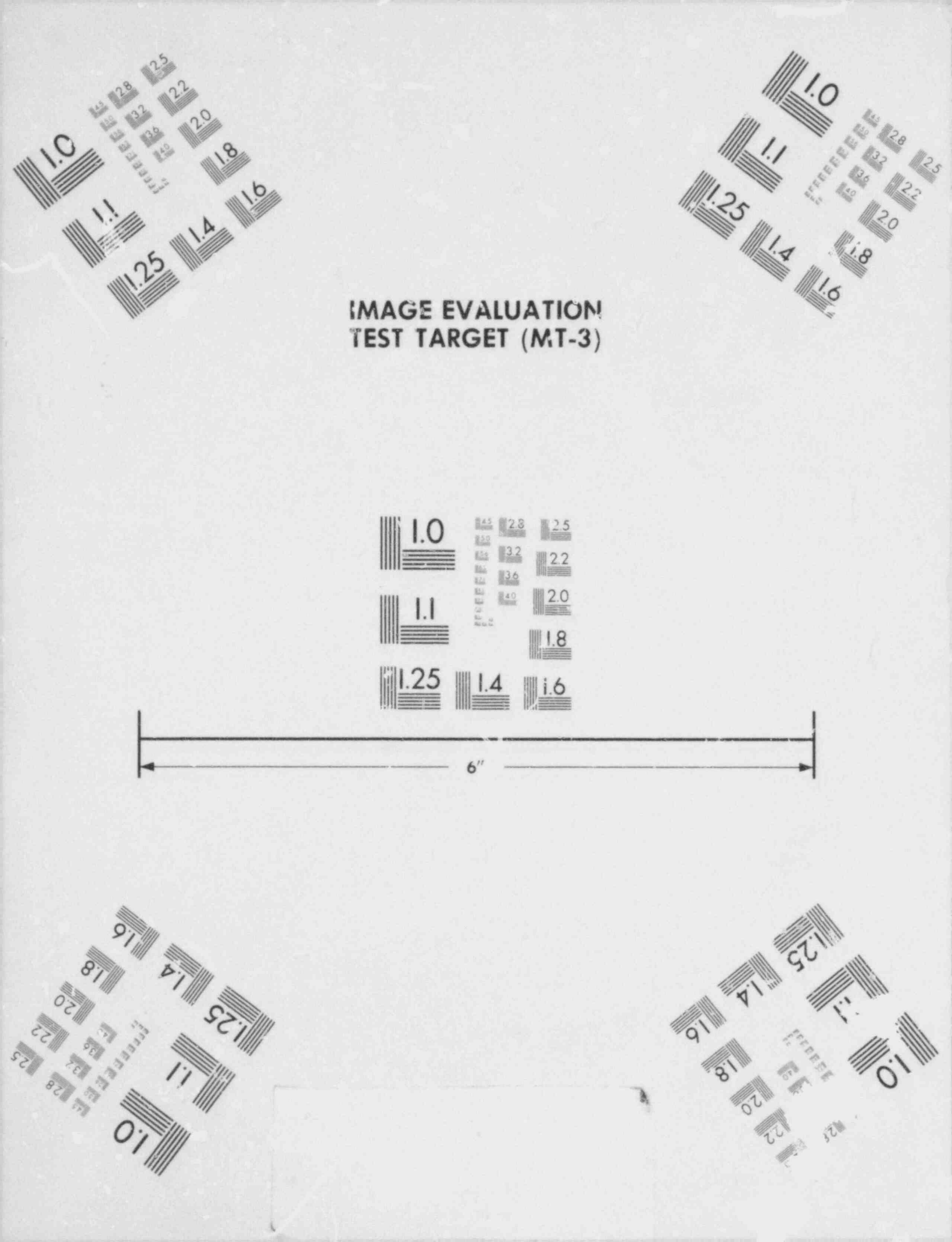
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Q Do you know which of the nuclides would primarily be involved with drywell purge?

A It would be your xenons and -- mainly your xenons.

Q Now, let me ask you a question which will have some assumptions: assume on the one hand the school is in full operation and assume on the other hand that no one is at the school, no children are at the school. Would there be a -- or could you give an estimate of the differences in the releases both from the vacuum pump and the drywell purge.

I don't mean add them together; you can do them separately as to what the manner and dosage would be.

A No, I don't have them separated off for those two -- two sources. We do present estimations on table 5-7, page 5-19, and there under "general public,"you have noble gas emission and under the "50 mile" column we have 14 manrem due to noble gases, and that includes all sources.

So your mechanical vacuum pump operation that would be on the order of 1 to 5 manrem, I would estimate, but I really don't have an exact number for you.

Q Well, what I'm trying to figure out is is there any possibility that, say, 5 manrems might cost less than $5000?

A We have done a manrem study on plants whose construction permits were applied for before 1971. This is published in NUREG 0389, and Zimmer is discussed in that, and

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it was determined that there was no system that could be added to the plant that would reduce effluents enough to be cost beneficial.

Q Well, were the scheduling possibilities that were raised here this afternoon discussed at all, considering --

A Yes, the way we do it is take away the whole source and determine if removing the whole source would be cost beneficial.

And we figured in the cost of the systems that would do it. It was be determined that there was no system that could be added to this plant for the gases or liquids that would be cost beneficial for our estimated normal releases.

(Board conferring.)

Q This isn't exactly -- removing the source isn't exactly what I was driving at. It depends -- I'm trying to develop a record at least on whether timing these various releases -- the one that's four times a year and the one that's, I guess, 24 times a year -- for periods of time when the school is the least populated, how that might be cost beneficial.

This NUREG 0389 -- is that document in evidence or not?

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A No, it is not. And I don't have a copy with me, but to answer your question: no, it would not be cost beneficial;

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no, it would not be cost beneficial to hold up the plant, to hold up the plant start up time or to add rad waste equipment that would reduce the effluents.

Answering the question before, I gave you the worst case situation, which included the one you're talking about.

Q Well, would -- would performing some of these operations at night, for instance, the source C, if that were done at night, to the extent that it was not precluded by other factors, that might not cost anything.

It might cost a little overtime or a little late pay; did NUREG 038 talk about that apparently or are you just scheduling workers to show up at 2:00 a.m. and do it?

A No, we were not considering releasing at different times; we were really considering normal operation effluents and normal system that could be added to control normal effluents.

We did not go into scheduling times, no.

Q That's what I'm driving at.

A No, I'm sorry.

(Board conferring.)

Q Now, I take it you haven't studied whether using some of these scheduling devices would be cost beneficial or wouldn't be cost beneficial using $1000 a manrem as a guide?

A No, but that is not part of the consideration.

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Q Do you know whether the scheduling of, what do you call them, fixes, scheduling davices have bean used before?

A Yes, they certainly have. I know of several plants who release their waste gas decay tanks, depending upon the meteorology. They will wait for the best time to release it. Because it is not critical whether they do it today or tomorrow. These are just hold-up tanks that don't normally affect the routine operation of the plant. And they will wait for the most favorable atmosph ric conditions.

Q Just to repeat, I take it you don't know whether the dry well purging operations are that type that could be delayed?

A I am not sure. I think it is probably a combination. Some could be and some probably not.

Q From what I understand, the mechanical vacuum pump, the use of that could not be delayed without delaying start-up?

A That is my general experiance, yes.

Q Is there any possibility of hold-up of what comes out of the dry well purge?

A Itis possible.

Q Would that be expensive?

A Yes, it woiuld. It would not be cost-beneficial.

Q Referring to the $1,000?

A Correct.

CHAIRMAN BECHHOEFER: That finishes my questions. Mr. Barth, do you have any redirect?

MR. BARTH: I do.

REDIRECT EXAMINATION

BY MR. BARTH:

Q Mr. Britz, you were asked whether you had calculated the dose at the Moscow Elementary School and you answered yes. Could you please tell us what that dose is, sir?

A At the Moscow school, the students, assuming they went to school and lived right next door to the school, total body dose would be about .03 milliram and the skin dose .065 millirem. That is noble gases. If I want to make an assumption that due to iodines and particulates, I would include the factor that there is a vegetable garden there and he is eating vegetables from that garden, and I will assume he is drinking milk from a dairy farm at .75 miles southeast, I will assume that that milk is brought into this child's location, he drinks that milk. His total dose then with iodines and particulates would be 5 milliram.

Q Sir, these assumptions you have made, in the real world that exists, are these assumptions likely to actually exist?

A It is possible but not probable, because the milk we consider is generally a family type cow, it is not sent to a dairy, you raise the cow and drink the milk right there.

But you could have a situation where the families have an arrangement to buy milk from the other local farmer. This is not milk that is processed through the local dairies. So this type situation could exist.

Q Now, sir, does this assume the milk is processed?

A It is not processed, no.

Q Does the processing of milk reduce its iodine content?

A Yes, it does.

Q Sir, to make the record clear, would you illucidate some of the conservatisms that are built into these staff calculations you have just made, sir? If I am not speaking loud enough, Dr. Hooper --

MR. WOLIVER: Before he goes on, I would like to object to this line of questioning and move to strike the answers he has made in reference to Mr. Barth's questions. I don't think Mr. Britz is competent and has the expertise, from his testimony, to make these calculations. He is assuming meteorological conditions based upon other perons' calculations.

MR. BARTH: In response, sir, I would point out the question was asked by Mr. Woliver on cross-examination and the redirect is merely to illucidate the question that Mr. Woliver asked. If he does not like the question he asked, that is his affair.

MR. WOLIVER: That would be irrelevant to my

objection. It stands. This is not competent evidence.

MR. BARTH: I am entitled to go into any matter raised on cross. I am going into a matter raised on cross.

MR. WOLIVER: If Mr. Barth felt it necessary to object to my questioning before, he could have done so. I am objecting to his questioning now because he is trying to illucidate evidence which is not competent evidence.

MR. BARTH: YOu can't have it both ways. I did not object to your question and there is no way you can withdraw your question. You asked the question. We lawyers often make mistakes, I ask questions I shouldn't ask, I get burned by it. That is how things are.

MR. WOLIVER: I beg to disagree with Mr. Barth, but he could have objected to my question.

CHAIRMAN BECHHOEFER: Let me just inquire, these calculations don't seem to be any different from the ones you submitted as part of your direct testimony, is that correct? These are the same type, they are not different?

THE WITNESS: The same type calculations, yes.

CHAIRMAN BECHHOEFER: Using different source figures, and different meteorological assumptions. I think I will allow the question both on the grounds that it arose on cross-examination, and I think in terms of the way the Staff analyzes its radiation exposures, this is normal practice. I think one staff member may rely on the work of other staff divisions. If there is any specific

challange to the people who did that calculation, perhaps they can be brought in. I think these are some assumptions that the Staff has used. I think it is a proper question. The objection is denied.

MR. WOLIVER: In the very least, I would need these persons to be brought in, because the body of evidence asked to be admitted, introduced here, is based upon the calculations made by experts who are not here, and not available for cross-examination.

We have some very serious questions with the meteorological data which has been derived.

MR. BARTH: Sir, the Appeal Board addressed this in the Point Beech decision. I call your attention to that decision. It states that experts may testify on the basis of experts. We are well aware that Mr. Britz is not an expert, but he is entitled to rely upon other experts in the agency and he has done so. We are far apart from the objection. The objection was that Mr. Britz could not expound assumptions which are conservatively used in making calculations as to the dose at the Moscow school. Mr. Woliver asked the question as to the dose at the Moscow school, he is stuck with his question. I would like to hear the conservatisms.

CHAIRMAN BECHHOEFER: I think we can hear the answer. I think Mr. Britz is allowed to rely on the work

of other experts. Certainly unless I hear some specific fault in that work, I think we can rely on it.

MR. WOLIVER: There is no way that any of us can know whether there is a specific fault in that work until we are able to cross-examine those experts which developed the data. They are not available for cross-examination. It is assumed as being true and we dont have any opportunity to cross-examine those experts. I am not an expert, but I don't believe that a two-year study indicates meteorological averages.

MR. CONNER: Your Honor, we object to this continuing arguing with delaying the hearing. Mr. Woliver has had three years to complete discovery in this case. If he discovers something now, he should have done somstime ago, that is no excuse for delaying this case by continuing to argue something after the Chair has ruled. We have many witnesses here that we are trying to put our case in with, and we object to this continuing harange about decisions.

MR. WOLIVER: This is not a delay. I assumed that in the NRC presentation of the case that they would bring in the experts to verify the data which they have presentad. They have not done so.

MR. BARTH: I will forego further argument. Could we have the witness respond for the record?

CHAIRMAN BECHHOEFER: Yes, I think Mr. Britz has answered a number of questions about the way he knows the

Staff goes about reaching its meteorological conclusions. He didn't work out the calculations, but I think to the extant he has relied on these in the past, I think he may answer questions about this. He is performing the basic calculations as he routinely does, as I understand it.

MR. WOLIVER: I would like my exceptions noted.

CHAIRMAN BECHHOEFER: Yes.

Do you recall the question?

THE WITNESS: Yes, I do. The major conservatisms in these calculations are I consider the child to not have the benefit of attenuation from being inside the school house, his vegetation was assumed to be consumed from the garden and the milk was assumed to be right from the cow, and not from a local dairy; I think those are the major points. They don't account for attenuation due to the child's clothing. Several of these factors would reduce these levels even further.

BY MR. BARTH:

Q Do you have any assumptions, sir, about the occupancy time of the child in school?

A I assumed that the child was either in the school or in the residence right next door to the school all of the time. I did not assume that he was there just during school hours.

Q Is that a conservative assumption, sir?

A Yes, it would be.

Q In making these calculations, did you take into account for conservatism any of the meteorological data performed by others in the Agency?

A I am sorry, I didn't understand the question.

Q Do these conservatisms you have just recited take into consideration meteorological data?

A No. The meteorological data is in addition to those conservatisms.

Q Now let's address another matter. The operation of the mechanical vacuum pump results in a release of some kind of physical properties from a plant?

A Right.

Q Is the basic component of this release noble gases?

A Yes, it is.

Q Sir, I refer you to table 5.6 which appears on page 5-18, and table 3.7 on page 3-17. DOes the operation of the mechanical vacuum pump significantly increase dose, bearing in mind that the major component of that release is noble gases?

A No, it would not be a significant portion.

MR. BARTH: I have no further questions of the witness. I would ask that the Board take official notice of new Reg. 0389, to which Mr. Britz has referred in accord with 10 CFR 2.743, which provides for official notice, and that official notice is described as of such acts or

matters as may be taken by Federal courts. I point out that rule 201(a) of the Federal Rules of Evidence provides the fact which is capable of accurate and ready determination to resort to sources whose accuracy can not reasonably be questioned is noticeable in Feder l District Courts. The new regulation is a publication of the Staff, we can produce it, there is no question as to the authenticity and reality of the document. Therefore it is certainly susceptible of being readily identified.

Since Mr. Britz has referred to it, in response to the Board's questioning about the timing of the application for the Zimmer facility, I askthe Board to take official notice of that document.

MR. WOLIVER: I would ask that the Staff make that document available, your Honor.

CHAIRMAN BECHHOEFER: Yes, I was going to ask the Staff, will you make that available to the parties?

MR. BARTH: I will serve copies of that document upon all the parties and the Board.

CHAIRMAN BECHHOEFER: Thank you. We will take official notice of it.

MR. BARTH: This concludes my redirect, sir, of Mr. Britz. Thank you.

CHAIRMAN BECHHOEFER: Any further cross-examination of Mr. Britz based on the redirect?

MR. WOLIVER: Yes, sir.

RECROSS-EXAMINATION

BY MR. WOLIVER:

Q Mr. Britz, you testified in answer to questions by the Board that a delay in the operation of the mechanical vacuum pump would not be cost-effective, as it relates to reducing dosage to the Moscow Elementary school children?

A Yes.

Q Was any specific study done on that issue?

A No. Our cost-benefit studies refer to reducing radiation by adding on extra equipment.

Q Would a delay in the operation of the mechanical vacuum pump, say for a day or two, require adding on of any additional equipment?

A Would you restate the question, please?

(Question read.)

THE WITNESS: I assume you mean just delaying the start-up of the plant. The answer is no.

BY MR. WOLIVER:

Q Would a rescheduling of the dry well purge for a period of say six or eight hours or up to a day require the adding on of any additional equipment?

A As I stated before, I think there are a combination of reasons for dry well purges. I think some of them could probably be delayed without holding plant operations up and

some probably would.

Q You could not describe those at this time?

A No.

Q One final question, Mr. Britz. Haveyou been involved in the development of other environmental statements concerning operation of other commercial nuclear power stations?

A Yes, sir.

Q How many would you say?

A Oh, about 15.

Q Did these 15 plants have operating licenses?

A Some do and some don't.

Q Out of these 15, are you familiar with any other licensed operating nuclear power station that has a school, an elementary school, within a half mile of the plant?

MR. CONNER: Objection, your Honor. This goes beyond any redirect or Board questions. It is a whole new area.

CHAIRMAN BECHHOEFER: Yes, that is a little far off.

MR. WOLIVER: THe Board did inquire into a cost-benefit analysis as it relates to this plant and other plants, and studies made. I would like to know if the characteristics of other plants are similar to this plant.

(Board conferring)

MR. BARTH: Mr. Bechhoefer, if he has evidence that other plants are similar, both in time frame of the application filed and the implementation of Appendix I, and where the

Board Chairman in those cases has ruled as you have ruled, in interpreting the Appendix I, I object, because it is unrelated to the issues before us.

CHAIRMAN BECHHOEFER: The question is not really related to the subject of my inquiry which you referred to. I asked the question to see whether Mr. Britz had done any analysis of Section II D.

MR. WOLIVER: I have no further questions.

CHAIRMAN BECHHOEFER: Ms. Kosik?

MS. KOSIK: No questions.

MR. HEILE: The City has no questions.

CHAIRMAN BECHHOEFER: Mr. Conner?

MR. CONNER: Yes. These relate to the questions you asked, Mr. Chairman.

BY MR. CONNER:

Q Mr. Britz, you stated you had some experience in operating reactors, but we passed over that kind of quickly. You also said you have evaluated these. So I want to ask you a question about the type of evaluation you would do under the Chairman's reference to Section II D of Appendix I, about the $1,000 value, the value selected by the Commission as the yardstick here, not by us.

A Yes.

Q I believe you testified you can't start up a reactor without the mechanical vacuum pumps, is that correct?

A No, I didn't say that. I said that the mechanical vacuum pumps were the first process in drawing a vacuum on a condenser to start the system. But that is not the only way. There are other methods.

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Q And directing your attention to table 5.7 which is the total manrem per year value that you referred to, where it has a total of 21 manrems to the general public, does that include any doses that might hypothetically exist at the school?

A Yes, it does.

Q And are you familiar to your own knowledge with what the cost would be of delaying a 1,000 megawatt nuclear power plant from startup for, say, one day?

A I have forgotten the number. I know it's staggering.

Q Is it in excess of $5,000?

A Definitely.

Q Is it in excess of $21,000?

A I think it's on the order of a quarter million, I believe. I'm not sure.

MR. CONNER: No further questions.

DR. HOOPER: Mr. Britz, were you here yesterday when I was asking some questions about shine radiation?

THE WITNESS: Yes.

DR. HOOPER: And you heard the question about the discrepancy between your figures and the figures that were presented yesterday?

THE WITNESS: Yes.

DR. HOOPER: Could I get your version of the reasons for this discrepancy?

THE WITNESS: Yes. The number that we gave was a

generic numbe based on the Brahn-type reactor. It does not take into account the specifics of the shielding that go around the turbine building here. We have not done a specific shine calculation for this plant.

DR. HOOPER: Well, in terms of conservatism, as far as shine goes, which one of these values would you say is the -- having the maximum conservatism, which one should be used?

THE WITNESS: I would say that the Applicant's value should be used before ours. Ours is more conservative.

DR. HOOPER: Yours is more conservative and therefore yours should be used or should not be used?

THE WITNESS: I'm saying that theirs is probably more correct and should be used.

DR. HOOPER: More correct, but I said more conservative.

THE WITNESS: No, ours is more conservative.

DR. HOOPER: In the interest of conservatism, which one would you use?

THE WITNESS: Ours.

DR. HOOPER: If the calculations you just made a minute ago and if you use the two millirem at the site which is approximately what you said, and you assume the residents time that you have assumed for this child, then you would have superimposed upon the worst case dose calculations which you have made an additional burden of radiation, would you not?

THE WITNESS: That's correct.

DR. HOOPER: And can you give me an estimate of what this might be?

THE WITNESS: Yes. We assume on page 11-8 the children would occupy the school approximately one-fourth of the time. This is in article 11.5.10. So what you could do is merely multiply our number of 2.4 that you would get from this -- multiply that by four and get about ten millirem per year direct shine according to that calculation.

I think the important thing here to remember is that when the plant is operating it will be operating under 40 CFR 190 which includes direct shine radiation and limits the total body exposure to 25 millirem, and the important point is that this is included in the technical specifications that it must meet and it must comply with the federal regulations.

DR. HOOPER: I'm aware of that and I just wanted to be sure that my figuring was correct. Thank you.

(Board conferring)

CHAIRMAN BECHHOEFER: Let me ask you something. Is it correct to add that ten millirem which you talked about to the five millirem that you talked about before in your hypothetical person?

THE WITNESS: We have to separate here the Appendix I type evaluation and the 40 CFR 190 type evaluation. I was referring to Appendix I dose calculations and in that respect it

is not proper to include the shine calculations because that is specifically excluded from Appendix I. If you want to talk about a 40 CFR 190 dose, it would be proper to include it.

CHAIRMAN BECHHOEFER: If we're talking about that dose, you get 15 and 10 plus 5. The limit is 25 there; is that correct?

THE WITNESS: Well, you couldn't add the 5. The 5 that I quoted was for iodine particulates which affect the thyroid and the thyroid dose is 75 millirem under 40 CFR Part 190.

CHAIRMAN BECHHOEFER: And the limit there would be what?

THE WITNESS: No, I was saying the limit is 75 millirem.

CHAIRMAN BECHHOEFER: I see.

THE WITNESS: What I was saying is you can't add the direct shine and the iodine particulate dose because they are affecting different organs -- excuse me -- the direct shine from the reactor will affect the child's thyroid also, so, yes -- I'm sorry, I correct myself. You would add the 10 millirem direct shine on to the 5 millirems and get 15. That's correct.

CHAIRMAN BECHHOEFER: 15 out of 75 under the EPA?

THE WITNESS: That's correct.

(Board conferring)

CHAIRMAN BECHHOEFER: Does anybody else have any

further questions of Mr. Britz at this time?

MR. WOLIVER: Only one.

BY MR. WOLIVER:

Q Mr. Britz, in response to Mr. Conner's question you described the potential staggering cost in the delay of starting up the operation of the plant for one day. Could you be more specific and explain what those costs would be?

A If the plant is operational the cost will be delay of revenues from the sale of electricity.

Q So the staggering costs are the lost of revenues; is that correct?

A Yes.

Q Therefore, you're assuming that the delay would result in lost revenues which presumably would not be made up by sale of electricity generated from other plants?

MR. BARTH: Your Honor, I object. The witness is far from his expertise when he talks about rates or sale of electricity or cost of plant or carrying charges and certainly doesn't know the cost of plants on the rate base. The questions are far beyond the witness' expertise and I move to strike the questions.

CHAIRMAN BECHHOEFER: I believe he can answer if he knows. If it's beyond his expertise, he can say so.

MR. BARTH: We seem to have a continuing difference. His expertise is not for him to judge. It's for you to judge.

It's a matter of law. He's had no course in rate economics, no course in capital costs, no course in financing, and I ask you to rule he's not an expert.

CHAIRMAN BECHHOEFER: We're trying to get a record on this potential cost-benefit analysis under Section 2(d) and if you wish to sponsor another witness you may, but I think --

MR. BARTH: I have no interest in putting on a case in that matter. I'm saying the question is objectionable as to the expertise of the witness under contention 6.

CHAIRMAN BECHHOEFER: I think if the witness can answer it he can say so.

MR. WOLIVER: I would like to join Mr. Barth, and if this witness is incompetent to answer in this matter I would move to strike his response to Mr. Conner's question prior to this.

MR. BARTH: It's rather belated, but I would agree to that. This is somewhat late to object to Mr. Conner's question, but I certainly agree with that, too.

MR. WOLIVER: It's only come out now that he does not have expertise in making this particular type of cost-benefit analysis, so therefore I think it would be proper to strike his response to Mr. Conner's question.

CHAIRMAN BECHHOEFER: I think he can state the types of factors he relied on in making his estimate and I would rather have a record on it.

THE WITNESS: This type of cost-benefit analysis is not our normal cost-benefit analysis for a power plant as far as radioactive effluents go. Our cost-benefit analysis is done to determine that a power plant has enough radioactive waste treatment systems installed in it before operation.

Getting into the field of operational cost and everything is a little beyond the type and purpose of the Appendix I cost-benefit evaluation and I do not feel I should comment any further on these costs. They are not related to the Appendix I cost-benefit analysis.

MR. WOLIVER: Therefore, your response to Mr. Conner's previous question concerning the staggering cost of a delay in starting up the plant for one day included these cost factors that are not normally considered in a cost-benefit analysis; is that true?

MR. BARTH: What cost-benefit analysis, if I may ask?

CHAIRMAN BECHHOEFER: The only thing we want to hear about is that under Section 2(d), but we -- I did ask questions as to delay as constituted in cost, so what brings up that delay is part of the question and part of the 2(d) analysis that I'm trying to develop.

THE WITNESS: My response to Mr. Conner's question was in excess of what I needed to reply to in regards to normal Appendix I cost-benefit analysis.

MR. WOLIVER: Thank you.

MR. CONNER: I'd like the record to show at this point that I did not intend to ask him any kind of an answer required by an expert. I asked him a dollar value and that's a factual question and he answered.

MR. WOLIVER: And I would move to strike it as irrelevant since that does not relate to the cost-benefit analysis described in Section 2(d).

CHAIRMAN BECHHOEFER: Well, it relates to the cost. It does relate to the cost per manrem. That's the 2(d) analysis.

MR. WOLIVER: I believe, though, the figure that the testimony of Mr. Britz gave was that he considered factors not included in the 2(d) analysis. That is a loss of revenues for sales. That's why I move to strike because it's not relevant to the cost-benefit analysis here.

MR. BARTH: Mr. Chairman, I agree with you that it's important under 556(d) to get a record and this is no time to make objection to a question that was asked 15 minutes ago and answered 15 minutes ago. I agree with the Chairman that to get the record in. So as far as the Chairman views the record should be built in getting the question, I think we should let the witness answer the best he can. I lost my argument and I suggest on behalf of Staff that we go ahead with questions.

CHAIRMAN BECHHOEFER: Yes. I think for this purpose Mr. Britz answered it. It may be self-amended later. I don't know whether we have other witnesses or not on this topic, but

let's just ask Mr. Britz if he knows. I think the factors do relate or may relate to the analysis of it.

MR. WOLIVER: If that's the case, then this answer is not stricken. I would like to ask him other questions relating to that concerning the potential loss. He talked about the loss of revenues from the sale of electricity. It would be important to know whether he assumed that these revenues would not be obtained or made up by the sale of electricity at presumably other operating plants, and here's where we're getting far afield, but I think that also relates to it if we're talking about costs.

MR. BARTH: Sir, we have the argument which the Board's ruling stopped but the questioning continues. I really thought we were going to get somewhere, but every time you make a ruling in favor of the Intervenor he sits and argues with you for half an hour.

CHAIRMAN BECHHOEFER: Wait a minute. I think Mr. Britz can answer questions about what went into the dollars that he spoke about. If he doesn't know, that will go on the record; but I don't think we will strike the answers and I don't think we're going to strike any part of his testimony.

MR. CONNER: Mr. Bechhoefer, I would like a separate type of objection to this. Talking about 2(d) which you brought up and which I was asking a simple question about certainly does not lay a foundation for going in for a need for power type of

argument and the exploration of the entire system. We asked about a simple number as it would apply in Appendix D on re-cross-cross, after the Board's questions had been asked. Certainly that did not establish a basis for opening up a whole new line of questioning about need for power and the rest of the system. It has to do, under Appendix I, with this plant, nothing else. The cost at Zimmer is all we're talking about, not how somebody else might raise the money by borrowing from somebody else.

CHAIRMAN BECHHOEFER: That's correct. I think this talking about the cost if Zimmer plant should be delayed or the other alternative of hours specified -- this is what I'm trying to develop, not whether they can go out and get it elsewhere or what the cost of that would be, but the cost of Zimmer as it stands now. You can ask whether this type of cost is included and maybe it shouldn't be, and you can develop that, but --

MR. WOLIVER: I think he's responded to that, that the loss of revenues were included in his answer. I'll ask it again.

BY MR. WOLIVER:

Q Mr. Britz, in your response to Mr. Conner's question concerning the cost of delaying the plant for, say, one day in its startup, did you in giving your answer consider the cost of lost revenues?

A Yes, I did, but this does not relate to Appendix I

cost-benefit evaluation.

MR. WOLIVER: No further questions.

CHAIRMAN BECHHOEFER: Does anybody else have any further questions of Mr. Britz?

MR. BARTH: We have no redirect, Mr. Chairman.

MR. WOLIVER: Your Honor, I would remake my motion tostrike his testimony that he gave which was based upon conclusions reached by other experts not available for cross-examination, unless they are available.

CHAIRMAN BECHHOEFER: We are not inclined to grant that motion.

MR. CONNER: I was going to suggest, if motions are going to be repeated, that the Board adopt a principle of having counsel submit them in writing following the hearing so we can get the hearing over with and conduct arguments in its proper time.

CHAIRMAN BECHHOEFER: Yes, I think I would like to move on. I guess Mr. Britz is excused.

(Witness excused)

MR. BARTH: Perhaps for lack of familiarity, I would like to advise counsel that exceptions need not be taken. Adverse rulings are automatically reserved for Appeal Board settlement.

MR. WOLIVER: Thank you.

CHAIRMAN BECHHOEFER: I would like to inquire whether

Mr. Woliver's rebuttal witness is here.

MR. WOLIVER: Yes, she is here.

CHAIRMAN BECHHOEFER: We will take a short break. I think she will follow.

MR. WOLIVER: Fine.

(Recess)

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CHAIRMAN BECHHOEFER: Back on the record.

MR. WOLIVER: I'd like to call Alice Hamilton to the stand.

Whereupon,

ALICE HAMILTON

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

DIRECT EXAMINATION

BY MR. WOLIVER:

Q State your name and address, please.

A My name is Alice Hamilton and my address is 518 Miller Road, Felicity, Ohio.

Q What is your occupation?

A I'm an elementary principal; I have been for the past five years at Moscow Elementary School.

MR. BARTH: Could I ask the board that counsel not come between me and the witness.

CHAIRMAN BECHHOEFER: Try and stay out of the sight line.

MR. WOLIVER: Is this all right?

May I have this marked as Exhibit -- Intervenor's Exhibit 1. I'm asking that this be marked as Intervenor's Exhibit 1.

MR. WETTERHAHN: Could you show it to the parties first?

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(Counsel d. stributing documents.)

CHAIRMAN B[illegible]CHHOEFER: I think it should be marked Fankhauser's Exhibit 1.

MR. WOLIVER: Fankhauser's Exhibit 1.

(The document referred to was marked Frankhauser's Exhibit 1 for identification.)

BY MR. WOLIVER:

Q Let me show you what has been marked as Fankhauser's Exhibit 1 and ask you if you can identify it.

A Yes, I prepared this.

(Counsel distributing documents to Board.)

BY MR. WOLIVER:

Q You stated that you prepared this?

A Yes, sir.

Q Could you state what this purports to represent?

A This is a distribution of the students, where they live and what areas that the students that we had in May in1979 -- this May.

Q This is the student body at the Moscow Elementary School?

A That's true.

Q There were 135 students at the school in May of 1979?

A That's correct.

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Q Of the subtotals, you have 40 that live in the Moscow Village.

A Yes, they walk to school.

Q They are presumably within how many blocks of the school?

A The school is about -- the town is about five blocks by about three blocks, not very far.

Q Within a half mile?

A Yes, sir.

Q Of that 40, are there students that live on the same street that the school is located on?

A There are approximately five students that live in the same street.

Q Are there students that live there that are not included in that first figure of 40 in the Moscow Village that live at the end of the street across route 52.

A Two other children live there -- three other children.

Q The second figure shows 24 at Moscow outlying area; what area is this?

A This would be Mc. Road, route 232, 743; all within probably a three mile radius of the school, and these children are transported by buses; also some on U. S. 52.

Q I assume there are no children from Kentucky.

A No, sir.

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MR. BARTH: Mr. Chairman, I understand this is a rebuttal witness. May I ask what is being rebutted, what testimony? What is purported to be rebutted?

MR. WOLIVER: You can ask.

MR. BARTH: May I ask that the line of questioning be ceased, the witness be excused in the absence of a proffer of evidence as to what is being rebutted for the purpose of this testimony, sir.

MR. WOLIVER: He may ask it.

CHAIRMAN BECHHOEFER: Would you explain?

MR. WOLIVER: Precisely, we are rebutting the testimony presented yesterday by Mr. Rooney. He made certain assumptions regarding the occupancy factor of the school, the potential masimum dosage of the elementary school children; relating the fact to their living situations, if students live on the same street with the plant, presumably the 25 percent occupancy factor is inaccurate.

That's what it purports to represent.

MR. BARTH: I withdraw my objections, your Honor.

MR. CONNER: If the board please, I think that we should focus on a point that may still be preliminary. The contention does not deal with a dose that the population in general will receive.

It does not deal with anything about children versus adults or standard man versus standard child. The

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contention that was granted is about the dose levels of the children at the Moscow Elementary School, not somewhere in the vicinity at other times.

And it strikes me that this line of questioning is going to be irrelevant to that contention.

No one is arguing that the people do not live somewhere in the general vicinity and what that has to do, though, with contention six, which has to do with the school itself at the school, I think should be -- makes this apparent line irrelevant.

CHAIRMAN BECHHOEFER: I believe I myself was asking questions about whether students were there during recesses, during summer periods, during weekends, and I think the place where they live -- the fact that they may or may not use the bus is still relevant to that, so I think it is relevant along that line.

BY MR. WOLIVER:

Q You may proceed with the answer.

A What was your question?

Q Okay. I was asking you what the 24 figure which is stated next to the Moscow outlying area --

A Those are the children that are sprinkled around in the rural area that are picked up by the buses, not the trailer court -- there is a trailer court within probably a mile and a half, and it does have another number

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there. It has 11 students at that trailer court; 24 students are picked up elsewhere besides the trailer court and bused in.

Q Which direction is the trailer court from the school?

A East.

Q Is it due east?

A Yes.

Q Which direction? There's 11 from Point Pleasant; which direction is that?

A West. It follows the river. The river goes north-south; I must be wrong on that. It's towards Cincinnati and the trailer court is in the other direction. One is up the road.

Q Point Pleasant would be north, then?

A Right.

Q What is the 5 figure, the non-area transfer?

A We had an attendance problem, so the teachers that have children who could bring those children with them were permitted to bring their own children to our school. So we have a secretary that brings one, a teacher that brings two; another -- a couple of other situations have been granted where babysitters live in our village and the people that stay with these babysitters were permitted to come to our school because we had an attendance problem last

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year.

Q Below that figure, a 5 there, there are four ther figures lumped together as 15; what do those figures represent?

A Like I said, last year our attendance was down to 86 at the end of the year, and the board, in order to make the school economically efficient to operate, with one class in each grade, one through six, chose to relaign the boundaries and expanded our district by adding four roads and another trailer court.

And so therefore the next figures are the four little roads, giving us 15 students and then a trailer court located at New Richmond giving us 29 more students.

Q Is that additional 29 reflected in any of these figures here?

A No, none of these are duplicated.

Q Next year -- do you have any prediction for what the school population will be next year?

A Approximately the same because we still have to maintain the same boundaries again for next year.

Q Oh, I see, at the bottom here is a 29 which is the New Richmond trailer court.

A Trailer court, yes.

Q How many teachers do you have at the school?

A We have seven classroom teachers; we also have

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support teachers that come in periodicallygiving special classes two days a week, one day a week, whatever is required.

Q What are the ages of the teachers?

A A beginning teacher, 22 years old; we also have --

Q Could yougive me their sexes also.

A They are all women except for the physical education teacher, a man who comes in two days a week.

Q You've been principal for five years?

A Five years.

Q During the time you've been principal, have there been occasions whereby any of the teachers have been pregnant?

A No, I don't think so.

MR. WOLIVER: I have no further questions. I would ask that Fankhauser Exhibit 1 be admitted into evidence.

CHAIRMAN BECHHOEFER: Are you admitting this as an exhibit or are you going to put it in as direct testimony?

MR. WOLIVER: As an exhibit, yes. The testimony will supplement it.

CHAIRMAN BECHHOEFER: Okay. This Fankhauser Exhibit 1 will be admitted.

(The document previously marked as Fankhauser Exhibit 1 was admitted into evidence.)

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MR. BARTH: Mr. Chairman, can I ask you to reconsider your ruling. This is offered as rebuttal to occupancy time to the school of the applicants which assumed 2200 hours or very close to it; as I look at the document I do not see any occupancy hours indicated therein, and certainly by no means rebuts the 2200 hours approximate assumption, which was made by the applicant's witness, sir.

Therefore --

CHAIRMAN BECHHOEFER: I'm not going to rule on the merits, whether it does or it doesn't.

MR. BARTH: To admit it into evidence --

CHAIRMAN BECHHOEFER: It's relevant; it's relevant to establish the total number of people. It may not establish the --

MR. BARTH: It was to --

CHAIRMAN BECHHOEFER: It's relevant. It may not --

MR. BARTH: I do not see the relevance to the occupancy. I don't see a single hour listed on the document. I defer to your ruling.

MR. CONNER: If the board please, we have not had an opportunity to respond to the offer in evidence; I'm assuming we can do this.

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CHAIRMAN BECHHOEFER: I'll listen, but I thought I ruled that it was relevant.

MR. CONNER: Our objectionto it -- none of the testimony is complete. We want to move to strike the testimony

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and object to the admission of this document in evidence on the grounds that the testimony is incompetent, immaterial, and irrelevant to the contention number six, which has to do with doses to the children at school.

That is not what this evidence relates to; it relates to other matters. If you want a number, that there are 135 students at this school at the end of May 1979, we'd be happy to stipulate to that, but I do not believe the record should include -- there should be included in the record material which does not relate to contention six, but only to the scattering of population around the neighborhood. And that's obvious.

It's fine, but it is not germane to contention six.

CHAIRMAN BECHHOEFER: It shows the number of people who are bused away, and I think that a substantial part of -- I have further questions, yes. You may also.

MR. CONNER: Has the chairman ruled?

CHAIRMAN BECHHOEFER: Yes, we're going to leave the testimony in; it's subject to cross examination. I guess you're first.

CROSS EXAMINATION

BY MR. CONNER:

Q Mrs. Hamilton, I want to make sure the first trailer court you referred to, as I heard it, I think you said it was north of the school; isn't that south of the school on the other side of Moscow School?

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A I was confused. The river does -- generally we think of Cincinnati as being in the opposite direction, but the river does run north and south there, and I was wrong.

MR. CONNER: Okay. No further questions.

MR. BARTH: May I have a moment?

CHAIRMAN BECHHOEFER: Yes.

(Pause.)

MR. BARTH: We have no questions of Mrs. Hamilton, Mr. Bechhoefer.

CHAIRMAN BECHHOEFER: Ms. Kosik?

MS. KOSIK: No questions.

CHAIRMAN BECHHOEFER: Do you have questions?

MS. KOSIK: No questions.

MR. LEWIS: No questions for the city, Mr. Chairman.

CHAIRMAN BECHHOEFER: Mrs. Hamilton, I would like to ask a few questions.

BOARD EXAMINATION

BY CHAIRMAN BECHHOEFER:

Q What types of -- does the school sponsor any non-curricular activities, playground activites?

A We have an intramural program in the fall and in the spring. The children are outside and it is generally held two days a week for 30 or 40 fourth, fifth and sixth graders and they play soccer or they will play spring sports such as softball; also two other teams use our ball diamond for

d12

softball practice.

Q What is your normal school day?

A We begin at 5 after 9:00, and we're finished at 3:35.

Q Do any of the activities that you just mentioned or perhaps others extend beyond those hours?

A They begin a 3:40 and go to 4.30

Q Now, are you in a position to state how many or whether any of the children use the school playground or school facilities beyond those hours?

A A few children in the community do; several years ago more of them did. The town itself has built a couple of playgrounds within the village and tennis courts and so more children are playing farther away from Zimmer now than they did before.

Before ours was the only playground in the town.

Q So that at the present time it's used untyl 4:30 or so and there are many fewer people there than earlier?

A Yes.

Q This total number, did I gather that -- well, you said that 24 are bused from the outlying areas of Moscow.

A There are more students than 24 bused.

Q This is what I wanted to find out. Are there other -- how many in this group are bused?

A All of the groups are bused except the 40.

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Q And the buses leave when?

A Please, sir?

Q The busss arrive and leave at what time?

A They would arrive at 5 to 9:00 and leave to go home at 3:35.

Q So that for the most part, all except 40 people would take the buses?

A That is right.

Q What about summer school? Do you have any sort of summer school?

A Yes, but not in our building, in Richmond.

Q So there is no formal activities going on in the summer at r school?

A None.

Q I take it then the use of your playground would be only occasionally during that time?

A That's correct.

(Board conferring)

BY DR. HOOPER:

Q I didn't understand where Broad Ripple Run Park was.

A I would guess it is about a mile.

Q A mile in which direction? Let's see, the river is north-south. And this is which way?

A It is away from Cincinnati, so evidently it must be south then.

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CHAIRMAN BECHHOEFER: The Board has no further questions. Mr. Woliver?

REDIRECT EXAMINIATION

BY MR. WOLIVER:

Q Mrs. Hamilton, isn't it true that during the summer there are softball teams and softball games scheduled at the school grounds?

A Oh, occasionally, like twice a week for maybe an hour and a half a day.

Q Is it possible that some of the children playing in these softball leagues could go to the school?

A A few of them. It also encompasses Monroe School which is about three or four miles away, this team.

Q Let me ask you a question which you responded to earlier. You stated there were no teachers that you knew of that were pregnant in the school.

MR.CONNER: Objection, your Honor. That is not related to any question asked on recross or by the Board.

MR. WOLIVER: I am trying to clear something up. I think there was confusion.

MR. BARTH: There was no confusion. I understand the question and I understand the answer, sir. I know what pregnancy is.

CHAIRMAN BECHHOEFER: Yes, that doesn't relate to any Board questions at least, or cross-examination questions.

MR. WOLIVER: Okay, that is all.

CHAIRMAN BECHHOEFER: Do any of the other parties wish to ask further questions?

MR. BARTH: I have no questions.

CHAIRMAN BECHHOEFER: On our questions.

MR. CONNER: I think we should let the lovely lady go home.

MR. BARTH: The Staff has no questions, Mr. Chairman.

CHAIRMAN BECHHOEFER: Ms. Kosik?

MS. KOSIK: No questions.

CHAIRMAN BECHHOEFFER: You are excused.

(Witness excused)

(Board conferring)

CHAIRMAN BECHHOEFER: Mr. Woliver, do you wish to put Mr. Fankhauser back on?

MR. WOLIVER: Yes, I would like to recall him as a rebuttal witness.

Thereupon,

DR. FRANK B. FANKHAUSER

was recalled as a witness, and having been previously duly sworn, was examined and testified further as follows:

FURTHER DIRECT EXAMINATION

BY MR. WOLIVER:

Q Dr. Fankhauser, you are still under oath from before.

A Correct.

Q Dr. Fankhauser, from your professional background, do you have an opinion on the effects of radiation on human beings?

A I have data that has been collected and submitted in professional journals, yes. And my opinion is based upon reading those journals.

Q COuld you describe whether or not radiation does affect human beings?

MR. CONNER: Objection, your Honor. This is hardly rebuttal evidence. This is a matter that everybody knows and the Commission's regulations recognize. I don't know what kind of rebuttal testimony starts out with a general lecture on the nature of radiation and its effect on tissue.

CHAIRMAN BECHHOEFER: Where is this leading? What is it rebutting?

MR. WOLIVER: We are going to be rebutting Mr. Britz' earlier testimony concerning the effects or lack of effects of radiation on age. In other words, whether or not age is a factor in the computation of the effects of radiation on human beings. He stated that age was not a factor, and there was not a safety advantage in reducing the radiation dosages below what was already stated and expected for the Moscow school.

CHAIRMAN BECHHOEFER: Mr. Barth, I am not sure your witness said that.

MR. BARTH: I was about to say, your Honor, that it is a gross breach of professional conduct to miscast the testimony of a witness so blatantly. Mr. Britz testified within two hours that there were differences due to age on vulnerability of humans to radiation. This is rebuttal of nothing. I move that the witness be dismissed and the purported rebuttal be stricken and I request that the Court admonish counsel to be more careful in how he mischaracterizes testimony so freshly given and so clearly and distinctly.

CHAIRMAN BECHHOEFER: Yes, my recollection is that Mr. Britz testified that there was an effect. He may not have found it significant, but he did indicate there was such a difference.

(Board conferring)

CHAIRMAN BECHHOEFER: Yes, I think he spoke about it in very limited terms, but I think general questions as to whether there is an effect or not are not proper. Mr. Britz was answering questions basically with respect to Appendix I, Section II D, cost-benefit analysis. I think he did answer questions along those lines.

MR. WOLIVER: Correct me if I am wrong, but I believe he testified that given the stated expected dosage of radiation to the Moscow School children, that he did not see a significant safety factor by reducing those stated amounts. And that is what we would rebut.

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MR. BARTH: That statement is irrelevant as to

whether or not there is a difference in the susceptibility of humans to radiation by age. That is a further mischaracterization of what he has just purported to rebut.

CHAIRMAN BECHHOEFER: I think your last question is not relevant to what the previous testimony was.

MR. WOLIVER: Okay. We were simply laying a foundation. We will proceed.

BY MR. WOLIVER:

Q Dr. Fankhauser, did you hear Mr. Bitz' testimony earlier today with respect to what he felt were not significant effects, or significant advantages in reducing the radiological dosage levels to the Moscow School children below what they already are stated to be?

MR. BARTH: I object to the question and ask the Board to rule on my previous motion to strike the line of questioning and dismiss the witness because he is offered, it was stated, to rebut Mr. Britz' testimony that there was no difference in receiption by a human being of radiation. That statement was never made, ,thus the rebuttal is irrelevant and improper and I ask it be stricken.

CHAIRMAN BECHHOEFER: I think the questions are going onto a somewhat diffarant topic.

MR. BARTH: In that case we are entitled --

CHAIRMAN BECHHOEFER: We did allow the previous questions.

MR. BARTH: In that case we are entitled to know

what this evidence is to do. That was the Board's question, and the Board got an answer for it, which was proper. I think if that is the case the Board and I are still entitled to an answer to the Board's question, which is where is this evidence going, what is it going to rebut.

MR. CONNER: I think it would be important to note on the record that this is not evidence in chief offered by Mr. Britz. This is matters that were objected to in various ways, and this should be treated in a different light than something voluntarily offered by a party.

CHAIRMAN BECHHOEFER: Yes, I think the questions here should be pretty narrowly directed to what Mr. Britz actually testified to.

MR. WOLIVER: Are you stating that we could not put in rebuttal testimony to rebut what Mr. Britz said on cross-examination?

CHAIRMAN BECHHOEFER: No. I am saying that the questions should be fairly closely related to what Mr. Britz actually said. I am not going to let you expand too much on this.

MR. WOLIVER: Certainly. We can look at the record but I believe Mr. Britz testified there was not a significant advantage in reducing the radiation levels below what they are already stated. Correct me if I am wrong.

MR. BARTH: Mr. Chairman, I think that this time he

has characterized correctly Mr. Britz' testimony, that Mr. Britz' personal opinion was that the doses would not be significantly reduced, and if this witness is being offered to rebut that, I withdraw my objections to his offering substantial probative evidence to that effect.

CHAIRMAN BECHHOEFER: Along those lines, you may answer the question.

MR. CONNER: If your Honor please, I think it is now clear that I want to object on a different ground. It sounds like we are now setting up a debate on the linear versus the BEIR III report, if you will, and I think that is totally improper for this forum because it is a matter of rulemaking --

THE WITNESS: That is a misrepresentation of the BEIR III report, I am sorry. The BEIR III report does not refute the linear --

CHAIRMAN BECHHOEFER: We don't want to sponsor any debates on the BEIR reports.

THE WITNESS: Mr. Conner brought it up.

MR. CONNER: May I ask that the witness speak through his counsel? Mr. CHairman, after the witness interrupted me, I would still like to make my objection, and I would also like him to speak through his counsel.

This line of questioning obviously is leading to a debate, to give Dr. Fankhauser an opportunity to say what

he wanted to say this morning, that he believes in the linear theory instead of the threshold theory. But that is certainly not proper rebuttal evidence here on something that has to do with Appendix I values.

CHAIRMAN BECHHOEFER: That's correct. The Board asked the questions of Mr. Britz and was trying to develop a record on the cost-benefit analysis under Section II D. And this doesn't really relate to the types of people involved and their ages or anything else. It relates to the way you can reduce a certain number of manrems at a certain cost.

MR. WOLIVER: What I am referring to is testimony prior to that. I am sure Mr. Barth will correct me if I am wrong on this, but Mr. Britz testified that he did not feel that there would be a significant advantage in reducing the radiation levels below what are already stated.

MR. BARTH: If he will include $1,000 per manrem as the Commission stated, I think it is a fair characterization.

CHAIRMAN BECHHOEFER: I think Mr. Britz in his entire testimony was in the context of the $1,000 per manrem. I asked a question about that amount.

MR. WOLIVER: I am referring to my cross-examination of Mr. Britz before that. You can look at the record, but as to that cross-examination, I know Mr. Britz said there would not be a significant advantage.

MR. BARTH: The answer was given within the context

of 10 CFR part 50, Appendix I. That is the only context it can be in, because those are the rules that govern this proceeding.

(Board conferring)

CHAIRMAN BECHHOEFER: I think we will let a few more questions and see where we are going here. I think we will overrule the objection at this time. I don't want to get too far afield, or far afield at all from what Mr. Britz actually testified to.

MR. WOLIVER: Thank you.

BY MR. WOLIVER:

Q Are you familiar with the question, Dr. Fanhauser?

A I can't say that I remember what the question specifically was after all of the wrangling.

Q I will attempt to rephrase it or re-state it. Let me ask you this: Were you present while Mr. Britz testified earlier today?

A Yes, I was.

Q Were you here and did you hear Mr. Britz testify that there would not be a significant advantage -- I am paraphrasing what Mr. Britz said, so correct me if I am wrong -- did you hear Mr. Britz say that there would not be a significant advantage in reducing the expected dosage levels of radiation to the Moscow Elementary School children below what is stated to be the expected levels?

A I heard him say that and I disagree with that position.

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Q Why do you disagree with that position?

MR. CONNER: Objection.

CHAIRMAN BECHHOEFER: Well, let's see if he can testify.

MR. CONNER: I just don't want to get too far afield and get stuck there.

THE WITNESS: I disagree with that decision because I believe his response ignores the elevated sensitivity to radiation by school children and I think that it is particularly important for school children of the elementary school age to be protected from that radiation and that the benefits resulting from reduction of exposure of children would be greater per man-rem than the benefits that would result from the reduction of exposure of the population in general.

The reason I say that is that there are studies performed by Dr. Alice Stewart which are referenced in my testimony this morning which demonstrates that the doubling dose for cancer in children is 1.2 rads. This contrasts with the data produced by Dr. Irving Bross in which he suggests doubling dose for adults is about 5 rads per individual. This would indicate that the child of elementary school age is roughly four times as sensitive to the deleterious effects of radiation as the adult and I think if we're going to try to estimate the benefits of making minor changes in the operation of the plant that we must give added weight to any radiation that -- any reduction in exposure to radiation that accrues, particularly

as it relates to those children.

MR. CONNER: If the Board please, I move that be stricken as an attack on Appendix I which sets forth values and how they will be applied.

CHAIRMAN BECHHOEFER: I don't know if I'll strike it, but it is an attack on Appendix I and that is not permitted. The only avenue of reducing the doses is the Section 2(d) avenue and that's all we can give consideration to, and I'm assuming this interpretation of Section 2(d) -- I'm sure that a number of parties here objected to that interpretation, but I'm giving it an interpretation which at this stage would permit looking below but only at the certain level of $1,000 per manrem.

THE WITNESS: $1,000 per manrem for a child, that would mean for $1,000 we would give one child cancer because one rem to a child is the doubling dose for cancer and I'm not certain whether that equation is proper.

MR. BARTH: Sir, I move --

CHAIRMAN BECHHOEFER: That last is not proper. That last answer should be stricken. The $1,000 is written into the regulation and whether we like it or not that's the figure we were told to use. The Commission has considered this twice and addressed it again several years ago and it reaffirmed the dollar value and that's all we can consider. So the reduction over Appendix I must be based only on that criteria and it doesn't depend on who gets the dose.

THE WITNESS: Am I incorrect that the Board ruled that there was a special circumstance --

MR. BARTH: I move to strike. If he wants to object to your rulings, I suggest it be done through counsel. This bickering by the witness with the Board is unseemly.

CHAIRMAN BECHHOEFER: I think the counsel should do this if he wanted to object or move or something.

MR. WOLIVER: I wouldn't characterize this as bickering. This is a witness and he misunderstood what was happening right here and very simply wanted an interpretation of what's going on. I think in the spirit of the public forum that that much should be accorded to any witness in this proceeding.

CHAIRMAN BECHHOEFER: Well, I tried to explain the only legal basis upon which we can go below the Appendix I doses, at least as I read the regulations, and I think the answer should be confined to that basis, if you're advocating going below Appendix I.

MR. WOLIVER: We have no further questions.

CHAIRMAN BECHHOEFER: Ms. Kosik, do you have questions?

MS. KOSIK: No questions.

CHAIRMAN BECHHOEFER: Any other party have any questions?

MR. BARTH: We have some questions, sir.

CHAIRMAN BECHHOEFER: Okay.

MR. CONNER: Would the Board consider a motion to strike at this point?

MR. BARTH: I would defer to the Board's ruling.

MR. CONNER: Would you consider a motion to strike at this point as being not rebuttal to any point raised by any witness other than the statement of his opinion that he disagrees with Mr. Britz?

CHAIRMAN BECHHOEFER: Well, the Board will consider anything, but I don't think the Board would grant such a motion.

MR. CONNER: I was trying to save the cross-examination.

CROSS-EXAMINATION

BY MR. BARTH:

Q Mr. Fankhauser, when did you file your contention 6 which is now in issue?

A I do not have the precise date at hand. You probably have that date there. If you would suggest the date I would tell you whether that was within the correct year or not.

MR. BARTH: I would suggest that the witness answer the question, Your Honor. He's non-responsive.

MR. WOLIVER: It was responsive, Your Honor, and I'd ask this badgering of the witness stop. He said he did not have the correct date; he could estimate.

MR. BARTH: The statement was: "I don't have the exact date; you give it to me and I'll give you an answer." That's arguing with counsel.

CHAIRMAN BECHHOEFER: You can take it that he said he doesn't remember but he would like his memory jogged or refreshed.

THE WITNESS: I don't know the precise date I submitted contention 6.

BY MR. BARTH:

Q Can you tell me the year, sir?

A I believe it was approximately 1975 or 1976.

Q How would the dose at the Moscow Elementary School be reduced in your view, sir?

A Well, I believe one way that has been suggested which I think is an eminently reasonable method would be to adjust the times during which the mechanical vacuum pump was operated such that it was operated at a time to expose the elementary school to -- not expose the elementary school to those releases.

Q Sir, would you please tell me the percentage reduction in dose in the Moscow Elementary School as a result of this?

A The percentage of gaseous releases from the plant that result from the mechanical vacuum pump are approximately 26.9 percent.

MR. BARTH: Your Honor, the answer is not responsive to the question. What would be the percentage reduction in the dose received in the Moscow Elementary School if this program were adopted? I would like him to answer the question, sir.

CHAIRMAN BECHHOEFER: I think you can answer the question if you know.

THE WITNESS: You wish to know the percent reduction at Moscow Elementary School; is that correct?

MR. BARTH: Yes, sir; since that's your contention.

THE WITNESS: I believe that I might be able to provide that data. Again, I do not have access to a complex computer code. However, I would point out that the wind blows towards Moscow Elementary School, according to chart figure 2.3 in the FES --

MR. BARTH: Sir, at this time I will make the timely objection that he's not a qualified expert in meteorology and that he's not qualified to make such a statement.

THE WITNESS: I was making the statement based upon the assumption that the NRC data is correct. I must say I can't testify to its correctness.

MR. BARTH: I wish to instruct the witness not to argue with counsel.

MR. WOLIVER: I will remind counsel for the NRC that the figures relied upon by Dr. Fankhauser are those provided by the NRC. I believe that Mr. Barth in his objection is challenging

the validity of his own figures. We will join him. I don't think his figures are correct either.

CHAIRMAN BECHHOEFER: I think Dr. Fankhauser was trying to answer your previous question.

MR. BARTH: I'm aware of that, sir, but I'm interested in his calculation and his estimate of what the dose reduction would be if the mechanical vacuum pump were turned on or off at a different time.

CHAIRMAN BECHHOEFER: Well, he's giving it to you. He's telling you what he's doing to get it.

MR. BARTH: He's telling me what the Regulatory Commission says and what somebody else said.

CHAIRMAN BECHHOEFER: He's telling you the steps of his computation. I think he can do that.

MR. BARTH: I defer to your judgment, Your Honor.

THE WITNESS: Again, according to the wind rose presented in figure 2.3, assuming that the Moscow Elementary School is -- it wouldn't matter whether you chose it to be in sector south or south-southeast -- in either case, the wind blows in that direction roughly six percent of the time. That would suggest that six percent of the gaseous releases would blow over that school.

Now if you removed the mechanical vacuum pump contribution from that dose, you would reduce that dose to the school by about 26.9 percent.

BY MR. BARTH:

Q Would you show me how you arrived at the 26.9 percent?

A Well, 100 percent of the gaseous releases we presume, if there is random distribution of the gaseous releases, which if I'm not mistaken is the assumption that the NRC has made, random meaning these releases are made in a random fashion and that, therefore, we assume that the wind rose is a rough representation of the percentages of those releases that go in various sectors; therefore, we must anticipate that of the releases that go to the Moscow Elementary School that 26.9 percent of those releases, if we're speaking in terms of random releases, would be to the mechanical vacuum pump.

Q Sir, have you confused releases with dose? I asked you a question on dose. I did not ask for curie release.

A I'm not in a position at this point to convert the precise curie releases into dose. I can get those figures for you if you like.

MR. BARTH: In that case, I move to strike the previous answer. He's now testified he can't do the calculation and does not know how and does not know what the percent reduction would be. We're back where we were ten minutes ago.

I have no further questions of Dr. Fankhauser.

CHAIRMAN BECHHOEFER: I think we won't strike the answer. He said he could get the answer. He did not say he couldn't do it. I think he said he could.

MR. BARTH: Sir, he said he has no -- could I ask the reporter to read his answer? I'm certain he said, "I have no present basis."

(Whereupon, the preceding answer was read by the reporter)

MR. BARTH: I lost, Your Honor. I withdraw the objection, sir.

CHAIRMAN BECHHOEFER: Are you still through?

MR. BARTH: Yes, sir.

CHAIRMAN BECHHOEFER: Mr. Conner.

MR. CONNER: No questions.

CHAIRMAN BECHHOEFER: I guess that's all then -- well, I think Mr. Woliver can ask you questions.

MR. WOLIVER: Did the Board have any questions?

CHAIRMAN BECHHOEFER: No, the Board has no questions at this time.

REDIRECT EXAMINATION

BY MR. WOLIVER:

Q Dr. Fankhauser, referring you to table 3.7, you stated that by operating the mechanical vacuum pump when the school children were not at the Moscow Elementary School you assume that the percent dosage expected dosage to the school children would be reduced?

A I would expect that the dosage would be reduced; that is correct.

Q And you stated a figure of 26.9 percent. Now that

does -- that figure is not the amount of the dosage; is that correct?

A That is correct. That is a reduction by 26.9 percent of the radioactive releases in terms of curies that would blow towards the school.

Q Therefore, you're assuming that if those are released when the wind is blowing the other direction or when the school children are not in, they will not receive that dosage?

A I would assume that the school would not receive that dosage.

Q Correct; the school would not.

MR. WOLIVER: I have nothing further.

CHAIRMAN BECHHOEFER: You're excused, Dr. Fankhauser.

(Witness excused)

CHAIRMAN BECHHOEFER: At this stage I think we have finished our consideration of contention 6. The Board might have a question to ask certain of the parties with respect to that contention. If we do, we will let you know at a later date. It will involve possibly further study by the Board of a certain matter. We'll let you know if we want that. We would not expect to hear testimony on it this week.

MR. WOLIVER: Your Honor, I would like for the record to hold out the possibility, as I mentioned to you off the record, of obtaining an additional rebuttal witness in relation to contention 6. I would ask that this witness need not be

presented as the next witness and ask if we could present this witness later on during this hearing.

CHAIRMAN BECHHOEFER: Well, at the time you have a proposal, please let us know exactly what points are going to be rebutted and the expertise of the particular person and that type of thing and then we'll have to arrange a schedule if we can agree that would not inconvenience the other parties so thatthey might have to have people here to anser that witness.

MR. WOLIVER: We will make every effort to give the parties as much notice as possible.

CHAIRMAN BECHHOEFER: Well, the Board will insist on that. So we will leave it open.

MR. WOLIVER: We will try to get this information tomorrow.

CHAIRMAN BECHHOEFER: Fine.

MR. BARTH: Mr. Chairman, on behalf of the Staff, I do register a protest of any further rebuttal witness. The FSAR by the company was written years ago. The contention was filed three years ago. The Staff's Final Environmental Statement was issued in June 1977 and we have not changed our testimony one iota. All this evidence is well known. The Staff registers a protest to any rebuttal witness on contention 6.

CHAIRMAN BECHHOEFER: Well, we will consider it further when his specific witness is offered relative to a particular point. I don't think we can consider it in the

abstract. At this point we will adjourn temporarily until seven o'clock when we will be back here again for limited appearances.

(Whereupon, at 5:10 p.m., the hearing was recessed, to be reconvened at 7:00 p.m., this same day.)